III.

Ministerstvo životního prostředí

Waste Management Plan of the Czech Republic for the period 2025–2035

Ministry of the Environment December 2024

Prepared by: Ministry of the Environment (2022–2024)

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Contents

1 Introduction

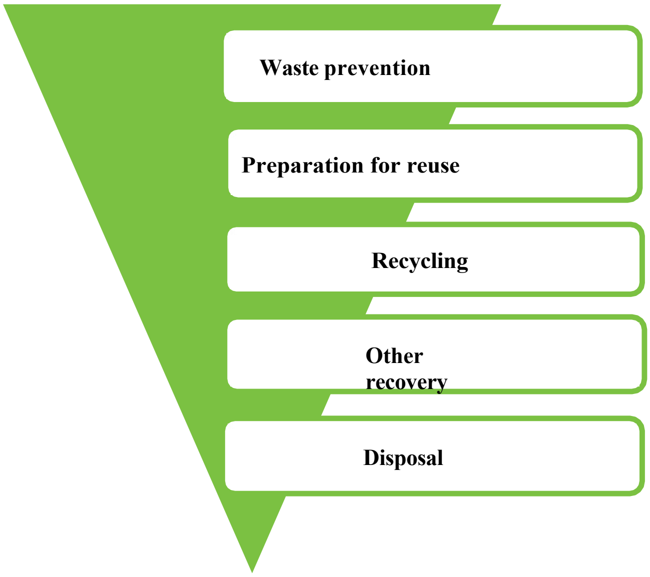
The Waste Management Plan of the Czech Republic (hereinafter also referred to as the “WMP CR” or “plan”) is **a fundamental strategic document** in the field of waste and circular economy management. Responsibility for its creation is entrusted to the Ministry of the Environment (hereinafter also referred to as “MoE”) pursuant to Act No. 541/2020 Coll., on waste (hereinafter also referred to as “the Waste Act”).

The POH ČR is drawn up with the aim of creating conditions for waste prevention and management in accordance with the Waste Act.[1] It formulates a long-term perspective and conceptual framework for effective waste management in the country with a horizon until 2035. The plan sets out objectives, principles, and measures to influence the behavior of consumers, waste producers, facility operators, and other actors in waste management.

The starting point for the development of the POH ČR are the principles of sustainable development and the circular economy. The plan complies with the **waste management hierarchy** principle, which provides a framework for waste policy with an emphasis on waste prevention and optimisation of waste recovery.

Given that waste is also an important source of raw materials, the objectives, principles, and measures in the POH ČR are focused primarily on the Strategic Framework for the Circular Economy of the Czech Republic [20402] and the Secondary Raw Materials Policy of the Czech Republic.[3]
The POH CR also takes into account other important policies of the Czech Republic (hereinafter also referred to as the "CR") which relate to the field of waste management.

Figure 1: Waste management hierarchy



Source: own processing

1.1 Scope and validity of the Waste Management Plan of the Czech Republic for 2015–2025

The Waste Management Plan of the Czech Republic for 2025–2035 sets out **the objectives, principles, and measures for waste management in the Czech Republic** in accordance with the principles of sustainable development and the circular economy. It applies to the management of all waste, with the exception of waste listed in Section 2(1) and (2) of the Waste Act.

The binding part of the POH ČR, including its amendments, is **a binding basis** for the preparation of regional waste management plans and a basis for the preparation of spatial planning documentation.

[1]The POH ČR also includes a Waste Prevention Program.

[2] The Strategic Framework for the Circular Economy of the Czech Republic 2040 ("Circular Czech Republic 2040") was prepared by the Ministry of the Environment in 2018-2021 with an implementation period of 2021-2040. The document is available here.

[3] The Czech Republic's Secondary Raw Materials Policy was prepared by the Ministry of Industry and Trade and is the first document in the Czech Republic to create a strategic framework for the efficient use of secondary raw materials. The Secondary Raw Materials Policy was approved by Government Resolution No. 755 of September 15, 2014, and can be found here.

The POH CR is designed for **the period 2025 to 2035**, i.e. it is valid for 11 years. It will be updated after each fundamental change in the conditions on which it was based (e.g., new extensive legislation in the field of waste management that will fundamentally affect the waste management strategy, including the setting of new targets or changes to existing targets, etc.).

This Waste Management Plan of the Czech Republic, approved by the Government of the Czech Republic, is valid and effective until the publication of a new Waste Management Plan of the Czech Republic for the next period.

1.2 Structure and content of the Waste Management Plan of the Czech Republic

The structure and content of the POH ČR are based on the requirements of Sections 97, 98, and 99 of the Waste Act, in conjunction with the relevant related legal regulations of the Czech Republic, applicable directives and regulations of the European Union (hereinafter referred to as the "EU"), and methodological recommendations of the European Commission (hereinafter referred to as the "EC"). The Waste Management Plan of the Czech Republic consists of analytical, binding and indicative parts, the content of which is presented below.

1.	**Introduction**	▪ Basic information on the scope, structure, and content of the POH CR. ▪ Characteristics of the main actors in waste and circular economy.
2.	**Analytical part**	▪ Status and development of waste management in the Czech Republic in terms of production and methods of waste management, including - the area of waste prevention, including an evaluation of tools and measures that can be used to prevent waste generation; - list of types, quantities, and sources of waste generated and assessment of trends in waste production and management, including cross-border waste flows; - evaluation of existing systems for separate collection and waste management in the Czech Republic, at least for municipal waste, mixed municipal waste, biodegradable waste, packaging waste, hazardous waste, construction and demolition waste, end-of-life products, including separate collection of material recoverable components of waste; - evaluation of the network of waste treatment facilities in the Czech Republic, including an assessment of capacities for individual treatment methods, assessment of necessary changes and additions to systems for separate collection and treatment of waste and end-of-life products with a view to improving them in accordance with the principles of self-sufficiency and proximity; - providing the necessary information for the development of criteria for the location and capacity of waste management facilities supported by public funds, where this is necessary in order to achieve the objectives set. the achievement of the set objectives.
3.	**Binding part**	▪ Setting targets, principles, and measures for waste prevention and for Selected waste groups that are of fundamental importance for waste management in terms of their production or properties. ▪ Determination of waste management objectives and principles, measures to achieve them, including preferred methods of waste treatment. The binding part is deals with:

		- the management of municipal waste, in particular mixed municipal waste, food waste, and biodegradable waste; - construction and demolition waste management; - handling packaging waste; - end-of-life product management; - handling of waste containing significant amounts of critical raw materials; - handling of hazardous waste and other waste; - preparation for reuse, recycling, recovery and disposal of waste, minimizing adverse effects on the environment; - reducing the amount of waste sent to landfills, in relation to biodegradable waste, and meeting targets for reducing the amount of municipal waste sent to landfills; - reducing the proportion of biodegradable components in mixed municipal waste; - limiting pollution from waste concentrated outside designated sites. ▪ Establishment of a set of indicators to assess the achievement of the objectives of the POH ČR.
4.	**Guideline s**	▪ List of instruments for achieving the objectives of the Czech Waste Management Plan. ▪ Criteria for evaluating changes in the conditions on which the plan was based. ▪ Information necessary for the development of criteria for the location and capacity of facilities for waste management supported from public sources, if necessary for the achievement of the set objectives. ▪ Proposals to necessary facilities designated for management of waste of supra-regional importance, if necessary for the fulfilment of the set objectives.

The Czech Republic's waste management plan for 2025-2035 was drawn up on the basis of detailed analytical data, which are mentioned in the sources.

1.3 Strategic environment and current policy e environment

The Czech Republic's waste management plan is firmly anchored in existing strategic documents and policies at both EU and national level. Waste management is comprehensively linked to various dimensions of specialized strategies. This section of the document provides an overview of key policies and strategies.

The functioning of these policies and strategic objectives is governed by legislation, which is usually directly applied or transposed from European legislation into Czech legislation. Regulations governing the functioning of waste management in the Czech Republic and the EU are listed in Annex 1 – Legislation and standards in the field of waste management in the Czech Republic and the EU.

1.3.1 nd EU policies

Waste management, as one of the main areas of the environment, is regulated by a number of EU policies. These primarily focus on waste prevention, reuse, recycling, and landfilling. Selected policies also focus on specific sectors of waste management or specific materials and their comprehensive use. A list of selected policies is provided below.

Green Deal for Europe (2019)

The European Green Deal is an ambitious and high-priority political initiative adopted by the EU in December 2019. This innovative strategy sets out a comprehensive framework for transforming the European economy towards sustainability and environmental protection. The main objective of the Green Deal is to achieve climate neutrality for all EU Member States by 2050, thereby promoting ecological transformation, sustainable development, and the protection of natural resources for future generations. This ambitious plan promises to transform the economy and society with regard to environmental considerations and strengthen Europe's position as a global leader in sustainability.

The strategy covers a wide range of environmental issues, from biodiversity to waste battery management. The main chapters of the Green Deal include transforming the economy, integrating sustainability into all EU policies, mobilizing research and promoting innovation, and positioning the EU as a global leader in the field of the environment.

Figure 2: Objectives of the European Green Deal

Source: European Commission, 2019.

Waste management under the Green Deal is part of a broader plan to achieve climate neutrality, as it plays a key role in the goal of more sustainable and efficient resource consumption. Efforts to reduce waste generation and promote recycling contribute to overall greenhouse gas emissions reductions, which is a key step towards limiting the impacts of climate change. The Green Deal also emphasizes the circular economy, which aims to minimize waste and maximize the reuse and recycling of raw materials. The EC has set specific waste targets, such as reducing the landfilling of hazardous waste and increasing plastic recycling. Emphasis is also placed on supporting innovation in recycling technologies and promoting industries that focus on the sustainability and renewability of materials.

EU Action Plan for the Circular Economy (2020)

Another key document in the field of waste management is the EU Action Plan for the Circular Economy, drawn up by the EC in 2020 (hereinafter also referred to as the "Action Plan"). The Action Plan responded to new legislation, in particular directives on municipal waste recycling.

The Action Plan does not focus solely on the end of a product's life cycle (waste), but addresses the entire life cycle in a systematic manner. The measures cover aspects of production, packaging, product lifespan, and the materials used. The Action Plan sets out a framework for sustainable product policy, which includes the design of sustainable products, strengthening the position of consumers and public procurers, and compliance with the principle of circularity in production processes. The EC emphasizes the importance of promoting recycling through instruments such as VAT incentives, green public procurement with support for recycled products, and other support mechanisms.

The action plan identifies **seven key areas** necessary to achieve a circular economy, including electronics and information and communication technologies (hereinafter referred to as "ICT"), batteries and vehicles, packaging, plastics, textile products, construction and buildings, and finally food, water, and nutrients. Each of these areas presents its own challenges and opportunities, and specific targets and measures are therefore set for each of them. The aim is not only to reduce the amount of waste, but also to maximize the reuse of raw materials and minimize negative impacts on the environment throughout the entire life cycle of products.

Table 1: Seven key areas of the Action Plan

Electronics and ICT

Electrical and electronic equipment is one of the fastest growing waste categories (2% per year). The EC plans to address this area through initiatives for electronics in the circular economy, which will focus on updating obsolete software, regulatory measures for chargers, and improving the processes for separate collection and treatment of waste electronic equipment. It is planned to designate electronics and ICT as a priority sector for the application of the "right to repair," regulatory measures for chargers for mobile phones and similar devices, or improvements to separate collection and treatment of waste electrical a n d electronic equipment.

Batteries and vehicles

Sustainability in the battery and vehicle value chain plays a key role in future mobility. To this end, a new regulatory framework for batteries has been presented, based on an evaluation of the Battery Directive and the results of the European Battery Alliance's work, and the legislation on end-of-life vehicles has been revised. Further efforts focused on developing a comprehensive European strategy for sustainable and smart mobility, which supported measures to reduce material consumption, promote sustainable fuels, optimize infrastructure and vehicles, increase efficiency, and eliminate waste and pollution.

Packaging

In 2017, packaging waste in the EU reached a record high of 173 kg per person. With the aim of ensuring the sustainability and recyclability of all packaging, a revision of Directive 94/62/EC[4] was planned to strengthen the mandatory basic requirements for packaging materials that can be placed on the EU market. At the same time, additional measures were introduced with an emphasis on reducing (excessive) packaging and packaging waste, design for reuse and recyclability of packaging, and reducing the complexity of packaging materials.

Plastics

With regard to plastics, the EC has set a target to increase the use of recycled plastics by introducing binding requirements on recycled content and waste reduction for key products such as packaging materials, construction materials, and vehicles. It has also focused on addressing the presence of microplastics in the environment, new sustainability challenges and the timely implementation of the new Directive on single-use plastic products and fishing gear[5].

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[4] /62/EC of the European Parliament and of the Council of 20 December 1994 on packaging and packaging waste (OJ L 3 94, p. 10).

[5] U) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic p he environment (OJ L 155, 12.6.2019, p. 1).

Textile products

Textile products represent a significant burden on the environment, with less than 1% of products worldwide being recycled. The EU is planning a comprehensive set of measures in this area, including the implementation of a new framework for sustainable products, improving the business and regulatory environment, achieving a high level of separate collection of textile waste, and promoting the sorting, reuse, and recycling of textile products.

Construction and buildings

Construction alone generates more than 35% of total waste production in the EU. Greenhouse gas emissions associated with the extraction of materials, the manufacture of construction products, the construction and renovation of buildings are estimated to account for a further 5-12% of total domestic greenhouse gas emissions. It is estimated that greater material efficiency could save up to 80% of these emissions. The EC is therefore planning a new comprehensive strategy for the sustainability of the built environment and will promote circular economy principles throughout the life cycle of buildings.

Food, water, and nutrients

The food value chain has a significant impact on resources and the environment. According to estimates, up to 20% of all food produced in the EU is wasted or discarded. The action plan for this area envisages measures to increase the sustainability of food distribution and consumption and to promote a circular approach to water reuse in agriculture and industrial processes. In addition, an integrated nutrient management plan will be developed.

S... d on the EU Action Plan for the Circular Economy (2020).

T... ces great emphasis on reducing waste and sets a target of halving the overall production of waste and the a... non-recycled municipal waste by 2030. These targets are linked to the development of waste/circular e... n individual countries. The document also highlights the need for further investment in technology. Overall, t... nprehensive strategy to support the circular economy in Europe.

A New Industrial Strategy for Europe (2020)

The need to transition to a circular economy is also emphasized by the European Industrial Strategy, which aims to strengthen the competitiveness of EU industry and promote a more sustainable, resilient, and digital economy that creates jobs. European industry has a key role to play in the green transition towards a circular economy, which means reducing the carbon and raw material footprint and integrating circularity into the entire economy. The strategy identifies the circular economy principle as one of seven key areas that should deliver a cleaner and more competitive industry, reduce the negative impact on the environment, and lower production costs.

The EU wants to move away from the traditional model of extracting raw materials, manufacturing, using and disposing of things, and move towards a circular model. This means taking back more than taking, thereby reducing the environmental footprint. In terms of measures to achieve the target, the strategy refers to the Action Plan. Specific steps include a new regulatory framework for sustainable batteries, an EU strategy for textile products, an initiative for electronics in the circular economy, and empowering consumers to play an active role in the circular economy through better product information and stronger consumer rights.

EU Strategy for the Sustainability of Chemicals (2021)

The Chemicals Strategy plays a key role in the European Green Deal and contributes to achieving the zero pollution goal. This strategy is also an important part of the plan to support recovery from the COVID-19 crisis. The aim of this strategy is to achieve a more sustainable use of chemicals that minimizes negative impacts on the environment and human health. The strategy addresses chemicals such as endocrine disruptors, substances that interfere with the immune and respiratory systems, and persistent substances such as per- and polyfluoroalkyl substances (PFAS).

The strategy proposes a new hierarchy for the management of chemicals with a greater emphasis on preventing the generation of hazardous waste. The basic principles of this hierarchy can be integrated into broader strategies for sustainable industry and environmental protection.

Figure 3: Toxic-free hierarchy – a new hierarchy for chemical management

Protect health and the environment	Encourage innovation
Use safe chemicals and prevent harmful effects on people and the environment by avoiding the use of substances of concern without a sound reason	Use safe chemicals and prevent harmful effects on people and the environment by avoiding the use of substances of concern without a sound reason
Minimize exposure of people and the environment to substances hazardous to health and the environment through risk management measures and by providing complete information to users of chemical substances	Promote modern and intelligent production processes, safe and sustainable use and business models, chemicals as a service, IT solutions for chemical tracking
Eliminate substances of concern from waste and secondary raw materials to the greatest extent possible, as well as improve human health and restore the good quality of the environment	Promote safe and clean recycling solutions, including chemical recycling, waste management technologies and decontamination solutions

Source: European Commission, 2020.

One element of the chemicals strategy is the introduction of the "**one substance, one assessment**" concept. This approach aims to simplify complex assessment procedures, which are a challenge for competent authorities and stakeholders. A single, comprehensive hazard and risk assessment will be carried out for each chemical substance, without unnecessary duplication or fragmentation of responsibilities between different authorities and procedures. To this end, coordination across public authorities, expert groups and EC coordination mechanisms will be strengthened.

The EU Chemicals Strategy emphasizes the need for innovation for safe and sustainable chemicals. Innovation should provide solutions for the transition to a toxic-free and circular materials economy and support clean recycling. The aim is to ensure that substances of concern are minimized in products and recycled materials. Innovation should also support the transition from traditional production and use of chemicals to the concept of "chemicals as a service." This concept includes the rental of chemicals, but also the rental of services such as logistics, the development of specific chemical processes and applications, and waste management.

Last but not least, the EC is showing a move towards a global approach to tackling the challenges associated with chemicals and waste. The aim is to incorporate strategies on the life cycle of chemicals into global biodiversity targets.

EU Strategy for Sustainable and Circular Textile Products (2023)

The strategy aims to create a comprehensive framework and vision for the transformation of the textile sector. Textile products will be durable, recyclable, largely made from recycled fibers, free of hazardous substances, and manufactured with respect for social rights and the environment.

European Strategy for Plastics in a Circular Economy (2018)

The main vision of the strategy is a smart, innovative, and sustainable plastics industry where design and production fully respect the needs of reuse, repair, and recycling. Plastics and plastic products should be designed to enable greater durability, reuse, and high-quality recycling.

EU Strategy on Methane (2020)

The EU Methane Strategy is a key document that affects a number of sectors, including waste management. Methane is a powerful greenhouse gas, with emissions often originating from waste (approximately 26%), specifically from landfills, biodegradable waste, and wastewater treatment plants. As part of this strategy, targeted support is planned to accelerate the development of the market for biogas from sustainable sources, including an initiative to implement pilot projects for rural and agricultural communities. The strategy calls for a review and potential changes to several key EU legal acts, including the Landfill Directive, the Urban Waste Water Treatment Directive, and the Sewage Sludge Directive, which have a significant impact on waste management and current practices in this area.

The strategy also includes potential new legislation on methane venting and flaring and new standards for the entire supply chain. In addition, the strategy supports the World Bank's global initiative called "Zero Flaring," which aims to eliminate methane flaring in the extractive industry.

EU Action Plan on Air Pollution (2021)

The EU Action Plan on Pollution focuses on reducing air, water, and soil pollution and affects a number of sectors, including waste management. The action plan aims to improve water quality, including reducing the amount of waste in seas and oceans. The goal is to reduce plastic waste in the sea by 50% and microplastics released into the environment by 30%. In addition, the plan emphasizes significantly reducing waste production and sets a target of reducing the volume of municipal waste by 50%.

To achieve these objectives, the EU Action Plan against Pollution contains several key measures aimed at improving the state of the environment. One of these is the effort to reduce marine pollution from waste by setting specific EU-wide thresholds, which will be laid down in the Marine Strategy Directive. The Action Plan also encourages operators in both the public and private sectors to commit to "zero pollution." In addition, initiatives focusing on waste from electrical and electronic equipment and batteries are highlighted to ensure better monitoring and management of international trade.

Farm to Fork Strategy (2020)

The Farm to Fork Strategy represents an innovative approach by the European Union to food production and consumption, with an emphasis on sustainability and reducing pollution. This strategy also has an impact on waste management.

One of the key points of the strategy is **to promote sustainable food production**. This includes encouraging farmers to take advantage of opportunities to reduce methane emissions from livestock farming through the use of renewable energy sources and the implementation of technologies for the production of biogas from waste and animal residues. Other key points include promoting the application of precision fertilization techniques and sustainable agricultural practices, particularly in areas with intensive livestock farming, and recycling organic waste back into the ecosystem in the form of organic fertilizers. These objectives are to be achieved through measures that Member States will include in their strategic plans under the European Union's Common Agricultural Policy.

The strategy also emphasizes **reducing food loss and food waste**. The European Commission has committed to an ambitious goal of halving food waste by 2030 at the retail and consumer levels. This means that Member States, including the Czech Republic, will have to implement effective measures to achieve this goal. A s part of a newly developed methodology for measuring food waste and based on data collected from EU Member States for 2022, a baseline will be established a n d binding targets for reducing food waste across the EU will be proposed. The EC will also assess what food losses occur at the production stage and how they can be minimized. Transnational coordination at EU level will strengthen national measures to tackle food loss and waste within the EU and will serve as a benchmark for all stakeholders.

1.3.2 nd policy

Waste and circular economy policy at the national level reflects European legislation and strategic documents and is based on the general principles used in waste and circular economy, namely:

1 **Prevence vzniku odpadu**	2 **Odpad zdrojem**	3 **Rozšířená odpovědnost výrobce**
4 **Znečišťovatel platí**	5 **Zásada soběstačnosti a blízkosti**	6 **Zásada významně neškodit** („Do No Significant Harm“ - DNSH)

Given that waste management is closely linked to a wide range of economic sectors, the Czech Waste Management Plan also responds to relevant strategic documents. The following overview presents the key policies of the Czech Republic that are related to the plan. Some of these policies are long-term in nature and affect the entire period of the plan, while others focus on its initial phase of effectiveness. This ensures that the POH ČR is firmly embedded in the country's strategic context and will effectively correspond with the dynamics of waste management, which plays a key role in the social and economic framework of the Czech Republic.

State Environmental Policy of the Czech Republic 2030 with a view to 2050 (Ministry of the Environment)

The policy defines the main areas of environmental risk in the Czech Republic and, on this basis, sets strategic and specific objectives with possible measures to lead to effective protection and improvement of the environment. Specific objectives fall under strategic objective 2.2 "The circular economy ensures the efficient use of raw materials, products and waste in the Czech Republic":

- "The material intensity of the economy is decreasing."
- "Waste generation is prevented as much as possible."
- "The waste management hierarchy is being followed."

Strategic Framework for the Czech Republic 2030 (Ministry of the Environment)

This strategy sets out the direction for sustainable development in the Czech Republic until 2030. The main focus of the strategy is to improve quality of life and economic development in a way that is socially, economically, and environmentally sustainable. The strategy sets out the goals that the Czech Republic should achieve in the areas of resource management, social development, the economy, municipal and regional development, ecosystem protection, good governance, and global connectivity. The strategy identifies the circular economy as one of the solutions to the limited availability of resources. Within the Czech Republic, **a waste management hierarchy** should be followed, which aims to prevent waste generation, followed by recycling, energy recovery, and disposal.

The Czech Republic aims to reduce its dependence on primary raw materials and strengthen its resilience to supply chain disruptions, thereby increasing the country's strategic autonomy.

Strategic Framework for the Circular Economy of the Czech Republic 2040 (Ministry of the Environment)

Circular Czech Republic 2040 is a strategic framework that promotes the principles of the circular economy and emphasizes the importance of the circular economy in the Czech Republic. The framework sets out the prerequisites, objectives, and measures for the Czech Republic to become more resilient to future environmental threats, including climate change, through the circular economy and to develop a sustainable social system.

The strategic framework focuses on 10 priority areas:

1) Products and design;
2) Consumption and consumers;
3) Waste management;
4) Industry, raw materials, construction, energy;
5) Bioeconomy and food;
6) Circular cities and infrastructure;
7) Water;
8) Research, development, and innovation;
9) Education and knowledge; and
10) Economic instruments.

The aim of the Strategic Framework is to achieve a state where the circular economy brings significant environmental, economic, and social benefits to the Czech Republic. As part of the measures adopted, the Czech Republic supports the circular economy as a model for improving environmental protection, strengthening competitiveness and technological advancement, creating new jobs, increasing raw material security, and acquiring new skills for the population.

The strategic framework also includes **the Circular Czech Republic 2040 Action Plan** for 2022–2027, which sets out in detail how the strategic objectives, specific objectives, and typical measures of Circular Czech Republic 2040 will be translated into activities and tasks, thereby establishing how they will be achieved.

Raw Materials Policy of the Czech Republic in the Field of Mineral Resources and Their Sources (Ministry of Industry and Technology)

The document responds to economic developments in Europe and worldwide and to changes in the global market for mineral resources. The most significant part of the transformation of the raw materials industry is the shift towards modern high-tech raw materials, which are key to electronics and other modern industries. This development reflects the need to modernize industry and adapt to new technological requirements. The new state raw materials policy is based on the principles of the European Integrated Strategy for Raw Materials, which was developed in response to the growing importance of raw materials security in EU Member States. At the same time, raw materials policy has been updated in connection with the adoption of the new State Energy Concept in 2015, which provides a framework for meeting energy targets with an adequate raw materials base.

The stated objective is to ensure the Czech Republic's security of raw materials and to secure stable, safe, and economically advantageous access to mineral resources for the sustainable development of society as a whole. One of the main approaches to ensuring this security is to promote **the use of secondary sources**, which mixed municipal waste, sorted municipal waste, solid alternative fuels, sewage sludge, tires, and others.

Currently, there is no possibility in the Czech Republic to obtain mineral resources for the production of steel, cast iron, and non-ferrous metals from domestic primary sources. **Recycling** is a key option, offering opportunities for obtaining ore, metal, and critical raw materials. Metal scrap, especially from end-of-life electrical and electronic equipment, is a valuable source of secondary raw materials. Basic and precious metals and their alloys, semiconductors/semi-metals, plastics, and glass can be obtained from electronics.

The trend of the last decade in the Czech Republic has been **the recycling of construction materials**, especially aggregates. Recycled construction materials account for approximately 15% of natural stone mining in the country. One of the goals is to at least partially replace depleted deposits of construction materials by increasing self-sufficiency in raw material sources through the use of secondary raw materials. However, there are certain problems with the use of recycled materials, as the price of natural raw materials (crushed stone, sand, gravel sand) is often lower than that of recycled materials. When processing recycled materials in construction, it is also necessary to adhere to higher technological standards than when using natural aggregates, which entails additional costs.

Secondary Raw Materials Policy of the Czech Republic for 2019–2022 (MPO)

The Czech Republic's raw materials policy is closely linked to the Czech Republic's Secondary Raw Materials Policy for 2019–2022, whose strategic objectives are derived from five basic areas aimed at promoting the circular economy. These strategic objectives are formulated in such a way as to be relevant in the long term and to correspond to the main objective of the circular economy, i.e. closing the resource cycle by replacing primary raw materials with secondary sources. This wording has been retained from the first Secondary Raw Materials Policy of the Czech Republic from 2014 to reflect the long-term perspective and continuity of efforts to achieve a more sustainable approach to resources. These objectives include, in particular:

- Increasing the Czech Republic's self-sufficiency in raw material resources by substituting primary resources with secondary raw materials.
- Support for innovation ensuring the recovery of secondary raw materials of a quality suitable for further use in industry.
- Support for the use of secondary raw materials as a tool for reducing the energy and material intensity of industrial production while eliminating negative impacts on the environment and human health.

The aim of the updated policy is to continue the trend of increasing the share of recycled raw materials in total raw material consumption in the Czech economy. To this end, 19 tasks have been set, which focus on continuing to support innovative technologies for the use of secondary raw materials as a tool for reducing the material and energy intensity of industrial production, solving material eco-design, but also continuing to support education and awareness-raising in the field of the circular economy, which are necessary to ensure the acceptance and implementation of new directions and changes in industry, the service sector, and the entire Czech economy.

National Reform Program of the Czech Republic 2023 (Government of the Czech Republic)

The National Reform Program is a document created annually as part of the coordination of EU economic policies. One of the topics it has been focusing on for a long time is the transition to a circular economy. Continuing reform in this area includes the implementation of new waste management legislation in the Czech Republic and the adoption of the Circular Czech Republic 2040 strategy. The reform program specifically mentions investments in recycling infrastructure, the use of secondary raw materials in businesses, and reducing water consumption in production processes.

State Energy Policy of the Czech Republic 2012-2040 (MPO)

This strategic document sets out the state's objectives in the energy sector with regard to economic and social development, while also taking into account environmental protection. The document also serves as a basis for the development of regional energy plans. Chapter 5, "Concept for the development of important energy sectors and energy-related sectors," lists measures for the coming period. The main measures include maximizing the use of secondary energy sources, including suitable industrial and municipal waste, while respecting the waste hierarchy after sorting recyclable components. Another important measure is the direct (thermal) use of non-recyclable waste for cogeneration heat supply systems, in accordance with environmental protection, in particular air protection.

The concept of bioeconomy in the Czech Republic from the perspective of the Ministry of Agriculture for 2019-2024 (MZE)

The aim of the concept is to promote the development of the bioeconomy and ensure the sustainable management of natural resources in areas such as agriculture, forestry, water management, and aquaculture. It also seeks to achieve sustainable food and feed production, strengthen the role of primary producers, and integrate them into the bioeconomy value chain. In forestry, emphasis is placed on involving the entire value chain and related sectors.

In the context of waste management, the concept focuses on the recycling of biological waste and its subsequent use, for example as fertilizers, mulch, biogas, or advanced biofuels for transport purposes. It also focuses on the processing of secondary raw materials and waste from food production and the more efficient use of waste streams.

Regional Development Strategy of the Czech Republic 2021+ (Ministry of Regional Development)

This strategy defines the main objectives of the state's regional policy for the period 2021-2027, with an emphasis on supporting dynamic, balanced, and sustainable development of the territory. As part of its action plans, the strategy recommends preventing waste generation and applying the principles of the circular economy. A hierarchy will be promoted in waste management, with preference given to waste recovery, such as composting and anaerobic digestion. Based on the strategy, there are plans to develop public awareness of waste management and focus on zero-waste technologies in industrial sectors.

National Research, Development and Innovation Policy of the Czech Republic 2021+ (ÚV ČR)

The National Policy for Research, Development and Innovation is a strategic document that serves as a basis for the development of a society focused on the creation and use of knowledge. Support for research and development of innovative technologies is one of the key factors for maintaining and increasing the international competitiveness of the Czech Republic. In connection with the POH ČR, the development of new technologies plays an important role in waste management.

National Recovery Plan (MPO)

The National Recovery Plan is based on key strategic documents and takes into account the situation of the Czech economy and long-term trends. The waste and circular economy is addressed in component 2.7 "Circular economy, recycling, and industrial water," which is under the responsibility of the Ministry of the Environment and the Ministry of Industry and Technology. The Ministry of the Environment's investments, following on from the National Recovery Plan, focus on comprehensive support for the development of the circular economy in the area of biodegradable waste management. The MIT's investments focus on supporting the use of secondary raw materials as substitutes for primary raw materials and increasing the efficiency of water use in technological processes.

Economic Strategy of the Czech Republic 2020–2030 (MPO)

The main objective of the strategy is to achieve long-term sustainable growth of the Czech economy based on competitiveness and high added value. The measurable goal of the economic strategy is to rank among the top ten European Union countries in terms of gross domestic product per capita in purchasing power standard.

According to the strategy, the Czech Republic must support a shift away from landfilling in the coming years and create conditions for the transition to a circular economy and for strengthening the material utilization of waste, e.g., through the development of a technologically advanced recycling industry. The document also mentions potential threats in the field of waste management, such as an increase in the production of waste batteries due to the development of electromobility or insufficient capacity of advanced recycling facilities and the outflow of recyclable waste for processing outside the Czech Republic.

With a growing population, there are increasing demands for support for the circular economy and sustainable use of raw materials. Emphasis is also placed on increased use of renewable energy sources and the implementation of smart technologies in agriculture. The Czech Republic will have to actively engage in supporting the transition from landfilling to waste disposal and creating conditions for the development of alternative waste management methods, including strengthening the recycling industry, which is not yet sufficiently developed in this area. A key aspect for the Czech Republic will also be a smooth transition to increasing the share of nuclear energy and renewable energy sources.

Climate protection policy in the Czech Republic (Ministry of the Environment, currently being updated)

The climate protection policy was adopted by the government in March 2017 and is based on international and European commitments. These include the targets set out in the European Green Deal, the EU's commitments under the Paris Agreement, the European Climate Law (2021) and the Fit for 55 package. The policy represents a long-term strategy for low-carbon development in the Czech Republic. The aim is to achieve cost-effective measures leading to a reduction in greenhouse gas emissions. Effective waste management is one of the areas of action that should contribute to reducing emissions, as waste accounts for approximately 4.5% of the Czech Republic's emissions (CHMI, 2023).

The government's policy statement includes a commitment to revise the Climate Policy by the end of 2023, which is linked to the creation of a National Energy and Climate Plan and the updating of the State Energy Policy. These documents form a comprehensive framework approach to energy, climate, and environmental issues in the Czech Republic.

Environmental Security Concept 2021–2030 with a view to 2050 (MoE)

The Environmental Security Concept 2021–2030 with a view to 2050 is a strategic document that focuses on environmental protection and risk prevention in the field of environmental security in the Czech Republic. The functioning of waste management can be significantly affected by the consequences of environmental disasters of anthropogenic and natural origin. Protection against these risks and preparedness to deal with their consequences are key elements of the environmental security strategy in the Czech Republic.

Transport Sector Strategy Phase 3, for the period 2024-2030 (MD)

The Transport Sector Strategy Phase 3 for the period 2024-2030 (hereinafter referred to as "DSS 2024-2030") follows on from the Transport Policy of the Czech Republic for the period 2021-2027 with a view to 2050. This conceptual document from the Ministry of Transport sets out priorities and objectives for the development of transport and transport infrastructure. As part of the implementation of DSS 2024-2030, a negative impact is expected in connection with the generation of construction and demolition waste, mainly excavated soil, construction debris, and demolished concrete (plain concrete and reinforced concrete). However, the strategy also offers ways to mitigate this burden on waste management

, for example by adhering to the "Do no significant harm" (DNSH) principle and shifting part of road transport to rail.

Other strategies and policies

- Transport Policy 2021–2027 with a view to 2050 (Ministry of Transport and Construction),
- Industry 4.0 Initiative (Ministry of Industry and Technology),
- Innovation Strategy of the Czech Republic 2019–2030 (Government of the Czech Republic),
- Concept research development and innovation of the Ministry of Agriculture for the period 2023–2032 (MoA),
- National concept for of cohesion policy in the Czech Republic after 2020 (Ministry of Regional Development),
- Research concept research, development and innovation Ministry of Agriculture for the period 2023+ (MZe),
- Food Safety and Nutrition Strategy 2030 (Ministry of Agriculture),
- Strategy for the Prevention and Combating of Crime related to waste for the period 2021–2023 (Ministry of the Interior)
- National Emission Reduction Program of the Czech Republic (Ministry of the Environment), State
- Program for Environmental Education, výchovy and osvěty and environmental education and counseling at for the period 2016-2025 (Ministry of the Environment),
- Climate Change Adaptation Strategy in the conditions of the Czech Republic (Ministry of the Environment)
- Education Policy Strategy of the Czech Republic until 2030+ (Ministry of Education, Youth and Sports),
- National Energy Plan of the Czech Republic and Climate (MPO/MŽP),
- Health 2030 – Strategic Framework for Development Health Care in the Czech Republic until 2030 (Ministry of Health),
- National Implementation Plan for the Minamata Convention on Mercury in the Czech Republic – in preparation.

All national strategies focus on several key priorities in the field of waste and circular economy, including activities to prevent waste generation, minimize negative impacts on the environment and human health, maximize waste recovery, reintegrate resources back into the economic cycle, and promote the use of waste as alternative sources of natural materials and energy.

1.4 Institutional arrangements and actors in waste nd management

Public administration in the field of waste management is governed by the applicable laws of the Czech Republic. The organizational structure of waste management corresponds to the model and structure of Czech public administration. From a vertical perspective, public administration of waste management can be divided into **state administration** and **local government**. Horizontally, it is divided into individual public administration institutions in the field of waste management, corresponding to their territorial jurisdiction and the associated hierarchy. The institutional framework of waste management itself is determined by powers and competences that are largely defined in the Waste Act, the End-of-Life Products Act, the Packaging Act[6] and the Act on the Reduction of the Impact of Selected Plastic Products on the Environment[7]

A wide range **of other actors** (e.g., associations, societies, etc.) also play a role in waste management.

6 Act No. 477/2001 Coll. on packaging and on amendments to certain acts, as amended.

7 Act No. 243/2022 Coll. on reducing the impact of selected plastic products on the environment.

1.4.1 State administration in waste

The description below mentions only those activities and operations that relate to waste management.

Ministry of the Environment

The Ministry of the Environment (hereinafter also referred to as "MoE") is the central state administration body in the field of waste management. Its main task is to establish legal regulations, coordinate and manage waste management with an emphasis on efficient waste treatment and environmental protection in the Czech Republic. Its activities include:

- **State administration:** The Ministry of the Environment is the central administrative authority in the field of waste prevention and waste management, including the prevention of waste from selected products, packaging, and selected plastic products, and the management of end-of-life products, packaging waste, and waste from selected plastic products. It supervises state administration in accordance with the laws governing waste management and monitors compliance by administrative authorities performing state administration in the field of waste management with the provisions of these laws and regulations issued for their implementation. The Ministry of the Environment also decides on appeals against decisions of the Czech Environmental Inspectorate (hereinafter also referred to as "CEI") and regional authorities (hereinafter also referred to as "RA"). It approves waste transport control plans and issues decisions in accordance with Regulation (EC) No. 1013/2006 of the European Parliament and of the Council on shipments of waste.

  It decides on applications for authorisation to provide joint performance under the Packaging Act and applications for authorisation to operate a collective system under the End-of-Life Products Act and the Act on the Reduction of the Impact of Selected Plastic Products on the environment . It monitors the activities of authorized packaging companies and operators of collective systems and, in the event of identified deficiencies, imposes measures to remedy the situation. It issues a uniform environmental opinion (hereinafter also referred to as "JES"), which replaces the binding opinion pursuant to Section 146(3)(a) and the statement pursuant to Section 146(3)(b) and (c) if it is competent to issue a JES.

  Records, data processing, and provision of information: The MoE processes and records data on waste management, waste quantities, types, and treatment, as well as other data from the field of waste management within the Waste Management Information System (hereinafter also referred to as "ISOH"), which is a public administration information system. ISOH is a modern agenda information system that unifies all waste management agendas required by legislation (the Waste Act, the End-of-Life Products Act, the Packaging Act, the Act on the Reduction of Single-Use Plastics in the Environment, including implementing regulations and European legislation). The system provides functionalities to support process management and data control across the entire public administration. The system is integrated with shared eGovernment services. In the future, the system will also be connected to European Union systems.

  - The Ministry of the Environment provides expert support and manages the Waste Management Information System, collects and processes the data entered into it, and performs comprehensive analysis and reporting. This data includes on reported waste and methods of waste management; on the transport of hazardous waste; on waste treatment facilities; on persons who submit reports under this Act; on waste producers; on waste dealers, brokers, and transporters;
    on the registration of polychlorinated biphenyls, equipment containing polychlorinated biphenyls, and equipment that may contain polychlorinated biphenyls; on waste persistent organic pollutants; on the status of reserves, available landfill capacity, landfill fees, including billing; on cross-border waste shipments; on decisions issued by regional

authorities and municipal authorities of municipalities with extended powers pursuant to the Waste Act, the End-of-Life Products Act and the assessments of the hazardous properties of waste carried out.

The Ministry of the Environment publishes summary information on waste and methods of waste management; a list of waste management facilities, waste dealers, intermediaries, and waste transporters; current information on the operation of waste management facilities and the activities of waste dealers, intermediaries, and waste transporters; information in accordance with the Act on End-of-Life Products and a list of persons authorized to assess the hazardous properties of waste. It also publishes the locations of product take-back points and the costs incurred by municipalities for operating the take-back system for packaging waste for different size groups of municipalities.

The Ministry of the Environment also maintains a list of persons under the Packaging Act and a list of decisions issued on authorisation under the Packaging Act, decisions on changes to or revocation of authorisation decisions, and publishes these lists. The Ministry of the Environment maintains the prescribed records of packaging and packaging waste under the Packaging Act, as well as summary records on packaging and the management of packaging waste. It also maintains and publishes a list of decisions issued on the authorization to operate a collective system under the Act on End-of-Life Products and the Act on the Reduction of the Impact of Selected Plastic Products on the Environment, and decisions on their amendment or revocation. It collects and processes data contained in applications for authorisation to operate a collective system and applications for changes to authorisation to operate a collective system.

In addition, the Ministry of the Environment keeps records of data sent by manufacturers concerning responsibility for waste management, information from operators of collective systems from annual reports on selected plastic products and end-of-life products. The Ministry of the Environment maintains a List of Manufacturers, a Register of Take-Back Points, and an Information System for keeping information on end-of-life vehicles in accordance with the End-of-Life Products Act.

The Ministry makes data reported under the Waste Act available to the Czech Statistical Office and cooperates with it in assessing the quality of the data made available.

Furthermore, the Ministry provides information to European Union bodies, in particular the European Commission, the Organization for Economic Cooperation and Development (OECD), the European Environment Agency (EEA), the United Nations (UN), and other bodies established under international treaties in the field of waste management to which the Czech Republic is bound.

The Ministry of the Environment provides and evaluates information on the state of waste management, data on waste management, packaging and packaging waste, data on selected plastic products and waste from selected plastic products, data on the take-back and management of end-of-life products and waste from the processing of end-of-life products.

- **Preparation and drafting of legislation:** The Ministry of the Environment is responsible for the adaptation, implementation, creation, and updating of legislation relating to waste management, i.e., EU regulations and directives, other implementing acts and acts within the delegated powers of the European Union, laws, and implementing regulations of the Czech Republic. Legislation lays down rules for the separate collection, treatment, and disposal of different types of waste.
- **Development of waste policy:** The Ministry of the Environment develops strategic plans and policies relating to waste management. These documents set out the objectives and direction of waste management. It is also responsible for drawing up the Waste Management Plan of the Czech Republic.
- **Methodological activities:** The Ministry of the Environment provides methodological guidance to other public authorities in the field of waste management.

- **Support for recycling and waste management:** The Ministry of the Environment supports and finances programs and projects aimed at improving waste management, including support for recycling and waste minimization. It is also the managing authority for grant financing and the redistribution of grant funds together with the State Environmental Fund (hereinafter also referred to as "SEF").
- **International cooperation:** The MoE cooperates with international organizations and partners around the world to address global environmental issues and exchange experiences in the field of waste management. It acts as the contact point for the Basel Convention. It also acts as the competent authority and contact point for transboundary waste shipments, the competent authority for ship recycling facilities, and the contact point for persistent organic pollutants under the Stockholm Convention.
- **Education and awareness raising:** The Ministry of the Environment organizes and develops awareness-raising and educational activities for the public, businesses, and local governments ( ) to increase awareness ( ) of proper waste management ( ) and the environmental aspects of waste management ( ) ( ). In addition, the Ministry of the Environment publishes relevant documents and methodologies in this area on its website.

Ministry of Industry and Trade

The Ministry of Industry and Trade (hereinafter also referred to as "MIT") plays a role in waste management, particularly in the area of economic and industrial aspects. Its main activities include:

- **Submission of expert documentation:** The MIT issues a statement in proceedings for the issuance of a permit that the matter ceases to be waste under the Waste Act, and in proceedings for the amendment or revocation of this permit. The MIT submits an expert opinion to the MEA as expert documentation in proceedings concerning applications for the issuance of a license to operate a collective system, changes to decisions on the issuance of a license to operate a collective system, the revocation of decisions on the issuance of a license to operate a collective system, or the granting of consent to the transformation of a collective system operator or the transfer, lease or pledge of its business, both under the Act on End-of-Life Products and under the Act on the Reduction of the Impact of Selected Plastic Products on the Environment.
- **Preparation of opinions:** The MIT issues an opinion to the MOE within the framework of proceedings concerning decisions on authorisation under the Packaging Act.

Ministry of Agriculture

The Ministry of Agriculture of the Czech Republic (hereinafter also referred to as the "MA") coordinates the implementation of checks on compliance with obligations when using treated sludge on agricultural land and decides on appeals against decisions of the Central Institute for Supervising and Testing in Agriculture.

Central Agricultural Inspection and Testing Institute

The Central Institute for Supervising and Testing in Agriculture (hereinafter also referred to as "ÚKZÚZ") is responsible for supervising and testing in the field of agriculture and food production. It decides on the approval of sludge use programs and checks whether sludge is used in accordance with the approved sludge use program. It registers fertilizers produced from waste in accordance with Act No. 156/1998 Coll., on fertilizers, and checks whether fertilizer producers from waste and agricultural entrepreneurs comply with certain obligations under the Waste Act and Act No. 156/1998 Coll., on fertilizers.

Ministry of Health

The Ministry of Health (hereinafter also referred to as "MoH") authorizes persons to assess the hazardous properties of waste. It performs inspections in the area of public health protection in waste management; it inspects how administrative authorities performing state administration in the field of waste management comply with the provisions of the Waste Act and regulations issued for its implementation in the area of public health protection in waste management.

Regional Public Health Authorities

Regional Public Health Authorities (hereinafter also referred to as "KHS") ensure supervision of safe waste management, public health control, and compliance with environmental and hygiene regulations. They perform their activities mainly in the following areas:

- **Proceedings for the issuance of operating permits for waste management facilities:** KHS issues a binding opinion in proceedings for the issuance of operating permits for facilities under the Waste Act and in proceedings for the amendment or revocation of such permits, whenever the amendment or reason for revocation relates to the protection of public health. In its binding opinion, it may lay down conditions to ensure the protection of human health.
- **Proceedings for issuing a permit stating that movable property ceases to be waste:** The Regional Hygiene Station issues a binding opinion in proceedings for issuing a permit stating that movable property ceases to be waste under the Waste Act, and in proceedings for changing or revoking this permit, whenever the change or reason for revocation relates to areas of public health protection. In its binding opinion, it may lay down conditions to ensure the protection of human health.
- **Inspection of waste treatment facilities:** The KHS inspects the operation of waste treatment facilities in terms of compliance with operating conditions related to the protection of human health and the minimization of health risks specified in the operating rules.
- **Cooperation:** The KHS cooperates with other administrative authorities in the field of public health protection in waste management.
- **Packaging:** Based on the Packaging Act, the KHS inspects compliance with obligations relating to prevention, placing packaging on the market or into circulation, labeling, and reuse in the case of cosmetic packaging.
- **Selected plastic products:** The KHS monitors the ban on the placing on the market and into circulation of certain selected plastic products and also checks whether the labeling requirements for certain selected plastic products are met.

Czech Environmental Inspection

The Czech Environmental Inspectorate plays a key role in monitoring and supervising waste management in the Czech Republic. Its tasks and powers in relation to waste management include the following:

- **Waste management control:** The CEI checks how legal entities, self-employed individuals, and municipalities comply with legal regulations, including directly applicable European Union regulations and administrative decisions in all areas covered by the Waste Act.

  . It monitors compliance with waste management obligations laid down by law.

  on waste. It inspects waste producers (municipalities, companies, enterprises, authorities, sole traders), waste management facilities, waste collection and processing facilities, transporters, intermediaries, and traders. Every year, it inspects waste collection points, sorting lines, landfills, incinerators, and waste-to-energy facilities. It imposes penalties for violations of the Waste Act. The CEI promotes the basic principles of the circular economy, environmental protection, and human health in waste management.
- **Inspection of waste producers:** The CEI inspects waste producers and, at least once a year, also checks how producers of waste from titanium dioxide production comply with the provisions of legal regulations and decisions of the Ministry of the Environment and other administrative authorities in the field of waste management.
- **Waste transport control:** The CEI inspects compliance with the conditions for cross-border waste transport laid down in Regulation (EC) No. 1013/2006 of the European Parliament and of the Council and the Waste Act
  on waste. It also draws up plans for waste shipment inspections in accordance with Regulation (EC) No. 1013/2006 of the European Parliament and of the Council.

- **Control of compliance with obligations relating to packaging and packaging waste:** The CEI checks compliance with the take-back and recovery obligations for packaging waste, awareness-raising activities, the reimbursement of costs for the collection of selected packaging waste, the mandatory content of recycled plastics in packaging, the appointment of an authorized representative, the verification of data by an authorized packaging company, and the transfer of funds upon expiry of the authorization decision.
- **Inspection of compliance with obligations in relation to selected products and end-of-life products:** The CEI checks how legal entities, self-employed natural persons, and municipalities comply with the provisions of legal regulations and decisions of administrative authorities in all areas of the End-of-Life Products Act, with the exception of areas where the Czech Trade Inspection Authority is responsible for inspection.
- **Inspection of compliance with obligations in relation to selected plastic products and waste from them:** The CEI checks how legal entities and natural persons engaged in business comply with the provisions of legal regulations and decisions of administrative authorities in all areas covered by the Act on the reduction of the impact of selected plastic products on the environment, with the exception of areas where the Czech Trade Inspection Authority is responsible for inspection. the State Agricultural and Food Inspection Authority, regional public health authorities or the Customs Administration.

State Environmental Fund of the Czech Republic

The State Environmental Fund of the Czech Republic is the administrator of the landfill tax and, together with the Ministry of the Environment, is the body responsible for subsidy financing and the redistribution of subsidy funds.

General Directorate of Customs and Customs Offices

The General Directorate of Customs provides the Ministry and the Czech Environmental Inspection Agency, upon request, with information on waste that has been exported from the Czech Republic to a country that is not a member state of the European Union or that has been imported into the Czech Republic from such a country. The General Directorate of Customs also provides the Ministry of the Environment, the CEI, or the Czech Trade Inspection Authority with information on selected products that have been exported from or imported into the Czech Republic.

Customs authorities then ensure:

- **Control of waste transport:** Customs authorities control the transport of waste, both domestic and cross-border, and forward reports to the Ministry of the Environment for further action in accordance with Regulation (EC) No. 1013/2006 of the European Parliament and of the Council on shipments of waste. Customs authorities also check whether the conditions for the transport of used electrical equipment, tires, or vehicles are met during cross-border transport.
- **Checking compliance with the obligations of manufacturers of selected products:** Based on the Act on End-of-Life Products, customs authorities check that manufacturers of selected products are fulfilling their obligations, in particular whether they are registered in the List of Manufacturers (checking for free-riding).
- **Checking compliance with requirements for transported packaging:** Under the Packaging Act, customs authorities are authorized to check whether packaging or packaging materials imported into the Czech Republic or transported from EU Member States to the Czech Republic meet the requirements of this Act.
- **Checking compliance with the ban on placing certain selected plastic products on the market:** Based on the Act on the reduction of the impact of selected plastic products on the environment, the Czech Customs Administration checks whether imports violate the ban on placing certain selected plastic products on the market and whether they are labeled in accordance with the requirements of this Act.

Czech Police

The Czech Police records and documents suspicious phenomena and circumstances indicating illegal cross-border transport of waste. The police cooperates and, within the framework of mutual assistance, provides expert assistance and appropriate conditions for the performance of their duties under the Waste Act to the Czech Environmental Inspection Authority, regional authorities, and customs authorities. It also cooperates in obtaining the necessary information in cases of suspected violations of waste management legislation.

Czech Trade Inspection Authority

The Czech Trade Inspection Authority (hereinafter also referred to as "CTIA") protects consumers and supervises compliance with consumer rights, particularly in the following areas:

- **Batteries, electrical equipment, and tires:** Based on the Act on End-of-Life Products , the Czech Trade Inspection Authority (ČOI) supervises the fulfillment of obligations related to the conditions for placing batteries on the market, labeling batteries and electrical equipment, compliance with requirements for easy and safe removal of batteries incorporated into products, separate indication of the costs of take-back and disposal of waste electrical equipment or tires when selling electrical equipment or tires, and further compliance with the obligations of final sellers of selected products in relation to ensuring take-back (informing end users, ensuring the take-back of waste electrical equipment or portable batteries, marking take-back points).
- **Packaging:** The COI checks compliance with obligations relating to prevention, placing packaging on the market or into circulation, labeling, and reuse, with the exception of packaging for cosmetic products, packaging that comes into direct contact with food, packaging for medicinal products, and packaging for raw materials for the preparation of medicinal products for human use. It also checks that persons who place packaging on the market or into circulation by selling it to consumers ensure that it is taken back. It also checks that beverages are sold in returnable deposit packaging by legal entities or natural persons authorized to conduct business who place packaged beverages on the market or into circulation by selling them to consumers. In the event of a breach of obligations, it imposes corrective measures in accordance with the Act on Market Surveillance of Products or administrative penalties.
- **Selected plastic products:** The COI checks compliance with obligations relating to the prohibition of placing certain selected plastic products and products made of oxo-degradable plastic on the market or into circulation, and obligations relating to the labeling of certain selected plastic products.

State Agricultural and Food Inspection Authority

The State Agricultural and Food Inspection Authority (hereinafter also referred to as "SZPI") in the Czech Republic plays a limited but important role in relation to waste management. It monitors compliance with obligations relating to prevention, placing packaging on the market or into circulation, labeling, and reuse in the case of packaging that comes into direct contact with food. If it finds that these obligations have been breached, it imposes corrective measures in accordance with the Act on Market Surveillance of Products and administrative penalties. Furthermore, the SZPI checks how legal entities and natural persons engaged in business comply with the provisions of the Act on the reduction of the impact of selected plastic products on the environment concerning the labeling requirements for certain selected plastic products (tobacco products with filters and filters placed on the market for use in combination with tobacco products).

State Institute for Drug Control

The State Institute for Drug Control (hereinafter also referred to as "SÚKL") monitors compliance with obligations relating to prevention, placing packaging on the market or into circulation, labeling, and reuse in the case of packaging for human medicinal products and packaging for raw materials for the preparation of human medicinal products. In the event of a breach of these obligations, it imposes corrective measures in accordance with the Act on Market Surveillance of Products or administrative penalties.

Institute for State Control of Veterinary Biopreparations and Medicines

The Institute for State Control of Veterinary Biopreparations and Medicines (hereinafter also referred to as "ÚSKVBL") shall, in accordance with the Packaging Act, monitor compliance with obligations relating to prevention, placing packaging on the market or into circulation, labeling, and reuse in the case of packaging for veterinary medicinal products and packaging for raw materials for the preparation of veterinary medicinal products. If it finds that these obligations have been breached, it imposes corrective measures in accordance with the Act on Market Surveillance of Products or administrative penalties.

Regional authorities

Regional authorities (hereinafter also referred to as "RA") perform a number of important duties and functions within the framework of state administration in the field of waste management. Their territorial jurisdiction is defined by the boundaries of the regions as higher territorial self-governing units. In terms of state administration of waste management, regional authorities perform tasks in the following areas:

- **Granting of permits:** Regional authorities grant permits for the operation of waste treatment facilities and permits for the waiver of separate waste collection at waste treatment facilities. They may also permit the mixing of hazardous waste with each other or with other waste in facilities for the treatment, recovery, or disposal of waste. Regional authorities also issue permits for waste trading and permits for the recycling or other recovery of waste in waste recovery facilities, whereby the waste ceases to be waste.
- **Supervision and restrictive measures:** Regional authorities supervise facilities and check their operations and compliance with legal regulations. If there is a change in the conditions decisive for the issuance of a waste trading permit, the waste trader fails to ensure the protection of the environment or human health, or repeatedly violates the obligations laid down by law or repeatedly fails to comply with the conditions laid down in the permit, the Regional Authority may amend or revoke the relevant permit. The Regional Authority may suspend or restrict the operation of a facility for the storage, collection, treatment, recovery, or disposal of waste if the operator of the facility fails to fulfill the obligations laid down by law or by a decision issued on the basis of the law, and if this could result in serious adverse effects on the environment or human health. The Regional Authority also has the power to revoke or amend a permit for the operation of a facility if there is a change in the conditions decisive for the issuance of the permit, if the conditions for the protection of the environment or human health are not ensured, if the obligations laid down by the Waste Act or the End-of-Life Products Act are repeatedly violated, or if the conditions laid down in the permit are repeatedly not fulfilled. The Regional Authority may suspend or revoke a certificate of exclusion of hazardous properties of waste.
- **Inspections:** Regional authorities inspect and process reports from operators of waste management facilities, waste transporters, waste dealers, and intermediaries. They also maintain and process records of permits and other decisions issued by them in accordance with the Waste Act. They check compliance with the requirements of the End-of-Life Products Act in relation to the collection or processing of end-of-life vehicles by natural persons and legal entities engaged in business. Regional authorities check how legal entities and natural persons engaged in business comply with the provisions of legal regulations and decisions of administrative authorities in areas covered by the Waste Act. They also check compliance with the requirements of the End-of-Life Products Act in relation to the collection or processing of end-of-life vehicles by natural persons and legal entities engaged in business activities.
- **Records:** Regional authorities keep and process records of permits and other decisions issued by them under the Waste Act.
- **Issuing opinions:** Regional authorities issue a unified environmental opinion (hereinafter referred to as "JES"), which replaces the binding opinion pursuant to Section 146(3)(a) and the statement pursuant to Section 146(3)(b) and (c), if it is competent to issue a JES.

- **Regional waste management plan:** Regional authorities, in cooperation with the relevant public authorities and the public, draw up a regional waste management plan for the territory of the region and any amendments thereto in accordance with the Environmental Impact Assessment Act.
- **Cooperation with municipalities:** Regional authorities decide on appeals against decisions of municipal authorities and municipal authorities with extended powers (hereinafter also referred to as "ORP"). They also provide methodological support to municipalities and their municipal authorities.

Municipal authorities of municipalities with extended powers

Municipalities with extended powers (hereinafter also referred to as "ORP") are authorized to perform delegated state administration powers in the field of waste management. Their main activities include:

- **Issuing permits:** The locally competent ORP municipal authority issues permits to waste producers for the separate collection of waste. It also issues permits for the operation of small facilities and may revoke such permits if the facility operator repeatedly violates the obligations laid down in this Act or repeatedly fails to comply with the conditions to which the permit is subject.
- **Inspection:** The municipal authority inspects and processes waste reports from waste producers, facility operators, and traders, as well as reports on plant residues from community composting facilities. It checks compliance with the provisions of legal regulations and decisions of administrative authorities in all areas covered by the Waste Act, with the exception of areas where the municipal authority is responsible for control. It also checks whether authorized persons comply with the established method of assessing the hazardous properties of waste. The municipal authority checks compliance with the obligations imposed by the End-of-Life Products Act on natural persons and may impose corrective measures and deadlines for remedial action.
- **Records:** The ORP keeps and processes records of the consents and other decisions it has issued in accordance with the Waste Act.
- **Restrictive measures:** The municipal authority of the ORP deals with illegally concentrated waste in its administrative district. It may secure waste that endangers or harms human health or the environment against the release of harmful substances into the surrounding environment or ensure the removal of such waste, including its transfer to a facility designated for waste management, at the expense of the responsible person. It may prohibit the waste producer from carrying out activities that cause waste to be produced if the waste producer does not have arrangements in place for the waste it produces to be taken over by a person authorized to take over the type and category of waste in question, and if the waste produced as a result of the continuation of this activity could cause damage to the environment or human health. It hears cases of administrative offenses and imposes penalties for violations of obligations defined by the Waste Act or imposed by a decision.
- **Issuing opinions:** The municipal authority issues a uniform environmental opinion (hereinafter referred to as "JES"), which replaces the binding opinion pursuant to Section 146(3)(a) and the statement pursuant to Section 146(3)(b) and (c), if it is competent to issue a JES.
- **Administration of the emission fee:** The municipal authority of the ORP is the administrator of the emission fee and records its payment in the road vehicle register.

Municipal authority

The municipal authority checks whether legal entities and natural persons engaged in business activities use the municipal system only on the basis of a written contract with the municipality and in accordance with it, and whether natural persons not engaged in business activities handle municipal waste in accordance with the Waste Act, and whether they have ensured the collection of waste that they do not process themselves in accordance with this Act. They also deal with offences and impose penalties for breaches of the obligations laid down in the Waste Act. Under the End-of-Life Products Act, they are authorized, after prior notification, to remove so-called abandoned vehicles (car wrecks located off the road) within their delegated powers.

1.4.2 nd local government performance

Local government

According to the Waste Act, every municipality has the status of a producer of all municipal waste generated as a result of the activities of non-business entities within the municipality. Waste management in the role of waste producers is the responsibility of municipalities and local authorities. In this context, each municipality or town establishes a municipal system for the separate collection, transport, and further treatment of municipal waste, which it may set out in a generally binding ordinance.

If a municipality establishes a municipal system by means of a generally binding ordinance, it may also specify in this ordinance the locations where it will collect the following within the municipal system:

a) construction and demolition waste generated in the municipality by non-business individuals,

b) movable property within the framework of waste prevention,

c) municipal waste generated within the municipality by legal entities and natural persons engaged in business activities who join the municipal system on the basis of a written contract,

d) end-of-life products, if they are taken over as part of a service for manufacturers in accordance with the End-of-Life Products Act, or

e) plant residues from the maintenance of green areas, gardens, and households for processing into compost as part of community composting.

The municipality is obliged to take over all municipal waste generated within its territory by non-business natural persons (hereinafter referred to as "citizens"). Municipalities shall designate locations for the separate collection of municipal waste (referred to as "separate collection"), at least for hazardous waste, paper, plastics, glass, metals, biological waste, edible oils and fats, and, from January 1, 2025, also textiles. They may also fulfill their waste management obligations through a voluntary association of municipalities based on an agreement concluded with another municipality.

According to the Waste Act, municipalities are required to increase the proportion of sorted waste in the coming years and should thus motivate their citizens to sort waste. Separately collected recyclable components of municipal waste should account for at least 60% in the calendar year 2025 and subsequent years, in the calendar year 2030 and subsequent years at least 65%, and in the calendar year 2035 and subsequent years at least 70% of the total amount of municipal waste produced in the given calendar year.

They also have a legal obligation to provide information at least once a year, in a manner that allows remote access, on the methods and extent of separate collection of municipal waste, the recovery and disposal of municipal waste, and the possibilities for preventing and minimizing the generation of municipal waste. At least once a year, municipalities should publish, in a manner allowing remote access, quantified results of municipal waste management, including the costs of operating the municipal system.

Regional self-government

Regions have a key role to play in implementing waste policy at the regional level and contribute to achieving recycling, sorting, and proper waste management targets in their regions. They adopt and approve documents and strategies in the field of waste management.

1.4.3 Actors in waste management

Actors in waste management include individual companies operating in waste management, their industry associations, clusters and associations (representing the interests of their members), associations and associations of local authorities (representing the interests of their members) and non-profit organizations (representing the interests of the public).

Associations, clusters, and business associations

These bring together major businesses involved in the use, disposal, collection, and recycling of waste. They include, for example:

- Association for the Recycling of Used Textiles,
- Textile, Clothing and Leather Industry Association,
- Czech Waste Management Association,
- Czech Circular Economy Association,
- Czech Association for Asbestos Removal,
- Composting Association,
- Chamber of Commerce,
- Plastics Cluster,
- Industry and Transport Association.

Associations and associations of local governments

Participates in the preparation of legislation and other measures relating to municipal waste management. Defends and promotes the interests of its members. These include, for example:

- Union of Towns and Municipalities,
- Association of Local Authorities of the Czech Republic,
- Association of Regions.

Non-profit organizations

There are a number of non-profit organizations and initiatives in the Czech Republic that fight for the protection and improvement of the environment or create various activities to support waste and circular economy. These include, for example:

- Arnika
- DUHA Movement
- Green Circle
- Save Food
- Czech Federation of Furniture Banks and Reuse Centers
- Institute of Circular Economy.

1.4.4 Consultation process for the preparation of the POH ČR

The Ministry of the Environment has been working on a strategy for the new Waste Management Plan for the Czech Republic for two years. Technical documentation was commissioned and prepared by a team of experts in data analysis, waste management, and waste management economics in cooperation with the Ministry of the Environment's Department of Circular Economy and Waste Management to properly assess the state of waste management and set predictions for meeting the set targets. Expert consultations were held on an ongoing basis with interest groups and associations in the field of waste management. The Ministry of the Environment's contributory organization, the Czech Environmental Information Agency (hereinafter referred to as "CENIA"), was involved in the preparation of the background materials. The POH ČR was also consulted and reviewed by the regions. The general public and experts also had the opportunity to comment on the draft POH ČR through a public consultation process.

The POH ČR was repeatedly presented to the Waste Management Council[8] (hereinafter also referred to as the "Council") and consulted with Council members. The draft POH ČR was submitted for internal and inter-ministerial consultation, and the comments received were addressed.

The POH ČR was submitted for environmental impact assessment in accordance with Act No. 100/2001 Coll., on environmental impact assessment, as amended. According to the conclusion of the preliminary investigation, ref. no. MZP/2024/710/4670, dated November 11, 2024, it can be stated that "*the draft concept of the "Waste Management Plan of the Czech Republic for the period 2025-2035" does not establish a framework for future permits for projects pursuant to Annex 1 to the Act on Environmental Impact Assessment within the meaning of Section 10a(2) of the Act on Environmental Impact Assessment and is therefore not subject to strategic environmental impact assessment pursuant to the aforementioned Act*."

The POH CR was submitted to the Government of the Czech Republic for approval on x. x.xxxx.

[8] This is an interministerial advisory body.

2 Evaluation was carried out by management nd Republic of the Czech Republic – Analytical part

Waste management is a key element of the current economic system, in which sustainability and efficient use of limited resources are becoming increasingly important. Given that this area affects all sectors of the economy, it is necessary to define a solid conceptual framework for its future direction, which is precisely the aim of the Czech Republic's Waste Management Plan.

The creation of such a framework requires detailed analytical data, which is the subject of this chapter. An in-depth analysis will provide a detailed overview of the current state of waste management in the Czech Republic and thus a better understanding of the challenges and prospects that this area presents. The chapter will focus on identifying key factors, presenting socio-economic data, monitoring waste flows, evaluating waste management practices, and assessing the role of the public and private sectors in the organization of waste management.

2.1 Basic characteristics of the Czech Republic in relation to waste

2.1.1 Geographical characteristics of the Czech Republic in relation to waste

The geographical characteristics of the Czech Republic play an important role in its waste management. The country is located in Central Europe and **has a diverse landscape with mountains, valleys, and** watercourses, which particularly influences the suitability of locations for waste technologies and recycling facilities.

The Czech Republic, with an area of 78,871 ^{km2}, is located in the middle of the temperate zone of the northern hemisphere in Central Europe. Of the total area**, the majority is occupied by arable land (37%), forest land (34%)** and permanent grassland (13%). The population density throughout the country is 133 inhabitants $^{per\ km^2}$(Czech Statistical Office, 2023).

Figure 4: Location of the Czech Republic within Europe

78,870
km

10,828
million inhabitants

1
regions

133
population density per km2

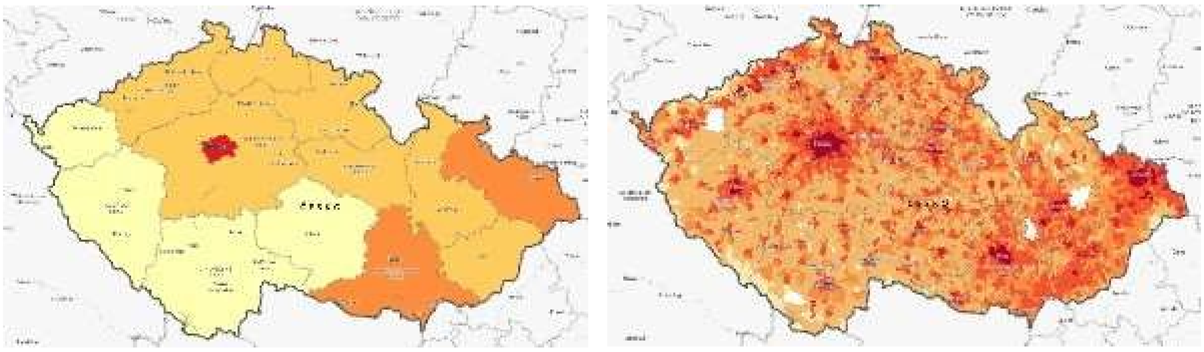
6,258
municipa lities

Source: own processing based on ČSÚ (2021, 2023)

The **main European watershed runs through** the Czech Republic, separating **the basins of the North Sea, Baltic Sea**, **and Black Sea**. The central location of the Czech Republic in Europe also ensures **good transport links with neighboring countries**. This can influence trade in waste and recyclable materials (CENIA, 2022).

The Czech Republic is unique in that it **has a large number of municipalities (6,258)** (ČSÚ, 2023b), which is reflected in the high segmentation of the waste management market. The settlement structure **is** currently **dominated by municipalities with fewer than 3,000 inhabitants** (93% or 5,799), which fall into the rural category. There are 459 cities (municipalities with 3,000 or more inhabitants) in the Czech Republic, six of which have a population of over 100,000 (ČSÚ, 2023c). The most populous city has long been the capital, Prague, with 1,259,413 inhabitants (in 2021). Other population centers include Brno (379,000), Ostrava (280,000), Plzeň (169,000), Liberec (103,000), and Olomouc (101,000). Higher population density in urban centers results in significantly increased municipal waste production, which requires an effective system of separate collection, sorting, and treatment. **The rate of urbanization continues to grow,** and with it the demands on urban waste management, which means a need to invest in waste management infrastructure.

Figure 5: Population density per 1 ^{km2} in regions and municipalities



Source: CZSO, 2021.

Waste management must be sensitive to these geographical characteristics and take into account environmental protection and sustainability when planning and implementing waste policies and projects. It must also be prepared for natural disasters such as floods and ensure the safety of waste facilities in relation to geographical risks.

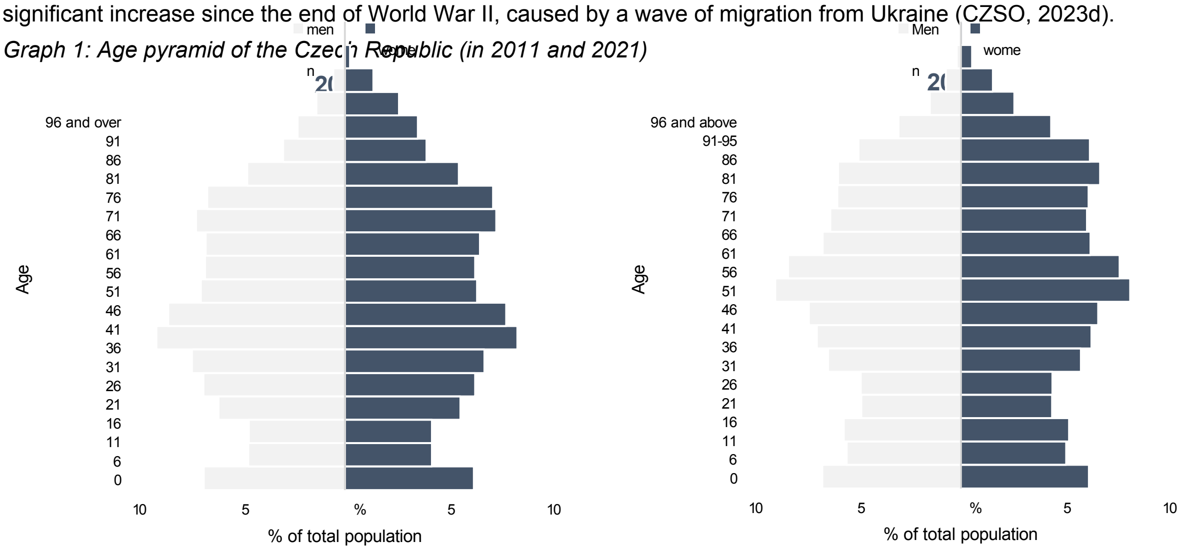
2.1.2 Demographic characteristics of the Czech Republic in relation to waste nd management

The demographic characteristics of the Czech Republic play a key role in the development and management of its waste management system. These characteristics influence the composition of waste. Older people usually produce more healthcare waste, which requires separate collection, and in the case of healthcare waste that poses a health risk, such as infectious, toxic, blood samples, unused medicines, etc., it must be disposed of in waste incinerators. On the other hand, younger populations are generally more interested in recycling and sustainable products, which can influence consumer preferences and demand for recycling services. These characteristics should be taken into account when planning and managing waste management. It must be adapted to the current needs of the population, but also anticipate future changes and challenges. This includes investing in infrastructure, educating the population about waste sorting, and implementing policies that promote sustainable waste management practices. Demographic aspects thus play a key role in the Czech Republic's efforts to achieve efficient and sustainable waste management in the future.

During 2022, **the population** of the Czech Republic **increased** by 310,800, with the total number rising from 10.517 million to 10.828 million. This increase was mainly due to the influx of people from war-torn Ukraine. The composition of the Czech Republic's population in terms of the proportion of men and women has not changed significantly over time. Traditionally**,** there has been **a slight predominance of women**, and at the end of 2022, women accounted for 51.0% (5.52 million inhabitants) of the population, while men accounted for 49.0% (5.31 million inhabitants) (ČSÚ, 2023d).

In terms of age structure, **the most numerous generation** is **that born in the 1970s**, specifically between 1973 and 1979. In 2022, these people will be between 43 and 49 years old. Another significant group consists of people born after World War II and in the mid-1950s, who will be between 66 and 76 years old in 2022. The least numerous generation is people born in the second half of the 1990s and at the beginning of the 21st century, who will be aged 19 to 24 in 2022. Compared to previous years, there will also be fewer people aged 60 to 64 in 2022. **The child component of the population (aged 0–14) is gradually growing,** with children under 15 accounting for 16.2 % of the total population at the end of 2022. The year-on-year growth of the child component reached 3.4% in 2022, which was the most significant increase since the end of World War II, caused by a wave of migration from Ukraine (CZSO, 2023d).

Graph 1: Age pyramid of the Czech Republic (in 2011 and 2021)



Source: Own processing based on CSO, 2021.

A long-term demographic trend in the Czech Republic is **the aging of the population**. The age index, which compares the number of seniors and children in the population, has been growing steadily since the mid-1980s. From an initial level of 50 seniors per 100 children in 2006, it has gradually increased, reaching 128 seniors per 100 children in 2021. Due to the wave of immigration from Ukraine, which increased the number of children aged 0–14, the age index fell to 126 seniors per 100 children at the end of 2022. Regardless of the age structure of the population, however, there is a correlation between waste production and population growth. A larger population means more waste. Whether the growth rate of the population and waste will be linear depends on the availability of waste management infrastructure, public awareness, and the economic strength of the population (ČSÚ, 2023d).

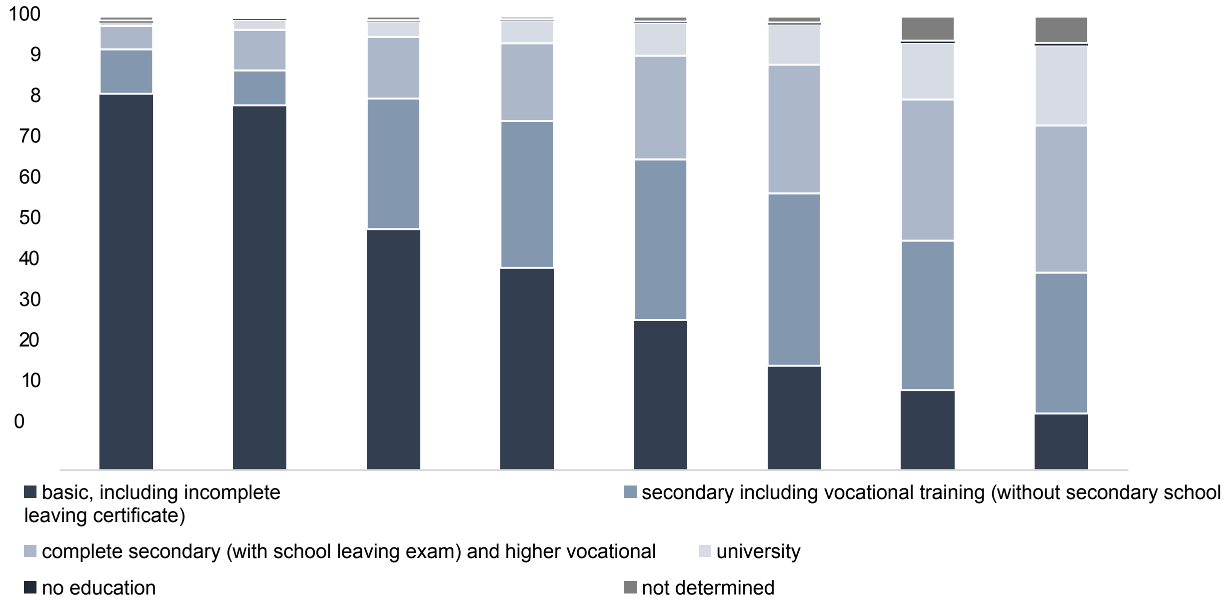
The economic dependency ratio, which compares the ratio of the non-productive (0–19 and 65+) to the economically productive (20–64) segments of the population, **is also** on **the rise**. It has been gradually increasing

[9] The available figure of 10,517,000 inhabitants was used for all analytical calculations in all parts of the POH ČR.

From 2013 to 2022, the number of people outside the working age group rose from 57 to 72 per 100 people of working age. This growth mainly reflected **an increase** in the **senior component,** which rose from 26 to 35 persons aged 65 and over per 100 persons aged 20–64 (by 32%). Although the number of persons aged 0–19 per 100 persons of working age increased by 5.6 persons, the pre-working age population contributed to the growth of economic dependency more slowly than the senior population. The exception was 2022, when the overall increase in the economic dependency index was mainly due to an increase in the pre-working age population, while a relative decline in the senior population helped to mitigate this economic burden (ČSÚ, 2023d).

In addition to the age structure, changes are also occurring in other structures of the population , such as **education**. The graph below shows **a long-term trend toward increasing levels of education**. In recent decades, there has been a significant increase in the proportion of people with tertiary education, which in 2011 accounted for 12% of the population aged 15 and over. These changes in the educational structure may have an impact on municipal waste production in relation to the behavior and attitudes of the population towards waste management issues (ČSÚ, 2021)..

Graph 2: Population aged 15 and over by highest level of education attained



Source: CZSO, 2021.

In the context of waste management, **household size** also plays an important role, as it can significantly influence the production of municipal waste and its specific components. Different household sizes can generate different amounts of waste and also differ in the types of materials produced. Most studies confirm that there is a significant negative relationship between average municipal waste production per person and the number of household members. Studies[10] emphasize that as the number of household members decreases, waste production per person increases.

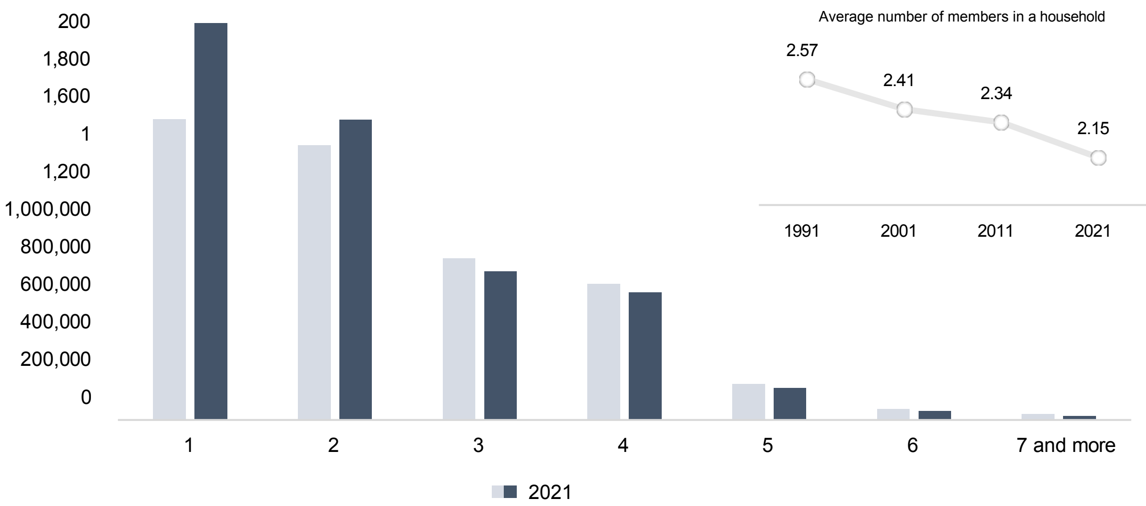
In the Czech Republic , the **average number of inhabitants in households that manage their own economy** is **2.15.** Almost 68% of these households have one or two members. More than 95% of households have four or fewer members. Only 4% are households with five or more members. Households with seven or more members are rare, accounting for less than half a percent of all households. Total number

[10] For example, Beigl (2004), Dennison et al. (1996), Johnstone and Labonne (2001), Khan et al. (2016) and Lebersorger and Beigl (2011).

people living in these households is 10,359,900, which corresponds to 98% of the population of the Czech Republic (ČSÚ, 2022).

The upward trend points to **an increase in the number of smaller households**, which may result in the distribution of generated waste over a larger geographical area. This phenomenon is particularly noticeable in the capital city of Prague, where the average number of household members is the lowest (1.95 compared to the national average of 2.15) (ČSÚ, 2022). The downward trend in the number of household members will be exacerbated in the future, particularly by the growing population of seniors, who often live alone. This development has the potential to affect the organization and efficiency of separate waste collection and treatment systems.

Graph 3: Households by number of household members

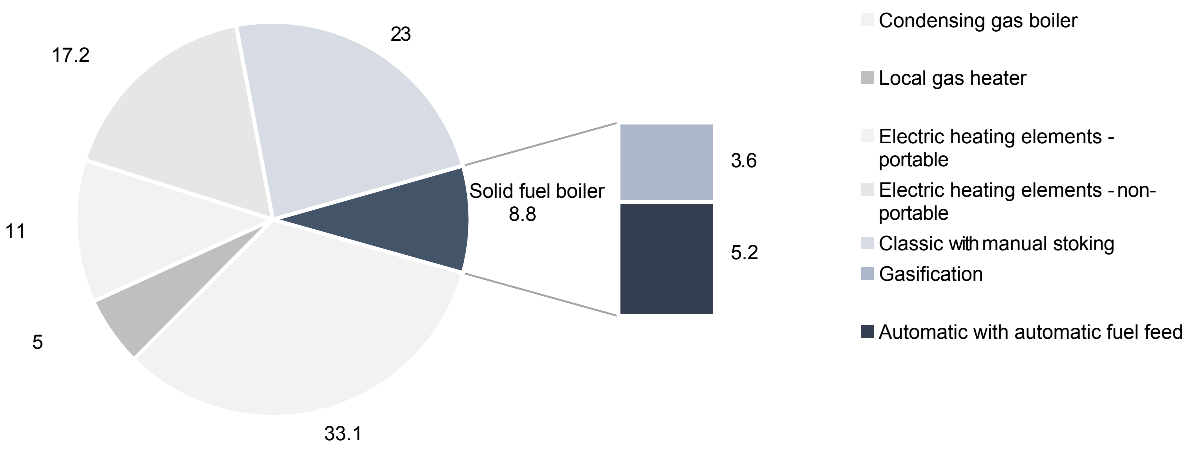


Source: own processing based on CSO, 2021. Census. Available here.

The method of heating a house or apartment also plays a role in explaining municipal waste production. The results concerning the relationship between the method of heating and municipal waste production are ambiguous. Some studies[11] suggest that households with solid fuel boilers produce less municipal waste, while other findings point to a negative impact, which may be linked to the higher amount of ash produced. In the Czech context, a 19% decrease in the number of households with solid fuel boilers can be observed between 2015 and 2021. Given the legislative requirements, this trend is expected to continue (ČSÚ, 2022).

[11] See, for example, Lebersorger and Beigl (2011) or Dennison et al. (1996).

Chart 4: Households by heating equipment (2021)



Source: own processing based on ČSÚ, 2021.

In this context, an interesting trend has emerged over the last decade, with **a significant shift from coal to renewable energy sources**. While natural gas was the most widely used energy source in 2010, the share of energy from renewable sources, particularly wood fuel, is currently increasing significantly. This trend is accompanied by **growing interest in the installation of photovoltaic panels and heat pumps** in an increasing number of households. Most of the energy used by households is now obtained from renewable sources, with these sources accounting for just over 30% of the total. Natural gas ranks second with a share of approximately 26%, while electricity accounts for less than 20%. Heat purchased from external sources contributes to the total energy consumption of households by approximately 13%, while solid fuels account for 9%. Given the subsidy policy, this trend is expected to continue (ČSÚ, 2022).

Furthermore, **the economic situation of the population** must be taken into account, as different socioeconomic groups have different consumption habits and thus a different impact on waste management. Higher incomes are associated with more intensive consumption behavior and thus with greater amounts of waste.

2.1.3 Economic characteristics of in relation to waste management

The Czech economy is small and open, with **a significant dependence on foreign trade** and strong trade and ownership links to EU countries. In 2022, 80% of total exports of goods went to EU countries, with Germany as the most important trading partner (30% of total volume) (ČSÚ, 2023e). Exports of goods are mainly linked to industrial production, which leads to increased production of waste generated in manufacturing (MPO, 2023).

The Czech Republic is **a** traditional **industrial country** and remains one of the EU countries with a high share of industry in its total economy and gross value added. During the first quarter of 2023, industry as a whole contributed 28.1% to total value added (MPO, 2023). Important sectors of Czech industry include the automotive, electrical engineering, and chemical sectors. These areas produce significant amounts of industrial waste and electronic waste, which requires specialized processing and recycling.

The Czech Republic has traditionally been one of the countries with **low unemployment rates** in Europe, at around 3%. However, more than a year of economic stagnation in the Czech Republic is beginning to

[12] See, for example, Gellynck et al. (2011), Hoffmeister and Gellenbeck (2009), Benitez et al. (2008).

reflected in the labor market situation. In the third quarter of 2023, a partial cooling of this market was evident, which was reflected in a decline in employment, a slight increase in unemployment, and a slight decrease in the number of job vacancies. In various sectors of the economy, the number of companies identifying a shortage of employees as an obstacle to their growth declined (ČSÚ, 2023e). At the same time, the size of the potential labor reserve increased, but this reserve remains limited, which may also have a negative impact on the functioning of waste management in the form of insufficient human resources.

Waste management in the Czech Republic is also influenced by **public debt and** the country's **national budget**. **The low level of public debt in the Czech Republic** gives the government some room for maneuver in financing public investments, including those in waste management infrastructure. On the other hand, if the national budget runs a significant deficit, these investments may be limited. The Czech Republic is generally ranked among the countries with the lowest public debt in the EU. However, for the fourth time in a row, the budget is running a deep deficit. This year's deficit was the lowest in this comparison, falling by a third year-on-year to CZK 215.4 billion. This improvement in the summer months was mainly due to the expected significant increase in state budget revenues, particularly from dividends and taxes on extraordinary revenues. The inclusion of funds from the National Recovery Plan, which significantly increased total EU revenues from June onwards, also played an important role (CSO, 2023e).

As regards **currency**, the Czech koruna is floating freely against the euro and the dollar. The koruna was stronger than in the previous year against both the euro and the dollar, but gradually weakened during the third quarter of 2023. A slight weakening of the koruna can also be expected at the beginning of this year, which will be caused by a gradual narrowing of the interest rate differential compared to the euro area. The subsequent slight shift towards a stronger koruna will mainly reflect the recovery in foreign demand and the associated upturn in the domestic economy and its export performance (CNB, 2023a).

The exchange rate of the Czech koruna affects waste management, particularly in relation to the import and export of waste and recyclable materials. It also affects the cost of waste treatment technologies, which are often imported. Changes in exchange rates may affect trading conditions in the waste management sector and have an impact on the costs and revenues associated with trade in raw materials and recycling technologies.

Chart 6: GDP development (bil. CZK, b.c.)

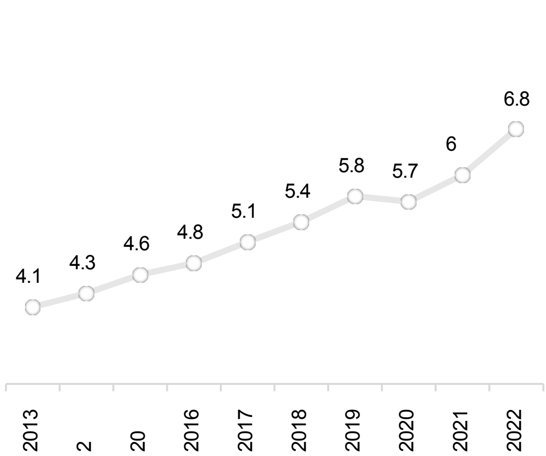


Chart5:RealgrowthGDPin%

Source: own calculations based on CNB data, 2023b. Source: Ministry of Finance, 2023.

There is generally **an** almost **linear relationship between economic development and waste production**. When the economy grows, waste production increases. Conversely, when the economy declines, the rate of waste production may slow down. Following fiscal reforms and austerity measures at the beginning of the decade, the Czech economy grew. In 2020, there was a significant slowdown in economic activity as a result of the COVID-19 pandemic, which led to a decline in GDP. However, in the following years, thanks to the gradual control of the pandemic and the recovery of world trade, the Czech economy began to revive again. In 2022, GDP reached just under CZK 7 trillion (CNB, 2023b).

The expected macroeconomic trends for the Czech Republic in 2024 point to a sharp slowdown in economic growth this year to just 0.3%. Rising living costs will lead to a 2.4% decline in real household consumption, while government consumption is expected to grow by 1.6%. Growth is expected to accelerate to 2.6% in 2024, supported by real household consumption rising by 3.5%. Inflation is expected to fall to 3.0% this year (compared to 10.9% in 2023). Wage and salary growth is expected, especially this year, when it should increase by almost 9%. Weak economic momentum will continue in 2025-2026, when GDP growth is expected to stagnate, fluctuating slightly around 2.6%. Weakening inflationary pressures will continue, leading to an increase in household consumption. However, this positive effect will be significantly weakened by a much slower pace of wage growth (Ministry of Finance, 2023).

Domestic material consumption (DMC)

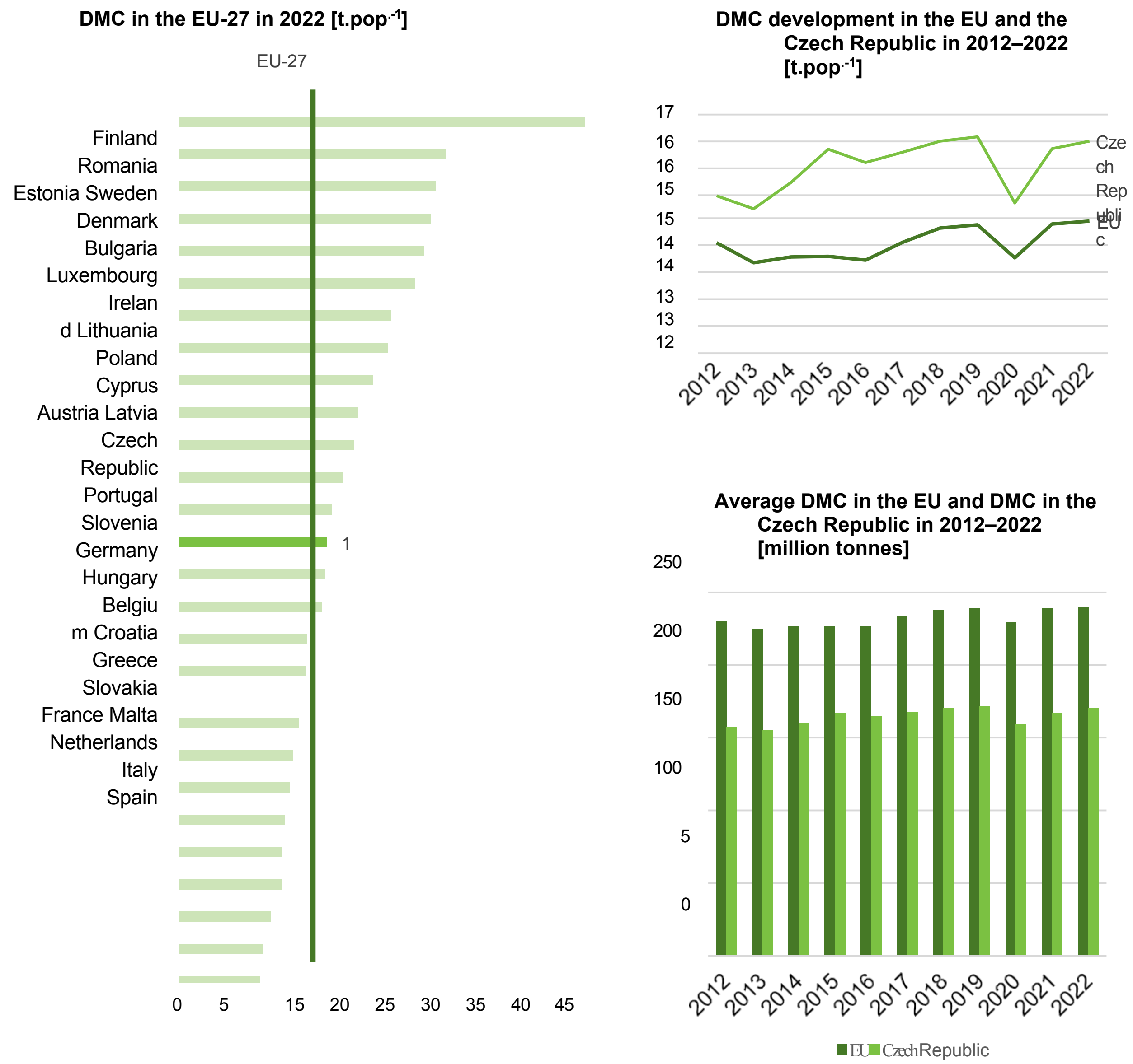
In order to produce services and goods to satisfy human needs, the economy needs to absorb substances from the surrounding environment. This socio-economic metabolism[13], or the transformation of inputs into outputs, is inextricably linked to the production of waste, which places a burden on the environment. Historically, economic growth and environmental pressure have been closely linked, with rising living standards leading to increasing pressure. However, in the pursuit of sustainable development, it has become a priority to separate the curves of economic performance and environmental pressure, or "decoupling."[14]

The results of the energy and material balance of the entire economy can be monitored using the aggregate environmental indicator **DMC (domestic material consumption).** The indicator tracks the total amount of materials used by the economy in a given year. **Between 2020 and 2022, DMC** increased by an average of 2.8 % **to reach 168 million tons in 2022,** compared to 166 million tons in 2020. Per capita, **domestic material consumption amounted to** 15.9 tons per capita in 2021 and **16 tons per capita in 2022. The Czech Republic has long reported above-average DMC values per capita compared to other European countries.** In 2022, it ranked 14th among the EU-27 member states.

[13] See, for example, Baccini and Brunner, 1991, or Fischer-Kowalski and Haberl, 1993.

[14] The term is an abbreviation of the English expression “decoupling of environmental pressure from economic performance” (OECD, 2002).

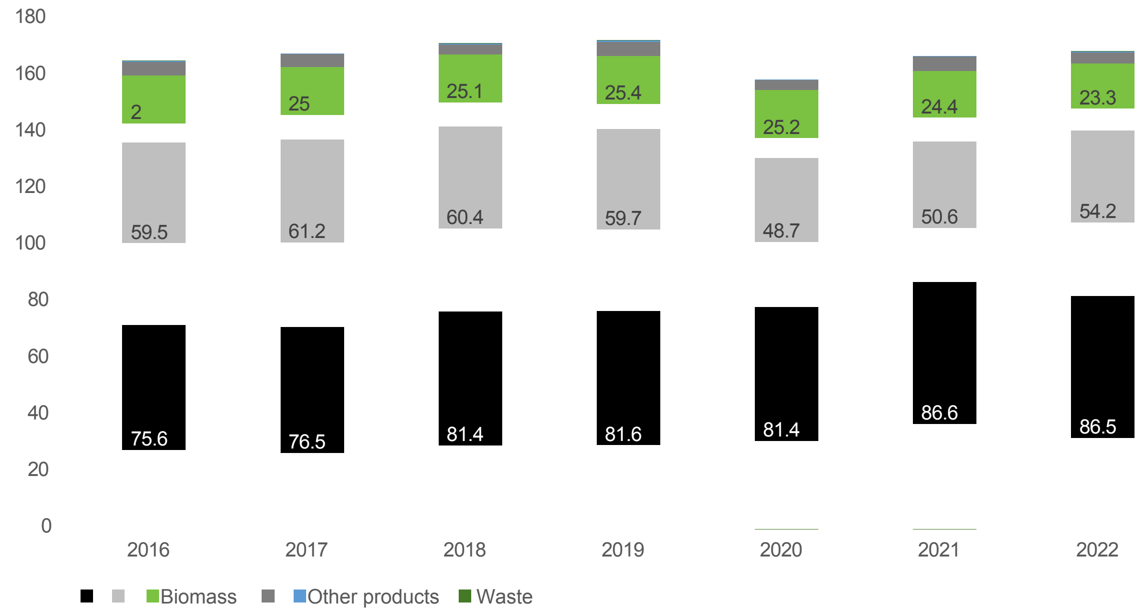
Chart 7: DMC in EU-27 countries



Source: own processing based on Eurostat, 2023.

Non-metallic minerals have long accounted for **the largest share of domestic material consumption** in the Czech Republic. Their DMC has been growing in recent years and was 14.4% higher in 2022 than in 2016. In absolute terms, the DMC of non-metallic minerals reached 86 million tons, which corresponds to 51.5% of the total DMC. Another significant flow is fossil fuels, which accounted for 32.3% of MMC in 2022 (54.2 million tons). However, their share is gradually declining, and in 2022, the MMC of fossil fuels was 9% lower than in 2016. Biomass accounted for just under 14% of the DMC in 2022 (23.3 million tons). This component of material consumption causes lower environmental impacts than the consumption of non-renewable resources, but its contribution to the DMC in the Czech Republic is among the lowest in the EU (ČSÚ, 2022c; CENIA, 2021b)..

Graph 8: Domestic material consumption by material category [million tons]



Source: CZSO, 2022c.

Material intensity (DMC/HDP)

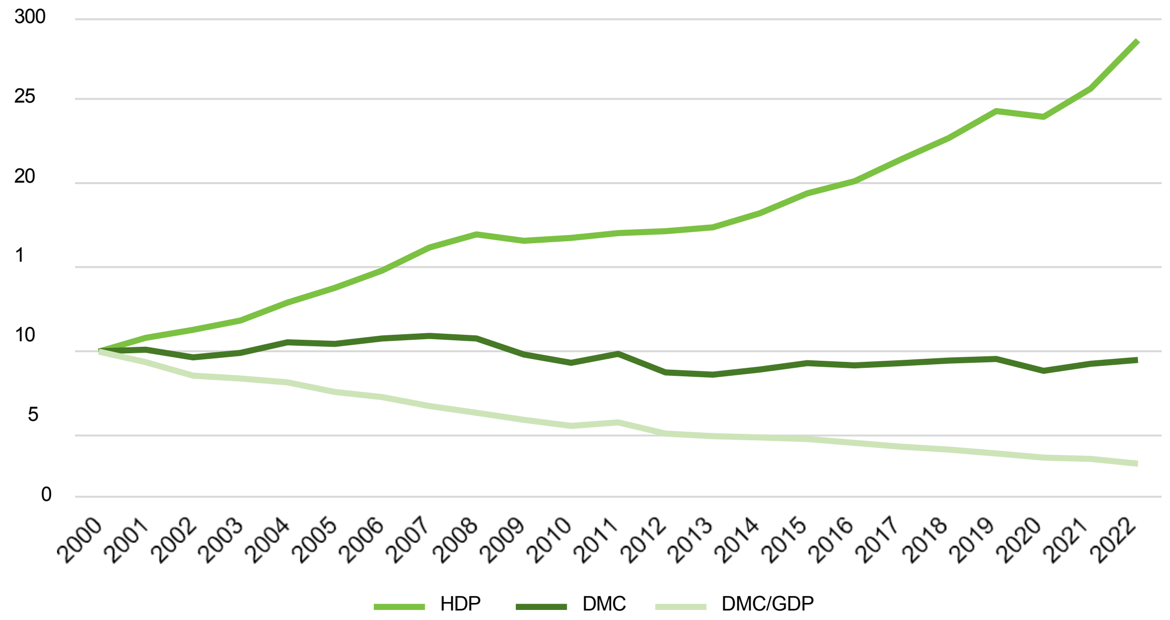
DMC is usually related to GDP, which provides information on the efficiency with which materials entering the economic system are transformed into economic output expressed in monetary units. This specific indicator is referred to as **the material intensity of the economy**.

Material intensity of the economy of the Czech Republic recorded a long-term decline, which reached 44.6% in the period 2000-2021. In 2020-2022, material intensity hovered around CZK 32/kg (CZK 31.71/kg in 2020, CZK 32.12/kg in 2021, and CZK 31.63/kg in 2022). The year-on-year comparison for 2020/2021 was affected by the COVID-19 pandemic, and due to the anti-epidemic measures adopted, decoupling did not occur (CENIA, 2023). However, **between 2021 and 2022, the material intensity returned to its pre-pandemic level and** even recorded a 1.5% decline. **The overall trend is therefore positive and indicates that the economy is achieving greater efficiency in the use of raw materials and materials to generate economic output.**

A number of factors contributed to the significant decoupling of economic growth from environmental pressure in the Czech Republic. First, **structural changes in the economy after 1989 led to more efficient use of resources and a reduction in the impact of industry on the environment**. Another key factor was **EU accession, which led to the implementation of a number of environmental regulations and the development of a legislative framework in this area. The** gradual **shift away from fossil fuels and the gradual focus on the development of renewable energy sources** contributed to the resulting decoupling**.** In the last three years, a number of institutional, legislative, and economic measures have been taken to reduce the impact of the economy on the environment. Strategic documents such as the Strategic Framework for the Czech Republic 2030 and the Strategic Framework for the Circular Economy of the Czech Republic 2040 have created a strong political framework for environmental measures in the country. At the same time, **the decarbonization of the economy has become a technological opportunity and a key element in tackling climate change. Investments in the Czech Republic's transition to a low-carbon economy have** made **a** significant **contribution. The European**

investment and structural funds, which in the previous programming period accounted for half of all capital expenditure in the Czech Republic in the area of support for improving energy efficiency across sectors.

Chart 9: Development of material intensity of the economy, domestic material consumption and GDP (b.c.) in the Czech Republic (index, 2000 = 100)



Source: own processing based on CZSO, 2023; CNB, 2023c.

2.1.4 PESTE nalysis

Waste management in the Czech Republic is influenced by many factors, the development of which can help minimize waste and increase sustainability. The PESTE analysis below maps the most important of these.

POLITICAL

- Political stability
- Government support
- Legislative environment
- Ambitious EU priorities
- Green Deal
- Regulation of cross-border waste shipments
- Emphasis on environmental protection and recycling
- Waste management hierarchy

ECONOMIC

- Economic cycles
- Supplier-customer relationships
- Imports of cheap primary raw materials
- Increasing landfill costs
- Availability of financing
- Large number of small waste producers
- Extended producer responsibility Extended (hereinafter also referred to as "EPR")
- General increase in price levels

SOCIAL

- Demographic trends
- Mobility for work
- Level of education
- Healthcare
- Lifestyle
- Motivation to sort
- Knowledge and Attitudes on People environmental issues
  xml-ph-0000@deepl.internal
- Active participation of consumers in the waste management system
- Approach of business entities to waste management

TECHNOLOGICAL

- Technological progress affecting production Waste
- Innovation for waste minimization
- End-of-life facility capacity
- Change in waste composition

ECOLOGICAL

- Environmental protection
- Climate change and adaptation measures

POLITICAL FACTORS

Political stability

The political situation in the Czech Republic is generally stable, which creates a favorable environment for the further development of waste management. However, there may be certain risks for this area in connection with changes in political leadership. Any changes may lead to changes in the political agenda and decisions.

Government support

Environmental protection and waste minimisation through the transition to a circular economy **are among the priorities of the current government set out in its policy statement**.[15] These efforts **include supporting the development of technologies for waste sorting, reuse and recycling, including support for recycling hubs, composting of bio-waste and the use of food waste**. Another **objective** is **to reduce the use of single-use packaging.** The current government also supports the introduction of sustainability requirements in public procurement and government and local government purchases as a means of preventing waste generation and reducing waste quantities. The aim is also to ensure conditions for research and development aimed at higher material efficiency in all production processes that are necessary for greater material self-sufficiency.

Individual aspects of waste management are covered in a number of strategic documents (see Chapter 1.3 for details), which, taken together, should contribute to the achievement of the objectives set in this area. The basic strategic document is the POH ČR.

Another important document is the Strategic Framework for the Circular Economy of the Czech Republic 2040 – Circular Czech Republic 2040. The global objective of this framework (see box on the right) reflects the effort to reduce waste while increasing the value created within the economy.

Less waste and more value for the Czech Republic.

Legislative environment

The Waste Act is a key instrument for achieving the waste management targets. **This legislation is driving the transformation of the waste sector, with an emphasis on sustainable principles and efficient waste management.**

Another **important law related to waste management is Act No. 542/2020 Coll., on end-of-life products**. which introduces measures relating to extended producer responsibility, meaning that producers are obliged to bear responsibility for the consequences and costs associated with the disposal of products at the end of their life cycle. More information on this concept can be found in the next section of this chapter. In addition, the Act contains provisions on the control and supervision of waste management, including penalties for violations of the established rules.

The area of packaging, which forms an integral part of many products, is regulated **by Act No. 477/2001 Coll., on packaging.** This regulation governs the rights and obligations of legal entities and natural persons when placing packaging on the market or into circulation, and sets out the take-back of packaging and the amount of packaging waste that must be recycled or recovered. Last year, an amendment to this law was submitted for inter-ministerial consultation, focusing on the issue of deposits on PET bottles and cans. Thanks to the planned changes**, more than 2.5 billion beverage containers should be recycled annually, which will further reduce the volume of unused waste and** protect

[15] Program Statement of the Government of the Czech Republic approved on January 6, 2022 Program Statement (revised version approved by the Cabinet on March 1, 2023).

nature from pollution. **It is expected that the deposit system could be launched in 2027.**

In recent years, **emphasis** has also been placed **on reducing the use of single-use plastics**. In 2022, a law on reducing the environmental impact of selected plastic products came into force, which includes several types of measures. These include a complete ban on specific single-use plastic products (e.g., plastic cotton buds, plastic cutlery, plates, straws), a gradual reduction in the consumption of others, and an obligation for manufacturers to inform buyers about the proper handling of such waste.

Ambitious EU priorities

As an EU member state, the Czech Republic must also reflect developments at the European level. Alongside the emphasis on technological development, there is a growing call for the implementation of the green agenda, which has resulted in **the adoption of** the European Green Deal. The Czech Republic must also take measures to meet a number of ambitious targets, such as **achieving 65% municipal waste recycling** by the end of 2035**,** which involves **a** significant **reduction in landfilling.**

Green Deal

The Green Deal for Europe is a set of political initiatives designed **to** lead the EU **towards a green transformation with the aim of achieving climate neutrality by 2050**. The Green Deal includes measures across various sectors, including energy, industry, agriculture, transport, and education, with an emphasis on linking economic growth with environmental sustainability. This approach is expected to **promote more efficient waste management, increase recycling, and reduce landfilling,** although the specific impacts will depend on the implementation of policies and initiatives at both EU and national levels.[16]

Regulation of cross-border waste shipments

Due to its international nature, the regulation of cross-border waste transport (import of waste into the Czech Republic, export of waste from the Czech Republic, and transit of waste through the Czech Republic) is based on uniform rules laid down by European Community regulations. The directly applicable legal regulation is Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of June 14, 2006, on shipments of waste. The regulation defines three control regimes for cross-border shipments of waste. The first regime allows the shipment of waste with the required information without the need to notify the authorities of the countries concerned and wait for their consent. The second regime requires notification and approval by the competent authorities of the countries concerned prior to the shipment of waste. The third regime prohibits the shipment of waste and does not allow it under any circumstances. **The shipment of waste for disposal to the Czech Republic is prohibited,** but from the Czech Republic to other EU Member States it is only permitted if there is no suitable disposal facility available in the Czech Republic. Conversely, **the shipment of waste for disposal to countries outside the EU is prohibited.** These measures aim to regulate and control the movement of waste across borders with regard to the environment and in an effort to minimize negative impacts.

Emphasis on environmental protection and recycling

The growing emphasis on environmental protection and recycling reflects current interests and priorities set at the international level. Countries sign agreements and make commitments within international institutions that influence companies' obligations in terms of sustainability and environmental responsibility. Political decisions at the international level, such as emission limits, recycling quotas, or support for renewable energy sources, have a significant impact on waste management actors and waste management itself in the Czech Republic.

Waste management hierarchy

[16] European Green Deal

The hierarchy determines the order of preferred waste treatment methods that minimize the negative impact on the environment. **Waste management actors should aim to move up the hierarchy, for example by giving greater priority to recycling and reducing the amount of waste sent to landfills**. Higher recycling rates would promote the production and consumption of environmentally friendly products.

ECONOMIC FACTORS

Economic cycles

Economic factors have a significant impact on the further development of waste management, as they can motivate waste producers to reduce waste production or to increase sorting and recycling. During periods of recession, for example, there is a decline in demand, which can lead to a slowdown in production and lower economic growth, as well as waste production. On the other hand, when the economy recovers, consumption and production may increase, which in the long term could mean increased waste production and environmental pollution. The economics of technology operation may therefore be subject to these fluctuations.

Supplier-customer relationships

Another factor that significantly influences waste management **is the securing of supplier-customer relationships**. In waste management, municipalities typically issue public tenders for waste collection for several years. In the case of in-house contracts, waste supply contracts are usually concluded for long periods, which brings stability to the investment economy. In view of the landfill ban, securing a municipal waste management strategy is a key factor.

Supplier-customer relationships can also be of crucial importance in the handling of waste that exhibits at least one hazardous property according to applicable legislation[17] (e.g., toxicity, infectivity). If a manufacturer or supplier uses hazardous chemicals in their processes, it is essential that the customer is informed of this fact in a timely and accurate manner. This means that the customer must have thoroughly developed procedures and appropriate means for the proper and safe handling of such hazardous waste chemical compounds, including their disposal.

Imports of cheap primary raw materials

Imports of cheap primary materials can have a negative impact on waste management in the Czech Republic. This problem is related to globalization and open markets, where some raw materials are imported from other countries to the Czech Republic at low prices, which can negatively affect waste recycling and sorting in the Czech Republic.

Imported cheap primary raw materials may compete with domestic secondary raw materials, which may lead to a decline in demand for domestic waste processing. This may also have a negative impact on the number of jobs in waste management, which could lead to an increasing trend in landfilling and increased environmental burdens. In addition, **imported primary materials may be of lower quality and therefore more difficult to sort or recycle,** which can complicate the waste management process and increase processing costs. This can also reduce the quality of waste treatment and recycling and lead to more waste being disposed of in landfills.

Increasing landfill costs

In line with European targets, the new Waste Act introduces a gradual increase in the fee for landfilling recoverable and recyclable waste. From the original CZK 500 per ton of municipal waste, the fee increased to CZK 800 in 2021, then to CZK 1,000 in 2023, CZK 1,500 in 2025,

[17] Annex to Commission Regulation (EU) No. 1357/2014 of December 18, 2014, replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste.

up to CZK 1,850 in 2029. **The increase in prices associated with landfill fees is expected to divert waste away from landfills and boost the further development of the recycling industry.**

Availability of financing

The availability of financing is also an important economic factor, which is becoming a pressing issue in a period of public finance consolidation. Despite limited financial resources at the national level, **there is the possibility of drawing additional resources from European Structural and Investment Funds.** This option includes the Environment and Technology and Applications for Competitiveness operational programs, as well as the National Recovery Plan, the Modernization Fund, and various community programs such as Horizon, LIFE, and Interreg.

Large number of small waste producers

The Czech Republic is unique in that it has a large number of small municipalities that produce small amounts of waste. These small amounts must be transported to processing facilities. Each waste producer usually has its own contractual relationship with an authorized waste management company. There are cases where several producers are linked under a single contract. This fragmentation creates space for smaller processors in the market environment. At the same time, fragmentation is a certain barrier to the conceptual solution of a given waste stream. Due to the specific situation and fragmented market, large-capacity end-of-pipe facilities are only suitable in locations where a certain amount of input waste is guaranteed. A systematic waste management solution requires the fragmentation of the market into larger units. For these reasons, waste streams must be managed at a higher territorial level. Within micro-regions or voluntary associations of municipalities (hereinafter referred to as "DSO"), a sufficient quantity of individual waste streams for processing technology may already be generated.

Extended producer responsibility

EPR is a set of measures aimed at ensuring that **producers bear financial responsibility or organizational responsibility for a product within the life** EPR uses financial incentives to encourage manufacturers to design products that are environmentally friendly. The rationale behind EPR is that manufacturers have key control over the design and marketing of their products and are therefore best **placed and** most **responsible for reducing toxicity and minimizing waste.**

Shifting responsibility to the manufacturer, who is also the polluter, is not only a matter of environmental policy, but also the most effective measure for achieving higher environmental standards in product development. At the same time, manufacturers tend to pass on increased costs to product prices, which may discourage some customers and indirectly contribute to a reduction in waste. However, EPR can also have negative effects in the form of increased administrative burdens and a distorted market environment. Measures should therefore be appropriately tailored to the functioning of the market for the commodity in question.

General increase in price levels

A general increase in price levels can have far-reaching effects on waste management and consumer behavior in an economic context, which has a fundamental impact on the overall dynamics of the waste sector. In **a context of rising prices, costs related to waste handling, recycling, and further treatment may be significantly affected.** This can have far-reaching consequences for the economic sustainability of waste management and, consequently, its efficiency.

Inflation can also have a significant impact on consumer behavior. With rising prices for products and services, consumers tend to adapt their behavior to minimize their spending. This can lead to changes in the handling of products and waste materials, reflecting consumers' efforts to make more optimal use of them. Such a change in consumer behavior can have a significant impact on the overall the quantity and composition of waste generated in a given economy. Changes in the structural composition of waste may occur, which can significantly affect strategies and procedures for its further treatment and recycling.

SOCIAL FACTORS

Demographic trends

The aging population in the Czech Republic may have a negative impact on waste management in the future, especially if there is a reduction in the number of workers in this area. Waste sorting and recycling are labor-intensive activities that require skilled workers who specialize in this field. If the trend of an aging population and a shortage of skilled workers continues, it may lead to problems, a deterioration in the quality of waste management, and higher waste management costs.

In addition, **the aging population may also affect product consumption and waste production**. With the growing number of seniors, the average age of households is increasing and the number of people per household is decreasing. This may result in less municipal waste per person, but it may also lead to more healthcare waste due to the higher incidence of health problems in the senior population.

Mobility for work

Urbanization and migration from rural areas to cities could have a positive impact on waste management in the Czech Republic, as cities generally have more efficient waste management systems.

Cities usually have better waste management systems and are able to process larger amounts of waste per unit of populated area. Waste management companies in cities may be better equipped with modern recycling and composting technologies, which can lead to higher recycling rates and reduce the amount of waste sent to landfills.

A larger population, together with higher consumption and industrial activity in urban areas, can lead to increased waste production and thus higher waste management costs. In addition, urbanization is also associated with high resource consumption, which can lead to a further increase in waste.

Level of education

Increased demand for skilled workers in technical fields due to technological progress and digitization may have a significant impact on waste management in the Czech Republic. Waste production, sorting, and recycling are fields that require skilled workers with specialized engineering education.

A shortage of skilled workers in this sector could jeopardize proper waste management and reduce the quality of waste treatment and recycling. A shortage of skilled workers could lead to insufficiently trained personnel in the waste management sector, which could increase the risk of environmental disasters.

However, **increased interest in technical fields and education is a positive trend for sectors** such as waste management. High demand for skilled workers may highlight the importance of these fields and help attract more people to the waste management sector. In addition, universities and educational institutions can respond to this increased interest by providing students with relevant education and opportunities to gain practical experience.

Healthcare

The quality of healthcare plays a role in waste management. **Healthcare for employees has a direct impact on their productivity, performance, and morale at work**, which can affect the overall atmosphere in the workplace. Workers in the waste management sector are exposed to risks such as injury, poisoning, and infection. It is therefore important to provide health services and prevention measures for employees. Workers must be trained in occupational health and safety and equipped with appropriate protective equipment.

The availability and coverage of healthcare in the Czech Republic are among the highest in the OECD. (National Health Information Portal, 2023).

Lifestyle

Lifestyle influences the amount of waste produced by individuals and households, and thus the total amount of waste produced by society. The general increase in price levels affects the accessibility and cost of waste management for individuals and businesses.

People's attitudes towards waste are gradually changing, with higher rates of sorting and active composting at home, leading to a reduction in mixed municipal waste. Changes are also evident in attitudes towards packaging, with consumers preferring products with less packaging material and new initiatives such as **packaging-free shops** emerging. At the same time, second-hand shops are becoming more popular, which **reduces the amount of textile waste.** Rising food and other product prices are encouraging lower consumption. If these trends continue, there may be a reduction in municipal waste and a decrease in waste entering waste treatment facilities.

Motivation to sort

Growing political and social pressure to sort waste is increasing citizens' motivation to sort, and this can be supported by economic incentives such as PAYT ("Pay As You Throw"). PAYT is a municipal waste collection and payment system where citizens pay for the actual amount of waste they produce. In practice, this involves assigning each household its own waste bins, with the collection vehicle equipped with a weighing system that measures the weight of the waste collected. Citizens are then charged only for the actual amount of waste, measured in kilograms. This system motivates citizens to reduce the amount of mixed municipal waste in particular and to sort waste more intensively. However, opponents of this system express concerns about possible circumvention of the system, for example through the creation of illegal dumps.

Waste sorting leads to better use of materials, which has a positive impact on the environment. At the same time, it supports the economy in the area of waste recycling. **The growing trend of waste sorting in the Czech Republic may affect inputs to waste facilities**, which is an important component of waste management. Motivated sorting by citizens also enables more effective planning and implementation of waste policies and programs that focus on sustainability and minimizing negative impacts on the environment.

People's knowledge and attitudes towards environmental issues and waste sorting

Currently, **Czech citizens are showing increased interest in environmental issues**. The latest survey by the Public Opinion Research Center showed that "living in a healthy environment" is among the most important social values, ranking third (95% of respondents answered "very important" or "rather important") (CVVM 2023). **Waste sorting has become a** common **part of** everyday life**,** with 75% of the population sorting waste in 2022 (EKO-KOM, 2023). However, there is still a section of the population that is unwilling to make too many sacrifices for the sake of the environment.

Active consumer participation in the waste management system

Active consumer participation is essential for effective waste management. This includes the responsible disposal of waste at specific locations, such as collection yards, recycling centers, or containers. Without the willingness and ability of residents to dispose of their waste properly and in an environmentally friendly manner, the entire system would cease to function.

Businesses' approach to waste management

Companies' approach to waste is influenced by both legal obligations and the practical application of these rules. Self-employed persons who operate from their place of permanent residence have legal obligations to dispose of waste as waste producers. To fulfill their obligations, they may also use the municipal waste collection and disposal system on the basis of a contract with the municipality in which they operate. In practice, however, a certain proportion of small businesses use the municipal waste management system intended for households without authorization, which can lead to non-payment of the relevant fees and disproportionate use of this system. This **situation could be improved by better informing and educating entrepreneurs about** their waste obligations.

In the case of legal entities or self-employed individuals, at least a small amount of waste will be generated in most cases. In cases where legal entities or self-employed individuals carry out their activities primarily electronically, waste may be generated, for example, from minor administrative activities, but with higher digitization, it can be accepted that their activities may not generate any waste. Even today, there are cases of legal entities and natural persons who translator, accountant, designer, project manager, etc.), where there is a strong presumption that they spend their breaks and rest periods in their households, where they produce waste that is then classified as municipal waste produced in households. In such cases, they do not need to have a contract for the transfer of waste, including municipal waste.

Legal entities and large companies are often producers of industrial waste and face the challenge of managing and processing this waste, which often contains hazardous substances. The diversity of industrial sectors requires specific waste management procedures, with safety and environmental considerations being key aspects. In the field of industrial waste, **effective regulation and management of waste in accordance with legislation and environmental standards** is **important.**

TECHNOLOGICAL FACTORS

Technological advances affecting waste production

With continuous technological progress, new types of waste are emerging, especially in the field of electronics. Wearable electronics are an increasingly important segment of electronic waste. The inhabitants of the Czech Republic are **characterized as consumers of modern technological innovations and seek out new products.** For example, between 2000 and 2015, the number of mobile phones in Czech households increased almost fivefold. Approximately 11,000 smart devices are sold on the Czech market every day, of which 8,500 are mobile phones. In addition to the products themselves, the material structure of products is also changing. This requires **the adaptation of recycling and end-of-life facilities for the treatment of products when they become waste.**

Innovation for waste minimization

At the same time, technological developments are bringing innovative approaches to efficient waste treatment and recycling. These innovations include **advanced waste sorting methods**, such as those focused on hard-to-recycle waste for mixed plastics or specific industrial waste streams. Currently

, **innovative thermochemical technologies are being developed** that focus on the production of recycled polymers **through chemical recycling**. Opportunities are offered **by the use of digital technologies,** which are applied, for example, to increase efficiency and optimize the value chain using AI or blockchain. Similar innovations contribute to more sustainable waste management and reduce environmental impact.

End-of-life facility capacities

The availability of capacity for the management of different waste streams varies. **Capacity is** particularly **insufficient** in the area of end-of-life facilities **for hazardous waste**. In terms of quality, there is insufficient capacity for mixed municipal waste management and recycling. These shortcomings are **caused by the NIMBY effect and** also **by** the economics of operating such facilities, including supplier-customer relationships. **The state of technological equipment capacity may limit the development of waste management in the desired direction.**

Change in waste composition

Significant changes in waste composition can in many cases lead to the need to adapt waste technologies and infrastructure, which can be costly and time-consuming. In recent years**, there has been an increase in the proportion of packaging materials in waste, mainly plastics and composite packaging.** This trend can have a significant impact on waste management, as **plastics are expensive to recycle and** can also have a negative impact on the environment.

Another important change in recent years is **the increasing amount of electronic waste**, which in turn requires further development and use of technologies for its recycling. Electronic waste contains many rare metals, which makes its recycling very important and beneficial for the economy as well as for the environment.

Changes in legislation, European regulations, the implementation of EPR systems, and initiatives by material flow producers, particularly in the PET and can sectors, together with changing consumer behavior, may lead to a reduction in the production of certain plastic materials and their replacement with even more recyclable and stable alternatives.

ENVIRONMENTAL FACTORS

Environmental protection

A well-functioning waste management system is key to reducing the burden caused by economic activity. Efforts to protect the environment can support initiatives to recycle and minimize waste. **Reuse and recovery,** such as waste heat recovery and biomass utilization, **also contribute to the sustainability of waste management**.

Climate change and adaptation measures

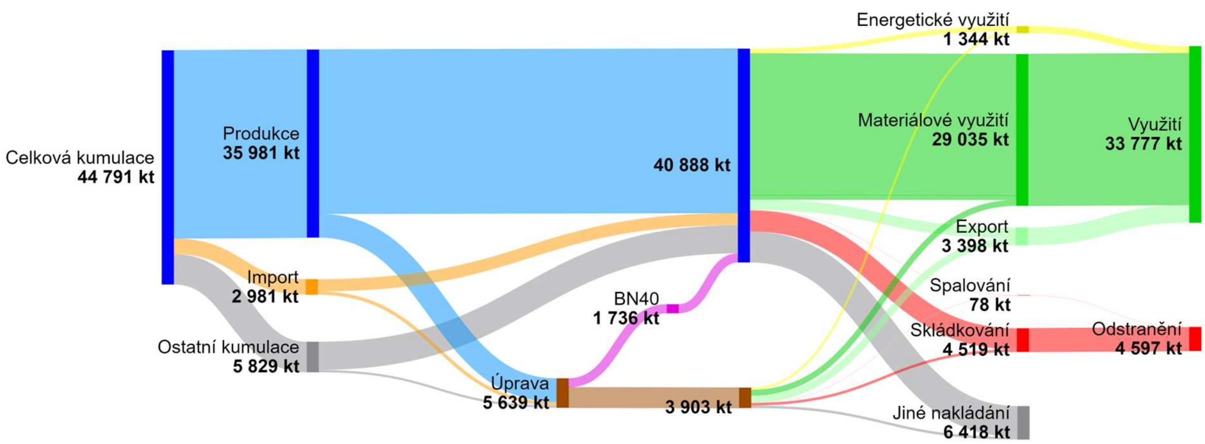
Climate change brings with it an increased likelihood of extreme events, with an expected increase in the intensity and frequency of extreme weather events and long-term droughts. This climate variability can cause floods, landslides, and forest fires, which **have the potential to affect waste systems and infrastructure**. The increasing frequency and intensity of these phenomena may also pose a threat to the energy system and waste management infrastructure. Last but not least, these events usually generate large amounts of demolition and often hazardous waste. This waste must be handled in the best possible way within a relatively short period of time. In this context**, it** is **essential to adopt adaptation measures aimed at minimizing risks and strengthening the resilience of infrastructure.** These measures are necessary to maintain the functionality of waste management in times of increasing climate variability and extreme events.

2.2 Status and development of waste management in the Czech Republic

2.2.1 The state of waste management in the Czech Republic

The state of waste management in the Czech Republic is very good. The network of facilities is well developed and enables the safe handling of all types of waste. A basic visualization of the flow of all waste from production to disposal is shown in Figure 10. The import of all waste relative to total production is negligible. More significant is the amount that is processed in a given year and was produced in the previous year. Most of the waste that is disposed of is recycled. Recycling reached 83% in 2022. The Czech Republic also uses waste for energy, with four waste-to-energy plants in operation with a total processing capacity of 858,000 tons. In 2022, energy recovery accounted for only 3% of all waste, with municipal waste being the main source of energy (see below). A total of 13% of all waste is landfilled. The Czech Republic has an extensive network of modern landfills for inert, hazardous, and other waste. Waste management in the Czech Republic is undergoing significant changes towards more sustainable management.

Chart 10: Waste flow in the Czech Republic in 2022 – Total waste production



Note: Production quantities include only primary production. Source:

processed based on ISOH

In 2021, new legislation came into force that increases the emphasis on recycling and reducing the amount of waste sent to landfills. As a result of the introduction of various measures, technological developments, investment support, education, and awareness-raising, recycling is on the rise, but challenges remain in the area of waste management, particularly municipal waste. The Czech Republic is also seeking to invest more in modern waste treatment technologies. New legislation, which will ban the landfilling of recoverable municipal waste from 2030, has also accelerated the preparation of new projects for waste-to-energy. In its June [2023] report, the European Commission assessed that the Czech Republic is one of nine countries that are on track to meet the 2025 municipal waste management targets. Overall, waste management in the Czech Republic is moving towards greater sustainability and efficiency, but the path to optimal results is still the subject of long-term efforts.

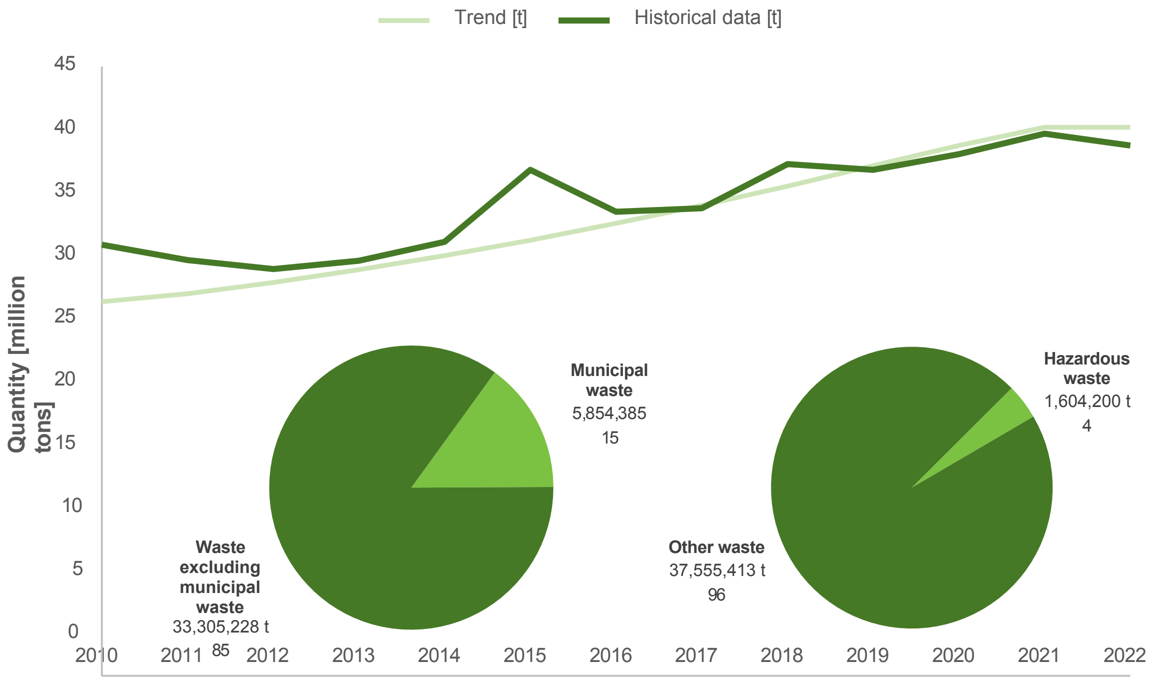
[18] REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND THE COMMITTEE OF THE REGIONS identifying Member States at risk of not meeting their targets for preparation for reuse and recycling of municipal waste by 2025, the packaging waste recycling target for 2025 and the municipal waste landfill reduction target for 2035, June 2023, COM (2023) 304 final

The following text provides key information on waste generation in the Czech Republic and developments in waste management. Chapter 2.3 then provides more detailed data on the individual waste streams that make up the total amount generated.

Waste production can be divided into primary and secondary production. Secondary production simply includes waste from waste processing. When assessing the amount of production, both groups, i.e. primary and secondary production, are taken into account. In the case of input management, only primary production is taken into account, as secondary production arises during their management.

The production of all waste has increased since 2012 to 39.2 million tons in 2022. Waste production in the Czech Republic has therefore been growing steadily in the long term (Chart 11), although there was a slight decline in production in 2022, which may indicate the beginning of a positive change in the trend. Comparing GDP and waste production, it can be seen that between 2013 and 2022, GDP grew by 66% *(*see Chapter 2*.1.3),* while waste production grew by only 23%. At the same time, waste production per unit of GDP has also been declining since 2015. In 2022, this amounted to 5.78 million tons of waste per 1 trillion CZK.

Chart 11: Development of total waste production in the Czech Republic



Source: processed based on ISOH and Tiramiso

Table 2: Waste production and management (relative to production in the Czech Republic) in 2018–2022

Year	Production [million tons]	**Recycled [%]**	**Of which material recovery [**	**Of which energy Utilized [**	**Disposed [**	**Of which landfilled** [%]	**Other disposal** [%]
2018	37	**86**	83	3	**9**	9	**5**
2019	37.4	**88**	84.5	3.5	**9.5**	9.5	**2**
2020	38.5	**90**	86	4	**10**	10	**0**
2021	40	**87**	84	3	**13**	13	**0**
2022	39.1	**86**	83	3	**13**	13	**1**

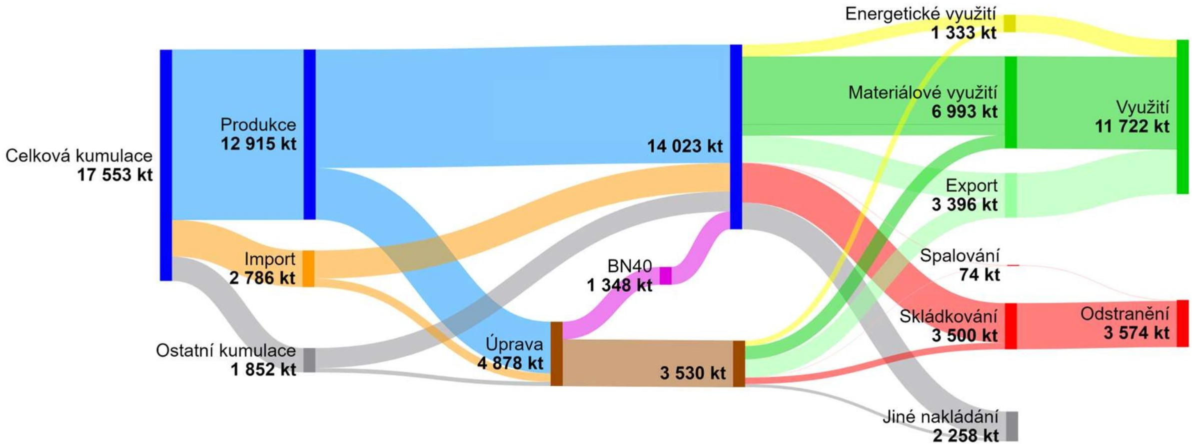
Source: ISOH, Ministry of the Environment 2024

Note: Data are processed according to the valid methodology of the Ministry of the Environment for the System of Waste Management Indicators of the Czech Republic (for the given year).

Production excluding mineral waste

Waste production and management can be assessed in more detail from various perspectives. Mineral waste is a significant waste stream, with production in 2022 amounting to 23 million tons, most of which is recycled (95%). It is therefore appropriate to also analyze the production of all waste excluding mineral waste (Chart 12). The production of all waste excluding mineral waste in 2022 amounted to approximately 13 million tons, and production has been declining slightly in recent years. Approximately half of this stream was recycled. Energy recovery and disposal are also significant.

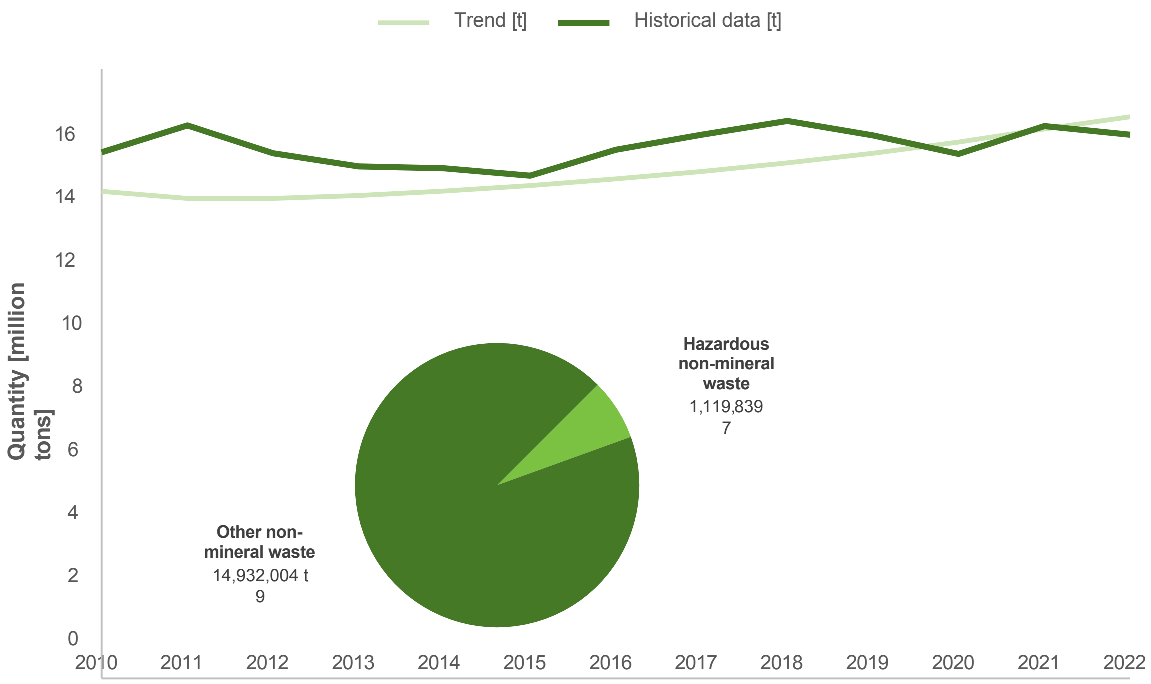
Graph 12: Waste stream in the Czech Republic in 2022 – Total waste production excluding mineral waste



Note: The amount of production includes only primary production. Source:

processed on the basis of ISOH

Chart 13: Development of total waste production excluding mineral waste in the Czech Republic



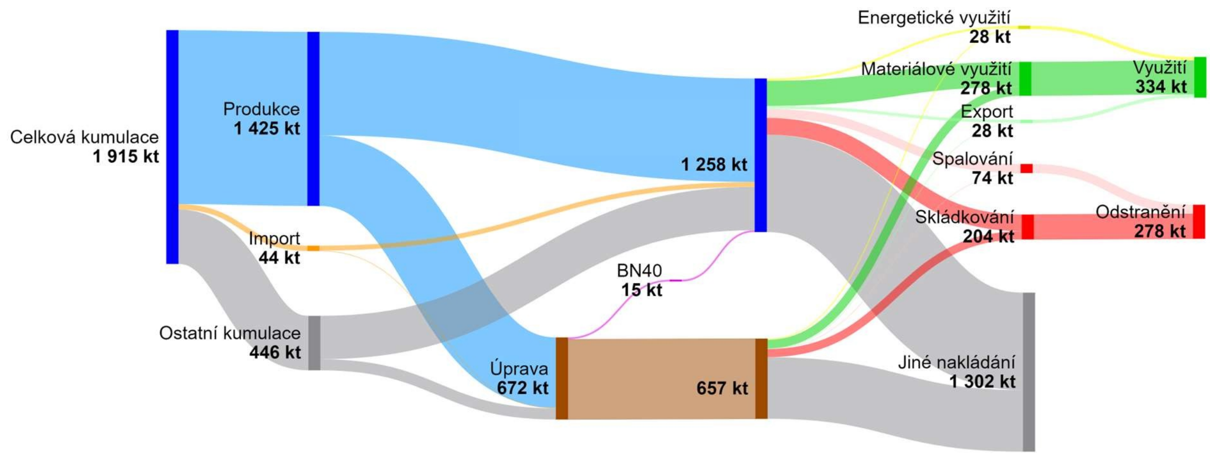
Source: processed based on ISOH and Tiramiso

Furthermore, the key conclusions on production and handling are summarized, broken down by category (other/hazardous), with the conclusions for hazardous waste and, where applicable, by source (municipal/other), with conclusions for municipal waste. Flows and sub-flows were also defined for the assessment of waste management developments. Summaries are provided in Chapter 2.3.

Hazardous waste

Waste in the other category accounts for a significant proportion (96% in 2022) of total production, but hazardous waste is an important stream due to its potential impact on the environment and the population. The Czech Republic has an established institute for the assessment of hazardous properties by authorized persons. The Czech Republic also has a well-developed system for the collection of hazardous waste by municipalities through collection yards and mobile collection in municipalities, which were often built with EU subsidy programs. The production of hazardous waste fluctuates in waves. In 2021 and 2022, production fell to 1.6 million tons. There was also a decline in the longer period from 2012 to 2022. Part of this production is represented by hazardous waste generated by the treatment of other hazardous waste. Primary production of hazardous waste was 1.4 million tons in 2022. Rules have been established for the collection of waste from health and veterinary care. Technologies for removing hazardous properties from waste (physical and chemical treatment, decontamination) are being developed. Hazardous waste is handled in the Czech Republic in accordance with legislation. Twenty-one percent of hazardous waste is recycled, and only 5.2% is incinerated in specialized facilities. The handling of hazardous waste is dominated by "other handling," which includes various methods of treatment prior to reuse or disposal.

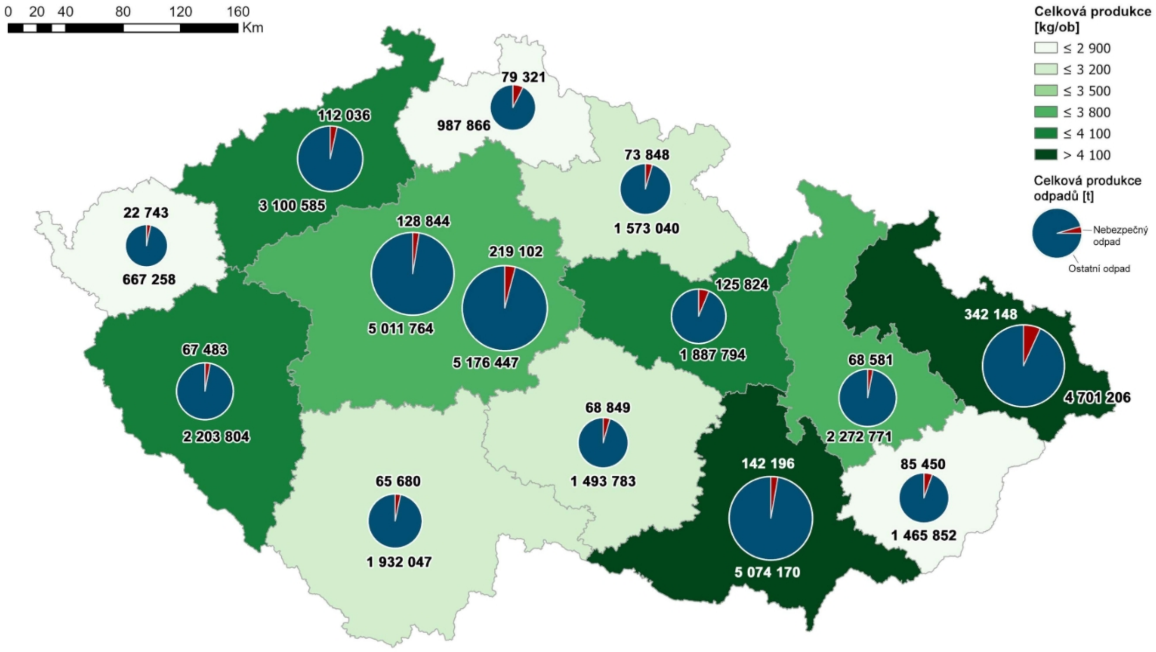
Chart 14: Waste flow in the Czech Republic in 2022 – Hazardous waste



Note: Production quantities include only primary production. Source:

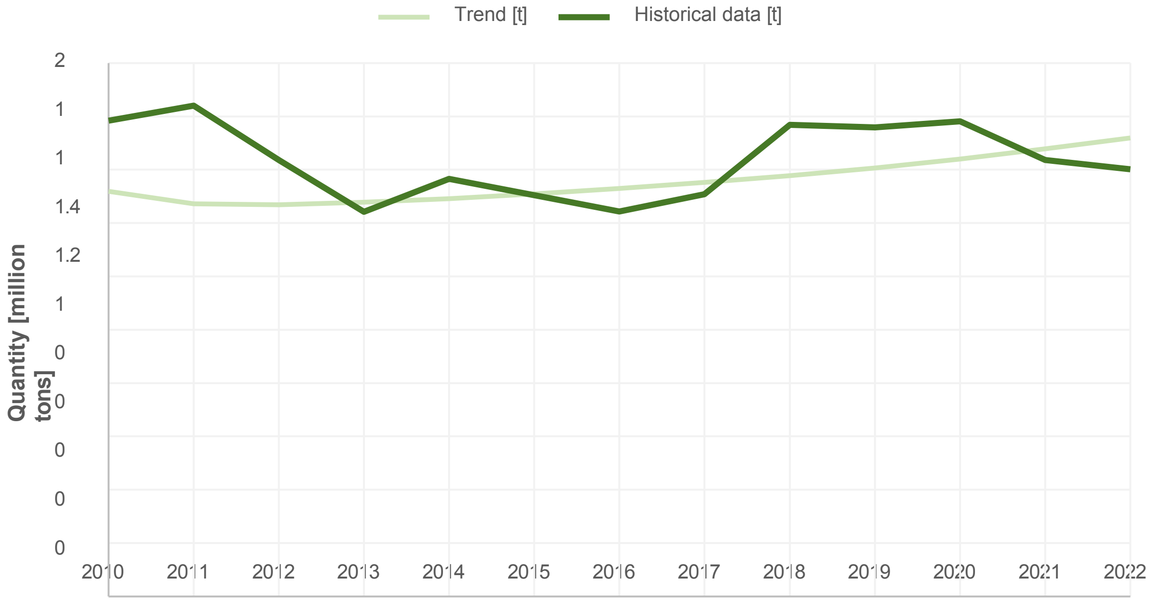
processed based on ISOH

Figure 6: Production of other and hazardous waste by region in 2022



Source: processed based on ISOH

Chart 15: Development of hazardous waste production in the Czech Republic

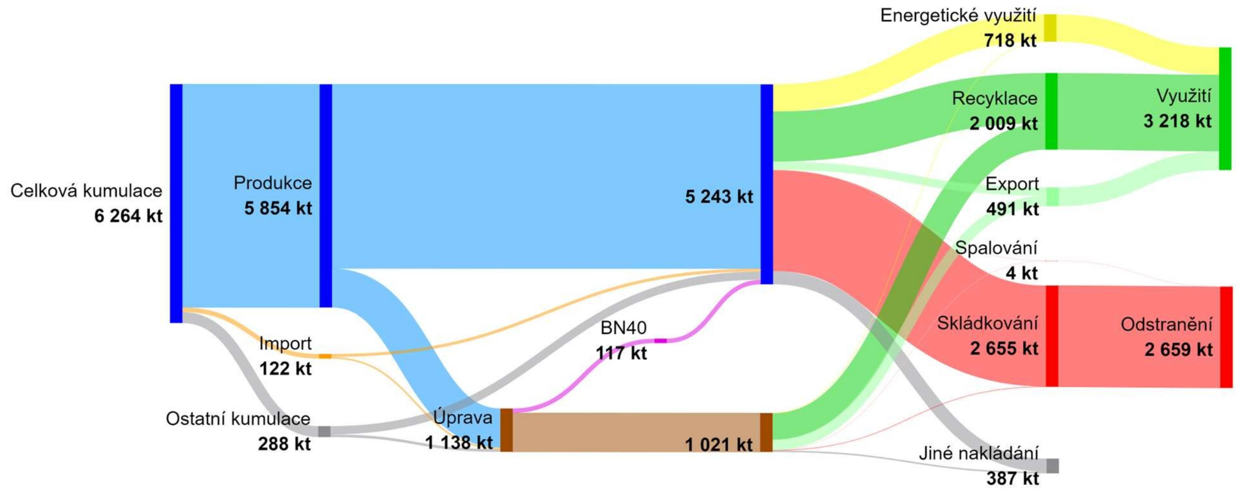


Source: compiled based on ISOH and Tiramiso

Municipal waste

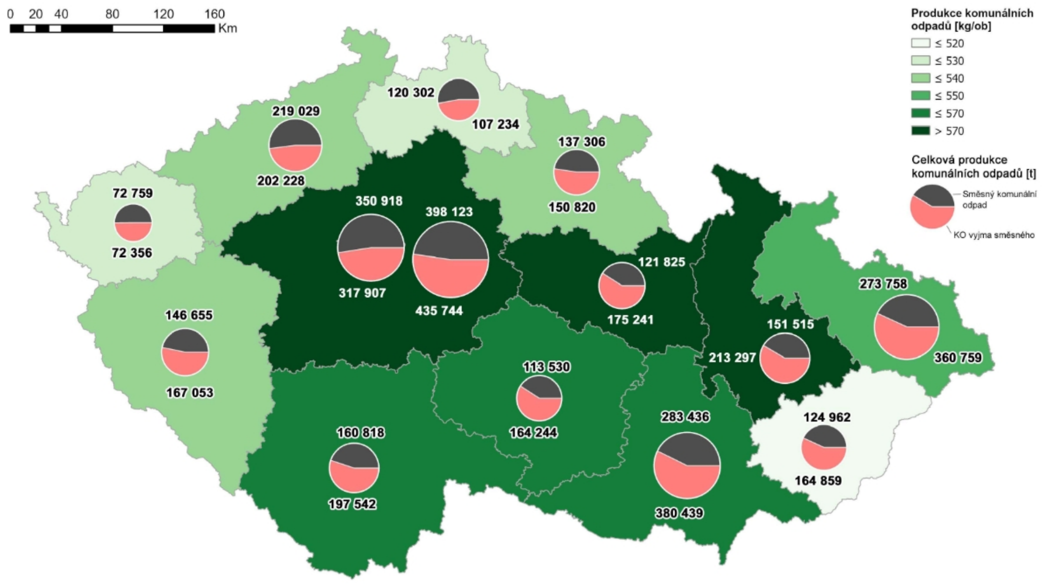
Municipal waste production also increased by 11.5% in the period 2012–2022, reaching 5.8 million tons in 2022. In 2022, municipal waste production per capita was 553 kg. The current trend of increasing specific municipal waste production continues. This is mainly due to the increasing production of biodegradable municipal waste thanks to more intensive collection in municipalities. The share of municipal waste in the total amount of waste produced remains around 15% (14.8% in 2022). In the individual regions of the Czech Republic, total waste production (including per capita) and the ratio between other waste and hazardous waste production vary depending on the different economic focuses of the individual regions. The municipal waste recycling rate is 41%, 13% of municipal waste is used for energy, and 45% is landfilled. Although municipal waste recycling is also gradually increasing, analyses of mixed municipal waste, which are systematically processed, show that there is still potential for a more efficient system of separate collection and sorting of municipal waste.

Chart 16: Waste flow in the Czech Republic in 2022 – Municipal waste



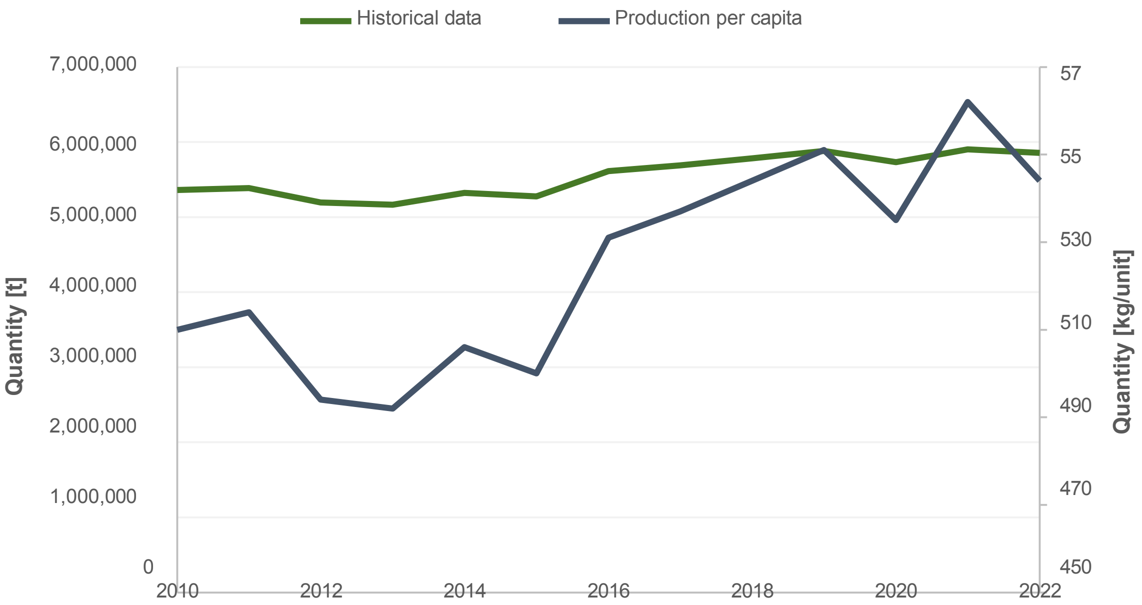
Note: Production quantities include only primary production. Source: Prepared on the basis of ISOH

Figure 7: Production of municipal waste and mixed municipal waste by region in 2022



Source: Prepared based on ISOH

Chart 17: Development of municipal waste production in the Czech Republic



Source: Prepared based on ISOH and Tiramiso

Table 3: Production of municipal waste and mixed municipal waste in 2018–2022

Year	Municipal waste production [t	Municipal waste production per capita [kg/capita]	Mixed municipal waste production [t	Production of mixed municipal waste per capita [kg/capita]
2	5,782,066	544	2,807,422	264
2019	5,879,163	551	2,787,356	261
2020	5,729,917	535	2,780,347	260
2021	5,904,434	562	2,755,893	262
2022	5,854,385	553	2,679,347	254

Source: ISOH, Ministry of the Environment
Note: Data are processed according to the valid methodology of the Ministry of the Environment for the System of Waste Management Indicators of the Czech Republic (for the given year).

Table 4: Municipal waste production and treatment (relative to municipal waste production)

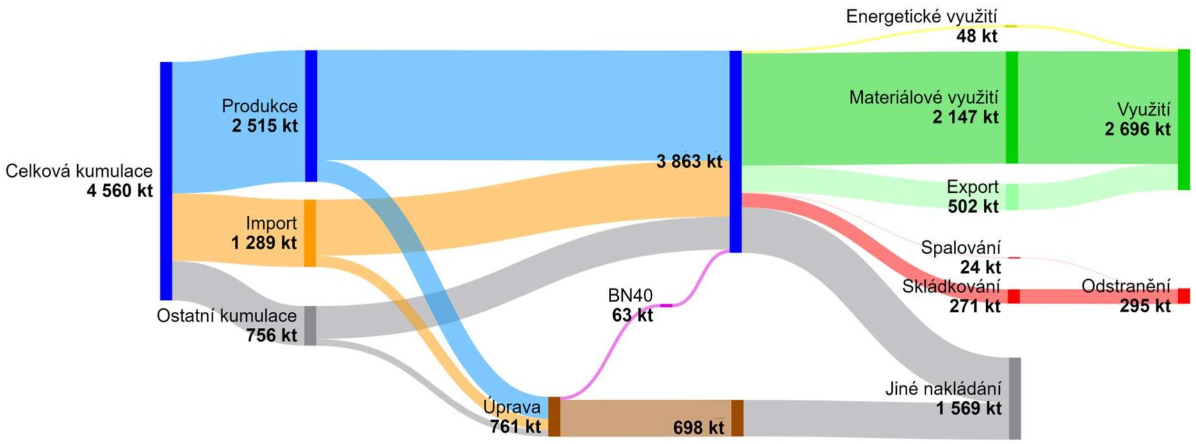
Year	Production [million tons]	Recycled [%]	Of which material recovery [	Of which energy Utilized [	Disposed of [%]	Of which landfilled [%]	Other disposal [%]
2018	5.8	**51**	3	12	**46**	46	**3**
2019	5.9	**53**	41	12	**46**	46	**1**
2020	5.7	**51**	39	12	**48**	48	**1**
2021	5.9	**52**	40	12	**47**	47	**1**
2022	5.8	**53**	41	12	**45**	45	**2**

Source: ISOH, Ministry of the Environment 2024
Note: Data are processed according to the valid methodology of the Ministry of the Environment for the System of Waste Management Indicators of the Czech Republic (for the given year).

Industrial waste

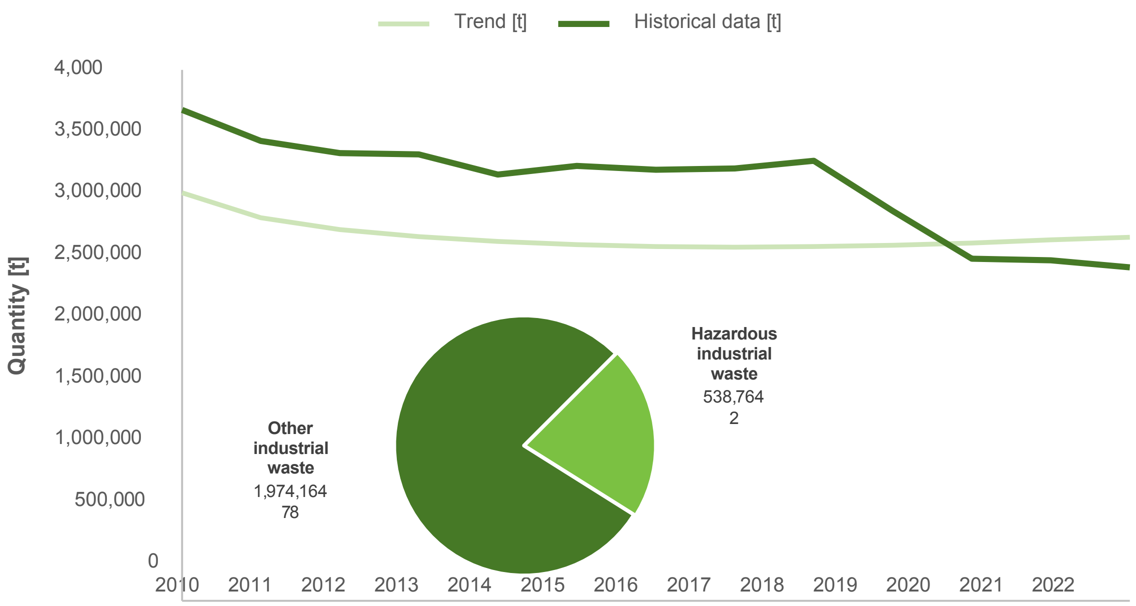
Industrial waste is a significant stream of waste outside municipal waste. The industrial waste stream includes waste classified in groups 03 to 14 according to the Waste Catalogue. Industrial waste production has been declining for a long time. In 2022, it amounted to 2.5 million tons. Approximately 21% of industrial waste production is classified as hazardous. Hazardous industrial waste thus accounts for 37% of all hazardous waste production. Material recovery dominated industrial waste management (56%), with recycling being the preferred method of disposal. Industrial waste is hardly used for energy recovery. Approximately 11% of industrial waste production was landfilled. The management of industrial waste varies according to the waste category, with the recycling of waste in the Other category being more successful. Figure 18 shows a graphical representation of the flow of industrial waste.

Graph 18: Waste flow in the Czech Republic in 2022 – Industrial waste



Note: Production quantities include only primary production. Source: Prepared on the basis of ISOH

Chart 19: Total industrial waste production



Source: processed based on ISOH

Packaging

From 2021 to 2022, the total amount of packaging waste decreased slightly from 1,437,000 tons to 1,405,000 tons, i.e. by approximately 32,000 tons. From 2020 to 2021, the total amount of packaging waste from glass increased by approximately 12,000 tons, from 222,000 tons in 2020 to 234,000 tons in 2021. From 2021 to 2022, the trend reversed and the total amount of packaging waste from this commodity fell again by 12,000 tons to just under 223,000 tons. In the case of plastic, there was also a slight decrease in 2022. The total amount of waste from plastic commodities in 2020 was approximately 264,000 tons, in 2021 it was approximately 20,000 tons higher (284,000 tons), and in 2022 the total amount decreased slightly by approximately 6,000 tons to 278,000 tons. The total amount of waste from paper/cardboard packaging increased by approximately 50,000 tons from 2020 to 2021, from 549,000 tons in 2020 to 599,000 tons in 2021. The increase between 2021 and 2022 was not as significant, amounting to approximately 4,000 tons (to 603,000 tons). The total amount of metal packaging waste also increased from 2020 to 2021, with an increase of approximately 8,000 tons to 88,000 tons in 2021. In 2022, the total amount of packaging waste from this commodity decreased slightly, specifically by approximately 2,000 tons to 86,000 tons. From 2020 to 2021, the total amount of waste from wood packaging also increased, specifically by approximately 45,000 tons to 222,000 tons in 2021. In 2022, there was a slight decrease in this commodity of approximately 14,000 tons to 208,000 tons.

Between 2021 and 2022, there was a relatively significant increase in the share of recycled glass waste from packaging, which already met the required recycling rate set by Act No. 477/2001 Coll., on packaging, of 75% in 2019. In 2021, the share of recycled packaging waste from glass was 81.4%, and in 2022 it was 84.6%.

The Czech Republic also met the required recycling target set by Act No. 477/2001 Coll. on packaging of 75% for paper/cardboard in 2021 and 2022. In 2021, the share of recycled waste from paper/cardboard packaging was 88.4%, and in 2022 it was 91.2%. The Czech Republic would therefore already meet the 85% threshold, which is not due to be set until 2035, from 2021 onwards.

In 2021 and 2022, the Czech Republic met the recycling target set by Act No. 477/2001 Coll., on packaging, of 15% for wood. In 2021, the share of recycled packaging waste from wood was 38.4 %, and in 2022 it was 41.3%. The Czech Republic would therefore already meet the 30% target set for 2035.

The Czech Republic also meets the legislative recycling target for iron packaging waste, which is set at 55% from 2021. In the case of this commodity, the Czech Republic met the limit with a margin, as the recycling rate for all such packaging waste in the Czech Republic was 82.7% in 2021 and 86.1% in 2022.

Only in the case of plastic packaging did the Czech Republic fail to meet the recycling target of 50% set by Act No. 477/2001 Coll. in 2021 and 2022. In 2021, the Czech Republic achieved a recycling rate of plastic packaging 45.1 %, and in 2022 47.2 %. I Despite the fact that the Czech Republic did not meet this target in 2021 and 2022, the share of recycled plastic packaging has been gradually increasing since 2020 (by 5.4% between 2020 and 2022) and it is therefore very likely that the Czech Republic will be able to meet this target in the coming years.

In 2021, the Czech Republic did not meet the total packaging waste recycling target of 70% by the end of 2024 set by Act No. 477/2001 Coll. on packaging. From 2024 onwards, this target is set at 75%. In 2021, the Czech Republic achieved a total recycling rate for all packaging waste of 69.4**%. In 2022, the Czech Republic met this target, achieving a recycling rate for all packaging waste of 71.6%.** This

This upward trend is positive, and it is therefore likely that the Czech Republic will also meet the targets set for 2024 and beyond.

Between 2021 and 2022, the Czech Republic met the total packaging waste recovery target of 75% set by Act No. 477/2001 Coll. on packaging. In 2021, the Czech Republic achieved a level of total utilization of packaging waste in the amount of 82 %, and in 2022 in the amount of 79.9%.

In 2022, Act No. 244/2022 Coll. came into force in the Czech Republic, amending certain acts in connection with the adoption of the Act on the reduction of the impact of selected plastic products on the environment. Under this Act, persons placing single-use plastic packaging listed in the Annex to the Act on the market are required to place such packaging on the market only in such a way that the closure or lid made of plastic remains attached to the container throughout the product's intended use. The aforementioned law also amended the original Act No. 477/2001 Coll. on packaging. It now stipulates that from 2025, persons placing single-use plastic products (beverage bottles) on the market are required to achieve a minimum level of waste recovery from these products of 77% by weight in each subsequent calendar year, and from 2029 this level will increase to 90%. Furthermore, according to the Act, persons placing single-use plastic products on the market are required to ensure that, from 2025, beverage bottles made from polyethylene terephthalate (PET) as the main component contain at least 25% recycled plastic.

End-of-life products Electrical

equipment

The amount of electrical equipment placed on the market between 2021 and 2022 grew, as it did in previous years. In 2021, more than 301,000 tons of electrical equipment were placed on the Czech market, and in 2022, just under 322,000 tons. In 2021, just under 106,000 tons of waste electrical equipment (57.5%) was collected, and in 2022, approximately 99,000 tons (57.0%). Although the level of take-back of waste electrical equipment decreased slightly between 2021 and 2022, it has been growing in the long term. **Nevertheless, the Czech Republic did not manage to achieve the mandatory minimum take-back rate of 65% for waste electrical equipment in 2022.** However, given the upward trend in the take-back rate for waste electrical equipment, the Czech Republic is well on track to achieve this level in the coming years.

Since 2021, Act No. 542/2020 on end-of-life products has set a minimum take-back target not only for waste electrical equipment in general, but also separately for waste electrical equipment groups 1, 2, and 3, also at 65%. **In 2022, the Czech Republic managed to meet this minimum rate of collection for groups of electrical equipment 1 (66.5 %) and group 3 (75.5%). Unfortunately, the minimum collection target was not achieved for group 2, with a collection rate of 56.5%. In** both cases, 2021 was not evaluated, as the current classification of electrical equipment groups has only been in force since 2019. Given that the take-back rate is calculated for a three-year period in accordance with Act No. 542/2022 Coll., it was only possible to evaluate these rates for the first time in 2022.

In 2021, the recovery rate for waste electrical equipment in group 1 was 91.4%, in group 2 it was 99.0%, in group 4 it was 98.0%, group 5 reached 94.0%, and group 6 reached 105.4%. In 2022, the recovery rate for waste electrical equipment in group 1 reached 95.3%, group 2 reached 100.2%, group 4 reached 93.6%, group 5 reached 88.3%, and group 6 reached 94.8%. **In both 2021 and 2022, the specified recovery rate for waste electrical equipment, which is different for each group, was therefore met. It can also be said that, with the exception of electrical equipment in group 6, the recovery rate for waste electrical equipment increased in all the above-mentioned cases between 2021 and 2022.**

In 2021, the recycling and preparation for reuse rate for waste electrical equipment in group 1 was 90.3%, in group 2 it was 98.4%, in group 3 it was 94.6%, in group 4 it was 96.8%, in group 5 it was 89.4%, and in group 6 it was 101.9%. In 2022, the recycling and preparation for reuse rate for waste electrical equipment in group 1 was 94.7%, in group 2 it was 100.1%, in group 3 it was 84.2%, in group 4 it was 93.5%, in group 5 it was 86.6%, and in group 6 it was 91.5%. **In both 2021 and 2022, the set recycling rate for waste electrical equipment, which is different for each group, was therefore met. Between 2021 and 2022, the recycling rate increased for electrical equipment in groups 1, 2, and 5, while it decreased slightly for groups 3, 4, and 6.**

Between 2021 and 2022, the most common method of waste electrical equipment disposal in the Czech Republic was material recovery (approximately 70%), with some of it being exported for processing to other EU countries (approximately 20%).

Batteries

Between 2021 and 2022, the number of batteries placed on the Czech market also increased. In 2021, just under 42,000 tons of these batteries were placed on the market, and in 2022, this figure rose to more than 46,000 tons. In 2021, just under 24,000 tons of automotive batteries, just under 13,000 tons of industrial batteries, and more than 5,000 portable batteries were placed on the Czech market. For 2022, the number of car batteries (more than 21,000 tons) has decreased slightly in favor of industrial batteries (just under 20,000 tons). The amount of portable batteries remained roughly the same, at more than 5,000 tons.

In 2021 and 2022, the Czech Republic managed to achieve the required take-back rate of 45% set by Act No. 541/2020 Coll. on end-of-life products. In 2021, the take-back rate for waste batteries was 50.5%, and in 2022 it was 50.2%.

Between 2021 and 2022, the Czech Republic met the minimum recycling efficiency target for lead batteries, which was set at 65% after 2020. For lead-acid batteries, the Czech Republic achieved a minimum recycling efficiency of 82.95% in 2021 and 83.83% in 2022. Although the recycling efficiency of this type of battery decreased slightly in 2021, it was the highest in this period in 2022, and the recycling target was thus met with a margin of 18.83%.

Between 2021 and 2022, the Czech Republic also met the minimum recycling efficiency target for nickel-cadmium batteries, which was set at 75% after 2020. For nickel-cadmium batteries, the Czech Republic achieved a minimum recycling efficiency of 93.95% in 2021 and 93.64% in 2022. Although the recycling efficiency of this type of battery decreased slightly during the period, it remained high in 2022, and the recycling target was thus met with a margin of 18.64%.

The Czech Republic also met the minimum recycling efficiency target for other batteries, which was set at 50% after 2020. For other batteries, the Czech Republic achieved a minimum recycling efficiency of 64.59% in 2021 and 65.06% in 2022. For this type of battery, the recycling efficiency increased every year during the period, and in 2022, the recycling target was met with a margin of 15.06%.

Tyres

Between 2021 and 2022, the quantity of tires placed on the Czech market increased slightly, with just under 107,000 tons placed on the Czech market in 2021 and just under 109,000 tons in 2022.

In 2021, the minimum collection rate for waste tires was set at 70%, rising to 80% from 2022 onwards. **In both 2021 and 2022, the Czech Republic met the minimum collection rate for waste tires, which was 81.9% in 2021 and 83.6% in 2022.**

In 2021, the Czech Republic met the target for recycling and reuse of waste tires set by Act No. 542/2020 Coll. on end-of-life products, at 10%, as it achieved recycling and reuse of waste tires at 65%. However, **in** that year, it did not achieve the required 100% utilization rate for waste tires, reaching only 99.4%.

In 2022, the Czech Republic also met the target for recycling and reusing waste tires set at 15%, achieving a rate of 68.5%. However, even in 2022, the Czech Republic did not achieve the target of 100% for the recovery of waste tires, as it achieved a recovery rate of 98.4%, which was 1% lower than in 2021. **Although the waste tire utilization rate declined slightly between 2021 and 2022, it remains high in the long term, and the Czech Republic is on track to meet these targets in the coming years.**

End-of-life vehicles

Between 2021 and 2022, there was a slight decrease in the number of end-of-life vehicles registered in the MAISOH system, i.e., the End-of-Life Vehicles Module of the Waste Management Information System, which has been recording end-of-life vehicles since 2009. In 2021, just under 177,000 were registered in this system, and in 2022, more than 162,000. This downward trend is due to various factors, including economic conditions, environmental measures, and changes in social behavior, with the short-term decline between 2019 and 2022 being a consequence of the COVID-19 pandemic.

In 2021, the Czech Republic met the target for the reuse and recovery of end-of-life vehicles set by Decree No. 345/2021 Coll.[(1)9] at 95%, and also met the target for reuse and recycling set by the same decree at 85%. In 2021, the Czech Republic achieved a level of reuse of end-of-life vehicles of 96.13% and a level of recycling and reuse of 91.19%.

In 2022, the Czech Republic did not meet the 95% reuse and recovery target, but it did meet the 85% reuse and recycling target. In 2022, the Czech Republic achieved 94.34% reuse and recovery of waste from selected end-of-life vehicles (0.66% below the threshold) and 89.49% reuse and recycling (4.49% above the threshold). In **the case of non-compliance with the minimum level of reuse and recovery, the shortfall is in the order of tenths of a percent, and it can therefore be assumed that the Czech Republic will again meet this target in the coming years, as was the case in 2021, for example.**

A positive trend can be observed in the Czech Republic in relation to the handling of end-of-life products such as electrical equipment, waste batteries, tires, vehicles, and, last but not least, packaging and packaging waste. There has been an increase in the material recovery rate of these products, which indicates a more efficient approach to waste treatment and recycling. The targets set for the recycling of selected products are being met and often exceeded in most cases.

2.2.2 Basic data and data sources

Data from the Ministry of the Environment's ISOH agenda was used to compile the POH ČR. The basic source of the data used is the ISOH working database (hereinafter referred to as "PDISOH"). PDISOH is a nationwide database on waste production and management. ISOH is created from annual reports on waste production and management in accordance with Waste Act No. 541/2020 Coll. From the primary recorded data, PDISOH is created through a series of adjustments, which include the calculation of sub-threshold entities to which

[19] Decree No. 345/2021 Coll., on details of the disposal of end-of-life vehicles.

the reporting obligation does not apply; treatment of duplicates for entities involved in the municipal separate waste collection system, recalculation of dry matter in sludge, and the like. PDISOH is administered by CENIA for the Ministry of the Environment.

Other data used

The Czech Statistical Office is the source of socioeconomic, demographic, and other data in the Czech Republic that may be related to waste management. Other sources of information included, for example, reports on the state of the environment published by the Ministry of the Environment, background documents for the area of waste and circular economy support as part of the Program Document in the Operational Program Environment 2021-2027, Implementation study for the EKO-KOM system strategy "Strategy 21+", data provided by the authorized packaging company EKO-KOM.

2.2.3 nd sources of waste

Production can be monitored from various perspectives. The traditional approach is to classify waste into types, sub-groups and groups, as defined by Decree No. 8/2021 Coll. (hereinafter referred to as the "Waste Catalogue"). Table 5 provides an overview of production in individual groups and their share of total production. The last column contains a brief comment on the development of the flow in recent years.

Table 5: Waste production broken down by waste groups in accordance with the waste catalog

Group	Group name	Production [t]	[	Trend note
01	Waste from geological exploration, mining, processing and further processing of minerals and stone	60,243	0.2	Significant decline or stagnation since 2013 in recent years
0	Waste from agriculture, horticulture, fishing, forestry, hunting, and food production and processing	214,824	0	Slight decrease since 2015
0	Waste from wood processing and the manufacture of wood panels, furniture, pulp, paper and paperboard	180,011	0	Growth since 2013, In 2020 and 2021, a sharp increase followed by a decline in 2022
0	Waste from the leather, fur and textile industries	69,874	0	Since 2016, significant decline
0	Waste from petroleum refining, natural gas purification and pyrolytic processing of coal	6,610	0	Stagnation since 2012, sharp increase in 2020 followed by a sharp decline
0	Waste from inorganic chemical processes	12,779	0	Until 2012, dramatic decline, followed by stagnation with slight fluctuations
0	Waste from organic chemical processes	146,665	0	Stable growth, stagnation since 2019
0	Waste from the manufacture, processing, distribution and use of coatings (paints, varnishes and enamels), adhesives, sealants and printing inks	51,015	0	Slightly increasing trend, stagnation in recent years
Group	Group name	Production [t]	[	Trend note

09	Waste from the photographic industry	1,263	0	Long-term downward trend, stagnation since 2018
1	Waste from thermal processes	1,088,496	2	Declining trend, significant decrease between 2018 and 2020, followed by stabilization of production
1	Waste from chemical surface treatment, metal surface treatment and other materials and from hydrometallurgy non-ferrous metals	86	0	Long-term slight upward trend, but since 2018 production has been declining
12	Waste from forming and physical and mechanical surface treatment of metals and plastics	718	1	Constant production with a slight negative fluctuations in 2020
1	Oil waste and liquid fuel waste (excluding edible oils and waste listed in groups 05, 12, and 19)	149	0	Long-term slight upward trend, since 2019 decrease
14	Waste organic solvents, cooling and propellants (excluding wastes listed in groups 07 and 08)	3	0	Long-term slight downward trend, more significant decrease between 2019 and 2020
15	Waste packaging; absorbents, cleaning cloths, filter materials and protective clothing not elsewhere specified	984	2	Long-term slight upward trend, since 2018 slight decrease
1	Waste not specified elsewhere in this catalogue	775	2	Declining trend until 2015, then increasing
17	Construction and demolition waste (including excavated soil from contaminated sites) places)	25,135,537	64	Long-term upward trend with positive fluctuation in 2015
18	Waste from healthcare and veterinary care and/or related research (excluding kitchen waste and waste from catering facilities not directly related to healthcare)	48	0	Long-term slight upward trend without significant fluctuations
19	Waste from waste treatment (recovery and disposal) facilities, from wastewater treatment plants for the treatment of such water outside the place of its generation, and from the production of water for human consumption and water for industrial purposes	3,530,456	8	Long-term upward trend, more pronounced in recent years
20	Municipal waste (waste from households and similar commercial activities, industrial waste and waste from offices), including components from separate collection	5,895,254	1	Long-term slight upward trend without significant fluctuations
	Total	**39,159,613**	10	Long-term slight upward trend

Source: Processed based on ISOH

A different perspective is provided by production broken down by CZ-NACE activity codes. Information on the classification of economic entities (producers) according to CZ-NACE when submitting annual waste production reports is available in ISOH for the first time for data for 2022.

Table 6: Waste production broken down by CZ-NACE sections

Section (CZ-NACE)	Section name	Production [t]	[
F	Construction	17,441,508	4
E	Water supply; sewage, waste management and remediation activities	6,196,163	15
C	Manufacturing	4,825,417	12
O	Public administration and defense; compulsory social security	4,415,668	11
G	Wholesale and retail trade; repair and maintenance of motor vehicles	2,582,620	6
H	Transportation and storage	1,266,421	3
M	Professional, scientific and technical activities	500,968	1
D	Production and distribution of electricity, gas, heat, and air conditioning	387,670	1
A	Agriculture, forestry, fishing	379,825	1
L	Real estate activities	288,927	0
N	Administrative and support activities	225,828	0
B	Mining and quarrying	173,746	0
Q	Health and social care	143,557	0
I	Accommodation, food and beverage service activities	140,205	0
P	Education	73	0.2
R	Cultural, entertainment, and recreational activities	45,529	0
J	Information and communication activities	29,010	0
S	Other activities	27,652	0
K	Finance and insurance	13,720	0
U	Activities of extraterritorial organizations and bodies	147	0
N/A	Not defined	1,727	0
Total		**39,159,613**	**10**

Source: Processed based on ISOH

The waste group with the highest production in the Czech Republic is group 17 Construction and demolition waste (including contaminated soil) with a production of 25.1 million tons, accounting for 64% of total production. The dominant producers of construction and demolition waste are self-employed individuals. Municipalities are also producers to a negligible extent. From the perspective of sectors (CZ-NACE), production is dominated by section F Civil engineering, construction of buildings and specialized construction activities, and to a lesser extent by the sector Waste collection, disposal and treatment for further use in section E.

The second most significant group is group 20 Municipal waste with a production of 5.9 million tons (15.1%). In this group, the producer is the public sector, section O according to CZ-NACE, as well as sections E and G.

The third most significant group is group 19, with a share of 8.9%. This is secondary waste from waste treatment in facilities with a waste management permit. This also corresponds to producers classified in section E according to CZ-NACE.

Other groups do not exceed a 5% share of production and will therefore not be mentioned further. However, they are included in the waste streams defined for the purposes of monitoring the status and development of waste management. A summary of the main information for the dominant streams can be found in Chapter 2.3. A detailed analysis of all streams can be found in separate documents (analytical documents).

CZ-NACE	The data for 2022 allow for the first time an analysis of waste production data according to the economic entities' affiliation to CZ-NACE groups, sections, and divisions. Almost half of the waste produced in the Czech Republic is construction and demolition waste. Therefore, 44% of production is linked to **section F** Construction, civil engineering, building construction, and specialized construction activities. Other significant producers are **section E** Water supply; sewage and waste management (15.9%), **section C** Manufacturing (12.3%) and **section O** Public administration and defense; compulsory social security (11.2%).

2.2.4 Assessment of of and private nd organization of waste management

In the Czech waste management system, municipalities are the producers and owners of municipal waste. They have full authority to set up a system for the separate collection of waste from paper, plastics, glass, metals, and other materials. The active participation of municipalities in the separate collection of municipal waste brings a number of benefits for the overall operation of waste management in the Czech Republic. At the same time, this approach is necessary to meet national and European waste management targets. Municipalities are in a better position to effectively manage and coordinate separate waste collection processes at the local level, which contributes to the smooth functioning of the system. It also enables municipalities to better respond to local needs and specificities, thereby enhancing the efficiency of waste management.

The public network of separate waste collection by municipalities, i.e., bins and containers located in public places, is very well developed in the Czech Republic and is among the best in Europe. Another positive trend is the reduction in the distance residents have to walk to the nearest colored containers for sorted waste. In 2022, the estimated walking distance was reduced to an average of 87 meters, which is below the acceptable limit that citizens are willing to walk (EKO-KOM, 2023).

Approximately 40% of cities with more than 10,000 inhabitants have already achieved above-average collection network density. The estimated walking distance to collection containers is less than 100 meters. Nevertheless, intensification of the collection network is still desirable for a significant number of municipalities. Smaller municipalities in particular face financial challenges, as waste management costs are high and financial resources are limited. Each municipality has its own contractual arrangements for the management of separately collected waste, which places additional demands on transfer facilities and increases the cost of transporting waste from the producer to the processor. Waste management is thus fragmented among many actors and difficult to coordinate.

Another significant problem is information asymmetry and inequality in the bargaining position between municipalities and waste collection companies, especially in areas with limited competition. This can lead to unfavorable prices for municipalities and insufficient information about further waste treatment methods. In Czech practice, municipalities often hire waste collection companies to provide comprehensive waste management services, which makes it difficult to monitor municipalities' waste management costs. As a result, municipalities may not have an accurate overview of the prices for separately collected waste and find it more difficult to influence the final treatment of waste according to their preferences. At the same time, the asymmetrical position can be addressed through cooperation between municipalities, where there is still room for further development.

ENTITIES OPERATING IN THE WASTE MANAGEMENT MARKET

The waste management market is influenced not only by waste, but also by the companies that handle waste. These entities can be divided according to their ownership structure and the size of the catchment area in which they operate. These entities can be characterized as organizations that take waste from producers and handle it. These include operators of facilities designed to handle certain types and categories of waste and waste dealers with permits for certain types and categories of waste.

Locally operating public entities

Locally operating public entities are typically majority-owned by municipalities or other public entities. Most often, these are municipal (city) companies established for the purpose of managing the property of a given municipality, including (or exclusively) waste management. The most typical example is so-called technical services. The sole shareholder or co-owner of such a company is usually the municipality.

Technical services are provided as standard within the municipality. The dominant use of technical services by the municipality offers the advantage of being able to award contracts in-house, i.e. without a tender procedure under the Public Procurement Act, provided that the conditions laid down in the Act are met.

For this reason, technical services do not operate in a wider catchment area, but only in the immediate vicinity of the municipality concerned. Another locally operating publicly owned entity is companies established by voluntary associations of municipalities. The principle of operation is similar to that of technical services. The difference lies in the number of owners and, therefore, in the size of the catchment area. The amount of waste handled by locally operating public entities varies. The amount of waste handled by companies is influenced by the number of inhabitants and the size of the catchment area. The amount of waste can therefore range from a few hundred tons to thousands or tens of thousands of tons per year. The most common waste handled by locally operating companies is municipal waste. Locally operating public entities often also operate collection yards and collection points. They therefore also have other waste streams (hazardous waste, metals, construction waste, and others). However, this waste is usually handed over to another authorized person. The impact on the market environment varies depending on the size of the company, but is generally small or insignificant.

Within the chain of activities, these entities usually focus on waste collection and concentration, or waste transshipment or the operation of smaller, local waste treatment facilities. Historically, these have been landfills or simple sorting lines.

In the Czech Republic, there are several companies owned by one or more municipalities that process significant amounts of mainly mixed municipal waste and separately collected waste. Their ownership structure is the same as that of locally operating public entities. The catchment area is also of local importance. The main difference is the amount of waste they handle. While locally operating companies handle hundreds to thousands of tons, a group of major municipal companies handle tens to hundreds of thousands of tons of waste per year. These companies operate in the largest cities of the Czech Republic or in the vicinity of larger agglomerations. The catchment area for collection (primarily mixed municipal waste and separately collected waste) is primarily determined by the municipality or agglomeration. Waste treatment technologies (sorting and re-sorting lines, composting plants, incinerators) also cover a catchment area the size of a region or larger than the region in which the company operates.

The amount of waste these companies have at their disposal means they can significantly influence supplier-customer relationships in their catchment area, as well as market power. Thanks to the amount of waste they have, they are also important stakeholders in the waste management market. These companies usually own facilities that can process tens of thousands of tons of waste per year. The cumulative capacity of these facilities covers a significant part of the Czech Republic. The companies are able to create conditions for the disposal of waste produced by more distant waste producers. Their influence on market share is therefore significant.

Locally operating private entities

Locally operating private entities operate in smaller areas. A typical catchment area is a city, several municipalities, or an association of municipalities, a micro-region, etc. These companies cannot obtain contracts in-house, as they are not owned by the contracting authority. The companies therefore compete through public tenders issued by individual municipalities. Given the size of these companies and the capacity of their facilities, it is not economically viable for them to operate throughout the country. They therefore concentrate in the vicinity of their processing facilities. The amount of waste processed by companies in this category can range from a few hundred tons to tens of thousands of tons per year. The impact on the market environment is not significant for mixed municipal waste and separately collected waste. The impact on specific types of waste may be significant.

In addition to municipalities, locally operating private entities often serve businesses. Some companies may also act as authorized entities for the management of specific waste streams and link their activities to locally operating public entities. The waste managed by these companies is again mixed municipal waste and separately collected waste. However, private companies also have other specific technologies in their technology portfolio. These include, for example, technologies for the management of hazardous waste, dismantling of electrical equipment, management of bulky waste, recycling of construction and demolition waste, and management of kitchen waste, catering waste, and others.

Supraregional private companies

The last category includes companies that operate throughout the Czech Republic or in a significant part of it. These are often companies with highly developed know-how in waste management and process setup. These companies own end-of-life facilities for various types of waste (municipal waste landfills, hazardous waste landfills, composting plants, hazardous waste incinerators, sorting and re-sorting lines, recycling technologies, etc.). Supra-regional private companies usually have the resources, know-how, and technology to ensure the functioning of the entire waste management chain. A typical waste stream is mixed municipal waste and separately collected waste. However, these companies also handle other waste streams (e.g., hazardous waste, sewage sludge, biowaste). Companies in this group provide waste management services in the form of waste collection from waste producers and transport to final treatment facilities.

In the case of separately collected waste, these companies follow up on primary sorting directly at the waste producer. Pre-sorted components are transported to a sorting line for secondary sorting. The usable components are then sent for material or energy recovery. Non-reusable components are sent to landfills.

The amount of waste they handle is significant, ranging from tens to hundreds of thousands of tons per year. The capacities of processing facilities range from tens of thousands to hundreds of thousands of tons per year. Thanks to their relatively broad network of technologies, know-how, and financial strength, these companies are able to influence a large part of the waste market.

Specific processors with a narrow market niche

In the field of material recovery or hazardous waste treatment, there are specialized companies on the market that deal with waste recovery or hazardous waste disposal. These companies specialize in a narrower market segment. Given that the quantities of waste are small or the activities are more specialized, they cover a larger geographical area but only a narrow market segment of waste management. Market power is proportional to the narrow focus of the companies.

2.3 Waste nd flow status

This chapter contains brief summaries of the status of key waste streams within the waste management system of the Czech Republic. For each stream, essential information is provided on the production of this waste, its treatment, the network or facilities for its treatment, and, where relevant, the import and export of this waste, if such treatment is significant. For each stream, an overview of the development of management indicators is provided, which was prepared based on the MŽP[20] methodology. Given that the specific characteristics of individual waste streams vary, the structure of their summaries may also differ. More space has been devoted to more significant flows such as municipal waste and construction and demolition waste. Where a given flow is handled significantly differently at the regional level, map outputs are added. Map outputs are also used to visualize the management of the most significant flows in terms of weight. Selected essential information is mentioned, which is further used to set up waste development scenarios in Chapter 2.13. A detailed analysis of all flows can be found in separate documents (analytical background documents).

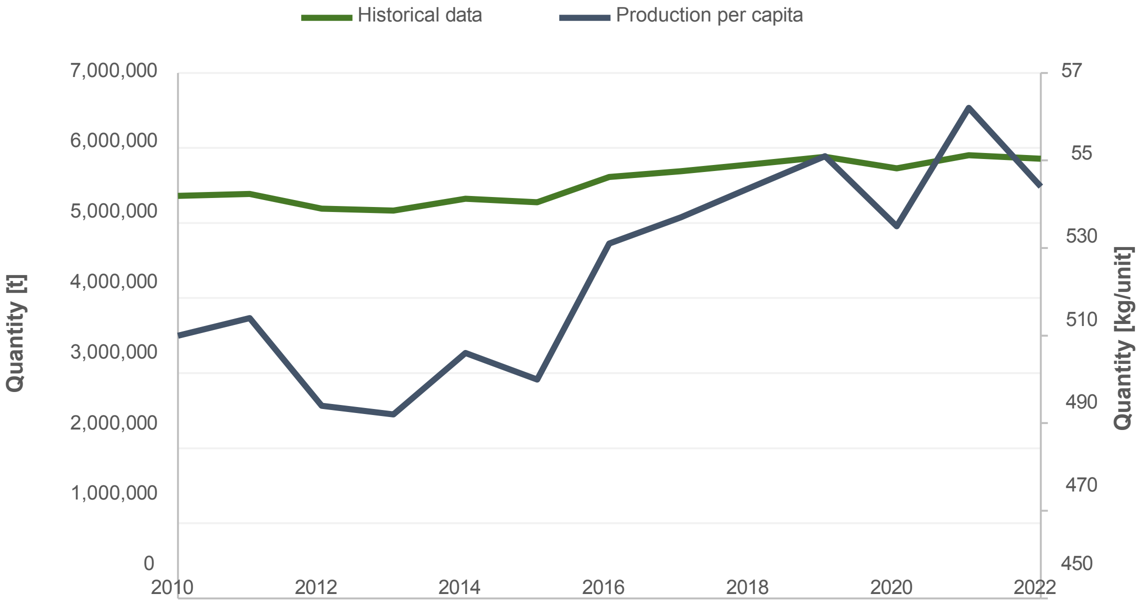
2.3.1 Municipal waste

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Equipment capacity	Required investment
5.9 million tons 553 kg/capita	Recycling (41%) Landfilling (45%)	Exports 207,000 tons Imports 114,000 tons	Insufficient at ZEVO, plastic sorting, mechanical sorting of municipal solid waste, biogas plants, composting plants (in the future), collection infrastructure and efficient transport.	Collection network for municipal waste – CZK 6.5–7.4 billion Biowaste – CZK 8.1–8.8 billion Waste treatment (paper, plastic) – CZK 8.9–9.9 billion Municipal waste not collected separately – CZK 32.5–65.3 billion over 10 years

[20] Methodology of the Ministry of the Environment. Set of indicators for waste management in the Czech Republic (2023). Available at https://www.mzp.cz/cz/metodika_soustava_indikatorů

Municipal waste accounted for approximately 15% of all waste produced in 2022, which is a significant proportion. In 2022, municipal waste production amounted to 5,854,385 tons. The production trend is slightly upward, with a slight decline in 2022. Figure 20 shows the trend in municipal waste production, including per capita production. It is clear that per capita **production is growing steadily by an average of about 2% per year. In 2022, 544 kg of municipal waste was produced per capita.**

Chart 20: Municipal waste production



Source: processed based on ISOH and Tiramiso

Chart 21 shows the development of the production of three sub-groups of municipal waste. Effective separate collection is a prerequisite for the material recovery of municipal waste. The relative share of waste production in subgroups 20 01, 20 02, and 20 03 is used as a quick indicator of the development of separate waste collection (20 02 and 20 03) and the production of so-called residual waste that is difficult to recycle (20 03). Details are provided in the following chapters.

Subgroup 20 01 includes the production of components from separate collection, including separately collected hazardous waste. Historically, packaging waste classified in subgroup 15 01, where the municipality was the producer, was also included in the municipal waste stream. With the entry into force of Decree 8/2021 Coll., the frequency of occurrence should have decreased significantly, but the 2022 data show that production in 15 01 occurs in municipalities. When processing historical data, production in 15 01 was excluded from municipalities.

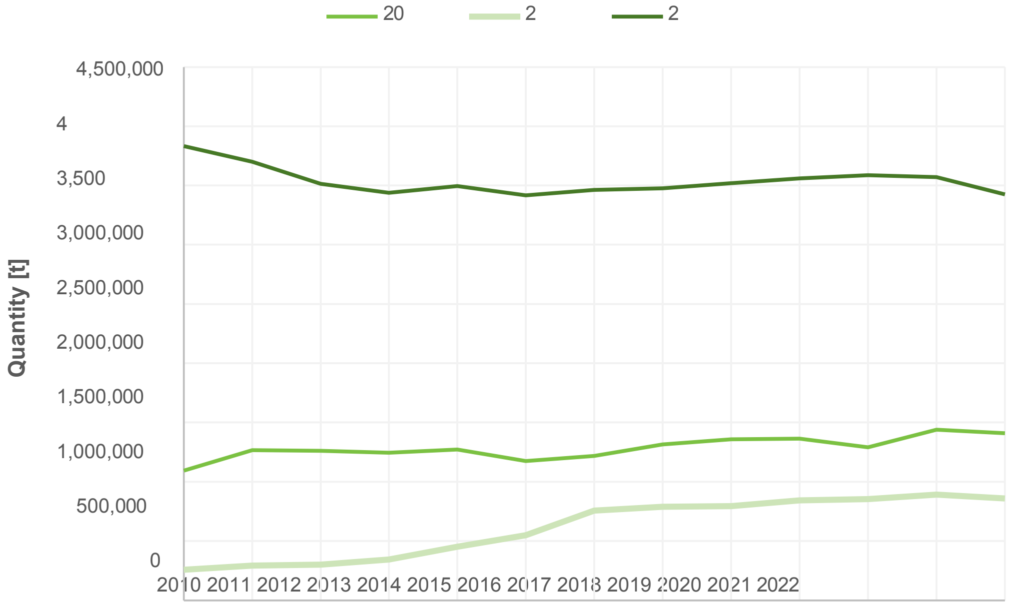
occurrence should decrease significantly, but in the 2022 data, production in 15 01 from municipalities is still present. When processing historical data, production in 15 01, where the originator is a municipality, is considered municipal waste and moved to the appropriate types in subgroup 20 01.

Subgroup 20 02 *Garden and park waste (including cemetery waste)*, where category 20 02 01 is important due to its quantity and significance for the fulfillment of future municipal waste management objectives. Subgroup 20 02 saw a significant increase in production between 2010 and 2016, followed by a return to constant production. The most significant subgroup, 20 03 *Other municipal waste*, saw a decline between 2010 and 2013, but production has been growing slightly since then. There was a slight decrease in 2021, which increased in 2022. Subgroups 20 01 and 20 02 include waste that is already being recycled or has the potential to be recycled in the future. In contrast, subgroup 20 03 is intended to contain residual waste, i.e., waste whose recycling potential has been exhausted and which is preferred for energy recovery. Due to insufficient capacity at energy recovery facilities, this waste is currently landfilled.

It is clear from Figure 21 that achieving an increase in the ratio between the totals of production in 2001 and 2002 compared to 2003 is a key challenge for waste management in the Czech Republic in the coming period. An increase in separate collection is a prerequisite for meeting future waste management targets. In the future, it will be necessary to transfer waste from subgroup 20 03 to 20 01 or 20 02. Therefore, the current legislation sets a sorting target of 70% by 2035 for waste produced in municipalities. Higher sorting rates will also be achieved for municipal waste from other sources, which are also subject to the separate collection obligations laid down in the law.

 **Municipal waste**	**Effective separate collection of municipal waste (within municipal systems and from other producers) is a basic prerequisite for further increasing municipal waste recycling. Municipal waste recycling in 2022 was 41%. In the coming years, it will be necessary to ensure an increase in the production of recyclable and recoverable components of separate collection (subgroup 20 01) and the production of biodegradable waste from gardens and parks (category 20 02 01). As a result of sorting, the production of mixed municipal waste (category 20 03 01) and bulky waste (category 20 03 07) will decrease, especially after the sorting of wood.**

Graph 21: Development of municipal waste sub-group production



Source: processed based on ISOH

Table 7 summarizes the total production and specific production per capita for individual subgroups. Production is also broken down by municipal waste sub-streams. Sub-streams are discussed in more detail in the following subchapters.

Table 7: Production of municipal waste subgroups and sub-streams in 2022

Stream/substream	Production [t]	Production [kg/capita]
Total municipal waste	5,854,385	54
Subgroups		
20 01 (including 15 01)	1,477,636	137
20 02	921,788	86
20,03	3,454,961	321
Sub-tributaries		
Plastic	205,920	19
Paper	466,454	43
Glass	171,084	16
Metals	441,751	41
Wood	79,187	7
Textiles	35,855	3
BRO gardens	845,876	7
BRO kitchens	42	4
SKO Mixed municipal waste	2,674,934	2
OBJ Bulky waste	634,822	59
Hazardous 20	406	0
Remaining	255	2

Source: processed based on ISOH

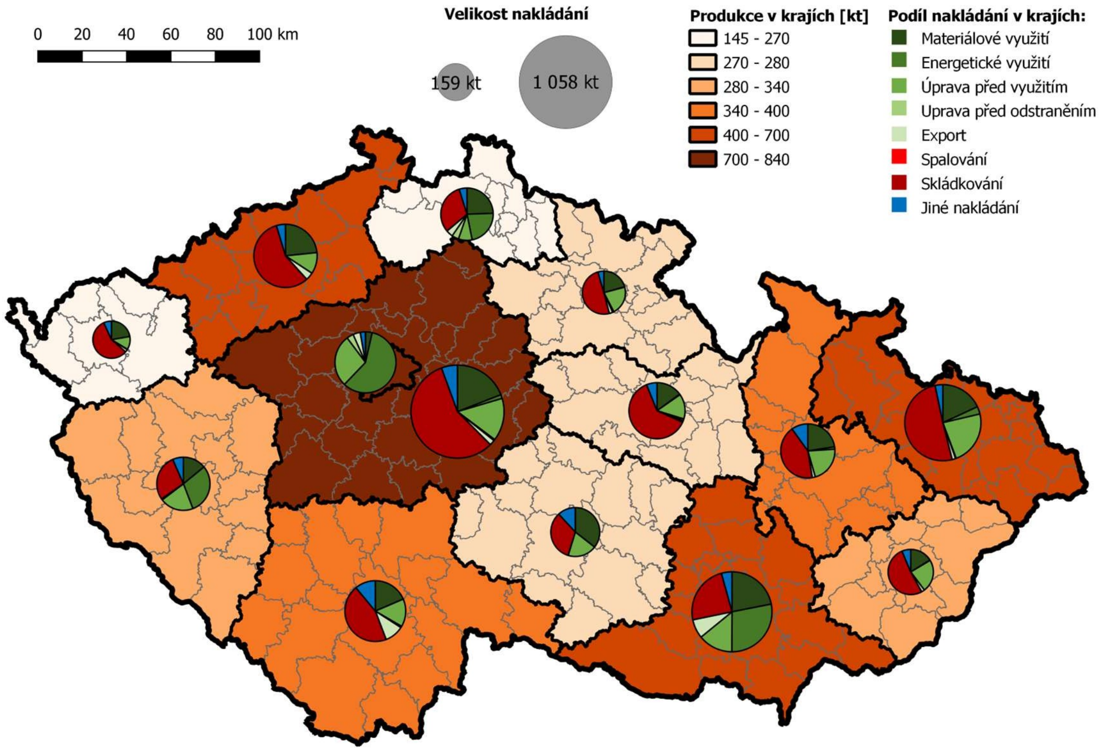
Municipal waste is imported and exported. Imports remain relatively constant, with 114,300 tons of waste imported in 2022. Exports fell by 29% between 2018 and 2020, reaching 207,500 tons in 2022. Most imports (98.9%) in 2022 consisted of subgroup 20 01, in particular category 20 01 25 (*Edible oil and fat* – 42.1 thousand tons) and 20 01 01 (*Paper and cardboard* – 34.7 thousand tons). In terms of countries from which municipal waste is imported, Slovakia (27.2 thousand tons), Germany (21.0 thousand tons), Poland (16.0 thousand tons), the Netherlands (11.9 thousand tons), and Switzerland (10.6 thousand tons) dominate. In terms of exports, subgroup 20 01 also ranks first, but category 20 01 01 (*Paper and cardboard* – 189.3 thousand tons) accounts for the majority of exported municipal waste. This category thus accounts for 91.2% of all exported municipal waste. In second place is category 20 01 10 (*Clothing* – 10.0 thousand tons). The destination countries in this case are Austria (73,000 tons), Germany (70,000 tons), Poland (28,200 tons), Slovakia (8,900 tons), and Croatia (8,400 tons).

A total of 53% of municipal waste was recovered in 2022, of which 41% was recycled. Energy recovery accounted for around 12%, with a slight upward trend. In contrast, a downward trend can be observed in disposal, which reached 45% in 2022.

Municipal waste	**Municipal waste production in the Czech Republic is growing steadily by an average of approximately 2% per year.** **In 2022, 5.9 million tons were produced, or 553 kg per capita.** **A total of 53% of municipal waste is utilized, of which 41% is recycled. Energy recovery accounted for around 12%.**

Municipal waste is a stream that will have to undergo significant changes in management in order to meet the targets for 2030 and 2035. A prerequisite for achieving these targets is a change in people's behavior—a change in consumption habits (waste prevention, preference for sustainable products and easily recyclable packaging) with the aim of reducing waste production. If waste is generated, it is necessary to further increase the level of public involvement in proper waste management, where the efficiency of primary waste sorting, i.e., sorting by residents, plays an important role.

Figure 8: Map of municipal waste production and treatment in regions in 2022



Source: processed on the basis of ISOH

Table 8: Production and management 2018–2022 – Municipal waste

Year	Production	Energy recovery			Recycling			Use			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	5,741	703	11.9	12.6	2,163	40.9	38.9	2,865	52.8	51.5	2,675	46.6	48.1	5	0.1	0
2019	5,842	713	11.	12.6	2,183	40.3	38.7	2,896	52.2	51.4	2,719	46.5	48.2	5	0.1	0
2020	5,814	747	12.5	12.	2,264	41.0	39	3,010	53.5	51.9	2,768	47.6	47.7	5	0.1	0
2021	6,016	730	11.9	12.5	2,232	39.6	38.4	2,962	51.5	50.9	2,841	47.2	48.8	4	0.1	0
2022	5,854	737	12.	13.2	2,177	40.5	39.0	2,915	52.7	52.2	2,655	45.4	47.5	4	0.1	0

Source: Prepared based on ISOH

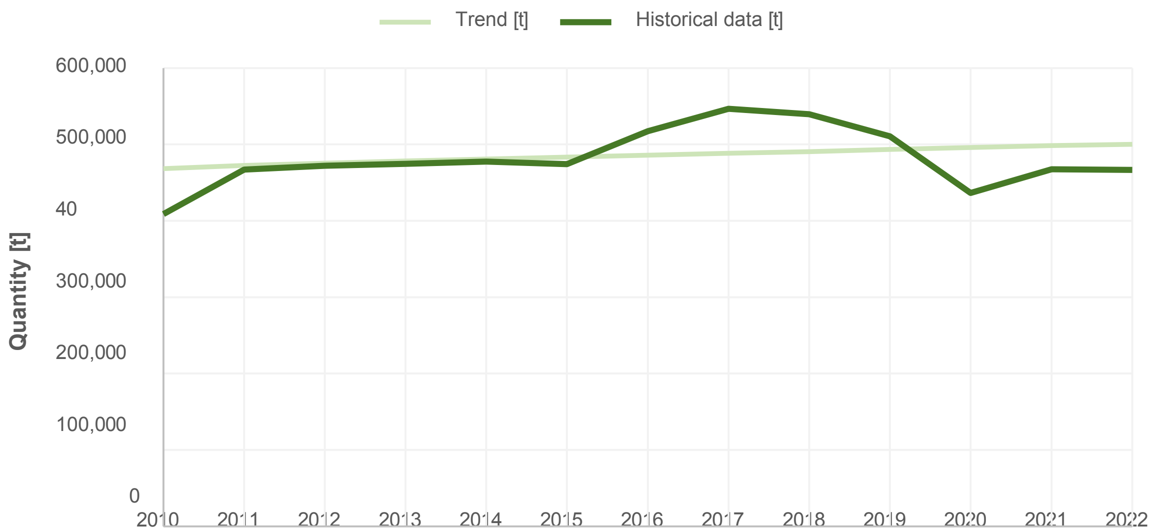
2.3.1.1 Separately collected components

A significant subgroup of municipal waste is components from separate collection (20 01). This subgroup contains 30 types (cat. numbers) of waste according to the methodology of the Ministry of the Environment. The number of catalog numbers listed indicates significant hazardous municipal waste. The following subchapters provide a summary of the most important sub-streams in terms of their production.

2.3.1.2 Paper from separate collection

The production of separately collected paper shows a very slight upward trend, with production hovering around 500,000 tons per year. Higher production levels were achieved between 2016 and 2019, with the highest level in 2017 (547,000 tons). The lowest production in the last ten years was recorded in 2020 (437,000 tons). In 2021, production reached 468,000 tons and in 2022, 466,000 tons. The production of separately collected paper in group 20 accounts for approximately 40% of total waste paper production. As mentioned above, paper accounts for a significant share of municipal waste imports (45%) and dominates municipal waste exports (91%). Since paper from separate collection is treated in a similar way to the total paper stream, which also includes paper produced by industry, its treatment is discussed below in section 2.3.2.

Graph 22: Paper production from separate collection



Source: processed based on ISOH

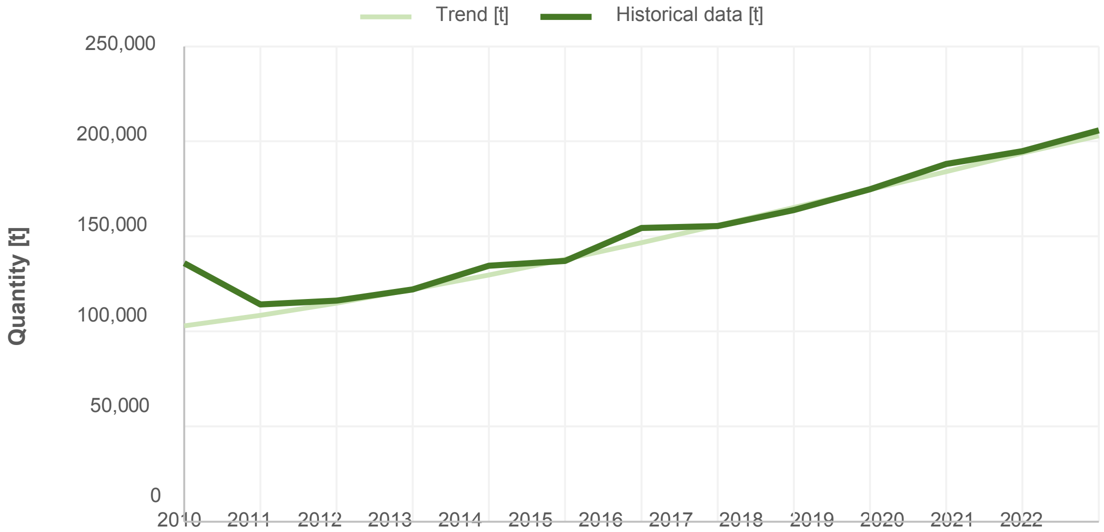
In general, the Czech Republic has a deficit in capacity for handling separately collected paper. For catalog number *20 01 01 Paper and cardboard,* this deficit was highest in 2022 in the South Moravian Region (47,000 tons), the Capital City of Prague (35,000 tons), and the South Bohemian Region (20,000 tons). The total deficit of treatment facilities in 2022 for this catalog number (20 01 01) was approximately 162,000 tons. For catalog number *15 01 01 Paper and cardboard packaging,* the highest deficit of treatment facilities in 2022 was in the Central Bohemian Region (80,000 tons) and the South Moravian Region (41,000 tons). The total deficit of facilities in 2022 for this catalog number (15 01 01) reached almost 201,000 tons. For catalog number *03 03 08 Waste from sorting paper and cardboard intended for recycling,* the highest deficit of treatment facilities in 2022 was in the Moravian-Silesian Region (19,000 tons). The total deficit of facilities in 2022 for this catalog number (03 03 08) reached just under 45,000 tons.

2.3.1.3 Plastic from separate collection

Total plastic waste production is on the rise. Separately collected plastic accounts for a significant share (41%) of production, which is also growing significantly. The lowest production value was recorded in 2011 (114,000 tons), since then it has been growing every year to the current value from 2022 (206,000 tons). Plastic collected from municipalities is sorted at sorting lines, which are relatively dense in the Czech Republic. Approximately 100 facilities are operated for plastic sorting.

with mostly manual sorting. The flow is therefore handled primarily in the preferred manner, i.e., material recovery or treatment. Analysis of actual flows shows that 77% of plastics from separate collection were recovered (43% recycling, 34% energy recovery) and approximately 21.5% were disposed of without recovery.

Graph 23: Plastic production from separate collection



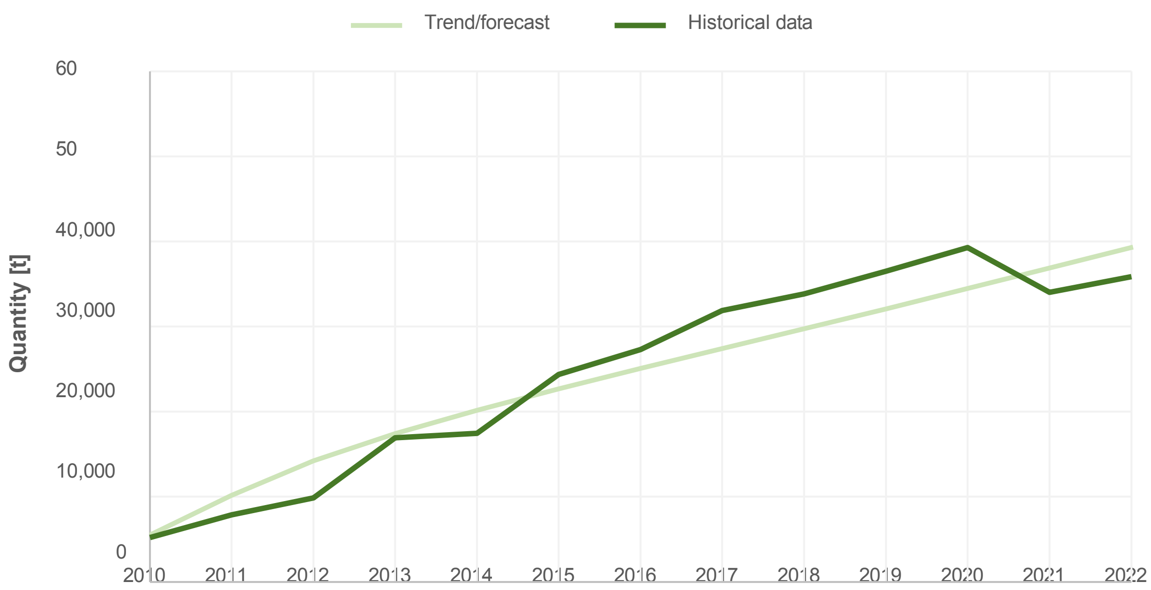
Source: processed based on ISOH

In general, the Czech Republic has a slight deficit in capacity for the treatment of separately collected plastics. For catalog number *20 01 39 Plastics,* this deficit was highest in 2022 in the capital city of Prague (6,000 tons) and the Karlovy Vary Region (4,000 tons). Overall, the Czech Republic had a surplus capacity for the treatment of this waste (20 01 39) of just under 2,000 tons in 2022. For catalog number *15 01 02 Plastic packaging*, the highest deficit in treatment facilities in 2022 was in the South Moravian Region (6,000 tons). The total deficit of facilities for this catalog number (15 01 02) reached 9,000 tons in 2022.

2.3.1.4 Textile waste from separate collection

The dominant group within the textile waste stream in 2022 was municipal textile waste, with a production of 36,000 tons in 2022 (34,000 tons in 2021 and 39,000 tons in 2020). This is separately collected textile waste, predominantly with catalogue number 20 01 10 (*Clothing)*. Municipal textile waste accounted for more than one-third of all waste produced in the Textile Waste stream (Chapter 0). Catalogue number 20 01 11 (*Textile materials)*, which accounted for approximately quarter of production, was another source. Municipalities are the dominant producers of this waste group 20, accounting for 88.5% of production. The management of this waste stream is described in more detail in Chapter 0.

Graph 24: Development of textile production from separate collection (group 20)



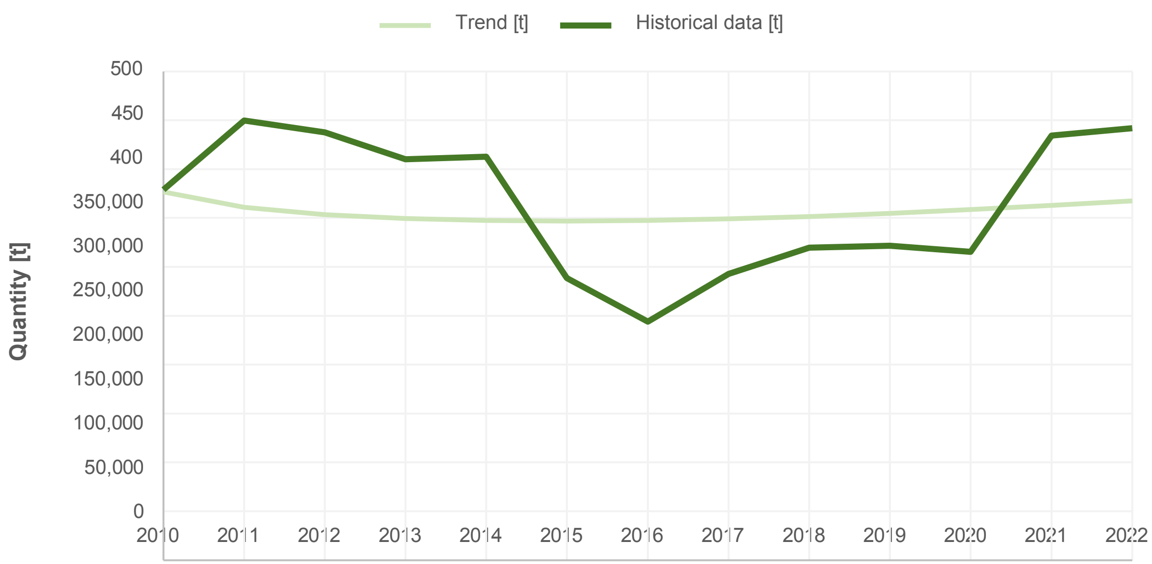
Source: processed based on ISOH

2.3.1.5 Metal waste (ferrous and non-ferrous) from separate collection

The total production of all ferrous and non-ferrous waste has been on a slight downward trend for a long time, which in recent years has been turning into stagnation at around 4 million tons per year. The production of recyclable metals from separate collection from the municipal system (i.e., part of municipal waste) accounts for only about 10-11% of the total production of all metal waste. The production of separately collected metals has been rather stagnant, with a very slight increase in recent years. Production in individual years varies significantly, ranging from 250,000 to 450,000 tons per year. The lowest production value was recorded in 2016 (244,000 tons), and since then, production has risen in most years to its current level. The highest recorded values are from 2011 (450,000 tons).

and from the current year 2022 (442 thousand tons). Since metal from separate collection is treated similarly to the total metal stream, its treatment is discussed below in the section on metals (Chapter 2.3.4).

Graph 25: Production of metals from separate collection



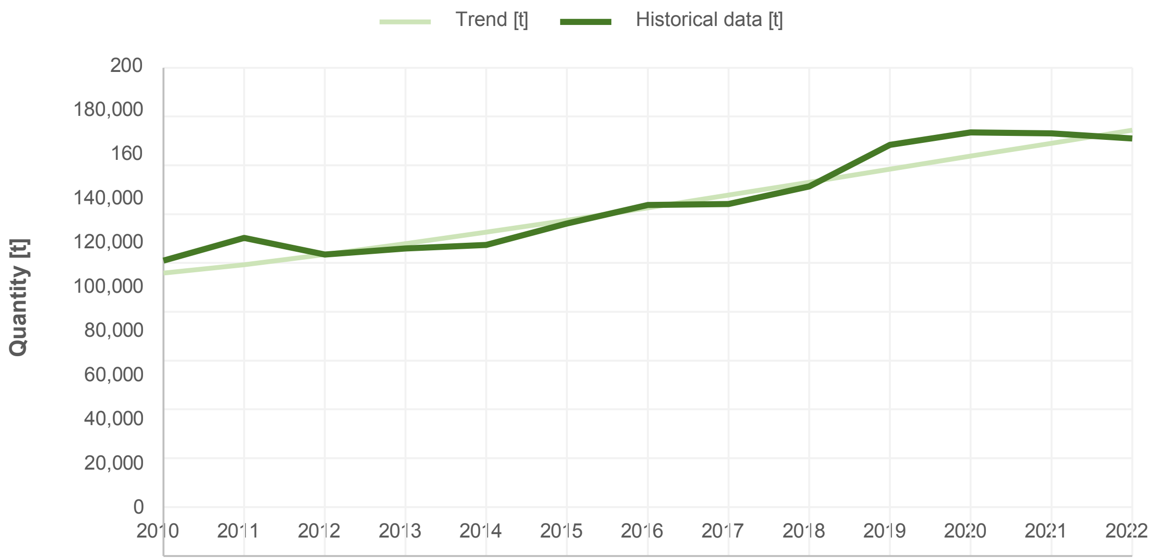
Source: processed based on ISOH

In general, the Czech Republic has a slight deficit in capacity for the treatment of separately collected metals. For catalog number *20 01 40 Metals,* this deficit was highest in the Olomouc Region in 2022 (11,000 tons). The total deficit in treatment facilities in 2022 for this catalog number (20 01 40) was approximately 39,000 tons. For catalog number *15 01 04 Metal packaging,* the highest deficit in treatment facilities in 2022 was in the capital city of Prague (130 tons). In general, the Czech Republic had a surplus capacity of 463 tons for this catalog number (15 01 04) in 2022. The Czech Republic has a high deficit in capacities for the treatment of other ferrous waste, with a total deficit of just under 924,000 tons in 2022. The highest deficits in that year were in the Central Bohemian Region (273,000 tons) and the South Moravian Region (209,000 tons), while a surplus capacity was recorded in the Moravian-Silesian Region (386,000 tons).

2.3.1.6 Glass from separate collection

The production of separately collected recyclable glass is on the rise. The lowest production value was recorded in 2010 (114,000 tons), since then it has grown more or less every year until 2020 (174,000 tons). In recent years, production has stagnated, with current production in 2022 standing at 171,000 tons. Although glass waste production is now dominated by production from separate collection, its management is assessed collectively for the entire glass stream below (see Section 2.3.5).

Graph 26: Glass production from separate collection



Source: processed based on ISOH

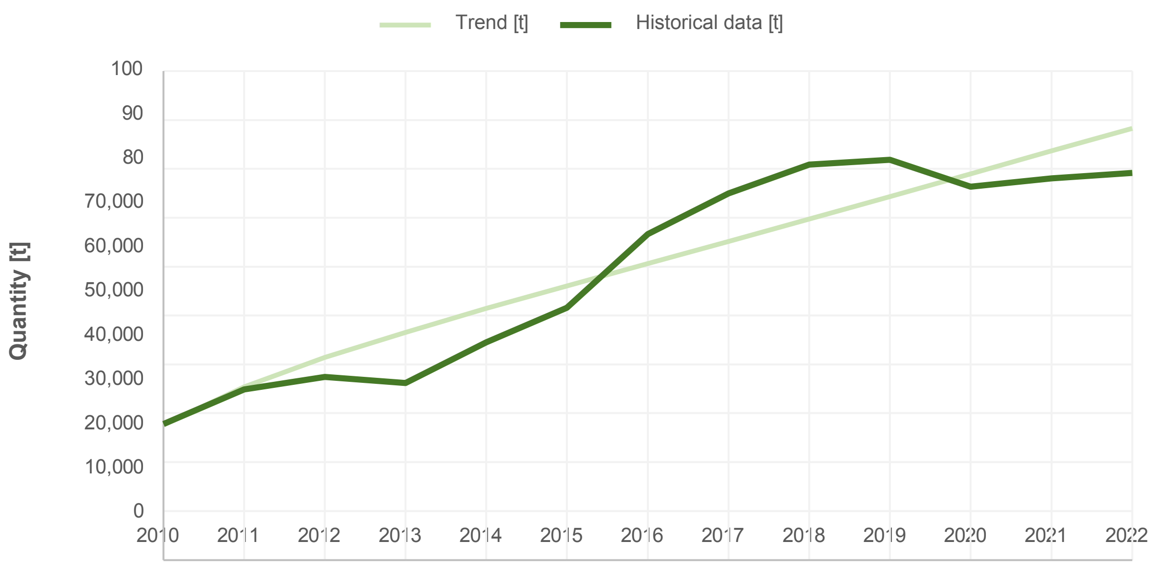
In general, the Czech Republic has a deficit of facilities for the treatment of separately collected glass. For catalog number *20 01 02 Glass,* this deficit was highest in 2022 in the capital city of Prague (18,000 tons) and the Central Bohemian Region (14,000 tons), the South Bohemian Region (10,000 tons), the Olomouc Region (9,000 tons), and the Hradec Králové Region (9,000 tons). The total deficit of treatment facilities in 2022 for this catalogue number (20 01 02) was approximately 18,000 tons. For catalogue number *15 01 07 Glass packaging,* the highest deficit of treatment facilities in 2022 was in the Moravian-Silesian Region (16,000 tons). Overall, however, the Czech Republic had a surplus of treatment capacity for this waste (15 01 07) of 1,000 tons in 2022.

2.3.1.7 Wood from separate collection

The production of material-usable wood from separate collection has been growing in the long term, which is also related to the significant development of collection yards. With a production of around 80,000 tons, it accounts for approximately 30% of total waste wood production. The lowest production was recorded in 2010 (27,800 tons), gradually increasing in the following years to reach the highest recorded production in 2019 (81,900 tons). In 2020, production fell slightly to 76,300 tons, and the current figure for 2022 is 79,200 tons.

Wood under catalogue number 20 01 37 (*Wood containing dangerous substances*) is also collected separately, as it is classified as hazardous waste and is therefore not included in Figure 27. However, its production is very low compared to cat. no. 20 01 38, specifically ranging from 33 tons (2016, lowest recorded value) to 281 tons (2022, highest recorded value).

Chart 27: Production of material-recyclable wood from separate collection (cat. no. 20 01 38)



Source: processed based on ISOH

In general, the Czech Republic has a slight deficit in capacity for handling separately collected wood. For catalog numbers *20 01 37* Wood containing dangerous substances and 20 01 38 Wood not covered by 20 01 37*, this deficit was highest in the capital city of Prague (14,000 tons) in 2022, with a large surplus.

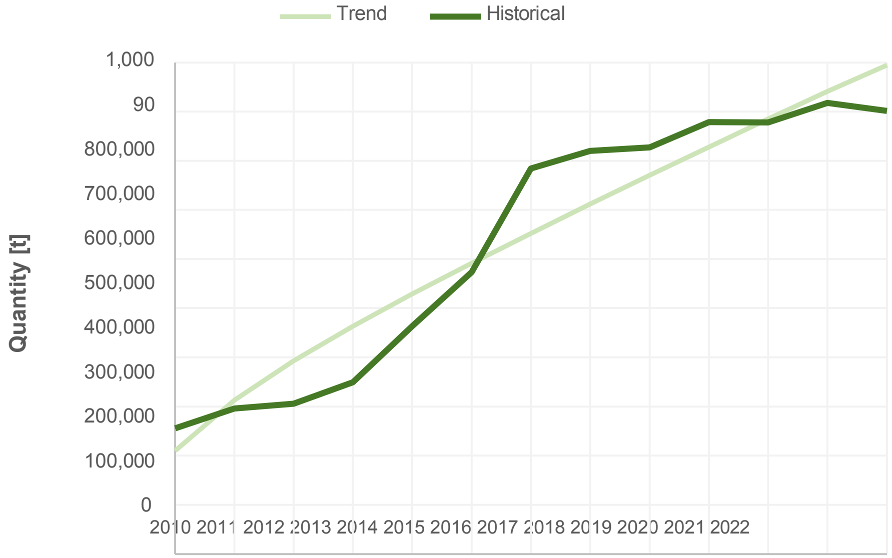
The highest capacity deficit was recorded in the Vysočina Region (19,000 tons) in the given year. The total deficit of handling equipment in 2022 for the given catalog numbers (20 01 37 and 20 01 38) was approximately 5,000 tons. For catalog number *15 01 03 Wooden packaging*, the highest deficit of treatment facilities in 2022 was in the Central Bohemian Region (7,000 tons) and the Moravian-Silesian Region (6,000 tons), while a surplus of capacity in that year was recorded in the Vysočina Region (11,000 tons) and the Capital City of Prague (9,000 tons). The total deficit of facilities in 2022 for this catalog number (15 01 03) reached 404 tons.

Due to the low share of wood in group 20 in total waste wood production, more information is provided in section 2.3.6 below.

2.3.1.8 Biological waste (BIO)

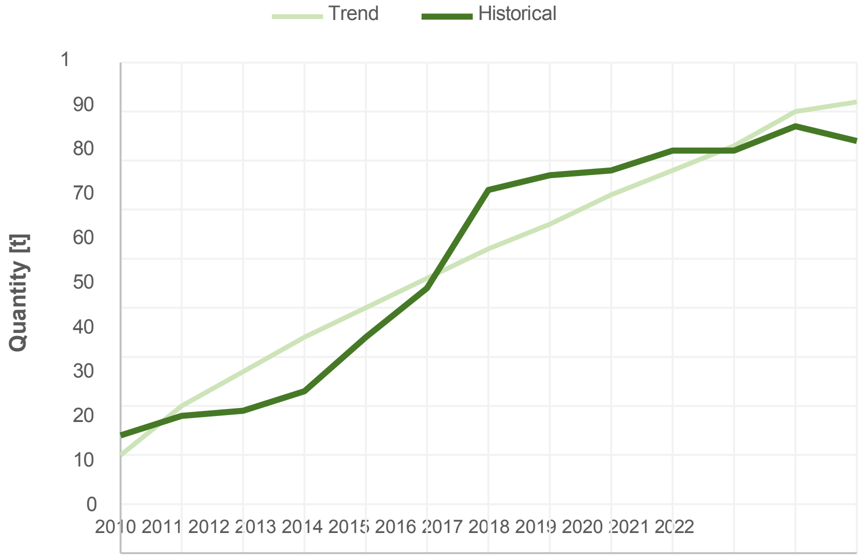
Biological waste (hereinafter also referred to as "BIO") is defined by Act No. 541/2020 Coll., on waste, and also by Directive (EC) No. 98/2008 of the European Parliament and of the Council on waste as biodegradable waste from gardens and parks, food and kitchen waste from households, restaurants, catering and retail facilities. Biological waste is a subset of biodegradable municipal waste. According to the methodology of the Ministry of the Environment, it includes 3 category numbers and is mostly represented by biological waste from gardens and parks. The production of biological waste is growing significantly. Over the last 10 years (2012-2022), production has tripled. However, since 2017, the increase has been slower than between 2013 and 2016. Production in 2022 was 901,349 tons. The trend mirrors the increase, i.e., it is growing significantly. Since biological waste is an important stream in terms of production and also for the future achievement of municipal waste management targets, more details on production per capita and the distribution of this production in municipalities are provided below. The data are important for compiling forecasts further in the POH ČR document.

Graph 28: Production of the biological waste stream – absolute figures



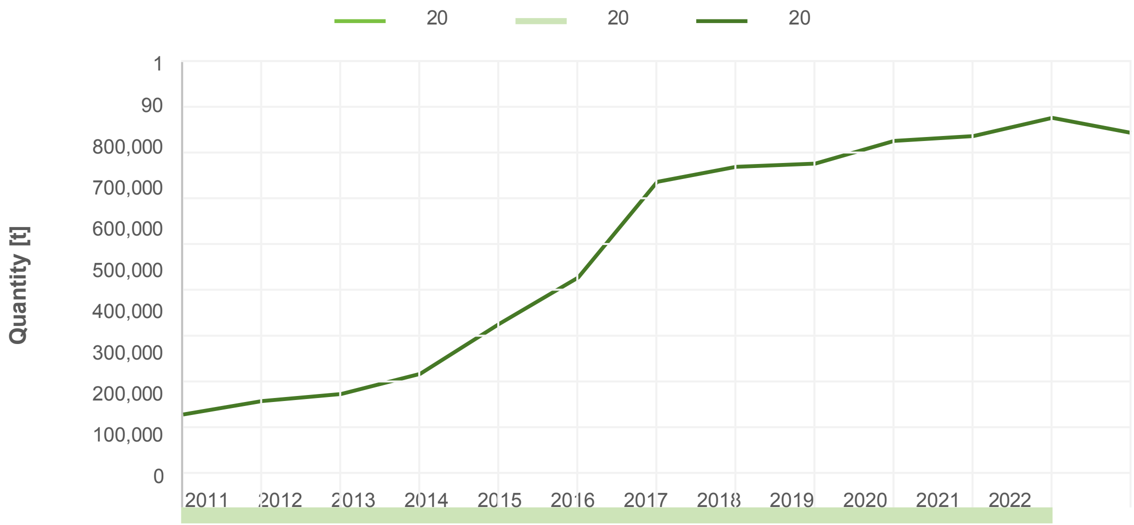
Source: processed based on ISOH and Tiramiso

Chart 29: Production flow of biological waste – production per capita



Source: processed based on ISOH and Tiramiso

Graph 30: Development of biological waste production by catalogue numbers

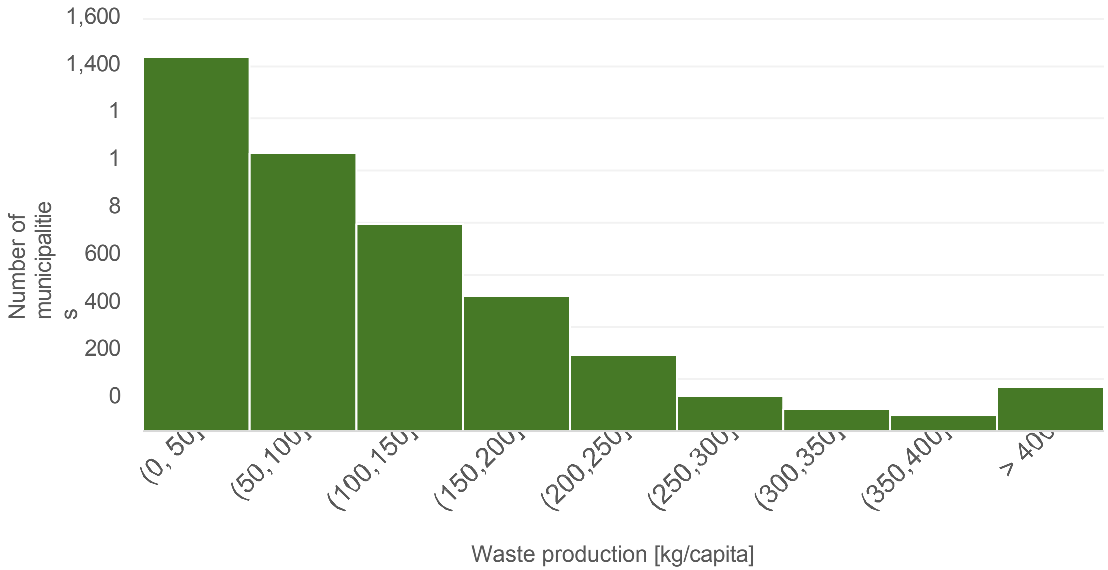


Source: processed based on ISOH

The most common waste is category no. *20 02 01 Biodegradable waste* (from gardens and parks) with a production of 845,992 tons in 2022 and a share of almost 94% of BIO production. This is followed by category *20 01 08, biodegradable waste from kitchens and catering facilities,* with a production of 42,919 tons in 2022 (4.8% share) and the third most represented category was category no. *20 01 25 Edible oil and fat with* a production of 12,438 tons and a share of only 1.4%.

In 2022, a total of 730,450 tons of category 20 02 01 were produced by municipalities, accounting for 81% of the production of the biological waste stream and 86% of the production of this category. An important figure is production per capita. Graph 31 shows a histogram indicating the distribution of production in municipalities. The histogram does not include municipalities with zero production. In 2022, production was recorded in 4,554 municipalities out of a total of 6,254 municipalities. The average production in 2022 was 123 kg/capita, with a median of 88 kg/capita.

Chart 31: Distribution of production of 20 02 01 Biodegradable waste from gardens and parks per capita in municipalities

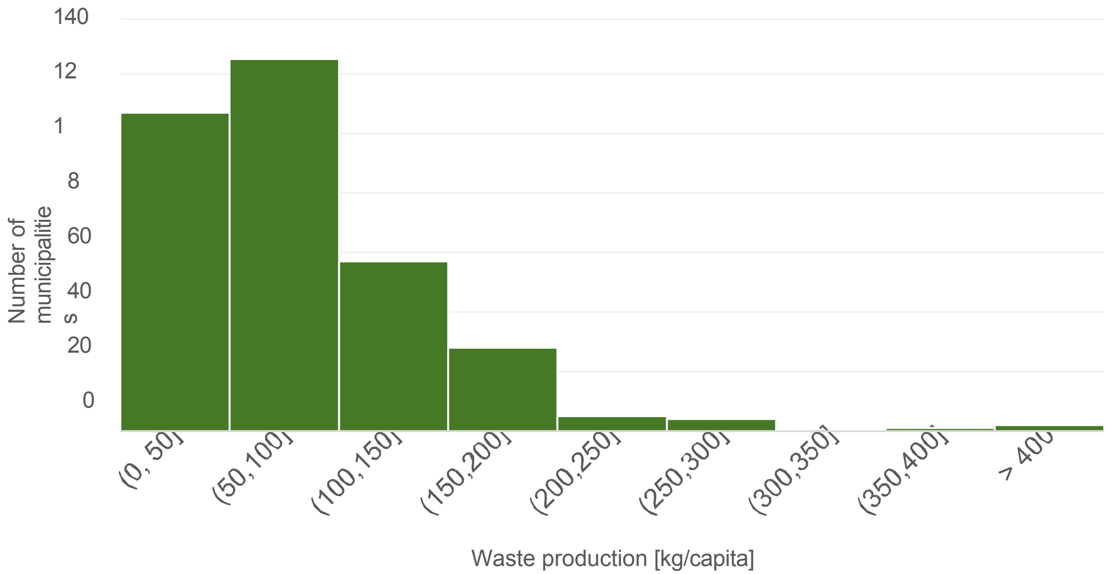


Source: processed based on ISOH, Ministry of the Environment and Czech Statistical Office

Municipalities can also be divided according to population size – rural municipalities and smaller towns vs. larger and large towns. The dividing line was set at 4,000 inhabitants. For municipalities with up to 4,000 inhabitants, production was recorded in 4,125 out of 5,909 municipalities. The average production in 2022 was 127 kg/capita, with a median of 89 kg/capita. The distribution is similar to that shown in Figure 31.

However, in larger cities, i.e., municipalities with a population of over 4,000, the distribution of production is different, ranging mainly in lower figures, see Graph 32. In 2022, production was recorded in 329 out of 345 municipalities, with an average production of only 83 kg per capita and a median of 71 kg per capita.

Chart 32: Distribution of biodegradable waste from gardens and parks per capita in municipalities with more than 4,000 inhabitants



Source: processed based on ISOH and ČSÚ

In the context of developing separate waste collection, the need to develop an individual collection network (door to door) is emphasized. An analysis of data from municipalities operating individual collection networks showed that in 2022, the average production was 87 kg/capita, with a median of 83 kg/capita. The introduction of a door-to-door system does not necessarily mean an increase in bio-waste production. The effect can also be explained by the fact that municipalities that have adopted a door-to-door system also prefer to prevent bio-waste generation through home composting. The analysis shows how significant the effect of prevention can be in terms of the generation of separately collected bio-waste.

In 2022, only 7,000 tons of waste were produced that fall under the category of animal by-products and biological waste from kitchens and catering facilities, which is generated by the municipality, accounting for 13% of the production of the given category number (7.7% of the production of the biological waste stream). It is therefore clear that most of the production was generated by other producers. In 2022, the production of animal by-products and biological waste from kitchens and catering facilities was recorded in only 70 municipalities out of a total of 6,254 municipalities. The share of municipalities that ensure separate collection of this stream increased from 0.83% in 2021 to 1.12% in 2022. The share of municipalities is therefore still very small. The average production in 2022 was 9.6 kg/capita, with a median of 0.6 kg/capita. The stream is significant in terms of compliance with the targets for sorting in municipalities and recycling municipal waste in 2035. In supporting documents,[21,22] the Ministry of the Environment clearly declares the importance of this stream, the need for education and awareness-raising, which will lead to the expansion of separate collection of kitchen waste from households and its treatment with a preference for subsequent use in biogas plants (extended agricultural or newly built waste facilities).

Biological waste was handled exclusively in the preferred manner. No non-preferred handling of this stream was recorded. Material recovery accounted for the dominant share (77%). Within the preferred handling, treatment prior to recovery and energy recovery accounted for minor shares. Biological waste is not subject to export or import. The key type of facility for waste stream management is composting plants, which processed almost all of the waste stream. Approximately 40% of waste stream 20 01 08 (17,000 tons) was processed by anaerobic digestion in biogas plants. Given that the waste stream is managed in the preferred manner, it can be concluded that the capacity of the facilities for current production is sufficient. However, in view of the expected increase in production, the network of facilities will also need to be adapted to this increase.

Table 9: Production and disposal 2018–2022 – Biological waste I

Year	Production	Energy recovery			Recycling and composting			Composting		
	Amount (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	827	42	5.0	5.2	751	90.2	94.2	718	86.3	90.2
2019	878	43	4.9	4.8	850	93.2	94.7	803	90.5	89.5
2020	878	40	4.6	4.3	884	97.4	95.2	826	93.0	89.0
2021	919	32	3.5	3.5	900	94.3	96.3	841	90.7	89.
2022	901	36	3.9	3.8	900	95.1	96.0	826	90.4	88

Source: processed based on ISOH

[21] Ministry of the Environment, Examples of good practice in bio-waste management – Household kitchen waste, available at: https://www.mzp.cz/cz/kuchynsky_odpad_dobra_praxe

[22] Ministry of the Environment, May 2024, Improving the collection of kitchen waste from households, available at: https://www.mzp.cz/cz/odpad_kuchyn_domacnost_zlepseni

Table 10: Production and management 2018–2022 – Biological waste II

Year	Landfilling			Incineration		
	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)
2018	3.4	0.4	0.4	0	0	0
2019	2.9	0	0	0	0	0
2020	1.8	0	0	0	0	0
2021	1.2	0	0	0	0	0
2022	0.5	0	0	0	0	0

Source: compiled based on ISOH

In general, the Czech Republic has a deficit of facilities for the treatment of separately collected biological waste.

In terms of biological waste, the deficit in waste treatment capacity in the Czech Republic is greatest for catalog number 20 02 01, *biodegradable waste (*from gardens and parks), which totaled 55,000 tons. The highest deficit in facility capacity was in the capital city of Prague (42,000 tons) and in the South Moravian Region (15,000 tons). In contrast, there was a significant surplus of capacity in the Central Bohemian Region (30,000 tons).

For catalog number 20 01 08*, biodegradable waste from kitchens and catering facilities*, there is a slight deficit in waste treatment capacity, totaling 1,700 tons. The largest deficit is in the capital city of Prague (10,000 tons) and the South Moravian Region (8,000 tons). There is a surplus capacity in the Central Bohemian Region (8,000 tons) and the Zlín Region (5,000 tons).

There is a surplus of waste treatment facility capacity for catalog number 20 01 25 *Edible oil and fat*, which reached 2,500 tons in 2022. The capacity deficit is mainly in the South Moravian Region (1,800 tons). The highest surplus capacity is in the Moravian-Silesian Region (3,800 tons) and the Ústí nad Labem Region (1,800 tons).

2.3.1.9 Bulky waste (OBJ)

Bulky waste (cat. no. 20 03 07) accounts for approximately 1.6% of waste production in the Czech Republic, with 635,000 tons of bulky waste produced in 2022, compared to only 518,000 tons in 2010. Apart from a decline between 2010 and 2014 and between 2021 and 2022, production in the Czech Republic shows an upward trend. Over the last 10 years, production has increased by 25%, reaching a maximum of 713,000 tons in 2021. Only 0.04% (0.24 thousand tons in 2022) of bulky waste is classified as hazardous waste, with the vast majority of the stream falling into the category of other waste. Bulky waste represents a significant stream of municipal waste, yet its recovery rate is generally low (15%). Material recovery is negligible.

This is a very heterogeneous stream, where the material composition varies significantly depending on the product that has become waste. Bulky waste produced within the municipal system was considered treated for landfill purposes until the end of 2022, even if the separate collection of recoverable components of municipal waste was ensured during collection to the extent required by law. Landfilling dominates historical data on waste management. At some landfills, recoverable components were sorted from bulky waste. Landfilling reduces the volume of waste on the landfill body through mechanization. In the case of energy recovery, which is another important method of disposal, bulky waste is usually crushed in large-capacity crushers to ensure an acceptable size and to homogenize the waste slightly.

Currently, in the case of waste category 20 03 07, waste treatment prior to landfill is considered to be when the waste producer has ensured that at least metals, plastics, and large pieces of wood are sorted during collection. The Waste Act therefore requires intensive sorting of bulky waste into individual material groups, which will intensify their recycling in the future.

The data analysis also revealed a significant deficit in the preferred treatment of bulky waste. Restricting the landfilling of bulky waste is also necessary if municipal waste landfilling as a whole is to be reduced to below 10% or even 5%. The total capacity deficit for the Czech Republic, with current production at 635,000 tons, is 550,000 tons.

The current practice of reporting bulky waste as category 20 03 07, collecting it and then landfilling or using it for energy will have to change. Future production scenarios must take into account the fact that bulky waste will have to be sorted at source, meaning that some bulky waste will not even be generated. Sorting and re-sorting bulky waste will increase the production of recyclable and recoverable components, especially wood.

Table 11: Production and disposal 2018–2022 – Bulky waste

Year	Production	Energy use			Recycling			Utilization			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	613	3	6	6	115	18.8	18.8	152	24.7	24.8	459	74.9	75.2	0	0	0
2019	669	39	5.8	5.8	115	17.2	17.2	154	23	23	514	76.9	77.0	0	0	0
2020	709	45	6.4	6.4	118	16.7	16.7	164	23.1	23.1	546	77.1	76.9	0	0	0
2021	714	49	6.9	6.8	60	8.4	8.3	109	15.2	15.1	609	85.4	84.9	0	0	0
2022	635	40	6.3	6.3	55	8.6	8.7	94	14.9	15	536	84.3	85	0	0	0

Source: processed based on ISOH

In 2022, a slight overall deficit in the capacity of facilities for the treatment of bulky waste was recorded in the Czech Republic, totaling 5,000 tons. A very high deficit in bulky waste management capacity was recorded in the capital city of Prague (64,000 tons) in 2022, while a surplus was recorded in the Central Bohemian Region (59,000 tons).

2.3.1.10 Mixed municipal waste (MMW)

Mixed municipal waste is currently the most significant municipal waste in terms of volume. In 2022, 2,672,000 tons of mixed municipal waste were produced in the Czech Republic, accounting for approximately 6.4% of all waste produced and 47% of municipal waste. Thanks to increasing sorting rates among residents, the production of mixed municipal waste has been showing a slight downward trend in the long term. Over the last 10 years or so, the production of mixed municipal waste has fallen by about 8.8% (from 2,933,000 tons in 2011 to 2,672,000 tons in 2022). Production has fallen steadily, except for a slight jump in 2014. A steeper decline can be observed in 2022. Given the strong dependence of mixed municipal waste production on the number of inhabitants, it is common to evaluate its specific production per capita. Similarly, between 2010 and 2013, there was a decrease in the specific production of mixed municipal waste from 299 kg/capita to 272 kg/capita. In 2014, there was an increase to 279 kg/capita, and specific production continued to decline to 254 kg/capita in 2022. Over the last 10 years, specific production of mixed municipal waste has thus fallen by about 9%.

Mixed municipal waste is a highly heterogeneous waste that varies significantly in terms of location and time. The production of mixed municipal waste is strongly correlated with the number of inhabitants in a given area. Its production is widespread throughout the Czech Republic, with the highest production in agglomerations with a high number of inhabitants (regional capitals, Central Bohemian Region).

The dominant system for collecting mixed municipal waste is door-to-door collection, which is implemented in all municipalities in the Czech Republic. In the case of family houses, collection containers with a capacity of up to 120 liters are used, while in the case of apartment buildings, collection containers with a capacity of up to 1,100 liters are used.

The ratio of mixed municipal waste producers (municipalities/companies) remained stable between 2010 and 2022 at around 75% in favor of mixed municipal waste produced by municipalities. In 2022, approximately 75.7% of mixed municipal waste came from the municipal system, with the remaining 24.3% of mixed municipal waste originating from companies.

Although mixed municipal waste represents a significant municipal waste stream, its energy recovery rate is generally low, at 23% in 2022. Energy recovery takes place in four existing waste-to-energy plants (hereinafter also referred to as "WTE").

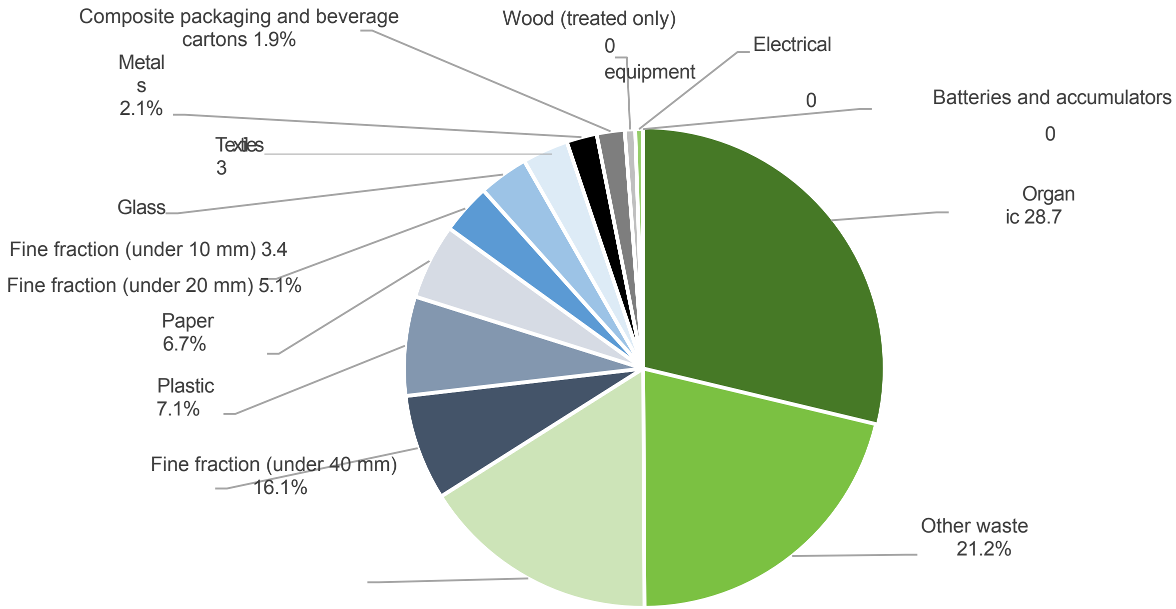
With current mixed municipal waste production of 2,672,000 tons, 2,047,000 tons are landfilled. Mixed municipal waste thus contributes significantly to municipal waste landfilling. The achievement of future municipal waste targets will be significantly influenced by the management of mixed municipal waste. These targets include, in particular:

- By 2035, reduce the amount of municipal waste landfilled to 10% (by weight) or less of the total amount of municipal waste produced.

It is clear that a fundamental change in the management of mixed municipal waste will have to take place by 2030.

Based on the Ministry of the Environment's analysis of mixed municipal waste (TIRSMZP19)[23], it is possible to estimate the average residual occurrence of material recoverable components in mixed municipal waste. The average composition is presented on the Ministry of the Environment website. The content of material recoverable components in mixed municipal waste also represents the theoretical potential for their future transfer to separate collection. A similar composition of mixed municipal waste is also presented by the AOS EKO-KOM system, which has been monitoring the composition of mixed municipal waste on a long-term basis.

Graph 33: Average composition of municipal waste in the Czech Republic, values are given in % by weight.[23]



Source: Ministry of the Environment

It will be essential for the management of mixed municipal waste to ensure an increase in capacity for its energy recovery.

[23] Gregor J. Kropáč J. Results of the average composition of mixed municipal waste in the Czech Republic, 2022 (Summary report of the Ministry of the Environment), Brno University of Technology, result of project TIRSMZP719, available at: https://www.mzp.cz/cz/prumerne_slozeni_sko

[24] Available at: https://www.ekokom.cz/vysledky-rozboru-smesneho-komunalniho-odpadu-z-obci-v-roce-2022

Table 12: Production and disposal 2018–2022 – Mixed municipal waste

Year	Production	Energy recovery			Recycling			Use			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	2,807	588	20.9	20.8	115	4.1	4	703	25.1	24.8	2,128	75.8	75.2	0.2	0	0
2019	2,787	596	21.4	21.3	87	3.1	3	683	24.5	24.5	2,111	75.7	75.5	0	0	0
2020	2,780	619	22.3	22.2	40	1.4	1.4	659	23.7	23.6	2,129	76.6	76.4	0	0	0
2021	2,775	615	22	22.2	12	0	0	627	22.6	22.6	2,146	77.3	77.4	0	0	0
2022	2,672	619	23	23.1	12	0.4	0	631	23.6	23.6	2,047	76.4	76.4	0	0	0

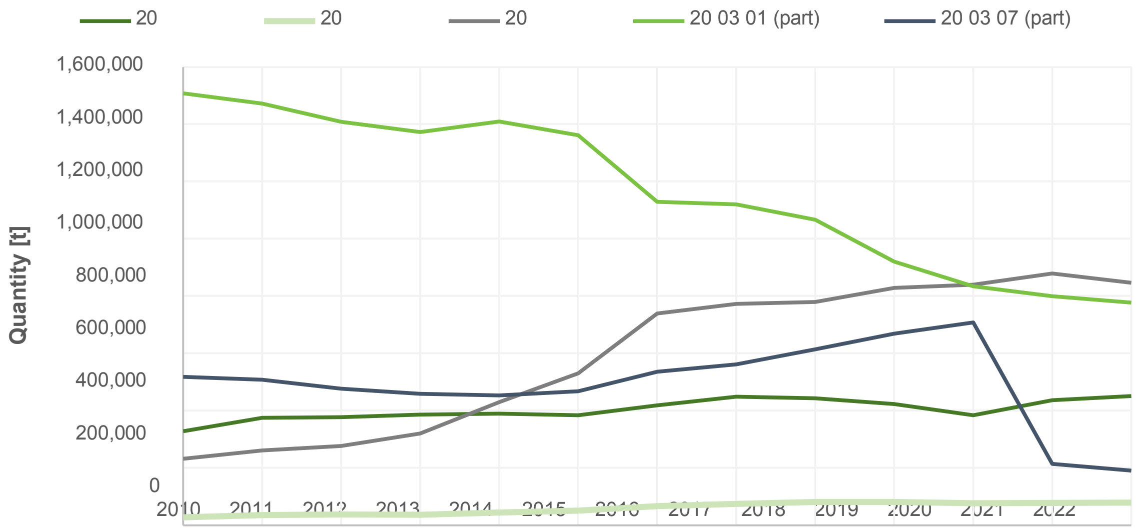
Source: processed based on ISOH

In 2022, there was a slight overall deficit in the capacity of facilities for the treatment of mixed municipal waste in the Czech Republic, totaling 4,000 tons, but there are significant differences between individual regions. A very high deficit in mixed municipal waste treatment capacity was recorded in 2022 in the capital city of Prague (81,000 tons), the Hradec Králové Region (45,000 tons), the Vysočina Region (32,000 tons), and the Zlín Region (30,000 tons). On the other hand, high surpluses in treatment capacity were recorded in 2022 in the Pardubice Region (80,000 tons), Central Bohemia (49,000 tons), South Moravia (31,000 tons), Liberec (25,000 tons), and Moravia-Silesia (21,000 tons).

2.3.1.11 Biodegradable municipal waste (BRKO)

According to the methodology of the Ministry of the Environment, biodegradable municipal waste (BRKO) includes 11 selected types of biodegradable waste from group 20 (paper and cardboard, biodegradable waste from kitchens and catering facilities, clothing, textile materials, edible oil and fat, wood, biodegradable waste, mixed municipal waste, market waste, street sweepings, bulky waste). In addition to the waste represented in the Biological waste stream (see above), the biodegradable fraction of mixed municipal waste (cat. no. 20 03 01) and bulky waste (cat. no. 20 03 07) is also included in biodegradable municipal waste (see
"part" in Chart 34). The share of biodegradable components in this waste is continuously reviewed based on expert opinions and waste analyses. The production of biodegradable municipal waste has been growing since 2014, with a decline since 2018. In 2022, production reached 2,424 thousand tons. This represents 225 kg/capita. The following wastes contribute most to the production flow: cat. no. *20 02 01 Bio-waste from gardens and parks,* cat. no. *20 03 01 Mixed municipal waste, followed by cat. no. 20 01 01 Paper and cardboard from separate* collection and cat. no. *20 03 07 Bulky waste.*

Graph 34: Development of biodegradable municipal waste production – contributions of the most significant catalogue numbers



Source: processed based on ISOH

In 2020, the target of reducing the amount of biodegradable municipal waste sent to landfills to 50% of 1995 levels was achieved. The Ministry of the Environment aims to further reduce the amount of biodegradable municipal waste sent to landfills. In 2022, this amount decreased from 818,000 tons in 2021 to 762,000 tons in 2022. The main source of biodegradable municipal waste going to landfill is mixed municipal waste. With the development of biological waste sorting and the increasing energy recovery from mixed municipal waste, the share of biodegradable municipal waste going to landfill will continue to decline.

Table 13: Production and management 2018–2022 – Biodegradable municipal waste

Year	Production	Energy recovery			Recycling and composting			Use			Landfilling			Composting		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	2,372	234	9.7	10.	1,170	57.0	53.8	1,404	66.7	64.5	769	32.4	35.3	959	35.7	44.1
2019	2,417	239	9.7	10.7	1,214	56.2	54.3	1,452	65.9	64.9	781	32.3	34.9	1,016	38	45.4
2020	2,382	250	10.3	10.9	1,248	57.7	54.3	1,497	68.0	65.2	796	33.4	34.6	1,033	39.0	45
2021	2,479	238	9.5	10.4	1,235	56.0	53.8	1,473	65.5	64.2	818	33	35.7	1,033	38.1	45
2022	2,404	238	9.7	10.9	1,180	57.3	54.1	1,418	67.0	65	762	31.5	34.9	994	38.3	45.5

Source: processed based on ISOH

Note: The table uses the same coefficients for the biodegradable fraction valid for 2022 for 2021 and previous years.

In 2022, the Czech Republic recorded a relatively high deficit in capacity for the treatment of biodegradable municipal waste, i.e. catalog numbers *20 01 01 Paper and cardboard* and *20 01 38 Wood not covered by 20 01 37*, totaling 167,000 tons. The highest deficit for waste under these catalog numbers was recorded in 2022 in the Capital City of Prague (49,000 tons), the South Moravian Region (46,000 tons), and the South Bohemian Region (21,000 tons). On the other hand, a high surplus of capacity was recorded in the Vysočina Region (19,000 tons).

A relatively high deficit in the treatment of biodegradable municipal waste was also recorded in the Czech Republic in 2022 for BRKO falling under catalogue number *20 02 01 Biodegradable waste*, specifically in the amount of 55,000 tons. The highest deficit was recorded in the capital city of Prague (42,000 tons), while the highest surplus capacity was recorded in the Central Bohemian Region (30,000 tons).

A slight deficit in capacity for handling this waste was also recorded for BRKO falling under catalogue numbers *20 03 01 Mixed municipal waste* and *20 03 07 Bulky waste*, totaling only 149 tons, but there are large differences in capacity between individual regions. The highest deficit in 2022 was recorded in the capital city of Prague (43,000 tons), while the highest capacity surpluses were recorded in the Central Bohemian Region (32,000 tons) and the Pardubice Region (27,000 tons).

For other biodegradable municipal waste (catalogue numbers 20 01 08, 20 01 25, 20 01 10, 20 01 11, 20 03 02 and 20 03 03), the deficit or surplus in capacity was in the order of thousands of tons.

2.3.2 Paper

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Required investment
1.1 million tons	Recycling (96%)	Exports 470,000 tons	Insufficient – paper recycling in the Czech Republic, necessary investment in paper machines in the Czech Republic.	Processing and recycling – CZK 23.8–24 billion over 10 years

Total production of recyclable paper is showing a slight upward trend. Since 2016, it has ranged between 1.1 and 1.2 million tons per year. Paper is a commodity that is exported in significant quantities (approximately 470,000 tons in 2022). The remaining amount processed in the Czech Republic was mainly disposed of in the preferred manner, i.e., recycled. The share of non-preferred disposal was negligible. Recycling is high, reaching 96%. A small proportion of waste was also used for energy recovery, but this type of treatment has tended to decline in recent years. Paper disposal has fluctuated in recent years, but does not exceed 1%.

Paper is predominantly produced in the "Other" category. The share of the "Hazardous" category is negligible (0.006%). If hazardous waste is generated, it is mainly incinerated, which is the preferred method of disposal for this category.

Stationary equipment is mainly used for final paper handling. Mobile equipment is mainly used for paper collection. The paper collected in this way is transferred to stationary equipment for further processing (328,104 tons in 2022). Some of the waste paper is processed in sorting or re-sorting lines. However, approximately 80% of the waste delivered was not pre-treated. In 2022, paper processing in facilities was distributed across all regions, with material recovery occurring mainly in the Moravian-Silesian Region, the Ústí nad Labem Region, the South Bohemian Region, and the Vysočina Region, i.e., in regions where paper mills are operated. Nevertheless, capacity is insufficient for domestic use of waste paper. In 2022, the Czech Republic was a net exporter of paper waste. The difference between paper exports and imports was 400,000 tons. In all regions, paper underwent significant processing before being used.

Data on the capacities of paper handling equipment are provided in Chapter 2.3.1.2.

Table 14: Production and disposal 2018–2022 – Paper

Year	Production	Energy recovery			Recycling			Use			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	1,188	2	0	4	453	100.6	92.8	474	101.5	97.3	11	0.9	2.3	0	0	0
2019	1,159	24	0	5.9	363	93.1	90.4	388	94.0	96.5	11	1.0	2.8	0.7	0.1	0
2020	1,111	25	1	5.7	403	98.7	90.8	429	99.7	96.6	14	1.2	3.1	0	0	0
2021	1,170	23	0.8	5.1	416	97.6	92.3	439	98.4	97.4	10	0.9	2.3	0	0	0
2022	1,118	16	0.9	3	371	95.8	93.4	387	96.7	97.4	9	0	2.3	0	0	0

Source: processed based on ISOH

Waste paper

The total production of material-usable waste paper is showing a slight upward trend. Since 2016, it has ranged between 1.1 and 1.2 million tons per year. The Czech Republic is a net exporter of waste paper, exporting 400,000 tons, which is approximately one-third of the total production in the Czech Republic. This is due to a lack of recycling technology in paper mills. Investments in recent years have focused on improving quality and capacity based on primary cellulose from softwood. Paper is a highly marketable commodity and there is sufficient capacity for its processing in neighboring countries.

2.3.3 Plastic

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Required investment
494,000 tons	Recycling (52%)	Export 34,000 tons	Sufficient for sorting, but modernization is needed to ensure high-quality recycling. Lack of recycling capacity in the Czech Republic for some polymers.	Treatment and recycling – CZK 10.3–11.1 billion over 10 years

Plastic waste production has been growing steadily since 2012. In 2022, production reached 494,000 tons. This increase is largely due to the significant growth in the production of recyclable and reusable plastic from separate collection in the municipal waste system, the dominant component of which is plastic packaging, where production has almost doubled since 2012 and accounted for 42% of plastic waste production in 2022. On the contrary, the production of recyclable and recoverable plastic outside group 20 has been declining since 2017. The amount of plastic packaging placed on the market is also growing, which is reflected i n the amount of packaging waste reported in subgroup 15 01 (from companies) and group 20 (from the municipal system). Plastic packaging waste thus accounts for approximately 280,000 tons, which is 56% of total production. The share of the Hazardous category in total plastic production is negligible (4%).

Plastic waste is also subject to intensive cross-border transport. The main items exported and imported are plastic packaging waste originating from other producers (15 01 02) and plastics from industrial production (07 02 13). The Czech Republic's overall balance is negative, i.e. 9,000 tons more is imported than exported. In terms of imports, plastic waste from production slightly predominates. Plastic packaging waste (15 01 02) is mainly exported.

Plastic waste is mostly handled in the preferred way, which is reuse. A total of 73% of plastic waste is reused, of which 51.9% is recycled and 20.3% is used for energy. Non-preferred plastic disposal in 2022 mainly involved landfilling (32%). Recycling takes place across the whole territory of the Czech Republic.

Partial landfilling of plastic waste leads to a capacity deficit for preferred treatment. Overall, the Czech Republic has a deficit of preferred treatment of over 80,000 tons. This deficit does not concern waste category 20 01 39, but mainly the treatment of packaging category 15 01 02 and other plastic waste classified in the stream in accordance with its definition. Only the Pardubice Region reports sufficient treatment capacity. Other regions are in deficit.

Data on the capacities of plastic waste treatment facilities are provided in Chapter 2.3.1.3.

Table 15: Production and disposal 2018–2022 – Plastics

Year	Production	Energy recovery			Recycling			Use			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	457	136	13	19	379	65.8	52.9	523	79.8	72.9	171	37.4	23.9	0.7	0	0
2019	470	154	13.6	23.4	294	55.0	44.5	461	70.2	69.8	175	37.3	26.7	0.7	0	0
2020	463	161	13.8	23.5	310	52.7	45.1	476	67.0	69.3	195	42.1	28.6	1	0	0
2021	484	173	16.9	26.1	314	53.0	47.2	492	70.7	74.0	163	33.6	24.5	0.5	0	0
2022	485	195	20.3	29.1	311	51.9	46.5	509	72.7	76.0	153	31.6	22.8	0	0	0

Source: processed based on ISOH

2.3.4 Metals

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Required investment
3.9 million tons	Recycling (96%)	Export 1.4 million tons	Insufficient – investment in furnaces, ideally hybrid ones, must be secured.	CZK 9.3 billion over 10 years

The production of recyclable metals has been on a slight downward trend for a long time, which has turned into stagnation in recent years. Production in individual years fluctuates around 4 million tons per year. Metals are predominantly produced in the Other category. The share of the Hazardous category is negligible (0.4%). If hazardous waste is generated, it is handled in the preferred manner, undergoing treatment prior to use or being recycled directly.

The production of separately collected recyclable metals (from municipalities) has been rising sharply since 2016. From 250,000 tons in 2016 to 450,000 tons in 2022. The production of recyclable metals from separate collection from the municipal system accounts for only about 10% of the total production of this stream. Ferrous metal waste is imported and exported. Exports strongly prevail, with approximately 500,000 tons imported annually and over 1.3 million tons exported.

The remaining quantity, which is processed in the Czech Republic, is disposed of in the preferred manner, i.e., recycled. The share of non-preferred disposal was negligible in 2022. Metal disposal takes place mainly in stationary facilities. The collection and subsequent transfer of metals for processing or export was also carried out by the majority of stationary facilities (approximately 2,600 facilities). A group of approximately 280 stationary facilities was mainly involved in the final processing of metals. The majority of metals were treated and recycled in these facilities. Only a small proportion of this waste was transferred within the Czech Republic or exported abroad. Data on the capacities of metal treatment facilities are provided in Chapter 2.3.1.5.

Table 16: Production and management 2018–2022 – Ferrous metals

Year	Production	Energy recovery			Recycling			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	3,781	12	0	0	2,122	98.3	92.4	28	0.7	1.2	0	0	0
2019	3,642	14	0	0	1,812	95.0	91.9	31	0.9	1.6	0	0	0
2020	3,363	15	0	0	1,896	102.0	93.1	38	1	1.8	0	0	0
2021	3,831	15	0	0	2,126	99.0	94.0	134	0.9	1.5	0	0	0
2022	3,583	15	0	0	1,961	96.1	94.5	24	0.7	1	0	0	0

Source: processed based on ISOH

Table 17: Production and disposal 2018–2022 – Non-ferrous metals

Year	Production	Energy recovery			Recycling			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	236	0	0	0	238	97.6	95.6	139	0.1	0	0	0	0
2019	230	0	0	0	198	88.9	98.8	143	0	0	0	0	0
2020	203	0	0	0	199	98.7	96.5	194	0.2	0	1.4	0	0
2021	230	0	0	0	201	105.6	97.4	132	0	0	0	0	0
2022	223	0.8	0	0	198	90.9	96.1	122	0.3	0.4	0	0	0

Source: processed based on ISOH

Metal scrap	**A capacity deficit of almost 900,000 tons was identified for the final treatment of metal waste in the Czech Republic, which corresponds to the difference between the imported and exported quantities. The capacity deficit primarily concerns metal waste from industry.** **From the perspective of the Czech Republic, the management of separately collected municipal waste is almost balanced. There is a significant lack of capacity for recycling metal waste from industry in all regions except Moravia-Silesia (based on data for 2022), where capacity is concentrated in two metallurgical plants.**

2.3.5 Glass

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Required investment
286,000 tons	Recycling (94%)	Export 23,000 tons	Currently sufficient, but technology needs to be modernized in line with quality requirements and to increase sorting efficiency, addition of processing capacity and sorting capacity for expected production growth.	CZK 0.1 billion over 10 years

The total production of this waste is showing a slight upward trend. In 2022, production fell to 286,000 tons. Most waste glass is recycled in the preferred manner. It is important to note that mobile facilities play a significant role in the flow, accounting for almost 140,000 tons. The second part of the amount was concentrated in stationary facilities. From mobile facilities and collection points, waste glass is usually transferred directly to end-of-life facilities for further processing. Glass is almost exclusively recycled, with only a minimal amount being landfilled. Recycling dominates in the South Moravian Region, where approximately 50% of the glass produced in the Czech Republic is recycled. More significant recycling takes place in the Liberec, Karlovy Vary, Central Bohemian, and Ústí nad Labem regions. These regions (except for the Central Bohemian Region) also show self-sufficiency or a slight surplus of processing over current needs i n the region. The capacity in the South Moravian Region is almost double that. Overall, a capacity shortfall of around 25,000 tons was identified for the Czech Republic at current production levels. Due to the high glass content in

In mixed municipal waste, greater involvement of citizens and company employees in sorting is expected by 2035, resulting in an increase in the amount of separately collected glass by approximately 70,000 tons, which will further increase the deficit in glass material utilization to 100,000 tons.

In 2022, there are several glass treatment and processing technologies and production plants in the Czech Republic that manufacture glass-based products and are also waste treatment facilities. According to the Register of Facilities, their total annual processing capacity exceeds 500,000 tons, which is sufficient for the treatment of glass waste. However, it is not possible to determine from the Register of Facilities whether part of this capacity is allocated to other types of waste.

Data on the capacities of glass treatment facilities are provided in Chapter 2.3.1.6.

Table 18: Production and management 2018–2022 – Glass

Year	Production	Energy recovery			Recycling			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	295	0.3	0	0.1	327	93.8	90.0	27	9.2	7.4	0	0	0
2019	315	0	0	0	340	93.8	90.3	28	9.0	7.6	0.1	0	0
2020	313	0	0	0	381	98.0	92.1	26	8.3	6	0	0	0
2021	322	0.5	0	0.1	392	101.4	93.1	21	6.6	5	0	0	0
2022	286	2	0.2	0.5	342	94.0	91.4	24	8.4	6.4	0.1	0	0

Source: processed based on ISOH

Glass

There are several glass treatment and processing technologies and production plants in the Czech Republic that manufacture glass-based products and are also waste management facilities. Their total annual processing capacity exceeds 500,000 tons, which is sufficient to process the glass waste produced in the Czech Republic.

2.3.6 Wood

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Required investment
269,000 tons	Recycling (94%)	Export 688 tons	Sufficient, only one dominant processor in the Czech Republic.	CZK 1–1.5 billion over 10 years

Wood waste production in the Czech Republic has been growing steadily since 2012. Since 2018, it has stagnated at around 320,000 tons. In 2022, it fell significantly to 269,000 tons. The share of the hazardous category is negligible (0.2%). In contrast, the production of material-usable wood from separate collection has been growing in the long term, also with the significant development of collection yards. With a production of around 80,000 tons, it accounts for approximately 30% of waste wood production. The amount of wooden packaging placed on the market is growing significantly, which is reflected in the amount of packaging waste reported mainly in subgroup 15 01 (Waste from other sources). Waste packaging made of wood thus accounts for approximately 200,000 tons, which is 75% of the total production flow. Group 20 and subgroup 15 01 dominate the production flow. Another significant group is wood from construction and demolition activities (subgroup 17 02). Approximately 54,000 tons of waste wood is imported into the Czech Republic for reuse. Imports relate to subgroup 17 02. Exports of waste wood are negligible.

The flow is mostly handled in the preferred manner, i.e. in the form of recycling (93.5%). To a lesser extent, wood is used for energy. Non-preferred handling is negligible.

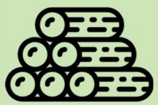
Approximately 300 mobile facilities are involved in wood disposal. In addition to collection for subsequent transfer for further processing, these types of facilities also treat (21,000 tons) and recycle (60,000 tons) waste. Over 700 stationary facilities with a dominant collection function processed 160,000 tons of wood, and another 40,000 tons passed through 82 other facilities where the wood was already being processed or recycled. However, final recycling (175,000 tons) only takes place at 430 end-of-life facilities, with over 100,000 tons processed in the Vysočina Region. Significant recycling at stationary facilities also took place in the Moravian-Silesian, Pardubice, and Ústí nad Labem regions. Overall, the Czech Republic reported a deficit in the preferred processing of waste wood of approximately 13,000 tons, with only the Vysočina and Pardubice regions reporting sufficient processing capacity. The other regions are in deficit or have a balanced balance.

Data on the capacities of wood handling facilities are provided in Chapter 2.3.1.7.

Table 19: Production and management 2018–2022 – Wood

Year	Production	Energy use			Recycling			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	321	2	6.9	4.6	528	89.0	92.4	15	4.6	2.6	0.2	0	0
2019	326	25	6.5	4.7	492	92.6	91.4	19	5.8	3.5	0.2	0	0
2020	315	29	7.7	5.3	482	92.3	89.9	24	7.5	4.4	0	0.1	0
2021	318	33	8.5	6.5	451	89.6	89.4	19	6.1	3.8	0.2	0	0
2022	269	25	7.4	6.1	369	93.5	91.4	8	3.1	2.1	0	0	0

Source: processed based on ISOH



Wood

Wood waste production in the Czech Republic has been growing steadily since 2012. The production of wooden packaging is also on the rise. Although the Czech Republic has only a slight deficit in the preferred treatment of waste wood, its recycling is dominated by facilities in only a few regions, particularly in the Vysočina Region. The untapped potential of wood is hidden in bulky waste. Sorting bulky waste will lead to an increase in wood waste and thus to the need to build capacity for the collection, treatment, and logistics of wood waste prior to recycling.

2.3.7 Textiles

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Required investment
59,000 tons	Recycling (52%) Landfilling (19%)	Export 11,000 tons	Inadequate – collection network, treatment and final processing technology	1 billion CZK over 10 years

According to the methodology of the Ministry of the Environment, the flow of textile waste consists of five waste catalog numbers – *04 01 Waste from the leather and fur industry*, *04 02 Waste from the textile industry, 15 01 09 Textile packaging, 20 01 11 Textile materials, and 20 01 10 Clothing*. Textile products in the waste regime can be divided into three main groups – industrial textiles, household clothing and non-clothing textiles, and other textile items.

The production of textile waste showed a significant upward trend between 2010 and 2016, with an average increase of 6.8 thousand tons (approximately 13.5% per year) to 76.6 thousand tons in 2016. Total textile waste production has been declining significantly since 2016, mainly due to reductions in waste from industrial textile production. On the contrary, the production of separately collected textiles from the municipal system has been growing in the long term (except for a one-off decline in 2021, which can be explained by changes in population behavior during the COVID-19 pandemic). Textile waste production amounted to approximately 61,000 tons in 2021 and approximately 59,000 tons in 2022, representing a year-on-year decrease of approximately 2,000 tons.

Approximately 18% of textile waste production is imported and approximately 16% of production is exported. The foreign trade balance is approximately even, concerns group 20 (see Chapter 0) and does not significantly affect textile treatment capacities. Textiles are mainly exported from the Czech Republic from the Liberec Region (without prior significant processing) and from the Pardubice Region. Textiles were mainly disposed of in the preferred manner, with the share of non-preferred disposal in the form of landfilling at 19%. Recycling is high, reaching 51.5% in 2022, but recycling has been declining in recent years. Approximately 10% of textiles were also used for energy, but this method of disposal has stagnated in recent years, with an increase in 2022. Landfilling of textiles is declining slightly. Mobile facilities play a significant role in the management of textile waste, collecting and transferring the collected quantities for further processing. Their activities are mainly recorded in three regions: the Capital City of Prague, the Hradec Králové Region, and the Plzeň Region, i.e., regions where major textile collection and processing operators are located. In 2022, textile management in facilities was divided among only a few regions, with the dominant processing methods varying according to the type of waste processed. Waste with cat. no. *20 01 10 Clothing* is mainly processed in the South Moravian Region, and to a significant extent also in the Pardubice and Plzeň Regions. Waste with cat. no. *20 01 11 Textile materials* are processed in the Karlovy Vary, Plzeň and Ústí nad Labem Regions. All

With the exception of the South Moravian Region, all regions have a deficit in the processing of waste with category code *20 01 10 Clothing*. The South Moravian, Hradec Králové, and Central Bohemian regions have a deficit in the processing of waste with category code *20 01 11 Textile materials*.

Textiles are predominantly produced in the Other category. The share of the Hazardous category is negligible (0.02%). If hazardous waste is generated, it is incinerated, which is the preferred method of disposal for this category.

Table 20: Production and disposal 2018–2022 – Textiles I

Year	Production	Energy recovery			Recycling		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)
2018	75	8	5.9	9	59	69.6	69.9
2019	69	8	5.9	10.7	55	73.3	70
2020	66	8	5.9	12	47	70.4	67.8
2021	61	9	7	12.7	45	73.0	66.2
2022	59	14	16.9	24.9	30	51.5	54

Source: processed based on ISOH

Table 21: Production and disposal 2018–2022 – Textiles II

Year	Landfilling			Incineration			Other disposal		
	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)
2018	17	23	20.6	0	0	0	0.1	0.1	0
2019	15	21.6	19.1	0	0	0	0	0	0
2020	14	20.9	19.9	0	0	0	0.1	0.1	0
2021	14	23.1	20.8	0	0	0	0.1	0.2	0
2022	11	19.2	20.6	0	0	0	0.1	0.1	0

Source: processed based on ISOH

In 2022, the Czech Republic recorded a deficit in the capacity of facilities for the treatment of textile waste falling under catalogue number *20 01 10 Clothing*, totaling 6,000 tons. The capacity deficit was recorded in all regions of the Czech Republic except for the South Moravian Region (surplus of 6,000 tons), with the highest deficit recorded in the Central Bohemian Region (3,000 tons), Plzeň Region (2,000 tons), Olomouc Region (2,000 tons), Liberec (2,000 tons), Moravian-Silesian (2,000 tons), Hradec Králové (1,000 tons), Zlín (1,000 tons) and Vysočina (1,000 tons).

A capacity deficit for loading was also recorded in 2022 for textile waste falling under catalog number *20 01 11 Textile materials*, totaling 8,000 tons. The highest deficit in that year was recorded in the South Moravian Region (8,000 tons) and the Hradec Králové Region (2,000 tons), while a slight surplus of capacity was recorded in the Ústí nad Labem Region (2,000 tons).

Textiles	**The production of textile waste grew until 2016. Since 2016, it has been declining, mainly due to the decline of the textile industry. The production of textiles from separate collection is growing steadily and already dominates the production flow. Approximately half of textiles are recycled. The remaining amount is mainly used for energy recovery or landfilled. The complexity of textile products (clothing), the use of fiber blends, and sorting and recycling complicate the situation given the current state of knowledge.**

2.3.8 Food waste

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investment needed
1,081 thousand tons	Landfilling (46%) Material recovery (25%) Energy recovery (21%)	Export 1,838 tons	Inadequate collection and utilization technologies (sanitation and biogas stations).	CZK 6.5–7.1 billion over 10 years

Food waste is usually defined as non-edible parts of food or food itself that are lost or discarded during the production, distribution, trade, preparation, or consumption of food. Act No. 541/2020 Coll. on waste (hereinafter referred to as the "Waste Act") defines food waste as food according to Article 2 of Regulation (EC) No. 178/2002 of the European Parliament and of the Council which has become waste.

Food waste production has shown a positive trend in recent years, and waste prevention measures have been successful in reducing waste volumes. This development is in line with the set targets. Food waste production can be divided into individual stages of the food chain, as shown in Table 22. Households account for the largest share of food waste production, at 60%. Restaurants and catering services (17%) and processing and manufacturing (15%) also contribute significantly to production. Retail sales (6%) and primary production (1%) account for the smallest share.

Table 22: Food waste production in individual stages of the food chain in 2022

Stage of the food chain	Production [t]
Primary production	14,670
Processing and manufacturing	165,414
Retail sale and other food distribution	67
Restaurants and catering services	180,773
Households	652

Source: Ministry of the Environment, ISOH

Production and subsequent disposal are largely influenced by mixed municipal waste, with the result that almost half of food waste ends up in landfills. Food waste is then recycled (30%) or used for energy (22%). This is reflected in the network of treatment facilities, which includes a significant number of landfills, and therefore the current network of facilities cannot be considered sufficient in terms of preferred capacities. However, the development of indicators shows a growing trend in energy recovery, which, in view of other projects in the pipeline, will continue to grow in the future at the expense of landfilling. Composting plants, biogas plants and the aforementioned waste-to-energy facilities are significantly represented among the preferred capacities.

Cross-border transport accounted for a negligible proportion of the total volume in 2022. Specifically, exports amounted to 1,800 tons of waste and imports reached 49,000 tons, with category 20 01 25 *Edible oil and fat* dominating. It can therefore be concluded that we are self-sufficient in food waste processing and are also able to process waste from neighboring countries, which was used exclusively for material recovery.

[25] Regulation (EC) No. 178/2002 of the European Parliament and of the Council of January 28, 2002, laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.

Table 23: Production and disposal 2018–2022 – Food waste I

Year	Production	Energy recovery			Material use			Landfilling		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	1,146	214	18.7	20	298	25.8	28.6	524	45.8	50.4
2019	1,146	219	19.0	20.6	318	25.5	29.9	519	45.3	48.8
2020	1,112	222	19.9	21.1	300	25.0	28.6	522	46.9	49.
2021	1,138	228	20	21.4	299	23.7	28.1	526	46.2	49.5
2022	1,081	231	21.2	22.1	312	24.8	29.9	498	45.8	47.5

Source: processed based on ISOH

Table 24: Production and disposal 2018–2022 – Food waste II

Year	Incineration			Other disposal		
	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	0.8	0	0	3	0	0
2019	0	0	0	7	0	0
2020	0.9	0	0	4	0	0
2021	1	0.1	0	10	0.9	0
2022	0.8	0	0	5	0	0

Source: processed based on ISOH

In the Czech Republic, the following deficits/surpluses in food waste treatment capacity were recorded in 2022: *02 01 03 – Plant tissue waste* – total surplus of 3,000 tons, *02 03 01 – Sludges from washing, cleaning, peeling, centrifuging and separation* – total deficit of 3,000 tons, *02 03 04 – Raw materials unsuitable for consumption or processing* – total deficit of 10,000 tons, *20 01 08 – Biodegradable waste from kitchens and canteens* – total deficit of 6,000 tons, *20 01 25 – Edible oil and fat* – total surplus of 1,000 tons, *20 02 01 – Biodegradable waste* – total deficit of 20,000 tons, *20 03 01 – Mixed municipal waste* – total deficit of 63,000 tons.

In the case of food waste with catalog number 02 01 03, the highest processing capacity deficit in the Czech Republic in 2022 was recorded in the Olomouc Region (4,000 tons). Conversely, the highest surplus capacity was recorded in the Vysočina Region (2,000 tons) in 2022.

In the case of food waste with catalogue number 02 03 01, the highest processing capacity deficit in the Czech Republic in 2022 was recorded in the Hradec Králové Region (3,000 tons). The excess capacity of facilities for this catalogue number is negligible.

In the case of food waste with catalogue number 02 03 04, the highest processing capacity deficit in the Czech Republic in 2022 was recorded in the Capital City of Prague (6,000 tonnes) and the Vysočina Region (4,000 tonnes). Conversely, the highest surplus of facility capacity in 2022 was recorded in the Central Bohemian Region (6,000 tonnes).

In the case of food waste with catalog number 20 01 08, the highest processing capacity deficit in the Czech Republic in 2022 was recorded in the capital city of Prague (11,000 tons) and the South Moravian Region (9,000 tons). Conversely, the highest surplus capacity was recorded in 2022 in the Central Bohemian Region (8,000 tons) and the Zlín Region (5,000 tons).

In the case of food waste with catalog number 20 01 25, the highest processing capacity deficit in the Czech Republic in 2022 was recorded in the South Moravian Region (2,000 tons). In contrast, the highest surplus of facility capacity in 2022 was recorded in the Moravian-Silesian Region (4,000 tons) and the Ústí nad Labem Region (2,000 tons).

In the case of food waste with catalog number 20 02 01, the highest processing capacity deficit in the Czech Republic in 2022 was recorded in the capital city of Prague (7,000 tons) and the South Moravian Region (3,000 tons). Conversely, the highest surplus capacity was recorded in the Central Bohemian Region (2,000 tons) in 2022.

Potravinový odpad

Food waste production has been declining slightly in recent years. Sixty percent of food waste is generated in households and is part of mixed municipal waste. Since most mixed municipal waste is landfilled, almost half of food waste is also landfilled.

2.3.9 Construction and demolition waste

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investment required
9.2 million tons	Material utilization (93%)	Exports 992,000 tons Imports 689,000 tons	Sufficient for current production	CZK 1.7 billion over 10 years

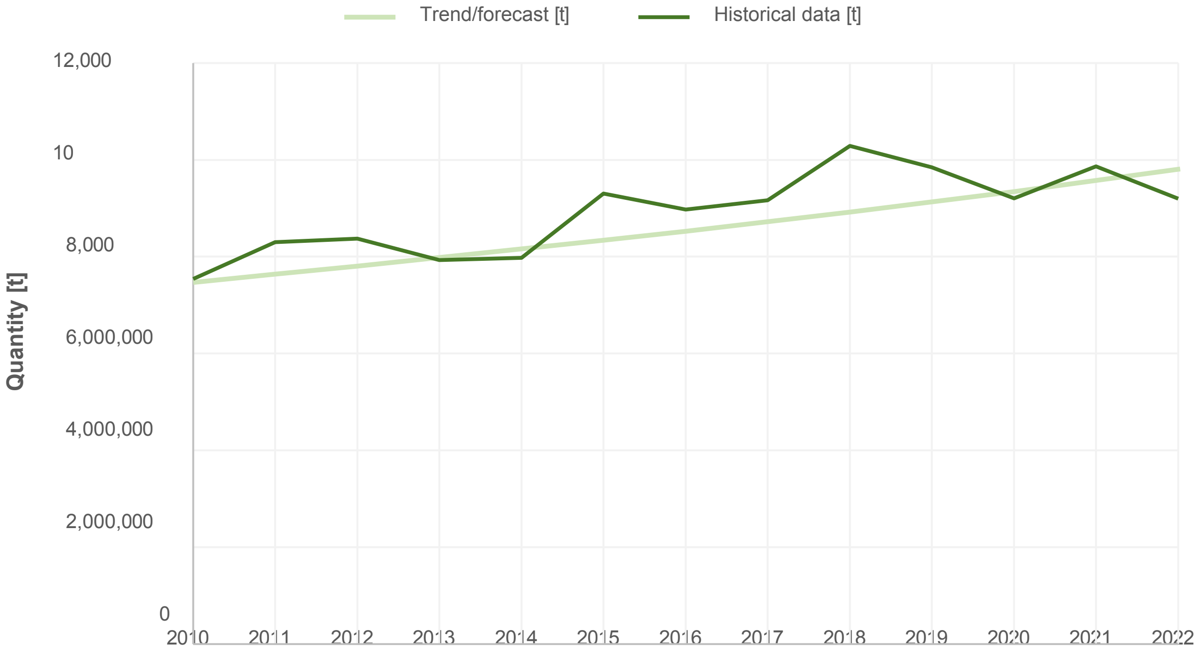
According to Act No. 541/2020 Coll. on waste, construction and demolition waste (CDW) means waste generated during construction and demolition activities. Construction and demolition waste represents a significant stream of waste produced in the Czech Republic. Construction and demolition waste includes catalog numbers in group 17, with the exception of several catalog numbers in subgroup 17 05 (Soil and stones, excavated waste rock).

The production of this waste accounts for 23.5% of total waste production. Given its significance, it is described in more detail below.

The dominant producers of construction and demolition waste are self-employed individuals. Municipalities are also producers, but to a negligible extent. The production of construction and demolition waste is not directly dependent on demographic growth, but is significantly dependent on the economic cycle, which influences construction activities in infrastructure projects and the construction and renovation of production and storage facilities. Construction activity focused on the construction and renovation of housing combines the influence of demographic developments (ensuring the availability of housing and accommodation infrastructure, including accommodation and care for the elderly) with economic developments (availability of mortgages, postponement of construction).

The production of construction and demolition waste has been on a long-term upward trend in the Czech Republic, which has tended to level off in recent years. The forecast expects the upward trend to continue in the coming years, in line with expectations that the Czech economy will grow in the coming years and that construction activity will continue as a result.

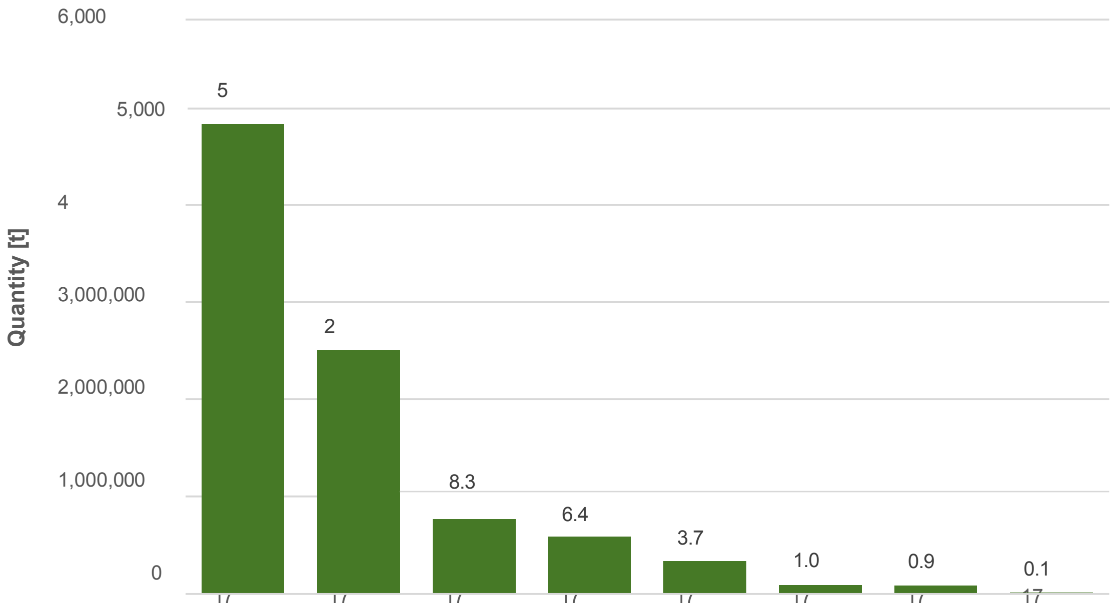
Graph 35: Production of construction and demolition waste



Source: processed based on ISOH

The production of construction and demolition waste varies over time and across regions, and is linked to the intensity of construction activities (construction and renovation of buildings, implementation of infrastructure projects). The share of individual subgroups in the production of construction and demolition waste is shown in the following graph (Graph 36).

Graph 36: Production of construction and demolition waste by individual subgroups in 2022



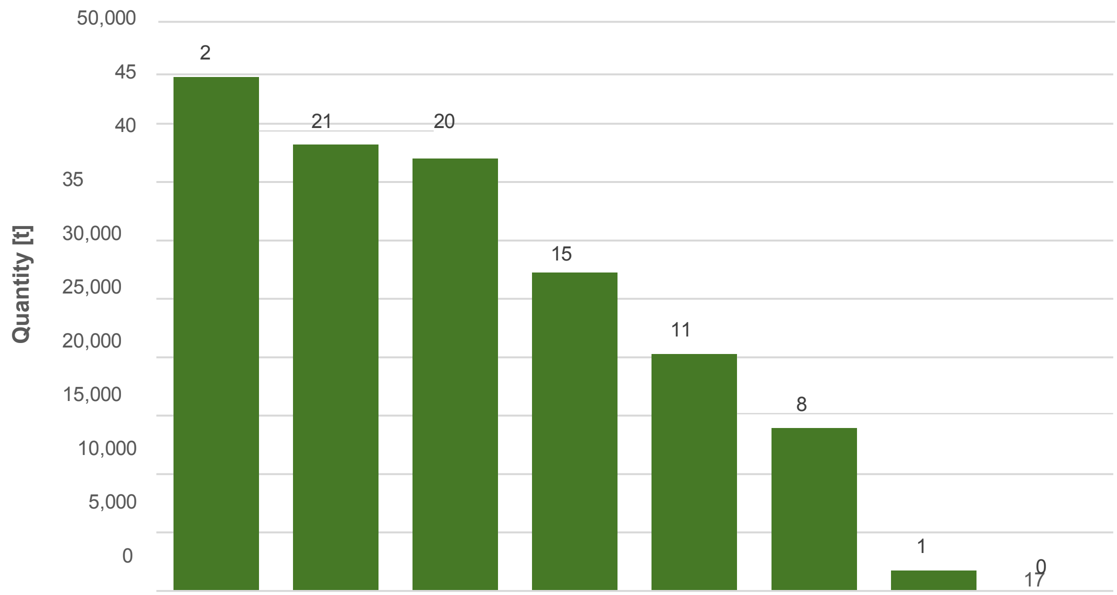
Source: processed based on ISOH

Subgroup 17 01 (Concrete, bricks, tiles and ceramics) is the most significant subgroup of construction and demolition waste. The second most significant is group 17 04 (Metals, including their alloys). The share of others is negligible. In terms of individual catalog numbers, production is dominated by No. 17 04 05 (Iron and steel) together with cat. No. 17 01 07 (Mixtures or separate fractions of concrete, bricks, tiles and ceramic products not listed under No. 17 01 06) and 17 01 01 (Concrete). Subgroup 17 04 is also important in terms of both imports and exports.

Subgroups 17 01 (Concrete, bricks, tiles and ceramics), 17 02 (Wood, glass and plastics), 17 03 (Asphalt mixtures, tar and tar products) and 17 05 (Soil, stone, excavated waste rock and tailings) show an upward trend. The production of subgroup 17 04 (Metals) is significantly influenced by the price of raw materials. Subgroup 17 06 (Insulation materials and construction materials containing asbestos) has recorded significant growth since 2017 (an increase of 75%). However, in 2022, there was a significant decline of almost 30%. Subgroup 17 08 (Gypsum-based construction materials) has been gradually declining since 2017 – a long-term trend change will only become apparent with data from subsequent years. The last subgroup, 17 09 (Other construction and demolition waste), shows greater data variability, but the long-term trend is rather constant.

Just as the entire flow of construction and demolition waste is growing, so too is the production of construction and demolition waste in the Hazardous category. Since 2020, there has been a significant, almost constant decline, which is also affecting the slowdown in the growth trend. In 2022, the production of construction and demolition waste in the Hazardous category was 182,346 tons, which accounted for 2% of the total construction and demolition waste stream.

Graph 37: Production of SDO-N by individual subgroups in 2022



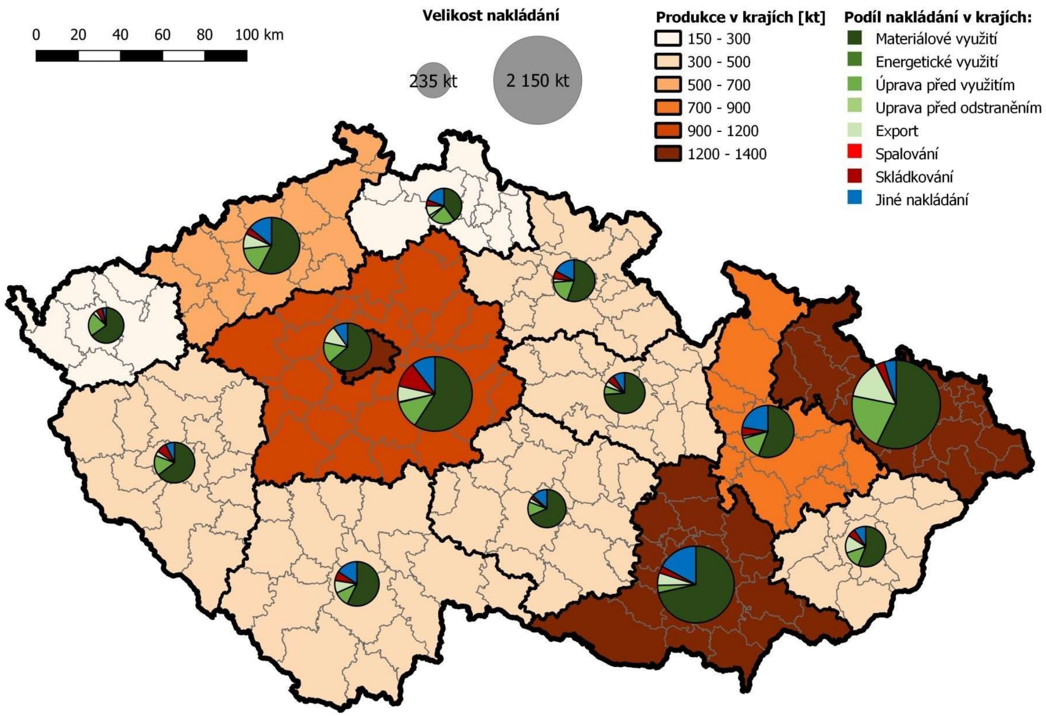
Source: processed based on ISOH

Within each subgroup, one dominant waste catalog number always prevails. The most common waste catalog numbers include 17 01 06 (Mixed or separate fractions of concrete, bricks, tiles, and ceramic products containing dangerous substances), 17 02 04 (Glass, plastics, and wood containing dangerous substances or contaminated with dangerous substances), 17 05 07 (Railway ballast containing dangerous substances), 17 06 05 (Construction materials containing asbestos) and 17 09 03 (Other construction and demolition waste (including mixed construction and demolition waste) containing dangerous substances). Their order changes continuously, but these catalog numbers determine the volume of hazardous construction and demolition waste production in the long term.

Construction and demolition waste is mostly reused and recycled. The recycling rate for construction and demolition waste in 2022 was 80%. The recycling rate for construction and demolition waste has been stable in recent years, ranging between 80% and 81.3%. The second most common method of construction and demolition waste management is landfilling, which accounted for 7.4% of production. Construction waste that will no longer be landfilled under new legislation from 2030 is also landfilled. In 2022, this amounted to 262,000 tons, and this amount has remained roughly constant over the long term.

The current capacity of recycling lines for construction and demolition waste appears to be sufficient in view of current production levels. In the context of achieving the recycling targets for construction and demolition waste in 2030 and, in particular, 2035, when the amount of recycled construction and demolition waste will need to be increased by approximately 600,000 tons, it will be necessary to increase processing capacities. The analysis revealed a significant deficit in technologies for the recovery of metals from construction and demolition waste (subgroup 17 04). This deficit amounts to 600,000 tons for the whole of the Czech Republic. Significant capacity is only available in the Moravian-Silesian Region, while other regions are in deficit. As a result, large quantities of metals are exported.

Figure 9: Map of production and share of waste management in regions for SDO category "other" in 2022



Source: processed based on ISOH

Hazardous construction waste is included in Chapter 2.3.13 Hazardous waste, also in the document Construction and demolition waste.

Table 25: Production and disposal 2018–2022 – Construction and demolition waste

Year	Production	Energy recovery			Recycling			Material recovery			Landfilling			Incineration		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	**10,291**	4	0	0	7,517	80.6	78	9,035	94.9	93.9	584	5.7	6.1	1	0	0
2019	**9,843**	4	0	0	6,716	77.3	77	8,392	94.0	93.7	627	6.4	6.2	1	0	0
2020	**9,205**	4	0	0	6,767	81.3	74.6	8,366	98.1	92.3	688	7.5	7	1	0	0
2021	**9,894**	10	0.1	0	6,800	77.8	75.5	8,220	91.8	91.2	781	7.9	8	1	0	0
2022	**9**	16	0	0	6,656	80.0	77.5	7,890	92.9	91.8	684	7.4	8	2	0	0

Source: processed based on ISOH

Construction and demolition waste

Construction and demolition waste (excluding excavated soil) represents a significant stream of waste produced in the Czech Republic. Its production accounts for 23.5% of all waste produced. This waste is mainly recycled. The recycling rate in 2022 was 80% in 2022. Nevertheless, there are approximately 262,000 tons of construction waste that are currently landfilled and will not be able to be landfilled in the future.

2.3.10 Industrial waste

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investment needed
2.5 million tons	Material utilization (57%)	Export 502,000 tons Imports 1.3 million tons	Sufficient	-

Industrial waste includes waste classified in groups 03 to 14 according to the Waste Catalogue. Industrial waste represents a significant stream mainly due to its origin, as its production is linked to specific industrial activities. In terms of weight, it has long accounted for less than 10% of total waste production in the Czech Republic; in 2022, it accounted for 6.4% by weight. Industrial waste production in the Czech Republic as a whole declined slightly between 2010 and 2014, remaining more or less stable at around 3.2 to 3.3 million tons per year between 2014 and 2018. Between 2018 and 2020, production fell slightly below 2.5 million tons per year and has been stable since then. In the current year 2022, production was 2.513 million tons per year. The dominant share of production is accounted for by catalogue group 10 (Waste from thermal processes, 1,088 thousand tons in 2022) and catalogue group 12 (Waste from forming and physical and mechanical surface treatment of metals and plastics, 719 thousand tons in 2022). These two groups accounted for almost three quarters of production in 2022. The development of total industrial waste production is mainly influenced by catalog group 10, whose historical trend corresponds to the trend in total industrial waste production (stable period from 2014 to 2018, significant decline from 2018 to 2020).

The share of hazardous industrial waste has been around 20% by weight in most of the years monitored, falling to 15% between 2012 and 2014. In 2020 and 2021, the share of hazardous waste was 22.5 % , which represents the highest recorded values, while in the current year 2022, the share was 21.4%. Some catalog groups consist mainly of hazardous waste (catalog groups 05, 06, 08, 09, 11, 13, and 14). Industry is the dominant source of certain hazardous waste sub-streams.

The treatment of industrial waste was dominated by material recovery (57%), with recycling being the preferred method in most cases. Industrial waste is hardly used for energy purposes. Approximately 11% of industrial waste production was landfilled. The management of industrial waste varies according to waste category, with the recycling of waste in the Other category being more successful. Recycling/recovery of other inorganic materials in group 10 (Waste from thermal processes, 1.3 million tons), recycling/recovery of metals and metal compounds in group 10 (178,000 tons) and in group 12 (Waste from forming and physical and mechanical surface treatment of metals and plastics, 110,000 tons), recovery/regeneration of organic substances in group 03 (Waste from wood processing and the manufacture of boards, furniture, cellulose, paper and cardboard, 96,000 tons) and group 07 (Waste from organic chemical processes, 41,000 tons). Pre-treatment was also represented (8%), especially in group 12 (180,000 tons). Non-preferred treatment of industrial waste in the Other category accounted for only 6%, which was exclusively represented by landfilling. The transfer of waste to another period is also very common. This treatment is considered other treatment (19%). Exports (12%) mainly concern group 12.

Hazardous industrial waste is treated in the preferred manner. Of the total amount of 538,000 tons, 336,000 tons underwent treatment prior to disposal and 58,000 tons underwent treatment prior to recovery.

There is a deficit in industrial waste treatment capacity for all waste groups in units of less than 1,000 tons. The deficit is significant for the disposal of groups 10 and 12. A deficit of tens of thousands of tons is evident in all regions except the South Bohemian Region for group 10 and the Zlín Region for group 12. The deficit would be even greater if only preferred disposal (i.e., without disposal) were required. For the whole of the Czech Republic, the deficit would be almost 800,000 tons.

Table 26: Production and disposal 2018–2022 – Industrial waste I

Year	Production	Energy recovery			Recycling			Material recovery		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	3,314	50	1.2	1.4	1,914	53.4	52.9	2,554	72.2	70.6
2019	2,937	54	1.5	1.6	1,951	57.5	58.6	2,343	70.2	70.4
2020	2,576	103	3.4	3.6	1,579	53.4	55.3	1,894	65.5	66.3
2021	2,555	83	2.4	2.5	1,995	55.2	61.5	2,234	64.4	68.9
2022	2,515	48	1.8	1.5	1,918	47.6	60.2	2,147	56.5	67.4

Source: processed based on ISOH

Table 27: Production and disposal 2018–2022 – Industrial waste II

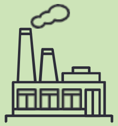
Year	Landfilling			Incineration			Other disposal		
	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	271	8.2	7	32	1.0	0.9	708	19.9	19.6
2019	257	8.8	7.7	29	1	0.9	645	20.5	19.4
2020	239	9.3	8.4	28	1.1	1.0	592	21.2	20.7
2021	271	10.6	8.3	28	1.1	0	628	22.5	19.4

Year	Landfilling			Incineration			Other treatment		
	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2022	271	10.	8.5	24	1	0	698	25.4	21.9

Source: processed based on ISOH

In 2022, the Czech Republic recorded a relatively high deficit in capacity for the treatment of industrial waste falling under group *12, Waste from shaping, physical and mechanical surface treatment of metals and plastics*, totaling 312,000 tons. The highest deficit for this group 12 was recorded in the Central Bohemian Region (64,000 tons), the Vysočina Region (44,000 tons), the Plzeň Region (35,000 tons) and the Olomouc Region (27,000 tons). However, with the exception of the Zlín Region (surplus capacity of 3,000 tons), a capacity deficit was recorded in all regions of the Czech Republic.

A high deficit in industrial waste treatment capacity was also recorded in the Czech Republic in 2022 for industrial waste falling under group *10 Waste from thermal processes*, totaling 140,000 tons. The highest capacity deficit was recorded in the Olomouc Region (32,000 tons) and the Vysočina Region (32,000 tons). However, a capacity deficit was recorded in all regions of the Czech Republic, with the exception of the South Bohemian Region (13,000 tons) and the Moravian-Silesian Region (capacity surplus of 349 tons).

 **Industrial waste**	**Industrial waste constitutes a significant waste stream, accounting for less than 10% of total waste production in the long term. Most (56%) industrial waste is recycled. Facility capacities are sufficient, with a capacity deficit for all waste groups is in the thousands of tons. A larger deficit (almost 800,000 tons, i.e., 32% of production) would only arise if only preferred treatment (i.e., without disposal) were required.**

2.3.11 Extractive waste

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investments needed
81,000 tons	Material utilization (63%) Landfilling (38%)	-	Insufficient	-

Mining waste generally includes materials produced by the mining industry that no longer have any further use. This waste stream includes waste group *01 Waste from geological exploration, mining, treatment, and further processing of minerals and stone, and* waste rock and tailings – two catalog numbers from group *17 Construction and demolition waste (*17 05 05* and 17 05 06). Mining waste can also be divided into mining waste (direct waste from mining), waste from processing (waste generated during the processing of extracted ores or materials) and extracted waste rock and tailings (waste generated mainly during construction activities – engineering networks or transport infrastructure).

The production of mining waste fluctuates considerably, as it largely depends on the implementation of large infrastructure projects. In 2022, the production of this waste reached 80,758 tons. The largest share of this waste (75%) fell into group 01, with the remainder falling into group 17 (25%). The largest share of waste was accounted for by subgroup *17 04 Waste from the physical and chemical processing of non-metallic minerals,* which accounted for almost 66% in 2022. In terms of catalog numbers, the most represented category in 2022 was 01 04 13 (Waste from cutting and grinding of stone not covered by 01 04 07) with a production of 32,978 tons.
with a share of 41%. The second most represented category was 17 05 06 *(*Excavated waste rock and tailings not covered by 17 05 05*)* with a production of 20,500 tons and a share of 25%.

Waste from mining is included under catalog numbers *01 01 01 Waste from the mining of metal ores* and *01 01 02 Waste from the mining of non-metal ores*. The production of waste under catalog number 01 01 01 has been almost zero since 2015, while the production of waste under catalog number 01 01 02 has been gradually decreasing since 2011 and in 2022 amounted to only 1,676 tons.

Waste from treatment includes catalog numbers 01 03 (Waste from physical and chemical processing of minerals), 01 04 (Waste from physical and chemical processing of non-metallic minerals), and 01 05 (Drilling mud and other drilling waste). The largest share of treatment waste is accounted for by waste with catalog number 01 04 (90.9%), of which more than 53,000 tons were produced in 2022, with waste with catalog number 01 04 13 (Waste from cutting and grinding of stone not specified under 01 04 07) with 32,978 tons, and catalog number 01 04 10 (Non-metallic dust not specified
under 01 04 07) with 10,797 tons.

The production of extracted waste rock and tailings (catalogue numbers 17 05 05* and 17 05 06) totaled 20,514 tons in 2022, almost exclusively waste with catalogue number 17 05 06 (Extracted waste rock and tailings not listed under code 17 05 05) (20,500 tons). This type of waste is most dependent on the implementation of large infrastructure projects, as in the past its production reached hundreds of thousands of tons (for example, 1.69 million tons in 2010 during the excavation of the Blanka tunnel).

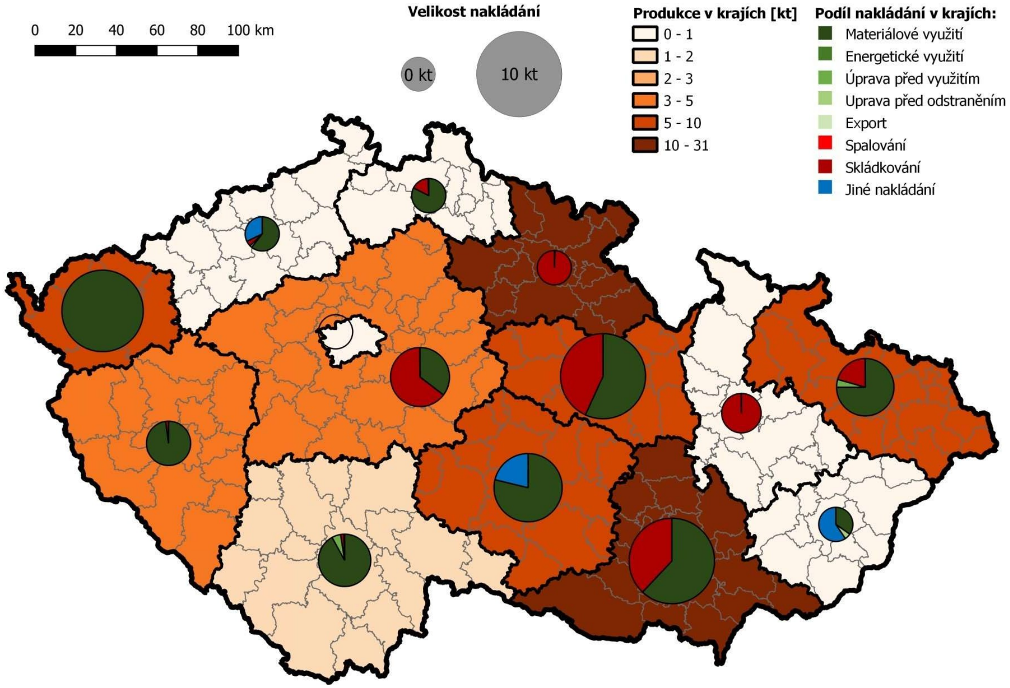
Within the regions, the largest producers in 2022 were the Hradec Králové Region (30,717 tons), the South Moravian Region (14,213 tons), and the Hradec Králové Region (8,376 tons). In general, it can be said that in most regions, production is minimal, almost zero, and significant increases occur only in certain years. The exception is the Central Bohemian Region, where mining waste production fluctuates but remains above 10,000 tons per year (with the exception of 2017 and a significant decline in 2022). Production in the Hradec Králové Region, which has been growing for a long time, is also worth mentioning.

In 2022, mining waste was most commonly disposed of through material recovery. The second most preferred method of disposal was landfilling. The production of mining waste classified as hazardous was negligible in 2022, amounting to only 243 tons. Most mining waste was disposed of in the South Moravian, Karlovy Vary, and Pardubice regions. The Karlovy Vary Region recorded only material recovery, while the South Moravian and Pardubice Regions landfilled approximately one-third of the waste. With the exception of the Hradec Králové Region, higher production also resulted in higher disposal, i.e., the waste probably remained in the vicinity of its place of origin.

It can be seen as positive that mining waste is predominantly used in the Czech Republic, but a large part of mining waste is still landfilled and, when used, it is mainly for backfilling. One opportunity in the area of mining waste is the use of part of waste category 17 05 06 (Solid rock) as a substitute for certain primary mineral resources.

The current capacity of recycling lines for construction and demolition waste appears to be slightly insufficient in view of current production, specifically in the case of waste with catalogue number 01 04, where there was a capacity deficit of approximately 5,000 tons in 2022. The Hradec Králové Region accounted for the largest share of this deficit (approximately -27,000 tons). This situation can be partially resolved by the available capacities in the neighboring Pardubice Region (13,000 tons) or in the Central Bohemian Region (just under 12,000 tons). In the future, it will therefore be necessary to increase processing capacity to eliminate the overall deficit of mining waste, ideally at a strategically advantageous location, as larger volumes of mining waste may arise in the coming years in various locations, for example, depending on larger infrastructure projects. In contrast, there is a slight surplus of capacity in the Czech Republic for waste with catalogue number 17 05, specifically 2,200 tons in 2022.

Figure 10: Map of production and share of disposal in regions for mining waste in the category “other” in 2022



Source: processed based on ISOH

Table 28: Production and disposal 2018–2022 – Mining waste I

Year	Production	Energy recovery			Recycling			Material use		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	102	0.08	0	0	35	34.4	33.2	92	90.2	87.3
2019	117	0	0	0.1	47	39.6	32.7	118	100.2	82.7

Year	Production	Energy use			Recycling			Material use		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)
2020	130	0.11	0	0.1	39	30.1	30.1	113	87	86.8
2021	154	0.14	0.1	0.1	112	72.6	64.1	153	99.5	87.9
2022	82	0.04	0.1	0.1	19	23	22.7	52	63.1	62

Source: processed based on ISOH

Table 29: Production and disposal 2018–2022 – Mining waste II

Year	Landfilling			Incineration			Other disposal		
	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	9	8.8	8.6	0	0	0	4	4.1	4
2019	20	17	14	0	0	0	5	3.9	3
2020	15	11.7	11.7	0	0	0	2	1.3	1.3
2021	19	12.4	11	0	0	0	2	1.1	1
2022	31	37.7	37	0	0	0	1	1	0

Source: processed based on ISOH

Mining waste

Mining waste accounts for a negligible proportion of waste production in the Czech Republic, totaling 81,000 tons per year. Most of the waste is recycled (most often for backfilling), with the remainder being landfilled. Insufficient capacity for mining waste treatment facilities is particularly evident in the Hradec Králové Region. This shortfall is partially offset by the capacity of facilities in the Pardubice and Central Bohemian Regions.

2.3.12 Mineral waste

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investment needed
23.1 million tons	Material utilization (95%)	-	Sufficient	-

Mineral waste (waste of mineral origin) is solid waste based on substances produced by natural inorganic processes. The vast majority of this waste falls under construction and demolition waste (see 2.3.9), which is mainly soil and stone, as well as waste of mineral origin from demolition work (concrete, bricks, tiles, and ceramics). To a lesser extent, mineral waste also includes selected catalog numbers from twelve other groups, of which 39 out of a total of 100 catalog numbers are classified as hazardous waste.

Mineral waste accounts for a significant proportion of waste production, representing approximately 59% of the Czech Republic's total waste production in 2022, which corresponded to 23.1 million tons. This is a stream with a high rate of material recovery and significant potential for increasing this rate in the coming years, making it a priority stream. The vast majority of mineral waste (97.7%) falls into group 17 (construction and demolition waste). The production of mineral waste is strongly linked to construction and demolition activities. For this reason, the share of individual types of waste may vary from year to year in terms of both production volume and, above all, their regional distribution in individual regions or municipalities with extended powers. However, the share of the main catalog numbers has not changed significantly in the long term.

The production of waste in this stream is significantly dominated by waste from subgroup 17 05 (Soil, including excavated soil from contaminated sites, stones, excavated rock and tailings) with a share of 70.4%, followed by sub-group 17 01 (Concrete, bricks, tiles and ceramics) with a share of 20.9%, 17 03 (Asphalt mixtures, tar and tar products) with a share of 3.3% and 17 09 (Other construction and demolition waste) with a share of 2.5%. In terms of individual catalog numbers, waste with catalog number 17 05 04 (Soil and stones not listed under 17 05 03) dominates, accounting for 67.8% of total mineral waste production, which corresponds to just under 16 million tons. Other significant catalog numbers include 17 01 07 (Mixtures or separate fractions of concrete, bricks, tiles, and ceramic products not listed under 17 01 06) with a production of 2.13 million tons in 2022 (9.2% of the flow) and 17 01 01 (Concrete) with production of 2 million tons (8.7% of the flow).

The conclusions for construction and demolition waste apply more or less to the management of mineral waste streams. The material recovery rate of mineral waste is higher (almost 95%) because selected waste from subgroup 17 05, which is not included in the construction and demolition waste stream, is used for landscaping within facilities (or rather areas) designated for backfilling.

Table 30: Production and management 2018–2022 – Mineral waste I

Year	Production	Energy recovery			Recycling			Material recovery		
	Quantity (thousand tons)	Quantity (thousand t)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	21,323	0	0	0	10,485	48.4	48.0	20,580	95.5	94.3
2019	21,328	1	0	0	9,918	45.9	46.7	20,056	93.3	94.5
2020	22,985	1	0	0	12,183	52.3	49.4	23,281	100.3	94.3
2021	23,589	5	0	0	11,760	49.2	49.1	22,629	95.1	94.5
2022	23,066	11	0	0	12,561	53.8	53.6	22,049	94.8	94.1

Source: processed based on ISOH

Table 31: Production and disposal 2018–2022 – Mineral waste II

Year	Landfilling			Incineration			Other disposal		
	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	1,036	4.	4	1	0	0	150	0	0
2019	923	4.3	4	1	0	0	197	0.9	0
2020	1,026	4	4	1	0	0	321	1.4	1
2021	1,086	4.6	4	2	0	0	188	0	0
2022	1,019	4	4	4	0	0	309	1.3	1.3

Source: processed based on ISOH

In 2022, the Czech Republic recorded a high deficit in the capacity of facilities for the treatment of mineral waste falling under group *17 Construction and demolition waste (including excavated soil from contaminated sites)*, totaling 628,000 tons. The highest deficit in 2022 was recorded in the Capital City of Prague (2,595 thousand tons), the Olomouc Region (195 thousand tons), the Hradec Králové Region (184 thousand tons), and the Vysočina Region (176 thousand tons). The highest surpluses in mineral waste treatment capacity were recorded in 2022 in the Central Bohemian Region (2,000,000 tons).

Mineral waste	The production of this stream is linked to the production of waste in group 17. Most of the stream is recycled, with backfilling being very common for soils in subgroup 17 05 in addition to recycling.

2.3.13 Hazardous waste

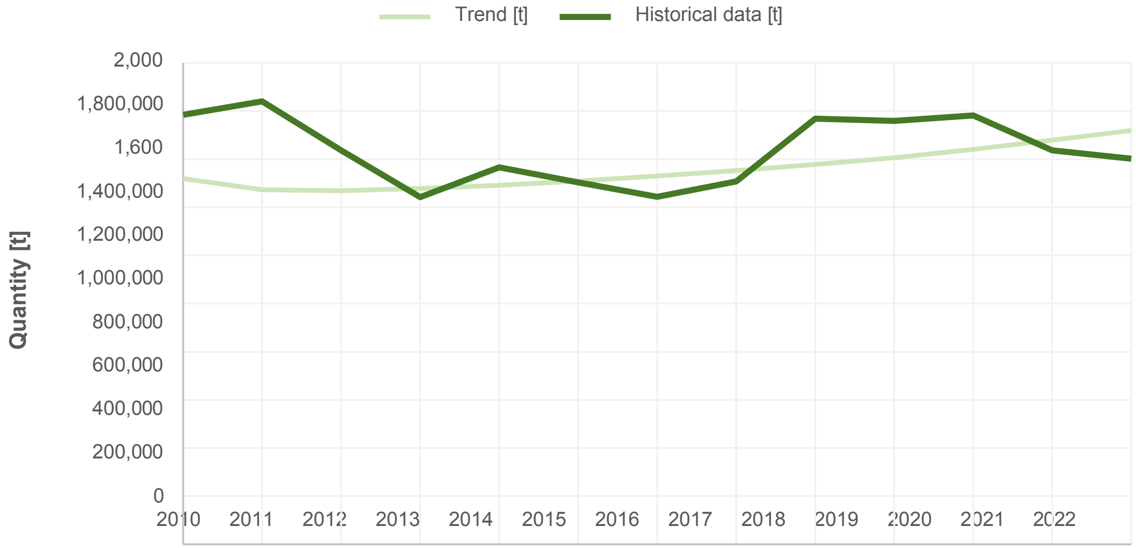
Production (2022)	Disposal (2022)	Transboundary shipment (2022)	Facility capacity	Investment needed
1.6 million tons	Other disposal (57%) Material recovery (19%)	Negligible	Insufficient, especially in NO incinerators, decontamination and treatment technologies	CZK 12.3 billion over 10 years

Due to their nature and potential harmfulness to humans, organisms, and the environment, hazardous wastes represent a stream that requires adequate treatment capacities. The production of hazardous waste is mainly influenced by industrial sectors, but also by the remediation of old environmental burdens. It is precisely the remediation of old environmental burdens that causes long-term year-on-year fluctuations in the production of hazardous waste in individual regions. In some cases, the production of hazardous waste may also be influenced by construction and demolition activities.

The production of hazardous waste across the Czech Republic (see Chart 38) tended to decline until 2016, but between 2016 and 2018 there was a noticeable upward trend in the production of hazardous waste, followed by stagnation between 2018 and 2020. The latest data show a slight decrease in production in 2022 compared to 2020. Production in 2022 was 1,602,000 tons, with 425 category numbers contributing to this according to the Ministry of the Environment methodology. In the case of 98 category numbers, which are defined as *other waste,* hazardous properties were identified and they were subsequently recorded as hazardous waste. This amounted to a total of 31,124 tons.

waste. Conversely, in the case of 38 category numbers defined as hazardous waste, there were instances where they did not exhibit hazardous properties and were reported as *other waste* (309,947 tons).

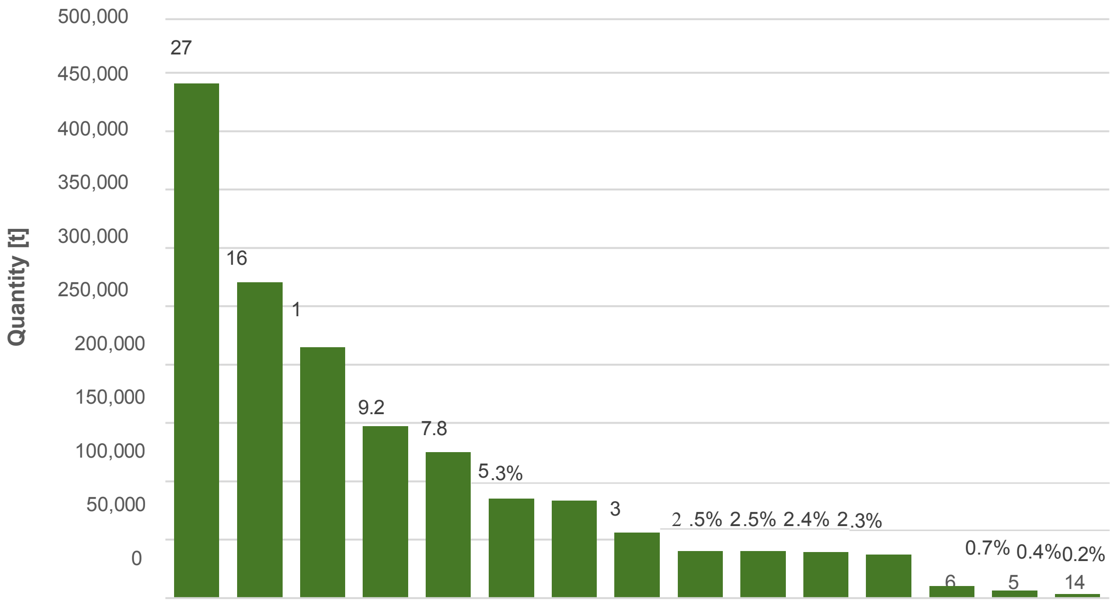
Graph 38: Production of hazardous waste



Source: compiled based on ISOH and Tiramiso

Several groups of catalog numbers dominate the total production of hazardous waste. The most significant are waste groups 17 (27.6%), 16 (16.9%) and 19 (13.4%) (Chart 39).

Graph 39: Waste catalog groups represented in hazardous waste in 2022 – top 15



Source: processed based on ISOH

The management of hazardous waste streams as a whole was mentioned in Chapter 2.2.1. Given the diversity of hazardous waste, it is appropriate to monitor its production and the network of facilities for its management, broken down into sub-streams according to their physical and chemical properties, which determine the type of facility for their treatment.

Waste identified as waste that should be treated at demulsification stations is also treated here (treatment prior to disposal dominates). This waste is treated in the preferred manner. The capacity of demulsification stations is almost sufficient for current production, but it is uneven.

Waste identified as waste that should be processed at neutralization stations is processed in the preferred manner. The capacity of demulsification stations is sufficient for current production. The network of neutralization stations is uneven, as is the case with demulsification stations. There is a capacity deficit in the Vysočina, Liberec, Olomouc, and Plzeň regions.

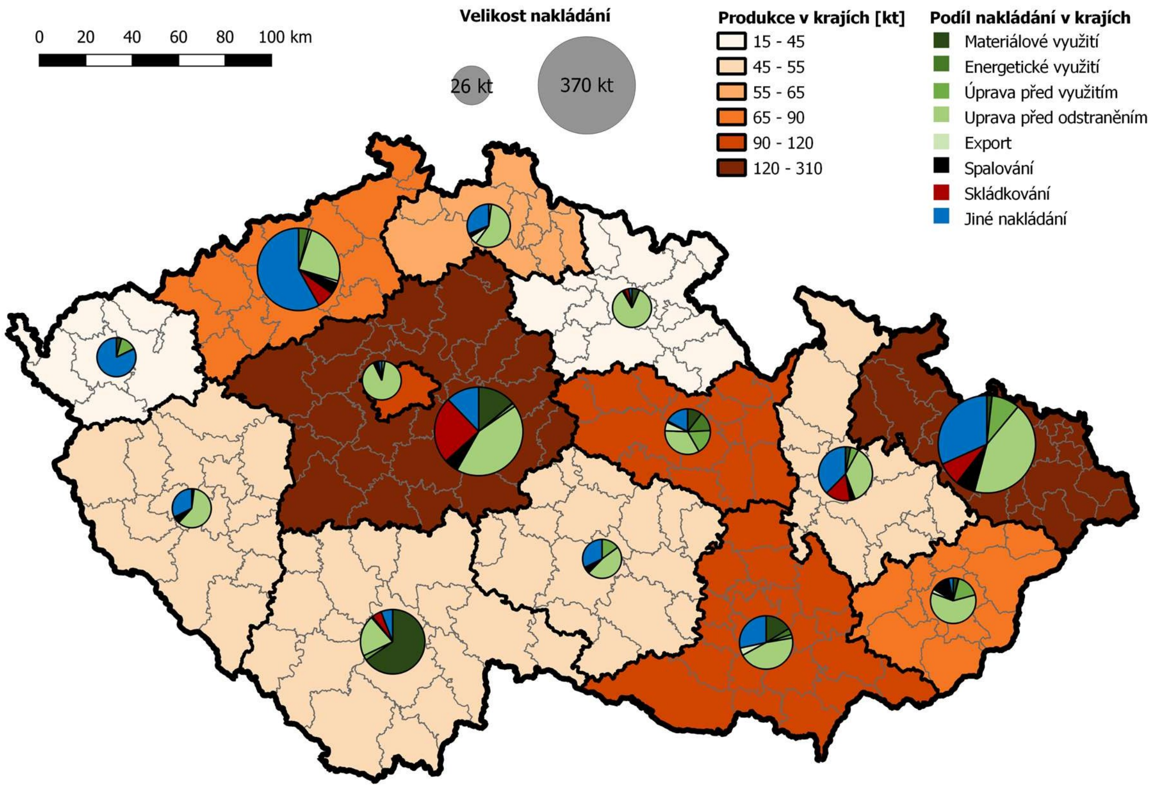
Waste classified as sub-stream waste exclusively for biodegradation or suitable for biodegradation is mainly handled in the preferred manner. The production of streams suitable for biodegradation is key, given the negligible production of streams exclusively for biodegradation. Non-preferred handling accounts for around 13%

of production and involves the storage of waste as technological material to secure landfill space. Given the high total production of the sub-stream of over 500,000 tons, this 13% causes a capacity deficit of up to 80,000 tons. The capacity of biodegradation areas is not sufficiently distributed across the Czech Republic. Surplus capacity is only available in the Central Bohemian and South Bohemian regions, and partially in the Zlín region.

Waste classified as sub-stream waste that should end up exclusively on stabilization lines is handled in the preferred manner in 80% of cases. In the future, non-preferred handling will be dominated by the storage of waste as technological material to secure landfill space. The use of stabilization lines is insufficient in relation to the current production of hazardous waste, with a deficit of 25,000 to 30,000 tons from a nationwide perspective. Sufficient capacity of stabilization lines in relation to future production appears to be available in the South Bohemian and Olomouc regions. There is a significant deficit in the South Moravian and Zlín regions. In other regions, the balance is roughly even, but capacities should be strengthened if the forecast is to be met.

Hazardous waste incinerators are a key technology for the safe treatment of combustible hazardous waste. With the current production of hazardous waste, there is a capacity shortfall of around 45,000 tons for incineration. The amount of this waste is still growing. At the same time, almost 16% of this waste is treated in a non-preferred manner (landfilling and storage of technological material in landfills). The South Bohemian, Pardubice, and Karlovy Vary regions have sufficient capacity for the preferred treatment of combustible waste. Although the capacity of hazardous waste incinerators in these regions is insignificant or zero (Karlovy Vary Region), the balance is positive due to the high material recovery of hazardous waste (South Bohemian and Karlovy Vary Regions) or the treatment of this waste for subsequent energy recovery (Pardubice Region).

Figure 11: Map of production and share of treatment in regions with hazardous waste in 2022



Source: processed based on ISOH

Table 32: Production and disposal 2018–2022 – Hazardous waste I

Year	Production	Energy use			Recycling			Material use		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	1,573	3	2	2	200	12	13.5	357	21.9	24
2019	1,625	44	2.7	2	208	11.9	13.5	404	23.7	26.3
2020	1,626	61	3	3	276	16.8	17.4	345	21.0	21.8
2021	1,497	25	1.5	1	304	19.8	20.7	349	22.7	23.7
2022	1,425	28	1.9	2	252	17.3	18	277	19.1	19

Source: processed based on ISOH

Table 33: Production and disposal 2018–2022 – Hazardous waste II

Year	Landfilling			Incineration			Other disposal		
	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	103	6.6	6.9	90	5.7	6	903	57.4	60.7
2019	112	6.9	7	87	5.3	5.6	892	54.9	58
2020	171	10.5	10.8	84	5	5.3	923	56.7	58.3
2021	223	14.9	15.2	81	5.4	5.5	791	52.8	53.8
2022	204	14.3	14.6	74	5	5.3	812	57.0	58.2

Source: processed based on ISOH

In 2022, the following deficits or surpluses in hazardous waste treatment capacity were identified in the Czech Republic:

- NO suitable for demulsification – total deficit of 5,000 tons, total deficit excluding landfilling of 5,000 tons,
- NO suitable for demulsification or stabilization – total surplus of 5,000 tons, total surplus excluding landfilling of 4,000 tons,
- NO exclusively for demulsification – total deficit of 13 tons, total deficit excluding landfilling of 13 tons,
- NO suitable for neutralization – total deficit 466 tons, total deficit without landfilling 466,

- NO suitable for biodegradation – total deficit 13,000 tons, total deficit without landfilling 81,000 tons,
- NO suitable for biodegradation or stabilization – total deficit 16,000 tons, total deficit without landfilling 37,000 tons,
- NO exclusively for biodegradation – total surplus of 104 tons, total surplus without landfilling 75 tons,
- NO suitable for incineration – total deficit of 18,000 tons, total deficit without landfilling 72,000 tons,
- NO suitable for incineration – total deficit of 8,000 tons, total deficit without landfilling 10,000 tons,
- NO exclusively for incineration – total deficit of 25,000 tons, total deficit without landfilling 43,000 tons,
- NO exclusively for stabilization – total surplus of 1,000 tons, without landfilling 25,000 tons.

The highest deficits in the Czech Republic in 2022 were recorded for **biodegradable** hazardous waste in the Pardubice Region (55,000 tons), the Moravian-Silesian Region (51,000 tons), and the Capital City of Prague (32,000 tons). Surplus capacity for this type of waste was identified in 2022 in the Central Bohemian Region (76,000 tons) and the South Bohemian Region (68,000 tons).

The highest deficits in the Czech Republic in 2022 were recorded for hazardous waste **suitable for biodegradation or stabilization** in the Pardubice (57,000 tons) and Moravian-Silesian (55,000 tons) regions and in the capital city of Prague (26,000 tons). Surplus capacity for this type of waste was identified in 2022 in the Central Bohemian Region (73,000 tons) and the South Bohemian Region (64,000 tons).

The highest deficits in the Czech Republic in 2022 were recorded for hazardous waste **intended exclusively for incineration** in the capital city of Prague (32,000 tons). Surplus capacity for this type of waste was identified in 2022 in the Central Bohemian Region (76,000 tons) and the South Bohemian Region (68,000 tons).

The highest deficits in the Czech Republic in 2022 were recorded for hazardous waste **intended exclusively for stabilization** in the South Moravian Region (24,000 tons) and the Zlín Region (13,000 tons). Surplus capacity for this type of waste was identified in 2022 in the Central Bohemian (19,000 tons), South Bohemian (12,000 tons), and Olomouc regions (12,000 tons).

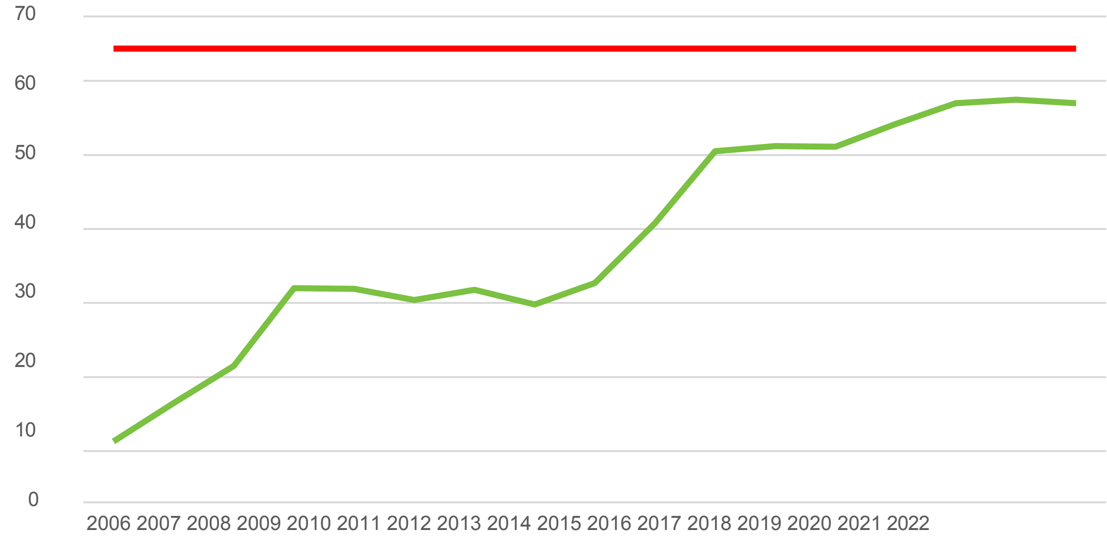
! **Hazardous waste**	**The production of hazardous waste has been growing slightly over the long term. Various forms of hazardous waste treatment dominate hazardous waste management. More than 200,000 tons of hazardous waste were landfilled in 2022, partly due to a lack of capacity at hazardous waste incinerators and biodegradation sites.**

2.3.14 End-of-life products

2.3.14.1 Waste electrical equipment

The total amount of electrical equipment placed on the Czech market increases every year. In 2021, approximately 302,000 tons were placed on the market, and in 2022, approximately 322,000 tons of such equipment. Along with the increasing amount of electrical equipment placed on the market, the amount of waste electrical equipment collected is also growing – in 2021, almost 106,000 tons were collected, and in 2022, more than 99,000 tons. The take-back rate remained relatively stable between 2020 and 2022, reaching 57% in 2020, 57.5% in 2021, and returning to 57% in 2022, which means that the Czech Republic did not achieve the minimum required take-back rate of 65% set by Act No. 542/2020 Coll. on end-of-life products in 2021 and 2022. Assuming a similar trend as before, the Czech Republic should achieve the required take-back rate of 65% by 2025 at the latest. The following graph shows the development of take-back of waste electrical equipment, including the minimum take-back rate of 65% set by Act No. 542/2020 Coll. (Graph 40).

Chart 40: Development of the level of take-back of waste electrical equipment in the Czech Republic between 2006 and 2022



Source: processed based on data from the Ministry of the Environment

The following table (Table 34) shows the development of the quantity of electrical equipment placed on the market and the results of take-back in the Czech Republic between 2016 and 2022.

Table 34: Quantity of electrical equipment placed on the market and results of take-back of electrical equipment in the Czech Republic between 2016 and 2022

Period	Total quantity of EEZ placed on the market [t]	EEZ take-back (+ BN30 from processors*) [t]	Separate collection [t]	Total (EEZ take-back + separate collection) [t]	Level of take-back and separate collection of waste electrical equipment [%]
2018	196,918	83	9,941	93,083	51.1
2019	236,297	89,338	11,981	101,319	54.2
2020	263,202	98,498	19,817	118,316	57
2021	301,537	105,935	27,486	133,421	57.5
2022	321,888	99,019	53,054	152,073	57

Source: processed based on data from the Ministry of the Environment

The most common type of electrical equipment placed on the market in the Czech Republic is type *4a – large appliances, any of whose dimensions exceed 40 cm, except for solar panels*, of which approximately 123,000 tons were placed on the market in 2022, and over 78,000 tons of such equipment were collected through separate collection or take-back schemes. In addition, a large amount of type 5 electrical equipment is placed on the Czech market – *small appliances with no dimension exceeding 50 cm (*over 75,000 tons in 2022), 1 – *Heat exchange equipment (*over 56,000 tons in 2022) and 4b – Solar *panels (*over 42,000 tons in 2022). The quantities of electrical equipment placed on the market and the results of take-back and separate collection by electrical equipment groups in 2022 are shown in the following table (Table 35).

Table 35: Quantity of electrical equipment placed on the market and results of take-back of electrical equipment by groups and subgroups of electrical equipment in the Czech Republic in 2022

Electrical equipment group	EEA placed on the market [t]	Total take-back+ nd separate collection of electrical waste [t]	Take-back of electrical equipment (including BN30) [t]	Separate collection of waste electrical equipment [t]
1	56	31	23	7,744
2	13,423	8,902	8,853	49
3	1,855	1,270	988	282
4	122,534	78,242	40,992	37,250
4b	42,528	139	112	27
5	75,255	25,702	19,710	5,992
6	10,1969	6,606	4,896	1,710

Source: processed based on data from the Ministry of the Environment

In 2022, roughly one-fifth of all waste electrical equipment collected (just under 29,000 tons) was exported from the Czech Republic, mainly for material recovery (98.3%). This mainly concerned electrical equipment of type 1 – *Heat exchange equipment (*9,000 tons), 4a – Large *equipment with any dimension exceeding 40 cm, except solar panels (*8,400 tons) and 5 – *Small equipment with no dimension exceeding 50 cm (*7,200 tons).

In 2023, there were 6,047 producers of electrical equipment registered on the List of Electrical Equipment Producers within the VISOH2 Waste Management Information System in the Czech Republic, with 6,011 of these producers fulfilling their legal take-back obligations through 13 collective systems and the remaining producers fulfilling their obligations individually. Within all these collective systems, just under 322,000 pieces of waste electrical equipment were taken back (or collected separately) in 2022, with the largest share of this figure accounted for by the collective systems ELEKTROWIN, a .s. (36.0 %) and ASEKOL, a.s. (32.6%).

In 2022, the Czech Republic achieved high recovery and recycling rates and thus met the recovery and recycling targets set by Act No. 542/2020 Coll. for all categories of waste electrical equipment. The following table (Table 36) shows an overview of the recovery rates achieved for electrical equipment in 2022, which shows that the Czech Republic met the required recovery and recycling rates for all groups.

Table 36: Overview of the achieved values for the recovery of waste electrical equipment in the Czech Republic in 2022

Electrical equipment group	Total take-back [t]	Recycling* [t]	Recycling rate [%]	Target recycling rate (EU) [%]	Recycling** [t]	Recycling rate** [%]	EU recycling rate target*** [%]
1	31,212	29,751	**95**	85	29,569	**94.7**	80
2	8,902	8,917	**100.2**	8	8,908	**100.1**	70
3	1,270	x	**x**	x	1,070	**84.2**	80
4	78,242	73,211	**x**	x	73,133	**x**	x
4b	139	159	**x**	x	159	**x**	x
4	78,381	73,370	**93.6**	85	73,292	**93.5**	80
5	25,702	22,682	**88.3**	75	22,246	**86.6**	55

Electrical equipment group	Total take-back [t]	Utilization* [t]	Utilization rate [%]	Required recovery rate (EU) [%]	Recycling** [t]	Recycling rate** [%]	EU recycling rate target*** [%]
6	6	6,260	**94.8**	75	6,043	**91.5**	55

Source: processed based on data from the Ministry of the Environment

In 2022, more than 155,000 tons of waste electrical equipment were disposed of. The most common method of disposal was material recovery, accounting for just under 106,000 tons (69.1%). The second most common method of disposal was export to European Union countries, accounting for more than 29,000 tons (18.8%).

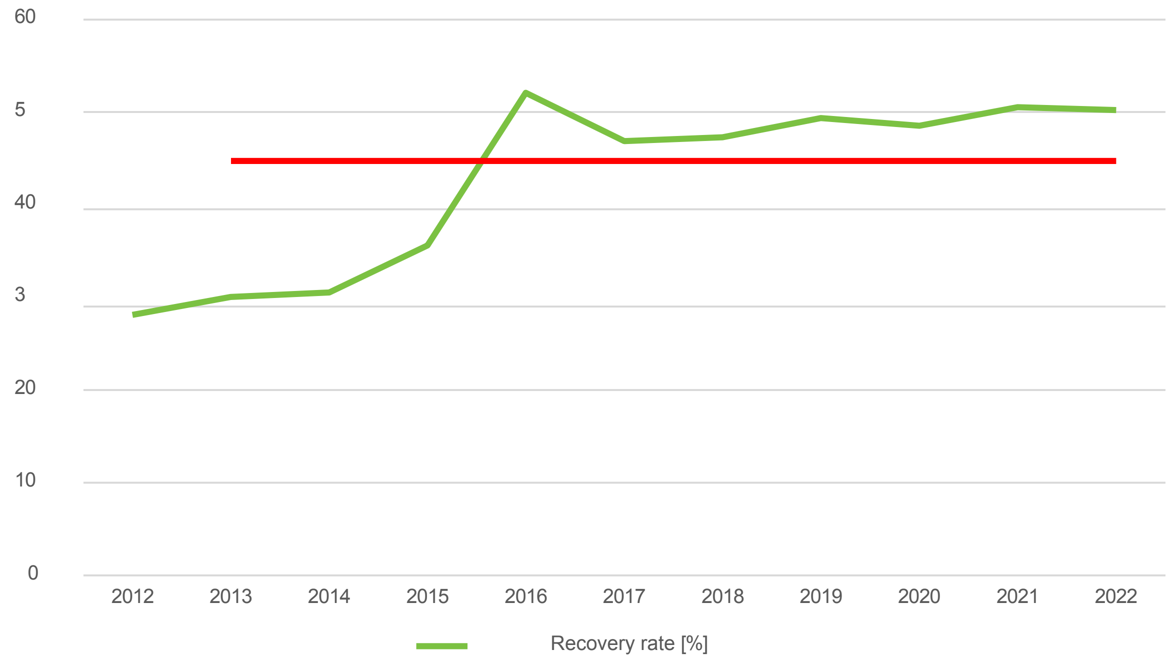
The Czech Republic has a relatively well-functioning system for the take-back of waste electrical equipment and a robust collection network. Most manufacturers of electrical equipment on the Czech market are involved in collective systems and do not shirk their responsibilities. In addition, most waste electrical equipment is processed and recycled directly in the Czech Republic. The quality of waste equipment processing has been improved by introducing mandatory certification for processors of such equipment. A large proportion of citizens are aware of the need to sort and separately dispose of waste electrical equipment. A shortcoming in this area is the low frequency of inspections of manufacturers and collective systems due to insufficient human resources at the inspection bodies. The goal for the future should be to recycle the maximum amount of waste electrical equipment within the Czech Republic, which would bring greater raw material independence, ensure the effective functioning of collective systems for selected equipment with a long service life (e.g., solar panels), and continue to educate the public and businesses about take-back schemes. Given the growing amount of electrical equipment being placed on the market, it is also appropriate to modernize and increase the capacity for recycling waste electrical equipment in the Czech Republic and to support processing capacities for obtaining fractions from the processing of such equipment.

2.3.14.2 Waste batteries

The total amount of batteries placed on the Czech market fluctuates annually, but is generally increasing. In 2021, approximately 5,200 tons of portable batteries, more than 12,000 tons of automotive batteries, and more than 23,000 tons of industrial batteries (a total of more than 41,000 tons of batteries) were placed on the Czech market. In 2022, more than 5,200 tons of portable batteries, just under 20,000 tons of automotive batteries, and more than 21,000 tons of industrial batteries (a total of more than 46,000 tons of batteries) were placed on the Czech market. The development of battery take-back has been growing slightly since 2017, and since 2016 it has always been above 45%, i.e. the minimum level set by Directive 2006/66/EC[26] until 2016 and since 2021 by Act No. 542/2020 Coll. on end-of-life products. Specifically, the collection rate for waste batteries in the Czech Republic was 50.5% in 2021 and 50.2% in 2022. The following graph (Graph 41) shows the development of waste battery collection, including the minimum collection rate of 45% set by Act No. 542/2020 Coll.

[26] Directive 2006/66/EC of the European Parliament and of the Council on batteries and accumulators and waste batteries and accumulators.

Chart 41: Development of waste battery collection rates in the Czech Republic between 2012 and 2022



Source: processed based on data from the Ministry of the Environment

The lowest share of take-back has long been recorded for automotive batteries, of which 19,600 tons were placed on the Czech market in 2022, with 2,300 tons taken back. Portable batteries accounted for 5,200 tons placed on the market, with 2,500 tons taken back. Industrial batteries accounted for the largest share of take-back in 2022, with 21,000 tons placed on the market and just under 19,000 tons taken back (Table 37). In the long term, the take-back curve for portable batteries is rising slightly, while that for industrial batteries is declining or stagnating. The take-back curve rose until 2021 and has been falling since 2021 at a similar rate to the quantity of this type of battery placed on the market.

Table 37: Quantity of batteries placed on the market and collected back in the Czech Republic in 2022 by group

Group	Quantity of products placed on the market [t]	Quantity of products taken back [t]
Portable batteries	5,209	2,571
Car batteries	19,666	2,391
Industrial batteries	21,359	18,938
Total	46,234	24,900

Source: processed based on data from the Ministry of the Environment

The most widespread electrochemical type of batteries placed on the Czech market in 2018 were lead-acid batteries (67.3%), followed by batteries classified as Other (31.7%). Nickel-cadmium cells accounted for a marginal share of the total quantity of batteries placed on the market (1%) (Table 38).

Table 38: Quantity of all batteries placed on the Czech market in 2022 by electrochemical type

Electrochemical type of batteries	Total placed on the Czech market [t]	Total placed on the Czech market [%]
Lead	31,084	6
Nickel-cadmium	465	1
Other	14,685	3
Total	46,234	100

Source: processed based on CENIA data

Primary portable batteries have long held the largest share of the Czech market compared to secondary batteries (61.6% of primary batteries in 2022), specifically alkaline, zinc-chloride, and zinc-carbon batteries, which are the fastest-moving batteries. Between 2021 and 2022, there was an increase in the share of alkaline primary cells (from 70.6% to 72.3%) at the expense of zinc cells (from 24.9% to 19.2%), which consumers are losing interest in. Secondary cells, which can be recharged, are considered more suitable. The proportion of secondary cells is growing year on year, rising from 2020 to 2022 to account for

The amount of portable batteries increased by 3.3% (from 35.1% to 38.4%). Li-Ion/Li-Pol batteries have long had the largest share of secondary cells (79.7% in 2022).

As of January 1, 2024, there were 1,701 collection points in the Czech Republic where automotive and industrial batteries could be returned. On the same date, there were a total of 3,114 battery manufacturers registered in the Czech Republic. There are 2,598 manufacturers of portable batteries, 620 manufacturers of industrial batteries, and 193 manufacturers of automotive batteries. There are only two collective systems of battery manufacturers on the Czech market, namely ECOBAT s.r.o. and REMA Battery, s.r.o. In 2022, there were a total of 2,489 portable battery manufacturers on the Czech market, of which 1,399 submitted annual reports to the ECOBAT s.r.o. collective system. (56.2%), while the remaining 1,090 submitted their annual reports to the REMA Battery s.r.o. collective system (43.8%). Industrial and automotive batteries were reported exclusively through individual systems in 2022.

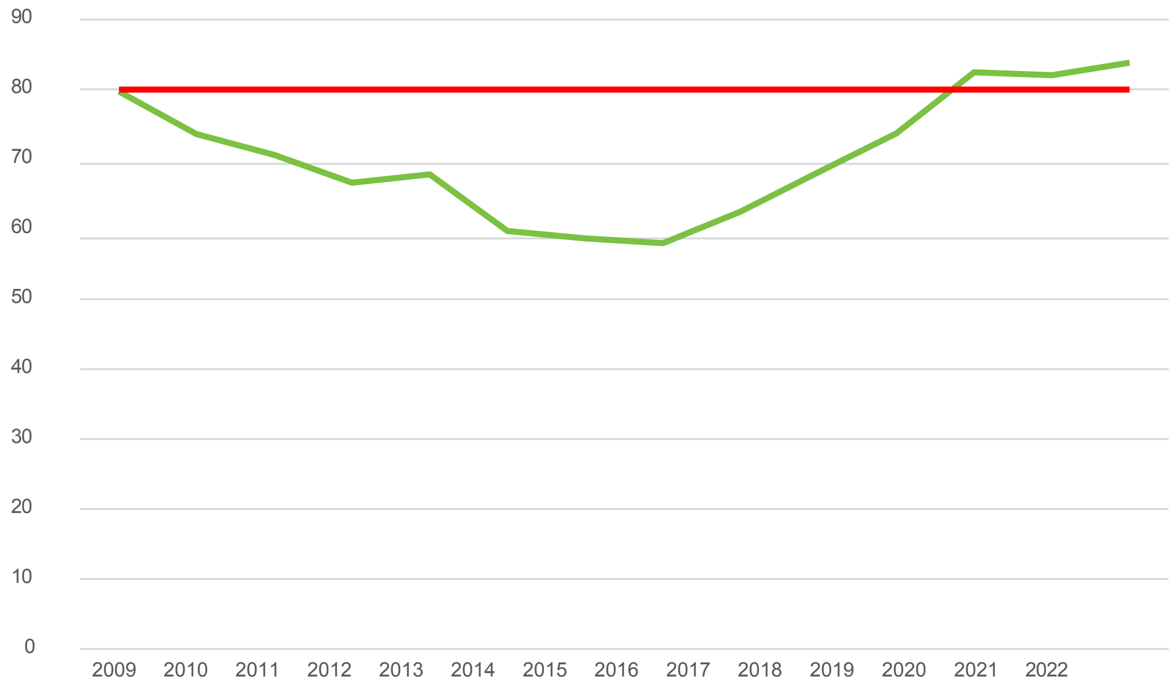
In 2022, just under 19,000 tons of automotive waste batteries, 2,500 tons of portable batteries, and just under 2,400 tons of industrial batteries were handled in the Czech Republic. All (100%) of the automotive batteries were recycled, as were most of the industrial batteries (92.9%).
%). Roughly half of portable batteries were recycled (51.2%), with the remainder exported to other EU countries (38.5%).

The Czech Republic has sufficient capacity to process lead, nickel-cadmium, and alkaline batteries, and a large part of the population is aware of the issue and sorts and separately disposes of waste batteries. The Czech Republic has also been meeting the targets set by European legislation for a long time, thanks in part to its sufficient collection network capacity and functional systems operated by collective systems. The weakest area is the collection of industrial and automotive batteries, which should be increased so that the Czech Republic can continue to meet its collection targets in the future. The main objectives in the area of waste batteries should be to continue raising awareness (especially among companies regarding industrial batteries and among motor vehicle owners regarding automotive batteries), support the construction of processing facilities, and increase monitoring activities to reduce free-riding.

2.3.14.3 Waste tires

The total number of tires placed on the Czech market is growing every year. In 2020, more than 89,000 tons of tires were placed on the market, in 2021 it was already more than 106,000 tons, and in 2022 it will be more than 108,000 tons. Along with the number of tires placed on the market, the level of take-back is also growing, and quite significantly until 2016. The level of take-back of waste tires reached 81.9% in 2021 and 83.6% in 2022. The Czech Republic thus achieved the required minimum take-back rate of 70% set by Act No. 542/2020 Coll. on end-of-life products by 2021, and the 80% threshold set by the same Act after 2022. The following graph (Graph 42) shows the development of waste tire take-back, including the minimum take-back rate of 80% set by Act No. 542/2020 Coll.

Chart 42: Development of waste tire collection rates in the Czech Republic between 2009 and 2022



Source: processed based on CENIA data

The following table (Table 39) shows the development of the number of tires placed on the market and the results of take-back in the Czech Republic between 2016 and 2022. The number of tires placed on the market in 2020 can be explained by the suspension of industrial production and lockdown due to the COVID-19 pandemic.

Table 39: Quantity of tires placed on the market and collected in the Czech Republic between 2015 and 2022

Year	Number of tires placed on the Czech market [t]	Quantity of tyres taken back [t]	Take-back rate [%]
2018	93,448	64,339	68.
2019	94,694	70,202	74.1
2020	89,446	73,590	82.3
2021	106,631	79,400	81.9
2022	108,681	84,975	83.6

Source: processed based on CENIA data

In 2022, just under 86,000 tons of waste tires were collected, with the largest amount coming from shops (84.3%), followed by industry (8.9%), and the smallest amount coming from municipalities (6.9%). The share of waste tires collected within municipalities is increasing; in 2015, 713 tons were collected within municipalities, while in 2022, this figure rose to 5,822 tons.

In 2022, just under 85,000 tons of waste tires were handled in the Czech Republic, with the majority of these tires being recycled (67.4%) and a smaller portion being used for energy (29.5%), while other methods of disposal were marginal. Between 2015 and 2022, the energy recovery of tires fell by almost half (from 51% to 29.5%), mainly in favor of material recovery, which more than doubled (from 32.7% to 67.4%).

There is one collective system in the Czech Republic that deals with waste tires, namely ELT Management Company Czech Republic, s.r.o. Through this collective system, a total of 243 tire manufacturers fulfilled their take-back obligation in the first quarter of 2024, with the remaining 117 manufacturers fulfilling their take-back obligation individually.

The Czech Republic has a sufficient number of waste tire collection points and citizens are very keen to dispose of waste tires at these locations. Municipalities are also showing growing interest in participating in the collection system. Within the Czech Republic, waste tires are also highly utilized, especially for material recovery. The biggest problems in the area of waste tires are free-riding in the import of tires from the European Union, high logistics costs for collection, and insufficient collection of recyclables from waste tires. The overall objective should be to further increase the take-back rate of waste tires in the Czech Republic through information and awareness campaigns, expanding the network of take-back points, and simplifying the logistics of collecting these tires, but also by preventing situations where collection points refuse to take back waste tires. Given the increasing number of tires placed on the market, it is also appropriate to support the construction of logistics centers to optimize transport and the construction of new recycling facilities.

2.3.14.4 End-of-life vehicles

End-of-life vehicles in the Czech Republic are registered in the End-of-Life Vehicles Module of the Waste Management Information System (MA ISOH), which recorded over 2.2 million end-of-life vehicles as of January 1, 2024. The number of end-of-life vehicles registered in this system gradually increased until 2019, when it peaked at 178,401, and has since been declining, with the exception of 2021, when it returned to a similar level to that of 2019. In 2021, 176,664 end-of-life vehicles were registered in the MA ISOH, in 2022 there were 162,240 end-of-life vehicles, and in 2023 there were 158,204 end-of-life vehicles (Table 40). The downward trend is the result of various factors, including economic conditions (price increases), environmental measures, and changes in consumer behavior.

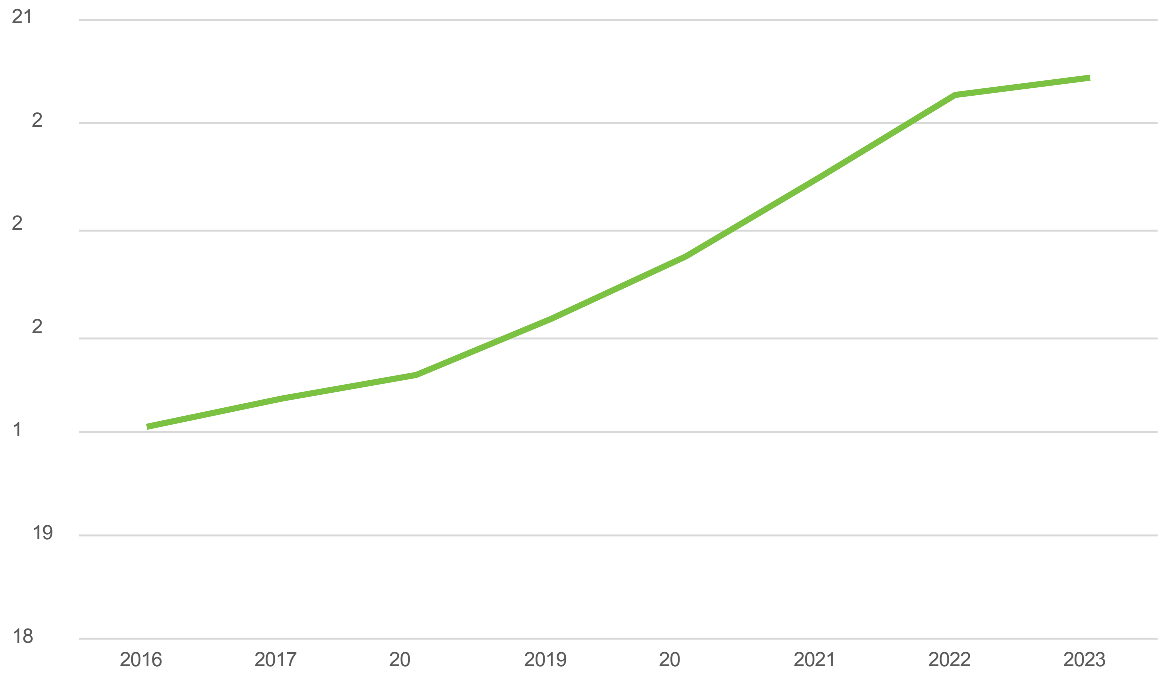
Table 40: Number of end-of-life vehicles registered in MA ISOH between 2016 and 2023

Year	Total
2	171
2	178,401
20	169,623
2021	176,664
2022	162,240
2023	158,204

Source: processed based on MA ISOH data

The average weight of end-of-life vehicles is also increasing every year in the Czech Republic (Chart 43). It was 0.96 tons in 2015 and 1.13 tons in 2021. The age of the Czech population's vehicle fleet is also increasing. While in 2015 the average age of a vehicle was 19.42 years, in 2024 it will be 21.77 years. In 2020 in particular, there was a significant increase of 0.66 years compared to the previous year. This jump may again be due to various factors, including the impact of the coronavirus pandemic on the car market and consumer behavior.

Chart 43: Development of the average age of end-of-life vehicles in MA ISOH between 2016 and 2023



Source: processed based on MA ISOH data

In 2022, according to MA ISOH, a total of 158,189 end-of-life vehicles were taken over and registered in the Czech Republic, with a total weight of just under 181,000 tons. More than 77,000 tons were sent for shredding, with the majority of this waste being recycled (90.9%) and a smaller portion being disposed of (2.4%). Most of the waste from end-of-life vehicles was sent for processing other than shredding, amounting to more than 86,000 tons. Most of this waste was recycled (94.1%), with a smaller portion used for energy recovery (4.2%). This year, the Czech Republic partially met its reuse, recovery, and recycling targets, which are 95% reuse and recovery and 85% reuse and recycling. In 2020, the Czech Republic did not meet the target for the recovery and reuse of end-of-life vehicles, with the recovery and reuse rate reaching 94.83% that year, 0.17% below the target. In 2021, the Czech Republic met this target, with a recovery and reuse rate of 96.13%. In 2022, the Czech Republic again failed to reach the 95% target, achieving a rate of 94.34%, which is 0.66% below the target. Recycling targets

The Czech Republic achieved recycling rates in all years between 2020 and 2022. In 2021, this rate was 90.16%, in 2021 it was 91.19%, and in 2022 it was 89.49%.

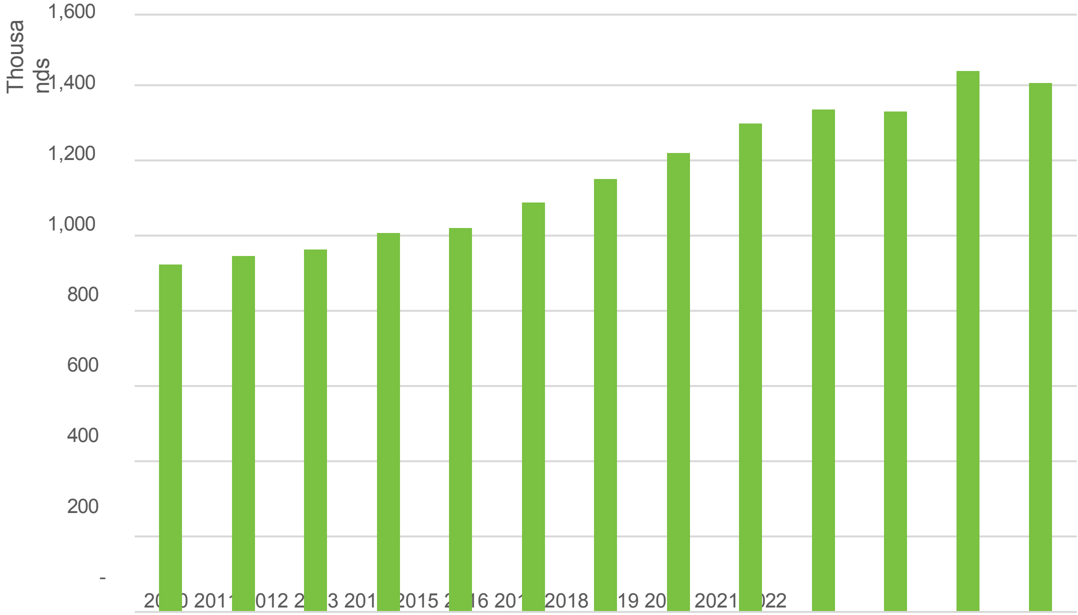
Although the number of active facilities accepting end-of-life vehicles is decreasing every year, it is still relatively high. While there were 505 such facilities in the Czech Republic in 2019, by 2023 there were only 466. As of January 1, 2024, most of these facilities were located in the Central Bohemian Region (56), the Pardubice Region (42), and the South Moravian Region (41). The largest share of the total number of facilities (207) in 2023 processed an average of between 101 and 500 end-of-life vehicles per year, while the second highest number of smaller facilities (113) processed an average of less than 50 end-of-life vehicles per year.

The Czech Republic has sufficient processing capacity (crushers for end-of-life vehicles with subsequent recycling) and a sufficiently dense collection network for end-of-life vehicles. The biggest problems include the storage of end-of-life vehicles in areas that are not protected against water pollution and the illegal dismantling of end-of-life vehicles. The Czech Republic should continue to aim to achieve high recovery rates for end-of-life vehicles and to set standards for the collection and treatment of end-of-life vehicles and standards for the reuse of vehicle parts.

2.3.15 Packaging and packaging waste

The amount of packaging waste in the Czech Republic is growing year on year, with an average annual increase of around 40,000 tons since 2010. From 2020 to 2021, the total amount of packaging waste increased by approximately 109,000 tons from 1,328,000 tons to 1,437,000 tons. From 2021 to 2022, the total amount of packaging waste decreased slightly from 1,437,000 tons to 1,405,000 tons, i.e., by approximately 32,000 tons. In 2022, the total amount of packaging waste generated in the Czech Republic was 1,405,300 tons, which is approximately 483,000 tons more than in 2010 (Chart 44).

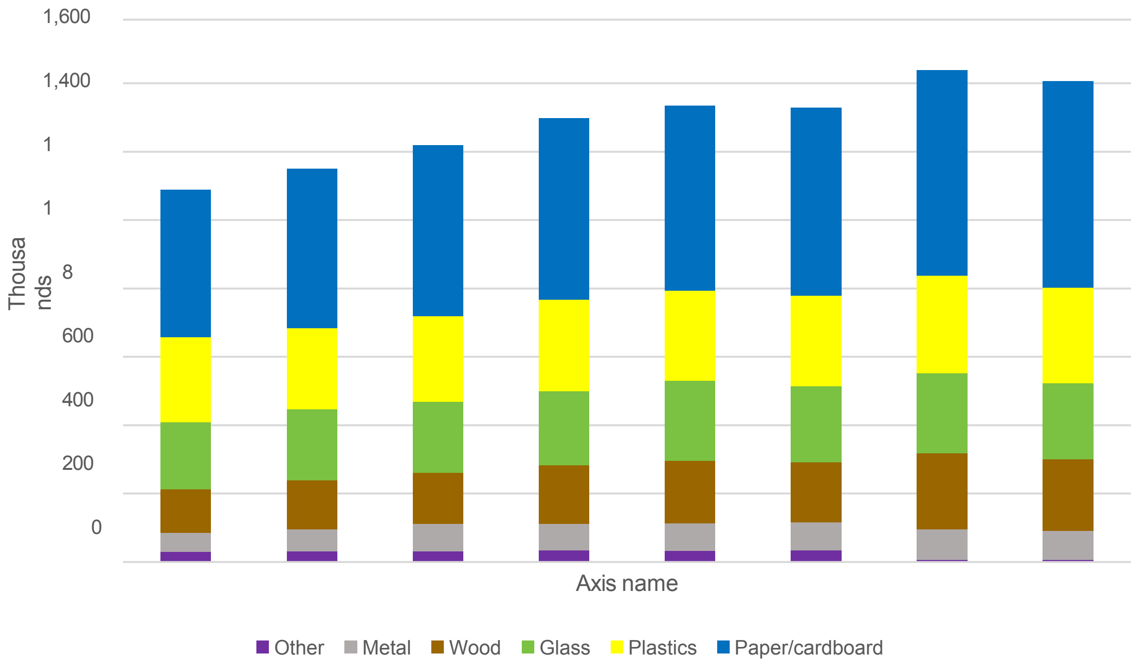
Chart 44: Total amount of packaging waste generated in the Czech Republic between 2010 and 2022 in thousands of tons:



Source: processed based on data from the Ministry of the Environment

Paper/cardboard has long been the commodity with the largest share of total packaging waste, which was also true in 2022, when just under 604,000 tons of this waste was generated. The second most represented commodity in 2022 was plastics (278,000 tons), followed by glass (just under 223,000 tons), wood (just under 209,000 tons), metals (86,000 tons) and packaging waste classified as Other (5,500 tons). The following graph (Graph 45) shows the total amount of packaging waste generated between 2015 and 2022 in the Czech Republic by commodity.

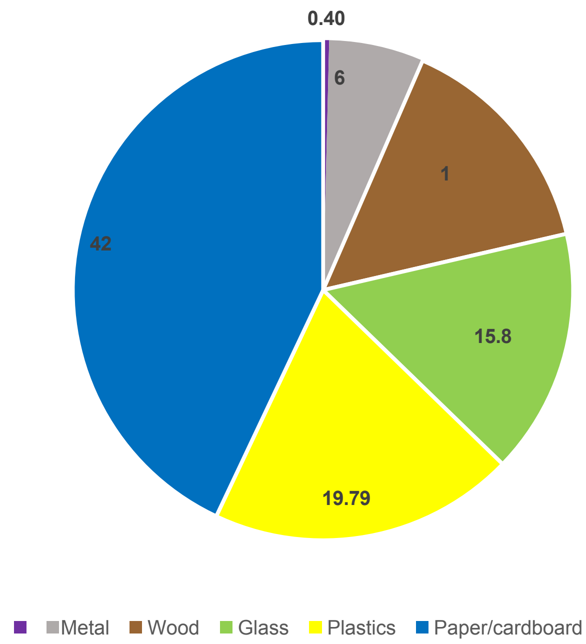
Chart 45: Total amount of packaging waste generated in the Czech Republic between 2015 and 2022 by commodity



Source: processed based on data from the Ministry of the Environment

For clarity, the next chart (Chart 46) shows the distribution of packaging waste generated in the Czech Republic in 2022 by commodity.

Graph 46: Percentage distribution of packaging waste generated in the Czech Republic in 2022 by commodity



Source: processed based on data from the Ministry of the Environment

The year-on-year growth of paper/cardboard has been slightly increasing since 2015, and between 2015 and 2022, the amount of this waste increased by more than 173,000 tons (604,000 tons in 2022). The year-on-year growth of plastic waste fluctuated between 2015 and 2022, with the total amount increasing by more than 31,000 tons (278,000 tons in 2022) during this period. The total amount of waste from glass packaging grew until 2019, fluctuated between 2019 and 2021, and declined significantly after 2022. Between 2015 and 2022, the total amount of this waste increased by more than 26,000 tons (223,000 tons in 2022). In the case of metal packaging waste, there was a slight increase in the amount of non-ferrous metal packaging waste between 2015 and 2022. The amount of ferrous metals increased until 2017, then stagnated until 2021, and even declined after that year. Overall, the amount of metal packaging waste increased by more than 30,000 tons between 2015 and 2022. The amount of waste from wood packaging also grew more or less throughout the entire period between 2015 and 2022 (with fluctuations between 2019 and 2022 and after 2021), even though the amount of this waste increased by more than 82,000 tons during this period.

The only authorised packaging company in the field of packaging waste in the Czech Republic is EKO-KOM, a.s. As of 1 February 2024, there were a total of 579 entities registered on the Czech market in the List of Entities pursuant to Act No. 477/2001 Coll. on Packaging. On the same date, 21,200 companies placing packaged goods on the Czech market were registered in the EKO-KOM system. Through the EKO-KOM system, companies cooperated with 6,176 municipalities in the Czech Republic, home to 10,553,339 inhabitants of the Czech Republic (99% of the population), and other entities ensuring the management of packaging waste.

In 2021 and 2022, the Czech Republic met the target share of recycled packaging waste for almost all commodities mentioned, with the exception of plastics. In 2021, the share of recycled packaging waste from glass reached 81.4%, and in 2022 it was 84.6%, meaning that the Czech Republic met the recycling target set by Act No. 477/2001 Coll. on packaging, which is 75% (Table 41).

In 2021, the share of recycled packaging waste from paper/cardboard reached 88.4%, and in 2022 it reached 91.2%, meaning that the Czech Republic met the required recycling rate of 75% set out in Act No. 477/2001 Coll.

In 2021, the share of recycled packaging waste from the metal commodity reached 67.4%, and in 2022 it reached 67.8%, meaning that the Czech Republic met the required recycling rate of 55% under Act No. 477/2001 Coll.

In 2021, the share of recycled waste from wood packaging reached 39.4%, and in 2022, it reached 41.3%, meaning that the Czech Republic met the required recycling rate under Act No. 477/2001 Coll. of 15%.

Only in the case of plastics did the Czech Republic fail to meet the recycling targets set by Act No. 477/2001 Coll. in 2021 and 2022, as the recycling rate was 45.1% in 2021 and 47.2% in 2022. The legal target is 50%. However, the recycling rate in the Czech Republic is increasing every year and should therefore reach the required levels in the coming years.

Table 41: Share of recycled packaging waste in the Czech Republic between 2015 and 2022 by commodity (%)

Material	2015	20	20	20	2019	2020	2021	2022
glass	72.6	72	72	74.8	76.4	83.6	**81.4**	**84.6**
plastics	61.7	59.2	58.6	57.0	61	41.8	**45.1**	**47.2**
Paper/cardboard	90.1	93.7	90.2	85.6	88.2	87.5	**88.4**	**91.2**
non-ferrous (aluminum)	24.2	20.1	20.1	28.6	22.4	32.5	26.7	28.8
iron (steel)	67.6	74.6	79.3	78	77.3	85.4	**82.7**	**86.1**

Material	2015	2016	2017	2018	2019	2020	2021	2022
Total metals	58.6	63.4	67.8	67.6	65.0	73.2	67.4	67.8
wood	73.0	63.9	49.3	45.0	42.3	34.8	39.4	41.3

Source: processed based on data from the Ministry of the Environment

The share of total packaging waste recovery set by Act No. 477/2001 Coll., on packaging, at 75% was met by the Czech Republic in 2021 and 2022, as this share reached 82% in 2021 and 79.9% in 2022 (Table 42).

Table 42: Share of total packaging waste recovery (%) in the Czech Republic between 2015 and 2022 by commodity (%)

Material	2015	2016	20	20	2019	2020	2021	2022
glass	72.6	72	72	74.8	76.4	83.6	81.4	85.7
plastics	74.7	72.0	72.4	69.8	74.2	76.1	76.0	85
Paper/cardboard	94.5	97.4	94.1	88.9	91.5	92.0	91.5	95.9
non-ferrous (aluminum)	24.2	20.1	20.1	28.6	22.4	32.5	26.7	28.8
iron (steel)	67.6	74.6	79.3	78.1	77.3	85.4	82.8	86.1
Total metals	63.4	67.8	67.6	65.0	73.2	67.5	67.8	63.4
wood	67.3	52.6	46.7	43.8	38.8	43.5	41.3	67.3
Total	79.9	77.1	73.9	75.5	77.3	77.6	82.0	79.9

Source: processed based on data from the Ministry of the Environment

In the Czech Republic, integrated collection of packaging waste is carried out together with non-packaging components, and they are processed together in waste treatment facilities. There are currently more than 100 sorting lines available in the Czech Republic, mainly lines combining paper and plastic (including beverage cartons), and several lines for the separate treatment of paper, plastics, and glass. While the treatment and possible sorting of paper, glass, and metals is carried out with minimal waste, which cannot be used for recycling, the opposite is true for plastics. Due to the specific properties of individual polymers and the requirements of the recycling industry, plastics must be sorted into many fractions.

The authorized company EKO-KOM, a.s. operates effectively in the Czech Republic, fulfilling the obligations of the collective system in the area of packaging waste. The Czech Republic also has a very dense network for separate collection and a well-functioning system for collecting paper, plastics, glass, and metal within municipal systems. It also has a dense network of sorting lines for plastic and paper waste and technologies for sorting glass for recycling. One of the problems is the stagnating active participation of the population in the separate collection of municipal waste, including packaging (72–75%). The Czech Republic's objective in the area of packaging waste should be to continue education and awareness-raising in order to increase the sorting of packaging waste and to ensure the availability and user-friendliness of the network for separate collection. Given the increasing amount of packaging waste, it would be appropriate to support the construction of automated sorting lines, facilities for the treatment of minor packaging waste, or processing technologies for the treatment and processing of packaging waste.

Information on deficits or surpluses in the capacity of packaging waste treatment facilities is provided in the relevant chapters on material-recoverable waste fractions – plastics (2.3.1.3), paper (2.3.1.2), glass (2.3.1.6), metals (2.3.1.5) and wood (2.3.1.7).

2.3.16 Single-use plastic products

Single-use plastic products are regulated by Directive 1019/904 of the European Parliament and of the Council on the reduction of the impact of certain plastic products on the environment, and the requirements for them are reflected in Czech legislation by an amendment to Act No. 477/2001 Coll. on packaging[27] and a completely new Act No. 243/2022 Coll. on the reduction of the impact of selected plastic products on the environment. Plastic products as defined in Directive 1019/904 are defined in Act No. 243/2022 Coll. as "selected plastic products". The aim is to prevent and reduce the impact of certain plastic products on the environment, in particular on the aquatic environment, and on human health, and to promote the transition to a circular economy through sustainable products and materials.

Through Acts No. 243/2022 Coll. and No. 244/2022 Coll., a number of measures were incorporated into Czech legislation, primarily concerning the prohibition of the marketing of certain products, the setting of targets for separate collection, and awareness-raising activities. Measures relating to the obligation of Member States to reduce consumption concern beverage cups and food containers. Restrictions on placing on the market apply, for example, to cotton swabs, plastic plates, cutlery, straws, beverage stirrers, balloon sticks, and polystyrene containers for beverages and food. The law also introduced an obligation for EU Member States to ensure that single-use plastic products with plastic caps and lids can only be placed on the market if the caps and lids are attached to the container. Under the law, Member States must also ensure that manufacturers of single-use plastic products cover the costs in accordance with the provisions on extended producer responsibility. These costs include the costs of awareness-raising measures, the collection of waste from these products, and the subsequent transport and treatment of this waste. Furthermore, the costs of collecting waste from products that are disposed of in public separate collection systems and the costs of data collection and reporting.

[27] Act No. 244/2022 Coll., amending acts in connection with the adoption of the Act on the reduction of the impact of selected plastic products on the environment.

These single-use plastic products may enter waste, for example through littering. Littering refers to waste that is intentionally or unintentionally discarded, left behind due to natural processes, or deposited in an urban or natural environment, as well as in the vicinity of transport infrastructure, outside of designated areas for separate waste collection (trash cans, containers for mixed waste or separate waste collection), where the originator shows no intention of collecting it, and which has a negative impact on the environment.

Based on the provisions of both Acts No. 243/2022 Coll. and No. 244/2022 Coll., it will be possible in the future to assess the production of selected plastic products (selected single-use plastics) according to the quantity of these products placed on the market in the Czech Republic, which become part of municipal waste, including littering, after use. However, it will not be possible to reliably assess the total production of littering, as there is no relevant data on the occurrence of these products in individual waste streams and outside waste (littering that is not cleaned up). It should also be noted that single-use plastic products represent only a small proportion of the total litter waste found in public spaces and the natural environment.

Data on littering production began to be monitored by the authorized packaging company EKO-KOM; this concerns the packaging part of littering, and at the time of processing the POH data, it is not yet available. The results of the UJEP[28] research showed that in terms of weight, glass (30.4%), plastic (27.7%), and metals (18.6%) contribute the most to littering %). In terms of piece composition, cigarettes (or cigarette butts and filters) account for the largest share of litter waste (71.6%), followed by plastics (13.6%).

A number of preventive and reactive measures are being implemented in the area of littering. Preventive measures include bans on the sale of single-use plastic shopping bags, fines for littering, the introduction of deposit systems, and educational and awareness campaigns (e.g., the #dostbyloplastu[29] initiative). Reactive measures respond to littering that has already occurred with the aim of removing it. In the Czech Republic, the best-known initiatives are "Ukliďme Česko" (Let's Clean Up the Czech Republic) and "Ukliďme svět" (Let's Clean Up the World), which in 2022, for example, carried out 4,687 clean-ups involving 194,800 volunteers and collected 2,730 tons of waste. Other activities include calls under the OPŽP aimed at preventing littering and the use of disposable tableware. In the previous programming period 2014-2020, a total of 19 projects worth a total of CZK 73 million were supported under the OPŽP.

The Czech Republic has appropriate legislation in place for selected plastic products, and the authorized packaging company EKO-KOM, a.s. operates effectively in the Czech environment. NEVAJGLUJ a.s. operates a collective system on the Czech market for the fulfillment of obligations for tobacco products with filters and filters placed on the market for use in combination with tobacco products. No collective systems are yet in place in the Czech Republic for other selected plastic products (e.g., wet wipes). The aim in the area of selected disposable products should be intensive communication with municipalities so that they conclude contracts with collective systems in order to meet the statutory share of 90% of municipalities covered by contracts (according to Act No. 243/2022 Coll.). It is appropriate to allow and implement the coverage of multiple commodities under a single collective system to facilitate the administration of municipalities and cities.

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28 Available at: https://www.ekokom.cz/wp-content/uploads/2023/01/IEEP-UJEP-littering_FINAL-web.pdf

29 Available at: https://www.mzp.cz/cz/kampan_dost_bylo_plastu

Single-use plastic products	**The Czech Republic is successfully meeting its targets for single-use plastic products. The separate collection rate for single-use plastic bottles reached 76% in 2023. The Czech Republic is thus well on track to meet its target of 77% in 2025 and 90% by 2029. The recycled content of PET beverage bottles is also growing steadily (11% in 2023), and the production of plastic cups and plastic food containers is also increasing slightly.** **It is no longer possible to place products made from oxo-degradable plastics on the Czech market. Since 2021, it has been mandatory in the Czech Republic to label selected plastic products with the "Plastic in the product" pictogram. There is currently one collective system in the Czech Republic for tobacco products with filters and similar products – NEVAJGLUJ, a.s. – and the introduction of other collective systems is planned.** **A number of awareness-raising activities are being carried out in the area of selected disposable products (samosebou.cz, Cigaretovník, ceskobezplastu.cz).**

2.3.17 Sewage sludge

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investment needed
169,000 tons	Recycling and composting (46%) Application to agricultural land (26%)	Import 5,000 tons	Insufficient	-

According to the methodology of the Ministry of the Environment, the following waste (7 types) is included in the flow of sludge from wastewater treatment plants: 02 – Waste from agriculture, horticulture, fishing, forestry, hunting, and food production and processing, 03 – Waste from wood processing and the manufacture of boards, furniture, cellulose, paper and cardboard, and in particular 19 – Waste from waste treatment facilities, from wastewater treatment plants for the treatment of such water outside the place of its generation, and from the production of water for human consumption and water for industrial purposes.

The quantity of sludge is recorded in dry matter. In 2022, 168,543 tons of sludge were produced, most of which originated in group 19, which includes waste category 19 08 05 (sludge from municipal wastewater treatment plants). The share of waste with catalog number 19 08 05 in the production flow reaches almost 97% and has been stable for a long time. Group 02 accounted for less than 3% and group 03 only 0.27%, therefore the following treatment and conclusions mainly concern 19 08 05.

The production of waste 19 08 05 has remained constant over the long term, ranging between 154,000 and 168,000 tons per year (163,000 tons in 2022). Given the high quality of the sewerage network in the Czech Republic and the fact that 90% of the population is connected to it, no significant change in production is expected in the future. On the contrary, production in groups 02 and 03 has been declining for a long time. Although sludge represents a minor flow in terms of quantity, considerable attention is paid to it due to its potential risks.

It is typical for sludge production and treatment that significantly more sludge is treated in a given year than is produced, which is related to the fact that a considerable amount of sludge is stored and transferred from the previous year to the new year for the purposes of annual reporting. In 2022, 228,000 tons were treated. More than a thousand waste treatment facilities have a permit to treat sludge. Only 406 facilities actively treated sludge, of which 54 were mobile facilities. Most sludge is now disposed of in the preferred manner. In 2022, most sludge was composted (82,000 tons, 46%) and applied to agricultural land (44,000 tons, 26%). Therefore, the most widespread type of facility was composting plants, which are operated throughout the Czech Republic. Energy recovery was negligible at 3% (5,000 tons), but there is still significant potential for its use. Sludge was also used in biological decontamination and biodegradation facilities. Sludge from wastewater treatment plants is not landfilled.

The forecast for the amount of sludge from the WWTP does not anticipate any significant changes in its production in the future. In view of the new requirements for the quality of wastewater discharged from wastewater treatment plants into receiving waters (revision of the directive on urban wastewater treatment), the composition and content of essential pollutants in sludge may change. Wastewater treatment plants will have to be expanded to include new treatment stages.

Sewage sludge is an important source of organic matter for improving soil balance in the Czech Republic and increasing its retention capacity, and thus its ability to prevent the effects of climate change. Organic carbon applied to soil as part of sewage sludge can improve soil fertility and its physical, chemical, and biological properties, which can be used, for example, to improve soil quality in semi-arid regions.

On the other hand, sewage sludge concentrates undesirable substances that were originally contained in wastewater, such as heavy metals, metabolites, pharmaceuticals and pharmaceutical residues, bacteria, viruses, etc. These substances are collectively referred to as pollutants. With the development of knowledge and new analytical methods, new types of contaminants are emerging, such as pharmaceutical residues and personal care products (PPCPs), microplastics, and a group of substances known as PFAS[30]. Monitoring the occurrence of these "new" pollutants is an important part of setting up future sludge management processes.

Table 43: Production and disposal 2018–2022 – Sewage sludge from wastewater treatment plants I

Year	Production	Energy recovery			Application to soil			Recycling and composting		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	17	4	2.3	2	45	26.3	25.6	95	51.1	54.1
2019	171	4	2	2	47	27.2	21.2	139	77.3	63.2

[30]Perfluoroalkyl substances.

Year	Production	Energy use			Land application			Recycling and composting		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2020	176	7	3.9	3	42	23.5	18.6	139	75.3	62.5
2021	171	7	3	4.5	45	26.3	27.7	94	51.9	57.8
2022	169	5	2.8	3.3	44	26.3	30.7	82	45.9	57.0

Source: processed based on ISOH

Table 44: Production and disposal 2018–2022 – Sewage sludge II

Year	Landfilling			Incineration			Other disposal		
	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	0	0.4	0	0	0	0	30	17.5	17
2019	0	0	0	0	0	0	29	16.8	13
2020	0.4	0	0	0	0	0	33	18.8	14
2021	0.3	0	0	0	0	0	13	7.8	8
2022	0	0	0	0	0	0	13	7.7	9

Source: processed based on ISOH

In 2022, a slight deficit in sludge treatment capacity was identified in the Czech Republic, mainly involving waste classified under code *19 08 05 Sludge from the treatment of municipal waste water*, totaling 32,000 tons. The highest capacity deficit in 2022 was recorded in the Capital City of Prague (21,000 tons), the Zlín Region (11,000 tons), and the South Moravian Region (10,000 tons). On the contrary, a surplus of sludge treatment capacity was recorded in the Central Bohemian Region (19,000 tons), Ústí nad Labem Region (8,000 tons), Pardubice Region (2,000 tons) and South Bohemian Region (1,000 tons). In all other regions of the Czech Republic, a deficit in sludge treatment capacity in the order of thousands of tons was recorded in 2022.

Sludge from WWTPs	**The production of sludge from wastewater treatment plants is almost constant. Sludge from wastewater treatment plants is a valuable source of organic matter. Most of the sludge was composted (46%) and then applied to agricultural land (26%). This treatment carries a certain risk of introducing and accumulating "new" pollutants in the soil. It is therefore necessary to focus on eliminating them directly at the source.** **There is considerable untapped potential for the use of sludge for energy.**

2.3.18 Waste oils

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investment required
32,000 tons	Recycling (48%)	Export 7,1 thousand tons	Included primarily in hazardous waste streams	Included primarily in hazardous waste streams

Waste oils are any mineral or synthetic lubricating or industrial oils that have become unsuitable for their original purpose. These include, in particular, used oil from combustion engines, gear oil, mineral or synthetic lubricating oil, turbine oil, and hydraulic oil. Waste oils are listed in group 13 (Oil wastes and waste liquid fuels, excluding edible oils and wastes listed in groups 05, 12, and 19) of the Waste Catalogue. Waste oils are also included in group 12 (Waste from the shaping and physical and mechanical surface treatment of metals and plastics) and 20 (Municipal waste, waste from households and similar commercial, industrial waste and waste from offices, including components from separate collection). Wastes included in waste oils are determined by the methodology of the Ministry of the Environment.

Until 2015, it was possible to return used motor oil under a take-back scheme, but the system was not functional. Currently, waste oils must be handled as hazardous waste in accordance with Act No. 541/2020 Coll. on waste. Individuals should not normally produce waste oil, as it is generated during servicing and maintenance of machinery and vehicles. However, if citizens do produce waste oil, they can dispose of it free of charge through the municipal waste management system.

In 2022, 31,543 tons of waste oil were produced in the Czech Republic, which is a marginal flow, as it accounts for approximately 0.1% of the total waste production in the Czech Republic. The most common type of waste is catalog number 13 02 08 (Other motor, gear, and lubricating oils).

was produced in 2022, which corresponds to 52.12% of the total waste stream. The second most significant catalog number is 13 02 05 (Non-chlorinated mineral engine, gear, and lubricating oils), of which 8,596 tons were produced in 2022, corresponding to 27.17%. After a relatively sharp decline in waste oil production after 2019, there was a slight increase in the production of this waste, which continued in 2022.

In 2022, the Pardubice Region had the highest production of waste oils (25% of the total flow), which is also related to the fact that the largest waste oil processor in the Czech Republic is located in this region. Furthermore, the amount of waste oil produced is related to the number of facilities that collect waste oils, such as car repair shops, etc.

Since there are no facilities for the complete recycling of oils in the Czech Republic, some of the waste oils are exported abroad for recycling. All waste oil catalog numbers fall under hazardous waste, and their transport is therefore governed by Regulation (EC) No. 1013/2006 of the European Parliament and of the Council on shipments of waste. With the growing production of waste oils in the Czech Republic, the amount of these wastes exported is also increasing. In 2022, 7,152 tons of waste oils were exported abroad. Although in the past waste oils were also exported to Poland for processing, in 2022 exports were only to Germany.

In 2022, the most common method of waste oil management was treatment prior to use, with a large proportion exported for recycling (7,100 tons). In the Czech Republic, there are 1,381 active stationary facilities and 102 active mobile facilities with a permit to handle some of the waste oil catalog numbers.

There are a large number of businesses in the Czech Republic that deal with waste oil management. However, the Czech Republic does not have any facilities for the full recycling of waste oils, and many small and medium-sized facilities also handle waste oils incorrectly.

At the time of preparing the POH ČR, the Ministry of the Environment is preparing a new decree on liquid fuels, which will enable the production of fuels for energy use from suitable waste oils.

Table 45: Production and disposal 2018–2022 – Waste oils I

Year	Production	Energy use			Recycling		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)
2018	40	4	8.8	10	9	39.4	29.4
2019	40	3	7	7.9	13	41.1	38.2
2020	30	2	7.8	10	11	54.4	48.4
2021	31	3	11	12.4	15	63.8	55.3
2022	32	3	8.4	11.5	11	57.3	48.1

Source: processed based on ISOH

Table 46: Production and disposal 2018–2022 – Waste oils II

Year	Incineration			Other disposal		
	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	1	3.3	3	18	46.7	56.1
2019	1	3.7	4.2	17	44	49.7
2020	1	3.9	5	8	28.7	36.7
2021	1	3	3	7	25.6	28.6
2022	0.8	2.8	3.8	8	26.7	36.6

Source: processed based on ISOH

A comparison of individual regions shows that all regions except Pardubice, Olomouc, and Zlín had a negative balance of waste treatment capacity, with the worst situation identified in South Moravia, Moravia-Silesia, Plzeň, and the capital city of Prague. In general, it can be said that, with the exception of the Pardubice and Olomouc regions, a shortage of processing capacity was identified in all regions of the Czech Republic in 2022. The worst situation in 2022 was associated with the disposal of subgroup 13 02 (waste motor, gear and lubricating oils), where there was a deficit of 7,886 tons in processing facilities.

Waste oils

The production of waste oils is increasing. Waste oils are recycled at a rate of 48%. However, the Czech Republic does not have any facilities for the full recycling of waste oils. Waste oils are partially exported.

2.3.19 Waste from health and veterinary care

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investments needed
48,000 tons	Incineration (71%)	-	Included primarily in hazardous waste streams	Included primarily in hazardous waste streams

Healthcare waste (18 01) is waste generated during the provision of healthcare in accordance with the Healthcare Services Act (No. 372/2011 Coll.) in inpatient, outpatient, and similar facilities. This group also includes waste generated during healthcare in the patient's own social environment and waste generated outside healthcare facilities, in particular in social care facilities, tattoo parlors, or drug treatment centers (if this waste has the same properties and risks as waste from healthcare facilities). Waste from veterinary care (18 02) is waste from research, diagnosis, treatment, and prevention of animal diseases that is generated during the provision of veterinary care. Waste from health and veterinary care is a subgroup *of* group *18 Waste from health and veterinary care and/or related research* according to the Waste Catalogue.

Sources of waste from healthcare and veterinary care include facilities where medical and nursing services are provided, such as hospitals, polyclinics, sampling points, diagnostic laboratories, doctors' offices, long-term care facilities, drug treatment centers, nursing homes, hospices, social care institutions, as well as non-healthcare facilities such as tattoo parlors and beauty salons. The production of waste from care provided in the patient's own social environment or in an environment replacing the patient's home environment is also increasing. Sources of this type of waste may include social services facilities, facilities for children requiring immediate assistance, schools and educational facilities, prisons for remand and imprisonment, secure detention facilities, facilities for the detention of foreigners, and asylum facilities. In the case of waste from veterinary care, the waste producers are mainly veterinary clinics and surgeries, or livestock farmers in accordance with the Veterinary Act.

Waste production from healthcare and veterinary care in the Czech Republic has been growing for a long time, reaching 48,000 tons in 2022. However, in terms of the total amount of waste produced in the Czech Republic in 2022, this is a marginal flow, accounting for 0.1% of total production. Nevertheless, this waste stream is important due to its often infectious properties. Most of the waste stream in 2022 consisted of healthcare waste (98.6%), with the remainder coming from veterinary care (1.4%). The share of hazardous waste in this waste stream was 83% in 2022. After 2020, a slight increase in the production of this waste was recorded in the Czech Republic due to increased production of healthcare waste as a result of the COVID-19 pandemic.

Within healthcare waste, almost all of the waste produced in 2022 was covered by two catalogue numbers*: 18 01 03 Waste whose collection and disposal are subject to special requirements in order to prevent infection* (76.2%), of which 36,185 tons were produced, and *18 01 04 Waste for which* *collection and disposal are not subject to special requirements with regard to the prevention of infection*, of which 8,066 tons (17%) were produced. Waste classified under code 18 01 03 includes all waste from infectious wards, biologically contaminated waste (dressing materials, infusion devices without needles, aids for incontinent patients, protective equipment for staff, etc.). Waste classified under code 18 01 04 includes healthcare waste that is not demonstrably contaminated with infectious agents or biologically contaminated, or decontaminated waste.

The most significant waste code number from veterinary care is *18 02 02 Waste subject to special collection and disposal requirements in order to prevent infection*, of which 594 tons were produced in 2022, representing 86.8% of the production of subgroup 18 02. This waste includes biologically contaminated equipment, needle-free infusion devices, and other contaminated waste. Other catalog numbers were represented marginally.

In terms of the production of this waste in the regions of the Czech Republic, the largest producers were the Capital City of Prague (18.2%), the South Moravian Region (11.9%), the Central Bohemian Region (10.8%) and the Moravian-Silesian Region (9.1%), while the smallest producer was the Karlovy Vary Region (2.7%). Waste production in regions is related to the number and size of healthcare and veterinary facilities, so regional capitals generally have higher production of this type of waste.

In recent years, cross-border transport of this waste has been minimal. The only country to which this type of waste was exported in 2022 was Austria, with 0.87 tons, and no imports of this waste were recorded.

In 2022, waste from healthcare and veterinary care in the Czech Republic was primarily incinerated (70.3%), with some of the waste being used for energy (8.7%) or landfilled (8.6%).

The biggest problem in the area of healthcare and veterinary care waste in the Czech Republic is the insufficient capacity for the safe incineration of this waste and the generally sparse network of such facilities. Waste is therefore transported over long distances.

Table 47: Production and disposal 2018–2022 – Waste from healthcare and veterinary care I

Year	Production	Energy recovery			Recycling		
	Quantity (thousand tonnes)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)
2018	44	3	6.0	6	0	0	0
2019	45	2	5.1	5	0	0	0
2020	46	2	5.3	5.3	0	0	0
2021	49	3	6.7	6.	0	0	0
2022	48	4.2	8.7	8	0	0.0	0

Source: processed based on ISOH

Table 48: Production and disposal 2018–2022 – Waste from health and veterinary care II

Year	Landfilling			Incineration			Other disposal		
	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	7	14	16	29	66.6	72.7	2	4.1	4
2019	7	15.3	15.5	27	60.8	61.5	8	17.6	17
2020	7	14.2	14.4	28	61.9	62.6	8	17.4	17
2021	4	8.4	8	34	68.7	69.6	7	15	15
2022	4	8.6	8.7	34	70.3	71.3	5	11	11

Source: processed based on ISOH

In 2022, there were 286 active stationary facilities and 116 active mobile facilities registered in the Czech Republic that were authorized to handle certain catalog numbers of this waste stream. An analysis of the waste management network shows that most regions of the Czech Republic have insufficient capacity to manage this waste. The analysis does not include landfilling, as this is a non-preferred method of waste management and will no longer be possible from 2028. In 2022, the largest capacity deficit for the disposal of waste from healthcare and veterinary care was in the capital city of Prague (-6,796 tons), followed by the South Moravian Region (-3,057 tons) and the Olomouc Region (-1,936 tons). The total deficit in available treatment capacity in the Czech Republic in 2022 was 4,406 tons, which may not seem problematic in terms of the quantity of this waste, but given the often infectious nature of this waste, it is essential to ensure sufficient capacity for its treatment.

Waste from health and veterinary care	**Waste from healthcare and veterinary care accounts for only a fraction of total waste production (0.1%), but it is a significant waste stream due to its often infectious properties. For this reason, most of the waste (70%) is incinerated, some of it is used for energy (8.7%) or landfilled (8.6%). There is currently a capacity shortfall of 4,400 tons for the treatment of waste from healthcare and veterinary care. Due to the sparse network, this waste often has to be transported over long distances.**

2.3.20 Waste containing persistent organic pollutants

Persistent organic pollutants are defined by Act No. 541/2020 Coll., on waste, as waste containing at least one of the substances listed in Annex IV to Regulation (EU) 2019/1021 of the European Parliament and of the Council, with the exception of polychlorinated biphenyls. Persistent organic pollutants (POPs) are substances listed in the Stockholm Convention on Persistent Organic Pollutants or in the Protocol on Persistent Organic Pollutants to the Convention on Long-Range Transboundary Air Pollution (CLRTAP) and meet the definition of this group of substances – they are organic substances that are harmful to organisms and the environment, persist in the environment for a long time, accumulate in living organisms and can be transported over long distances. These substances are used as pesticides, industrial chemicals or may be produced unintentionally, for example in combustion processes or as by-products of chemical production.

Measures adopted at global level are transposed into Regulation (EU) 2019/1021 of the European Parliament and of the Council. Measures for the manufacture, placing on the market, and use of POPs are listed in Annex I. Measures for the disposal of persistent organic pollutants are directly addressed in Article 7 and Annexes IV and V of this Regulation. These annexes are regularly updated to reflect global changes, in particular the inclusion of new substances. They were last updated in 2022 by Regulation (EU) 2022/2400 of the European Parliament and of the Council of November 23, amending Annexes IV and V to Regulation (EU) 2019/1021 on persistent organic pollutants.

Since 2015, the production and use of most persistent substances has been banned, with production now approaching zero. In some sectors, the use of these substances is still permitted, but even here their use is declining, albeit not at the necessary pace.

The method of handling waste containing persistent organic pollutants differs from other waste in that these substances must not be reused, recycled, or recovered for further use.

Persistent pollutants can be disposed of in four ways: physical-chemical treatment (D9), incineration (D10), energy recovery under certain conditions (R1), and recycling and recovery of metals and metal compounds under special conditions.

This waste must be traceable in waste streams to prevent it from re-entering the market through recycling. For waste containing persistent organic pollutants, even if not classified as hazardous, there is an obligation to keep records relating to producers or facilities handling hazardous waste, including documentation of the quantity, nature, and origin of the waste and its destination. This obligation has been transposed into Act No. 541/2020 Coll., on waste.

If the contamination limits specified in Regulation 2019/1021 on POPs are not exceeded, these substances can be treated as other waste. In the Czech Republic, there are no facilities dedicated to the disposal of waste containing persistent organic pollutants, but such waste is treated in an environmentally sound manner to comply with the POP Regulation and the Stockholm Convention. This waste is therefore disposed of in hazardous waste disposal facilities. Facilities treat persistent pollutants only by incineration; there are currently no facilities in the Czech Republic that use non-incineration technologies for the disposal of persistent pollutants.

Waste originating from incinerators, waste-to-energy plants, hazardous waste incinerators, and waste from the energy sector, i.e., fly ash, bottom ash, and slag, may be potential sources of persistent organic pollutants, and it is therefore necessary to monitor the occurrence of these pollutants in the aforementioned waste. Waste should be handled in accordance with the best available techniques and in accordance with procedures for the management of waste containing persistent organic pollutants. Furthermore, the occurrence of persistent organic pollutants must not exceed the levels permitted by applicable legislation and the Stockholm Convention. Waste from thermal processes with a potential content of persistent organic pollutants may be landfilled in hazardous waste landfills, provided that the waste has been pre-treated by solidification or partially stabilized. In the future, it will be necessary to research and develop technologies for the treatment of this waste other than landfill, as well as technologies that minimize the proportion of hazardous substances in this waste as much as possible. In accordance with Regulation (EU) 2019/1021, the parameters of ash from hazardous waste incinerators are monitored during landfill.

POPs waste	**There has been a long-term decline in emissions of persistent organic pollutants in the Czech Republic, but due to the constant addition of new chemicals, new problems may arise in the future, such as perfluorinated and polyfluorinated alkyl sulfonates (PFAS).**

2.3.21 Waste containing polychlorinated biphenyls

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Required investment
14 tons	Incineration (10 tons)	-	Included in hazardous waste streams	Included in hazardous waste streams

Polychlorinated biphenyls (PCBs) are classified as POPs and are defined by Act No. 541/2020 Coll., on waste, as polychlorinated biphenyls, polychlorinated terphenyls, monomethyl tetrachlorodiphenylmethane, monomethyldichlorodiphenylmethane, monomethyldibromodiphenylmethane, and any mixtures containing one or more of the above substances in a total concentration of these substances exceeding 50 mg/kg.

The development of waste production containing polychlorinated biphenyls is characterized by a sharp decline after 2010, an increase between 2016 and 2019, and a further increase after 2020, particularly in the category of construction and demolition waste. Increased production of waste with catalogue number 13 03 01 was recorded in 2015 and 2017, but in subsequent years production was almost zero. The occurrence of waste from transformers and capacitors in 2022 is zero. Other categories of waste containing polychlorinated biphenyls had zero production between 2010 and 2022. In 2022, the largest production of polychlorinated biphenyls was in the capital city of Prague and the Moravian-Silesian Region, but this was only a few tons.

An analysis of the development of polychlorinated biphenyls management in recent years has shown that waste was mainly disposed of by incineration, with values exceeding 90%. However, there was a decline in incineration in 2022. Overall, a downward trend was observed in the absolute amount of waste disposed of. Most polychlorinated biphenyls were incinerated or subjected to other treatment. An imbalance in the mass balance between production and disposal was identified, which was caused by inventory operations during the transfer of waste between years (entities only hand over waste for disposal in subsequent years).

There are a total of 320 facilities in the Czech Republic with a permit to handle waste containing polychlorinated biphenyls, of which 35 were active facilities that actually handled polychlorinated biphenyls in the given year. In 2022, a deficit in the capacity of facilities for the disposal of waste containing polychlorinated biphenyls of group 16 was recorded in the Czech Republic, particularly in the capital city of Prague (2,700 tons), South Moravian Region (1,500 tons), Karlovy Vary Region (1,400 tons) and Vysočina Region (1,100 tons). On the contrary, sufficient capacity was available in the Moravian-Silesian Region (6,000 tons), due to the presence of an incinerator for hazardous waste. The total deficit in the capacity of facilities for the treatment of waste containing polychlorinated biphenyls in 2022 was approximately 1,800 tons.

Between 2018 and 2022, there was no cross-border shipment of waste containing polychlorinated biphenyls. The import and export of equipment containing polychlorinated biphenyls is prohibited. The Czech Republic disposes of waste containing polychlorinated biphenyls within its own capacity.

Emphasis is placed on supporting the process of removing contamination and disposing of waste containing polychlorinated biphenyls, which is expected to be gradual and focused on addressing old environmental burdens. By 2035, the production of waste containing polychlorinated biphenyls in the Czech Republic is expected to be reduced by 64%, which is in line with the legal deadlines for the decontamination and disposal of equipment and waste containing polychlorinated biphenyls by 2025 and 2028, respectively. The goal is to achieve zero production of waste containing polychlorinated biphenyls.

Table 49: Production and disposal 2018–2022 – Waste containing polychlorinated biphenyls I

Year	Production	Energy recovery		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)
2018	0.7	0	0	0
2019	1	0	0	0.0
2020	0.04	0	0	0
2021	0	0	0	0
2022	0	0	0	0

Source: processed based on ISOH

Table 50: Production and disposal 2018–2022 – Waste containing polychlorinated biphenyls II

Year	Incineration			Other disposal		
	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	0.6	91.1	95.4	0.02	2.9	3
2019	0.6	54.4	96.9	0.003	0	0
2020	0	1031.0	99.2	0.004	8.5	0
2021	0.1	19.2	92.7	0.006	1.5	7.
2022	0.01	70	83.9	0.002	13.5	16

Source: processed based on ISOH

PCB waste	In the Czech Republic, the amount of waste containing polychlorinated biphenyls has been declining for a long time, and its occurrence is only sporadic. Contaminated sites (old environmental burdens) have been mapped thanks to the NIKM2 project. Thanks to the ban on their use, a further reduction in the occurrence of polychlorinated biphenyls is expected. The problem is insufficient capacity in incinerators for the preferred treatment of waste containing polychlorinated biphenyls.

2.3.22 Waste containing asbestos

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investment needed
36,000 tons	Landfilling (100%)	-	Included in hazardous waste streams	Included in hazardous waste streams

According to Act No. 541/2020 Coll., on waste, waste containing asbestos is defined as any waste that contains asbestos. According to the methodology of the Ministry of the Environment, waste from groups 06, 10, 16, and 17 of the Waste Catalogue is classified as asbestos waste. Waste from group 17, specifically waste with catalogue numbers *17 06 01 Insulation material containing asbestos and 17 06 05 Construction materials containing asbestos,* has the primary share in the waste stream. Historically, the largest amount of waste is produced under catalog number 17 06 05, which has long accounted for approximately 90% of production and has a constant upward trend. Waste with catalog number 17 06 01 has long accounted for only about 10%. However, in 2020, there was a significant increase to 30,745 tons, which accounted for approximately 45% of production. In 2021, there was a decrease to 20,069 tons and in 2022 to 3,476 tons.

The production of waste containing asbestos is currently on the rise in the Czech Republic. The previously relatively stagnant trend began to change in 2017, when the production of waste containing asbestos began to grow. The highest production to date occurred in 2020, when it reached almost 69,000 tons per year, an increase of 240% compared to 2015 (29,000 tons per year). The trend in the production of waste containing asbestos is growing, but given the majority share of group 17, i.e., construction and demolition waste, the production of waste containing asbestos will depend primarily on the demolition of old buildings and structures, whose construction materials very often contained asbestos.

In general, it can be said that the increasing occurrence is related to the gradual replacement of these materials with asbestos-free materials during building repairs (e.g., roofing). Production is distributed more or less evenly across the Czech Republic. Higher production is found in areas with lower population density, where older buildings and recreational facilities undergoing renovation predominate. A high increase in asbestos-containing waste is also evident in areas where old environmental burdens are being disposed of.

The Ministry of Health of the Czech Republic and the National Institute of Public Health are preparing *a National Asbestos Profile* (NAP). This document is being developed for the Czech Republic in accordance with the World Health Organization's recommendations for the structure of such national profiles. The document should define the baseline situation of asbestos in the Czech Republic in general and describe the applicable legislation in this area. Furthermore, the document should address asbestos in industrial sectors, the system for monitoring and enforcing compliance with exposure protection, the impact of asbestos on human health, and the handling of waste containing asbestos.

The EU Waste Shipment Regulation prohibits the import and export of waste containing asbestos, as it is included in the list of waste whose export is prohibited.

In 2022, waste containing asbestos was handled only in the preferred manner. The total number of active stationary facilities for asbestos handling in 2022 was 474. An active facility is considered to be a facility that handled at least some amount of asbestos in the given year. In addition to stationary facilities, 99 mobile facilities recording asbestos management were also in operation in the Czech Republic in 2022. In the future, waste containing asbestos should be managed in accordance with the applicable legislation, and there is no need to build additional facility capacity.

The Czech Republic has appropriately set legislative requirements in the area of health and environmental protection against the effects of asbestos. Thanks to a ban on the use of new asbestos products in 1990, asbestos is now found almost exclusively in demolition waste. In addition, research is being conducted in the field of this waste (e.g., remote sensing), which may help identify asbestos-containing materials in the future, facilitating the removal of this waste. However, due to its widespread use in the past, asbestos is still present in large quantities in buildings, and in the Czech Republic there is also a low level of public awareness of the risks associated with the handling of materials containing asbestos. In the Czech Republic, it is necessary to continue monitoring the occurrence of asbestos and to educate and raise awareness among both professionals and the general public.

Table 51: Production and disposal 2018–2022 – Waste containing asbestos I

Year	Production	Landfilling		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)
2018	35	35	100.7	99.8
2019	46	46	102.4	100
2020	70	70	101.6	100

Year	Production	Landfilling		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)
2021	62	62	101.8	100.0
2022	36	36	101.0	99.9

Source: processed based on ISOH

In 2022, a total surplus capacity was identified in the Czech Republic for facilities for the treatment of waste containing asbestos, i.e. waste with catalogue numbers *17 06 01* Insulation material containing asbestos* (surplus capacity of 102 tons) and *17 06 05* Construction materials containing asbestos*. In the case of waste with catalog number 17 06 01, the highest capacity deficit was recorded in the Capital City of Prague (1,000 tons) in 2022, while the highest capacity surplus was recorded in the Central Bohemian Region (1,000 tons). In the case of catalog number 17 06 05, the highest capacity deficit was recorded in the Vysočina Region (1,000 tons), Liberec Region (1,000 tons), Zlín Region (1,000 tons), Plzeň Region (1,000 tons) and in the capital city of Prague (1,000 tons), while the highest capacity surplus was recorded in the Central Bohemian Region (2,000 tons), Olomouc Region (1,000 tons), Hradec Králové Region (1,000 tons) and South Bohemian Region (1,000 tons).

Waste containing asbestos

Due to its widespread use in the past, asbestos is still present in large quantities in buildings and is a common component of construction and demolition waste. Waste containing asbestos is currently only landfilled. Given the nature of this waste, this is the preferred method of disposal.

2.3.23 Secondary waste

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Facility capacity	Investment required
3.4 million tons	Recycling (64%)	41% of total exports Imports 0.7 million tons Exports 1.4 million tons (Ferrous metals 0.7 million tons, paper and cardboard 0.3 million tons)	Comprehensive flow included in individual sub-flows	Comprehensive flow included in individual sub-flows

Secondary waste mainly includes waste from group 19, i.e. waste from waste treatment facilities, and selected types of waste from group 16, which are relatively small in terms of volume in the context of the entire flow (7.5% share). The production of secondary waste is on the rise, and this trend has been accelerating in recent years. Over the last 10 years (2012 vs. 2022), there has been an increase of almost 67%, with production rising from 2 million tons in 2012 to 3.39 million tons in 2022. The production flow is dominated by subgroup *19 02 Waste from waste treatment not elsewhere specified, e.g. sorting, crushing, pressing, pelletizing (*74% of production) with a share of 69%. This is followed at a considerable distance by subgroup *16 01 End-of-life vehicles from various modes of transport and waste from the dismantling of these vehicles (*shortened), with a share of 7.2%. This is followed by subgroup *19 01 Waste from incineration or pyrolysis of waste, with* a share of 6.9%, and subgroup *19 10 Waste from the crushing of waste containing metals, with* a share of 6.7%. Subgroup *19 03 Stabilized/solidified waste* accounted for 5.1% in 2022. Other subgroups account for less than 1.5%. The most produced category is *19 12 02 Ferrous metals,* which recorded a significant increase of over 70% in 2021 and 2022 (2022 vs. 2020). Category *19 12 01 Paper and cardboard* is also growing significantly.

Secondary waste accounts for a significant proportion of cross-border shipments. In 2022, it accounted for 24% of imports and as much as 41% of exports. In terms of sub-groups, imports of sub-group *19 12 Waste from waste treatment not elsewhere specified, e.g. sorting, crushing, pressing, pelletizing,* have long dominated. In 2022, imports of this subgroup amounted to 680,000 tons, accounting for over 95% of all imports of secondary waste. Specifically, the following were imported: cat. no. *19 12 04 Plastics and rubber (*276,000 tons were imported in 2022, accounting for almost 39%), category *19 12 10 Combustible waste*, *with* imports of 115,000 tons (16%), and category *19 12 07 Wood not listed under 19 12 06, with* imports of 115,000 tons (16%). In terms of sub-groups, exports are dominated by sub-group *19 12 Waste from waste treatment not elsewhere specified, e.g. sorting, crushing, pressing, pelletizing.* It has long accounted for over 80% of exports (1,146,000 tons were exported in 2022). The second most represented subgroup is *19 10 Waste from the crushing of waste containing metals, with* a share of 13.4% (184,000 tons were exported in 2022). The most exported category in 2022 was *19 12 02 Ferrous metals,* with a total of 728,494 tons transported, accounting for almost 53%. The second most common waste is category *19 12 01 Paper and cardboard.* In 2022, 326,257 tons were exported (24% share).

The utilization of secondary waste has been very high for a long time, reaching 73% in 2022. Of this, energy recovery accounted for 6% and material recovery for 67% in 2022. Non-preferred landfilling has remained almost constant in recent years, reaching a share of 15% in 2022, i.e. almost 500,000 tons. Landfilled waste mainly included subgroup 19 12 (224,000 tons), followed by subgroups 19 03 (129,000 tons) and 19 01 (90,000 tons), and 19 08 (45,000 tons).

In 2022, there were more than 2,000 active stationary facilities and 142 active mobile facilities registered in the Czech Republic that were authorized to handle certain catalog numbers of this waste stream. In most cases, mobile facilities serve as collection points and transfer waste to stationary facilities for further treatment. The diverse nature of the waste classified as secondary waste is also reflected in the wide range of stationary facilities that handle secondary waste. These include "metal production plants," which are located mainly in the Moravian-Silesian Region, various sorting and re-sorting lines evenly distributed throughout the Czech Republic, recycling facilities with significant capacity only in some regions (Moravian-Silesian, Vysočina, South Bohemian, South Moravian), and facilities for energy recovery (including cement plants). The deficit in processing capacity affects all flows and is due to a combination of exports and landfilling. A significant capacity deficit has been identified in facilities for the processing of scrap iron, paper and cardboard (both sub-group 19 12 with a deficit of almost 760,000 tons), and in facilities for the processing of 19 10 – a deficit of almost 200,000 tons. There is also considerable potential for the future use of slag from waste-to-energy plants as a building material for selected construction applications.

Table 52: Production and disposal 2018–2022 – Secondary waste I

Year	Production	Energy recovery			Recycling			Material recovery		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)
2018	2,627	32	5.	13	1,259	58.7	51.5	1,523	68.2	62.3
2019	2,647	385	6.5	17.3	1,045	54.4	46.9	1,316	64.0	59
2020	2,784	404	6.2	17.3	1,129	58.1	48.3	1,310	64.3	56.1
2021	3,104	402	5.7	16.	1,269	63.6	53.0	1,422	68.2	59.4
2022	3,391	412	6	17.2	1,282	64.4	53.6	1,371	67.0	57.4

Source: processed based on ISOH

Table 53: Production and disposal 2018–2022 – Secondary waste II

Year	Landfilling			Incineration			Other disposal		
	Quantity (thousand t)	PP (%)	PN (%)	Quantity (thousand t)	PP (%)	PN (%)	Quantity (thousand t)	PP (%)	PN (%)
2018	406	15.4	16.6	2	0	0	188	7.2	7.7
2019	393	14.	17.6	5.3	0	0.2	131	4.9	5.9
2020	482	17.3	20.6	5.7	0	0.2	133	4.8	5.7
2021	452	14.5	18.9	0	0	0	116	3.8	4.9
2022	496	14.6	20.8	0	0	0	110	3.2	4.6

Source: processed based on ISOH

In 2022, the Czech Republic recorded a capacity deficit for the treatment of almost all types of secondary waste falling under the following catalogue numbers:

- *16 Waste not otherwise specified in the Waste Catalogue* – total deficit of 41,000 tons,
- *19 01 Waste from incineration or pyrolysis of waste* – total deficit of 80,000 tons,
- *19 02 Waste from physical-chemical treatment of waste* – total deficit of 12,000 tons,
- *19 03 Stabilized/solidified waste* – total deficit of 3,000 tons,
- *19 05 Waste from aerobic treatment of solid waste* – total surplus – 2 thousand tons,
- *19 10 Waste from the crushing of waste containing metals* – total deficit of 176,000 tons,
- *19 12 Waste from waste treatment not elsewhere specified* – total deficit of 535,000 tons.

In the case of secondary waste falling under catalog number 16, the highest deficit in secondary waste treatment capacity in the Czech Republic in 2022 was recorded in the South Moravian Region (21,000 tons). Conversely, the highest surplus of secondary waste treatment capacity in 2022 was recorded in the Moravian-Silesian Region (15,000 tons) and the Liberec Region (6,000 tons), while all other regions recorded deficits in the order of thousands of tons.

In the case of secondary waste falling under catalogue number 19 01, the highest deficit in secondary waste treatment capacity in the Czech Republic in 2022 was recorded in the capital city of Prague (62,000 tons), followed by the Plzeň Region (24,000 tons), Central Bohemia (23,000 tons), and South Moravia (15,000 tons).

Conversely, the highest surplus capacity for secondary waste treatment facilities in 2022 was recorded in the South Bohemian Region (32,000 tons) and the Olomouc Region (16,000 tons).

In the case of secondary waste falling under catalogue number 19 02, the highest deficit in secondary waste treatment capacity in the Czech Republic in 2022 was recorded in the Central Bohemian Region (5,000 tons). Conversely, the highest surplus capacity for secondary waste treatment facilities in 2022 was recorded in the South Bohemian Region (3,000 tons).

In the case of secondary waste falling under catalogue number 19 03, the highest deficit in secondary waste treatment capacity in the Czech Republic in 2022 was recorded in the Liberec (7,000 tons) and Hradec Králové (3,000 tons) regions. Conversely, the highest surplus of capacity for secondary waste treatment facilities in 2022 was recorded in the Central Bohemian Region (7,000 tons) and the South Bohemian Region (2,000 tons).

In the case of secondary waste falling under catalogue number 19 05, the highest deficit in secondary waste treatment capacity in the Czech Republic in 2022 was recorded in the Ústí nad Labem Region (1,000 tons). Conversely, the highest surplus capacity for secondary waste treatment facilities in 2022 was recorded in the Liberec Region (2,000 tons).

In the case of secondary waste falling under catalogue number 19 10, the highest deficit in secondary waste treatment capacity in the Czech Republic in 2022 was recorded in the Moravian-Silesian (90,000 tons), Central Bohemian (35,000 tons), Liberec (22,000 tons), Zlín (14,000 tons), and Ústí nad Labem (14,000 tons). In contrast, the highest surplus of secondary waste treatment capacity in 2022 was recorded in the South Moravian Region (5,000 tons), which was also the only region where a surplus of capacity was recorded.

In the case of secondary waste falling under catalogue number 19 12, the highest deficit in secondary waste treatment capacity in the Czech Republic in 2022 was recorded in the Central Bohemian Region (183,000 tons), the Plzeň Region (162,000 tons), the capital city of Prague (148,000 tons), and the Hradec Králové Region (82,000 tons). Conversely, the highest surplus capacity for secondary waste treatment facilities in 2022 was recorded in the South Moravian Region (54,000 tons) and the Moravian-Silesian Region (19,000 tons), which were also the only two regions where a surplus capacity was recorded.

Secondary waste	**Secondary waste is produced by waste treatment facilities, and its production continues to grow.** **A significant part of the flow consists of treated waste, i.e., secondary raw materials, which are exported from the Czech Republic in large quantities (scrap iron, non-ferrous metals, paper, and cardboard) due to a lack of recycling capacity in the Czech Republic. Higher recycling of secondary waste is highly desirable in the future and should be facilitated by modern automated sorting lines that separately treat the components of municipal waste collected from municipalities.** **Slag from waste-to-energy plants will also contribute to the use of secondary waste in selected construction applications.**

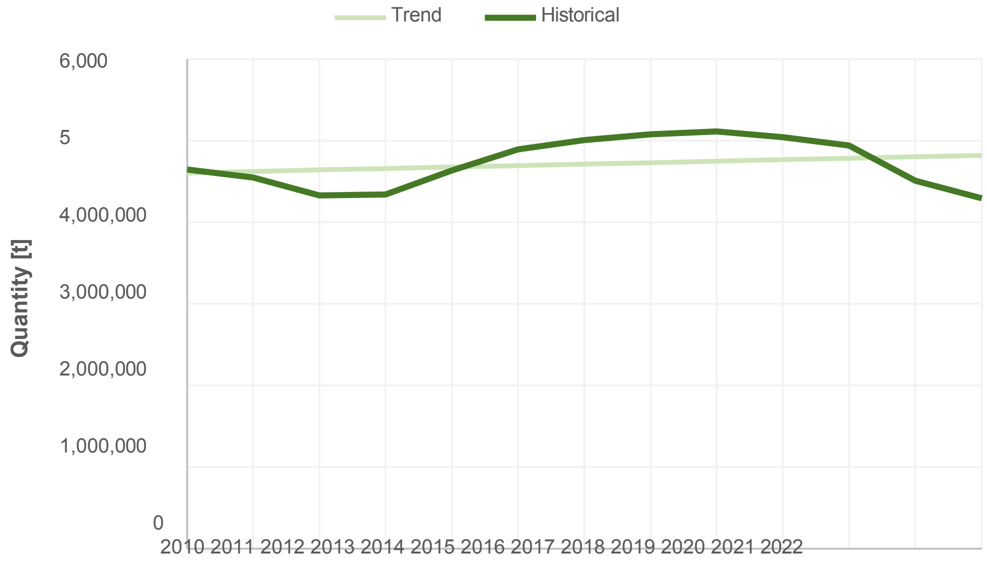
2.3.24 Biologically degradable waste (BDW)

Production (2022)	Disposal (2022)	Cross-border transport (2022)	Equipment capacity	Required investment
4.3 million tons	Utilization (78%)	Exports 804,000 tons	Insufficient – deficit capacity for paper and cardboard, wood, garden waste and parks	BIO: CZK 8.1–8.8 billion Paper processing and recycling: CZK 23.8–24 billion Wood: CZK 1–1.5 billion

The biodegradable waste (BDW) stream according to the Ministry of the Environment methodology includes 64 catalog numbers across groups 02, 03, 04, 15, 16, 17, 19, and 20. The catalog numbers in group 20 represent the biodegradable municipal waste (BMW) stream, which was evaluated in more detail in chapter 2.3.1.11. Group 20 also includes the biological waste stream analyzed in chapter 2.3.1.8. BDW production accounts for a significant proportion of total waste production in the Czech Republic. In 2022, BDW production was 4,294,972 tons, which accounted for 11% of total waste production in the Czech Republic in 2022. The production trend has been slightly increasing since 2013, with a decline in BRO production since 2019, accelerating since 2021, see Figure 47. As with biodegradable municipal waste, part of the catalog numbers in group 20 is calculated using the bio-component share coefficient, e.g., cat. no. 20 03 01 *Mixed municipal waste* or cat. no. 20 03 07 *Bulky waste.* The catalog numbers included in group 20 constitute the most significant part of biodegradable waste production. In 2022, this share was over 56%.

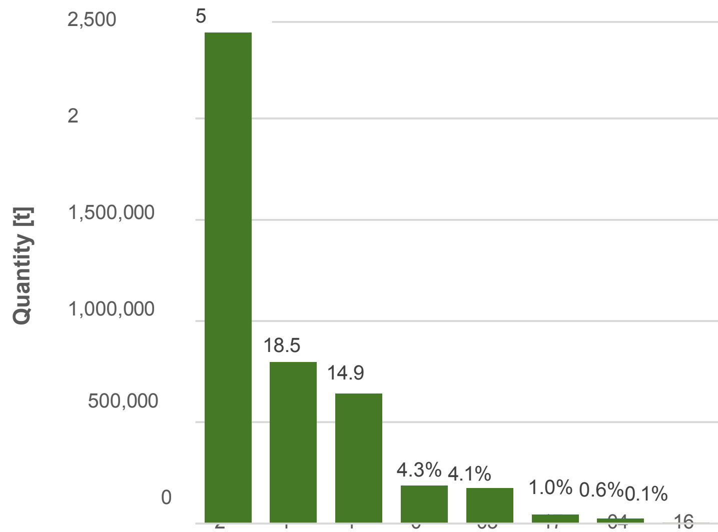
The second most represented group is group 19 with a share of over 18%, followed by group 15 with a share of approximately 15%. The most represented subgroup is subgroup 20 03 *Other municipal waste* with a share of 23%, followed by subgroup 20 02 *Garden and park waste (including cemetery waste),* which accounted for slightly less than 20%, and subgroup 15 01 *Packaging with* a share of 15%.

Graph 47: Production of biodegradable waste



Source: processed based on ISOH and Tiramiso

Graph 48: Production of biodegradable waste in 2022 by waste group



Source: processed based on ISOH

Table 54: Production and disposal 2018–2022 – Biodegradable waste

Year	Production	Energy recovery			Recycling and composting			Use			Landfilling			Composting		
	Quantity (thousand tons)	Quantity (thousand tons)	PP (%)	PN (%)	Amount (thousand tons)	PP (%)	PN (%)	Quantity (thousand tonnes)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)	Quantity (thousand tons)	PP (%)	PN (%)
2018	4,015	38	8.	10	2,375	67.7	64.1	2,784	77.2	75.1	852	21.2	23.0	1,884	37.1	50.
2019	4,024	399	9.2	10.8	2,360	67.5	63.7	2,792	77.4	75.3	864	21.5	23.3	1,952	39.8	52.7
2020	3,966	441	10.1	11.5	2,420	69.9	63.4	2,881	80.4	75.4	890	22.4	23.3	1,929	39.6	50.5
2021	4,064	445	9.9	11.	2,284	67.2	61.2	2,767	77.9	74.1	909	22.4	24.4	1,851	38.5	49.6
2022	3,808	409	10.2	12	2,104	67.4	61.5	2,528	77.9	73.9	841	22.1	24.6	1,697	38.7	49.6

Source: processed based on ISOH and the Ministry of the Environment's indicator calculation methodology

Note: The table uses the same coefficients for the biodegradable fraction valid for 2022 for 2021 and previous years.

In general, the Czech Republic has a deficit of facilities for the treatment of biodegradable waste.

However, for waste group **02** *Waste from agriculture, horticulture, fishing, forestry, hunting, and food production and processing*, a total surplus capacity of 25,000 tons was recorded in the Czech Republic in 2022, with the highest surplus in the Olomouc Region (31,000 tons).

A slight capacity deficit for loading was recorded in 2022 for waste group **03** *Waste from wood processing and the manufacture of boards, furniture, cellulose, paper, and cardboard*, totaling 9,000 tons. The highest deficit for this waste group was recorded in the Moravian-Silesian (15,000 tons), Olomouc (12,000 tons) and Central Bohemian regions (11,000 tons), while a surplus was recorded in the South Bohemian region (12,000 tons).

A slight surplus of capacity was also recorded in the Czech Republic in 2022 for waste group **04** *Waste from the leather, fur and textile industry* (684 tons).

A significant deficit in waste treatment capacity was recorded in the Czech Republic in 2022 for waste group **15** *Waste packaging, absorbents, cleaning cloths, filter materials and protective clothing*, *not elsewhere specified*, with a total deficit of 206,000 tons. The highest deficit in that year was recorded in the Central Bohemian Region (87,000 tons) and the South Moravian Region (41,000 tons). A surplus of capacity for this group (15) was recorded in 2022 in the Ústí nad Labem Region (23,000 tons).

A slight deficit in loading capacity was recorded in 2022 for waste group **16**. For catalog numbers *16 03 06 Organic waste not listed under 16 03 05* and *17 02 01 Wood*, totaling 8,000 tons. The highest deficit was recorded in the capital city of Prague (6,000 tons) and the South Moravian Region (5,000 tons). On the contrary, a surplus of capacity was recorded in the Vysočina Region (4,000 tons) in 2022.

A significant deficit in waste treatment capacity was recorded in the Czech Republic in 2022 for waste group **19** *Waste from waste treatment facilities, from wastewater treatment plants for the treatment of such water outside the place of its generation, and from the production of water for human consumption and water for industrial purposes*. with a total deficit of 253,000 tons. The highest deficit in that year was recorded in the Capital City of Prague (89,000 tons), the Plzeň Region (62,000 tons), and the Central Bohemian Region (50,000 tons). A surplus capacity was recorded in 2022 in the Vysočina Region (21,000 tons).

A high deficit in waste treatment capacity was also recorded in the Czech Republic in 2022 for waste group **20** *Municipal waste* (household waste and similar commercial, industrial waste and waste from offices), including separately collected components, with a total deficit of 182,000 tons. The highest deficit in that year was recorded in the capital city of Prague (144,000 tons) and the South Moravian Region (62,000 tons). Surplus capacity for this waste group was recorded in 2022 mainly in the Central Bohemian Region (70,000 tons) and the Pardubice Region (12,000 tons).

Further information on the handling of individual category numbers or sub-streams falling under biodegradable waste is provided in chapters 2.3.1.8 Biological waste (BIO), 2.3.1.11 Biodegradable municipal waste (BRKO), 2.3.2 Paper, or 2.3.6 Wood.

2.4 Evaluation of separate collection systems

The collection network is key to the effective development of waste management. Properly set up systems for collecting individual waste streams directly influence the participation of waste producers in proper waste management and, in the case of municipalities, the active participation of residents in the established waste collection system. The collection system determines the effectiveness of separate waste collection in relation to reducing the production of mixed municipal waste. A well-designed waste collection system also helps to eliminate illegal waste management, such as the creation of illegal dumps or the improper disposal of waste in the form of littering.

The collection network itself only creates the conditions for proper waste management; the key factor is the acceptance of the established waste collection system by waste producers.

The effective development of the collection network will be key to ensuring that the objectives of the Czech Republic's Waste Management Plan for 2025-2035 are met.

2.4.1 Characteristics of separate collection in the Czech Republic

Separate collection, according to Act No. 541/2020 Coll., on waste, means the collection of waste where individual types of waste are sorted according to type, category, and material with the aim of facilitating their subsequent processing. Within the Czech Republic, packaging waste is collected together with other separately collected waste as part of the Integrated Municipal Waste Collection System. The network for the separate collection of municipal waste thus partially overlaps with the network for the separate collection of packaging waste, which is provided by an authorized packaging company in accordance with Act No. 477/2001 on packaging. Among other things, the AOS is responsible for the take-back and recycling of packaging waste.

There is only one AOS in the Czech Republic – EKO-KOM a.s. Separate collection points (also referred to as collection nests) are used to collect both packaging and non-packaging waste separately. Collection containers are therefore also used to collect waste according to its material. Other methods of separate collection of municipal waste include municipal collection yards and collection points, large-capacity containers (mobile collection), bag collection, or waste collection facilities with redemption. According to Act No. 541/2020 Coll., on waste, the municipality is obliged to designate locations for the separate collection of municipal waste, at least for hazardous waste, paper, plastics, glass, metals, biological waste, and edible oils and fats. From January 1, 2025, there will also be an obligation to designate locations for the separate collection of textiles. However, these locations are already available in many places at the time of writing. In order to fulfill these obligations, municipalities are required to establish a municipal waste management system, which can be set up by a generally binding ordinance. Within this ordinance, the municipality may also designate locations where the following will be collected as part of the municipal system:

- construction and demolition waste generated within the municipality by non-business individuals,
- movable property within the framework of waste prevention,
- municipal waste generated within the municipality during activities of legal entities and natural persons engaged in business activities who participate in the municipal system on the basis of a contract,
- end-of-life products, and
- plant residues from the maintenance of green areas, gardens, and households.

The following is a summary description of the methods and forms of collection of individual waste streams originating from the municipal system and other sources, including the method of collection of selected end-of-life products under the take-back scheme.

A comprehensive overview of the methods of collection of selected waste streams and products under take-back schemes is provided in Table 55.

Table 55: Methods of collection and separate concentration of selected waste streams and products in the take-back scheme in the Czech Republic as of 2023-2024

Waste producer	Selected types of waste and products under take-back schemes	Cities (high population density)			Cities and larger villages (medium population density)			Rural areas (low population density)				Specific collection methods regardless of municipality size						
		Door to door	Collection points*	Collection yard/collection point	Door to door	Collection points	Collection yard/collection point	Door to door	Collection points	Collection yard/collection point	Collection yard/collection point in a neighboring municipality	Mobile collection	Waste collection with purchase	School collection	Retail network/services	Waste sorting bins at source	Waste bins at source	Special ashtrays
Municipalities - municipal waste	**Paper and cardboard**	Integrated collection system for packaging and non-packaging																
	Packaging	x	xxx	x	x	xxx	x	xx	xxx	x	x	x	x	x		x		
	other	x	xxx	x	x	xxx	x	xx	xxx	x	x	x	xx	x		x		
	Plastic	Integrated collection system for packaging and non-packaging																
	packaging	x	xxx	x	x	xxx	x	xx	xxx	x	x	x				x		
	other	x	xxx	x	x	xxx	x	xx	xxx	x	x	x				x		
	Beverage cartons	x	xxx	x	x	xxx	x	xx	xxx	x	x	x				x		
	Glass	Integrated collection system for packaging and non-packaging																
	packaging		xxx	x		xxx	x		xxx	x	x	x						
	other		xxx	xx		xxx	xx		xxx	xx	xx	xx						
	Metals	Integrated collection system for packaging and non-packaging																
	Ferrous metals																	
	packaging	x	xx	xx	x	xx	xx	x	xxx	x	x	x	x				x	
	other	x	xx	xx	x	xx	xx	x	xxx	x	x	x	xxx				x	
	Aluminum and non-ferrous metals	x	xxx	xx	x	xx	xx	x	xx	x	x	x	xxx				x	
	packaging	x	xxx	xx	x	xx	xx	x	xx	x	x	x	x				x	
	other	x	xx	xx	x	xx	xx	x	xx	x	x	x	xxx				x	
	Garden waste	x**	x	xxx	x**	x	xxx	xx**		xxx	x	x						
	Biowaste	x**	x		x**		x	xx**										
	Food waste	x			x													
	Edible oils		x	xx		x	xx		x	xx	xx	x						
	Textile		xx	xxx		x	xx		x	xx	x	x						
	Wood			xxx			xxx			xxx	x	xx						
	Hazardous waste			xxx			xxx			xxx	x	xx						
	Mixed municipal waste	x	xxx		x	xxx		xxx	x									
	Bulky waste			xxx			xxx			xxx		xx						
	Dog excrement																xx	
	Cigarette butts																xx	x
	Waste generated "on the street" - potentially littering																xxx	

Waste producer	Selected types of waste and products covered by take-back schemes	Cities (high population density)			Cities and larger villages (medium population density)			Rural areas (low population density)				Specific collection methods regardless of municipality size						
		Door to door	Collection points*	Collection yard/collection point	Door to door	Collection points	Collection yard/collection point	Door to door	Collection points	Collection yard/collection point	Collection yard/collection point in a neighbouring municipality	Mobile collection	Waste collection with purchase	School collection	Retail network/services	Waste sorting bins at source	Waste bins at source	Special ashtrays
Product take-back	**Electrical waste**		xx	xxx			x			x	x	x			xx			
	Battery		x	x			x			x	x	x			xxx			
	Fluorescent lamps			xx			xx			xx	x	x			xx			
	Tires			xx			xx			xx	x	x			xxx			
Other waste producers		Waste collection is based on individual contractual relationships between the waste producer and the waste management company that collects waste at the place of operation. The collection system is individually tailored to the needs of the waste producer. If the waste producer is connected to the municipal waste system, they use the collection infrastructure according to the conditions of the municipality. In the case of waste production that has a positive market value, some waste producers sell it to waste collection and purchase facilities or directly to recycling facilities ("recyclers").																

Legend:

- (light gray) - high collection convenience
- (dark gray) - collection motivated by the sale of waste
- x - xxx - the number of crosses indicates the dominance of the collection method
- * - the density of the collection network of container locations is in most cases within a short walking distance of approx. 100 m.
- ** - if waste prevention measures are introduced, home composting/community composting replaces the need to install containers

Source: own processing

The overview in the table above (Table *55*) shows that the key methods of waste collection in the Czech Republic include container collection and collection via collection yards and collection points. For specific types of waste with a positive purchase price, waste collection facilities with purchase are also used. Both the network of take-back points in shops and the network of take-back points at collection yards and collection points within municipal systems are widely used for product take-back. As mentioned above, information on the collection network is very limited and primarily related to the handling of specific commodities. The exception is collection yards and collection points, which are used both for the collection of multiple waste streams and for the collection of products under take-back schemes.

Light gray fields indicate locations with a high level of convenience for citizens. Dark gray fields indicate collection motivated by the sale of waste. The number of crosses in the fields indicates the dominance of a given method of commodity collection. The asterisk symbol for biological waste and garden waste indicates that, in the event of increased waste prevention, home composting or a community composting facility replaces the need to install containers. The table shows that **paper and cardboard, plastic, beverage cartons, glass, aluminum and ferrous metals, and mixed municipal waste are very convenient for Czech citizens to separate in cities, towns, larger villages, and rural areas, using collection points, i.e., places where collection containers are concentrated.**

In most cases, these containers are located within 100 meters. **Czech citizens also find it convenient to separate textiles, electrical equipment, and batteries, regardless of the size of the municipality, as collection points often have containers for these types of waste. In the case of end-of-life products (including tires and fluorescent lamps), it is also possible to return these products to the manufacturers.** In rural areas, it is apparent that door-to-door systems are more widespread for traditionally separated commodities than in larger cities. Commodities such as edible oils, wood, textiles, hazardous waste, and garden waste are predominantly collected separately at collection yards and collection points, regardless of the size of the municipality. Aluminum and ferrous metals, paper, and cardboard are the only commodities whose collection is motivated by the sale of these wastes. Hazardous waste, wood, and bulky waste are then collected separately to a greater extent through mobile collections, specifically large-volume containers. Dog excrement, cigarette butts, and littering waste in particular are then most often collected in trash cans at the place where this waste is generated.

2.4.2 Separate collection system in the Czech Republic

According to Act No. 541/2020 on waste, everyone is obliged to collect waste separately. According to Decree No. 273/2021 on details of waste management, every municipality is obliged to provide its citizens with year-round separate collection points for paper, plastics, glass, metals, edible oils and fats, and biological waste. Furthermore, the municipality must provide places for the separate collection of hazardous waste at specified times at least twice a year. In practice, this involves mobile collection or collection via collection yards or collection points.

The network of collection points for the separate collection of recyclable and recoverable components of municipal waste is very dense in the Czech Republic. Separate collection is available to virtually 100% of the Czech population.

The table (Table 56) shows that within the door-to-door system, there is a particular increase in the number of collection containers for plastic and paper, i.e. the types of waste produced in the largest quantities by individuals. The number of containers for metals and beverage cartons is not growing as much, as these types of waste are generally not produced in such large quantities per unit. In the case of glass, a high proportion of packaging waste is returnable, and generally not produced in such large quantities per unit.

Table 56: Number of containers in public spaces and within the door-to-door system in the Czech Republic between 2020 and 2022

Year	Metal	of which D2D*	NK	of which D2D*	Paper	of which D2D*	Plastic	of which D2D*	Glass	of which D2D*
2020	11,823	156	9,505	100	190,417	96,207	251,585	129,468	94,116	3,402
2021	14,009	156	9,680	100	240,789	148,639	317,728	201,546	96,511	4,250
2022	16,606	121	9,918	295	310,264	210,426	402,447	272,280	99,380	5,157

Source: processed based on AOS data

2.4.3 General evaluation of the Czech Republic

In the Czech Republic in 2023, approximately 75% of the population sorted waste into separate categories. The proportion of Czech citizens who sort waste is increasing every year; for example, it rose by 2% from 2020. One of the main reasons is convenience for citizens, as the average walking distance to collection containers is also decreasing every year. In 2022**,** the average walking distance to collection containers was **87 meters,** three meters less than in 2020.

The density of the collection network is even more evident in the figures for the average number of collection containers per km2 in the Czech Republic. While in 2019 there were an average of 6 containers per km2 in the Czech Republic, in 2022 there were already **11.67 containers per km2**, almost double (Table 57).

Table 57: Data on the separate collection network in the Czech Republic between 2020 and 2022

Year	Total number of collection containers	Average walking distance	Average number of collection containers per km2
	55	90	8.6
2	678,446	89	10.63
2022	838,578	87	11.67

Source: processed based on AOS data

In the 2014-2020 programming period, 1,075 projects focused on separate waste collection were supported under the Operational Program Environment (OPE) with total subsidies exceeding CZK 1.8 billion. These projects created a facility capacity of just under 151,000 tons per year.

The network of collection yards and collection points in the Czech Republic is also sufficient, as can be seen from the following table (Table 58). **Between 2020 and 2022, the number of collection yards increased by 60 and the number of collection points by 24.**

Table 58: Number of collection yards and collection points in the Czech Republic between 2020 and 2022

Year	Collection yards		Collection points	
	Number of municipalities	Number of inhabitants	Number of municipalities	Number of inhabitants
2020	1,268	7,091,928	439	1,275,876
2021	1,259	7,061,681	457	1,304,631
2022	1,328	7,003,613	463	1,333,306

Source: processed based on AOS data

During the program period, more than CZK 1.4 billion was spent on collection yard projects, involving a total of 353 projects, which resulted in the creation of a capacity exceeding 150,000 tons per year. So far, 132 projects have been supported during the program period, with a total subsidy of just under CZK 450 million. In the future, the Czech Republic plans to continue investing in the development of collection yards and collection points. It is expected that approximately 200 modern collection yards will be completed and that there will be significant development of inter-municipal cooperation in the sharing and use of existing or newly built collection yard infrastructure.

A significant factor in the growth of the amount of sorted waste, which is not only influenced by the separate collection system, is the natural growth in packaging production, growth in household consumption, but also the growth in the number of households that use their gardens for recreational purposes rather than for growing crops and keeping livestock. These factors have a significant impact on waste production and, consequently, on the demand for increased capacity of the collection network for separately collected waste fractions.

The inhabitants of the Czech Republic have a very positive attitude towards separate collection. One of the main reasons for the high rate of separate collection in the Czech Republic is the high level of convenience for Czech citizens, due to the very dense network of collection containers, with an average distance to a collection container of 87 meters. In addition, the average delivery distance is decreasing every year due to the growing number of collection containers, especially in door-to-door systems. The authorized packaging company also conducts extensive information and awareness campaigns to inform citizens about which commodities to sort and how. In the coming years, the Czech Republic is considering introducing a deposit system for PET bottles and cans, with the aim of increasing the sorting rate for these commodities.

Public collection network of containers

With the growth in the number of containers for recyclable and recoverable components, the availability of the collection network is increasing, bringing it closer to citizens and thus facilitating active sorting. The collection network is expected to continue expanding in the future. In particular, the development of door-to-door systems can be expected. Within the 2021-2027 programming period, calls for proposals will be issued under the OPŽP to support collection yards, door-to-door systems, and the introduction of PAYT-supporting systems. The aim is to further reduce delivery distances and increase the convenience of collection. In practical terms, this involves densifying the collection network by using containers already installed at other locations.

An authorized packaging company carries out detailed analyses of the collection network, on the basis of which it assesses whether the delivery distance is optimal. Based on these analyses, municipalities must optimize their collection networks. Municipalities place collection containers so that the delivery distance for citizens is as short as possible and separate collection is as convenient as possible. A reduction in delivery distances can also be expected in the future, as it will be necessary to further intensify separate collection in the Czech Republic in order to meet the set targets for municipal waste sorting and recycling.

In the future, it would be strategic for the Czech Republic to increase the density of the collection network in areas with below-average separate collection rates. In areas with increased tourist and recreational traffic, this could be achieved through the installation of waste bins for separate collection, and in satellite areas and newly developed urban areas through a door-to-door collection system.

The Czech Republic's future goal should also be to continue educating and raising awareness among citizens about separate collection, in particular to raise awareness of separate collection for less traditional commodities such as edible oils and fats, textiles, and kitchen bio-waste.

The Czech Republic is improving the performance and efficiency of its separate collection network every year—the distance to collection containers is decreasing every year, the number of collection containers per km^2 is increasing every year, and the number of collection containers is increasing significantly, especially in individual container collection. The Czech Republic is investing the necessary funds in the modernization and expansion of the separate collection network, mainly from OPŽP funds. In addition to investments in collection containers, this includes the modernization and construction of new collection yards, the establishment of reuse centers, community and individual composting projects, and more.

2.4.4 Development of separate collection of recyclable waste within municipal systems

The following table (Table 59) lists the recommended and preferred methods for ensuring separate collection of municipal waste, including the take-back of end-of-life products. The methods of separate collection and organization of waste collection from other producers are not described in detail due to the individual needs of each waste producer to ensure separate collection of the waste they produce. In the area of collection and sorting of municipal waste produced by other producers, the principles and preferences for separate collection of these waste streams within the municipal system will be used. Ensuring effective and efficient separate collection is a primary condition for achieving the objectives of the POH ČR.

The following table (Table 60) lists the recommended methods of separate collection for individual waste streams.

Table 59: Recommended methods for developing and ensuring the separate collection of individual waste streams and end-of-life products in the Czech Republic – desired future state

Waste producer	**Waste**	**Cities** (high population density)			**Towns and larger villages** (medium population density)			**Rural areas** (low population density)				**Specific collection methods linked to location regardless of municipality size**						
		Door to door	Collection points*	Collection yard/collection point	Door to door	Collection points	Collection yard/collection point	Door to door	Collection points	Collection yard/collection point	Collection yard/collection point in a neighbouring municipality	Mobile collection	Waste collection with purchase	School collection	Retail network/services	Waste sorting bins at source	Waste bins at source	Special ashtrays
Municipalities - municipal waste	**Paper and cardboard**	Integrated collection system for all plastic waste																
	Packaging	xx	xxx	x	xx	xxx	x	xxx	xx	x	x	x	xx	x		x		
	other	xx	xxx	x	xx	xxx	x	xxx	xx	x	x	x	xxx	xx		x		
	Plastic	integrated system for collecting all paper waste																
	packaging	xx	xxx	x	xx	xxx	x	xxx	xx	x	x					xx		
	other	xx	xxx	xx	xx	xxx	x	xxx	xx	x	x	x			xx			
	Beverage cartons	xx	xxx	xx	xx	xxx	x	xxx	xx	x	x				xx	x		
	Glass	Integrated system for collecting all glass waste																
	packaging	x	xxx	x	x	xxx	x	xxx	xx	x	x					x		
	flat		x	xxx		x	xxx	x	x	xxx	xxx	x	x		x			
	Metals	Integrated metal waste collection system																
	Ferrous metals																	
	Packaging	x	xxx	xx	x	xx	xx	x	xx	xx	xx	x	x			x		
	other	x	xx	xxx	x	xx	xxx	x	xx	xxx	xxx	x	xxx					
	Aluminum and non-ferrous metals																	
	Packaging	x	xxx	xx	x	xx	xx	x	xx	x	x	x	xxx			x		

	other	x	xx	xxx	x	xx	xxx	x	xx	xxx	xxx	x	xxx					
	Garden waste	xx**	x	xxx	xx**	x	xxx	xxx**	x	xxx	xxx	x						
	Biowaste	xx**	xx	x	xx**	x	x	xxx**	x	x	x							
	Food waste	x	xxx		x	xxx		x	xxx									
	Edible oils		xx	xxx		xx	xxx		xx	xxx	xxx	x						
	Textile		xxx	xxx		xxx	xxx		xxx	xxx	xxx	x			xx			
	Wood			xxx			xxx			xxx	xxx	xxx						
	Hazardous waste			xxx			xxx			xxx	xxx	xxx						
	Mixed municipal waste	x	xxx		x	xxx		xxx	x									
	Bulky waste			xxx			xxx			xxx	xxx	xxx						
	Dog excrement																xxx	
	Cigarette butts																xxx	xxx
	Street litter - potentially littering																xxx	
Product take-back	**Furniture*** **			xxx			xxx			xxx	xxx	xxx			xxx			
	Electrical waste		xxx	xxx			xxx			xxx	xxx				xxx			
	Battery		xxx	xxx			xxx			xxx	xxx				xxx			
	Fluorescent lamps			xxx			xxx			xxx	xxx				xxx			
	Tires			xxx			xxx			xxx	xxx	xxx			xxx			
	Leaflets* ** (collected together in paper collection)	xx	xxx	x	xx	xxx	x	xxx	xx	x	x	x	xxx	xx		x		
	Other products* for example "home and garden," "sports," bundled with a given commodity**	xx	xxx	xx	xx	xxx	x	xxx	xx	x	x	x			xx			

Other waste producers	Waste collection will continue to be carried out on the basis of individual contractual relationships between the waste producer and the waste collection company collecting waste at the place of operation. The collection system will continue to be individually tailored to the needs of the waste producer. In the case of waste production that has a positive market value, it will still be possible to deliver sorted waste to a waste collection facility with a buyback option or directly to a recycling facility (recycler) for a fee. If the waste producer is connected to the municipal waste system, they will use the collection infrastructure according to the conditions of the municipality. Recommendation for the involvement of the HORECA sector in the municipal system, at least with paper, plastic, glass, metal, beverage cartons, and waste from kitchens and catering facilities (food waste).

Legend:

(light grey)	- high collection convenience
(dark grey)	- collection motivated by waste sales
x - xxx	- the number of crosses indicates the dominance of the collection method
*	- the density of the collection network of nest boxes is in most cases within a short walking distance of approx. 100 m.
**	- if waste prevention measures are in place, home composting/community composting replaces the need to install containers
***	- assumption of the development of extended responsibility systems

Within the framework of separately collected municipal waste commodities, the principle of developing an integrated system for the take-back of packaging waste together with the relevant separately collected municipal waste commodity is maintained. In order to ensure maximum collection efficiency, door-to-door collection of recyclable commodities is recommended in areas suitable for the introduction of such a system. The development of door-to-door systems is preferred primarily in rural areas with low population density and in areas of detached houses within urban areas.

For waste with a relatively lower occurrence compared to the dominant components of separate collection, such as plastics, paper, or bio-waste, or due to their high volume weight, the development of delivery collection to an efficiently distributed network of bins and containers located in publicly accessible places with all-day availability is recommended.

With regard to the efficiency of separate collection and the space required for the placement of collection containers for minor commodities such as metals and beverage cartons, it is possible to introduce **multi-commodity collection** of these commodities with a dominant commodity in locations where the sorting line is capable of efficiently sorting these commodities. This mainly involves the collection of beverage cartons together with plastics, or the combined collection of ferrous and non-ferrous metals together with plastics.

With the development of machine-automated sorting and re-sorting technologies for both individually collected commodities and technologies for sorting mixed municipal waste, the way is also opening up **for joint multi-commodity collection of paper, plastics, metals, and beverage cartons**. However, it is essential that the collection system is linked to waste sorting and treatment technology that meets the strict criteria of secondary raw material collectors for subsequent recycling. With the development of glass treatment technologies in the production of high-quality glass cullet, multi-commodity collection of metals together with glass can also be considered. For multi-commodity collection**, it** is always **essential** that **the collection system** is **linked to high-quality waste treatment technology** capable of efficiently sorting the collected commodities primarily for the purposes of **high-quality material recycling.**

In the future, the importance **of collection yards and collection points** for the separate collection of wood and bulky waste will also increase with a view to their subsequent treatment, recycling, and utilization.

The collection of usable waste that has a positive value on the secondary raw materials market will continue to be carried out through **waste collection centers with purchase options.** This mainly concerns commodities such as paper and metals, both ferrous and non-ferrous.

As part of the development of the collection network, it is recommended to develop an integrated take-back system for packaging waste together with the separate collection of municipal waste, as described above. This also applies to end-of-life products and other products that are considered to be subject to take-back obligations, such as leaflets, home and garden products, sports equipment, etc. For larger products that are considered as additional products that could be subject to take-back obligations and are currently collected as bulky waste (e.g., furniture), it is recommended to maintain and develop collection at collection yards and collection points. Where it is effective to allow these products to be returned through the retail network, it will be necessary to ensure that logistics and handling arrangements are in place for the preparation of these products for reuse or recycling. When deciding on the development of take-back schemes for individual product groups, it is necessary to take into account the willingness of users of products covered by take-back schemes to return them to designated locations, in conjunction with ensuring the conditions for the collection, storage, and subsequent treatment of these products.

In order to ensure the separate collection of waste from other waste producers, it is appropriate to include municipal waste in the municipal system. However, this is subject to the condition that the municipality offers this contractual option to other waste producers. For most waste streams from other waste producers, except for municipal waste, collection and transport systems are set up according to the individual needs of each waste producer.

Specific waste producers are waste producers from the Horeca sector (the hotel industry and various types of catering establishments such as restaurants, cafés, bars, pubs, clubs, catering services, etc.). It is advisable for these producers to join the municipal system due to the high production of recyclable commodities such as glass, plastic, paper, and metals, including biodegradable waste from kitchens and canteens. Another group is administrative buildings and educational institutions, which again produce large amounts of municipal waste with high recycling potential.

The primary influence on the quantity and quality of waste sorting in municipalities is **the proportion of residents who actively sort waste**, followed by the participation of visitors to municipalities in separate collection and the involvement of small businesses in the municipal system. These factors can be influenced by technical, communication, and administrative tools.

The authorized packaging company will continue to carry out extensive, high-quality information and awareness campaigns to inform residents about which commodities to sort and how. In the coming years, the Czech Republic plans to introduce a deposit system for plastic beverage bottles (PET) and metal beverage cans, with the aim of increasing the share of these commodities in waste sorting.

The economic incentives used primarily include a municipal waste payment system "Pay as you throw" (PAYT). This incentive tool will continue to be used primarily in areas where waste containers can be assigned to the waste producer, i.e., mainly in residential areas with single-family homes. The system also places certain demands on waste collection, weighing, and record-keeping, which can be supported by the OPŽP.

2.4.5 Summary of separate collection in the Czech Republic

The following table (Table 60) provides a summary overview of the separate collection of selected waste components in the Czech Republic. Each selected waste type is assessed in terms of the current status of its separate collection, and the separate collection is then evaluated to determine whether it appears to be sufficient or not. For each type of waste, the future development of that type of waste is outlined, along with measures that need to be introduced or implemented in the future in order to achieve the desired state and meet the targets set by laws and European legislation.

Table 60: Summary of separate collection in the Czech Republic

Type of waste	Area	Assessment
Municipal waste Packaging waste	**Overview**	In 2022, more than 1.4 million tons of packaging waste was generated in the Czech Republic, and just under 72% of this waste was recycled. Packaging waste in the Czech Republic is collected separately in collection containers at collection points or through a door-to-door system. The obligation to take back packaging waste in the Czech Republic is ensured by authorized packaging companies. Other producers can join the system or arrange for containers through a contract with a person authorized to collect and handle this waste. More detailed figures are provided in the individual commodities below.
	Evaluation	**The network for the separate collection of packaging waste in the Czech Republic appears to be sufficient.** Between 2019 and 2022, the number of collection containers for packaging waste in the Czech Republic increased by almost 365,000. The walking distance to collection containers is decreasing every year and reached 87 meters in 2022. Nevertheless, the Czech Republic will continue to expand its separate collection network for packaging waste (especially collection containers) in the future, also thanks to support from the OPŽP. Development is expected through the introduction of door-to-door collection in residential areas and an increase in separate collection from other municipal waste producers (businesses, public institutions, etc.). More detailed information on individual packaging waste commodities is provided below.

	Future development	**In the coming years, we can expect to see an intensification of the already relatively dense network of collection containers for the separate collection of individual commodities, and in particular an intensification of separate collection through door-to-door systems (mainly for plastics and paper).** An economic analysis shows that in order for the separate collection network to be sufficient, investment in container collection should be around CZK 3.5 billion by 2035 (scenarios T1 and T2). The future situation will be linked to the separate collection of individual commodities from which packaging waste is generated (paper, plastic, beverage cartons, metals); a more detailed analysis of individual commodities is provided below.
Plastic	**Overview**	In 2022, over 403,000 containers for separate collection of plastics were placed in public spaces in the Czech Republic. Of this number, more than 272,000 containers were placed within door-to-door systems (67.7%). In general, container and bag collection dominates separate plastic collection in the Czech Republic. The network for separate plastic collection is very dense in the Czech Republic, and separate collection of this commodity is very convenient for citizens. The walking distance to collection points (collection points) i n 2022 averaged 87 meters. In 2022, each citizen of the Czech Republic sorted an average of 17.6 kg of plastics.
	Evaluation	**The separate plastic collection network in the Czech Republic appears to be sufficient given current plastic production** levels. Between 2019 and 2022, the number of plastic collection containers almost doubled, particularly in door-to-door systems (402,000 in 2022). The walking distance to collection containers is decreasing every year and reached 87 meters in 2022. Nevertheless, the Czech Republic will continue to expand its separate plastic collection network (especially collection containers) in the future, also thanks to support from the OPŽP. Development is expected with the introduction of door-to-door collection in residential areas and an increase in separate collection by other municipal waste producers (businesses, public institutions, etc.).
	Future developments	**In the coming years, we can expect the introduction of a deposit system for selected plastic beverage containers, the intensification of the already relatively dense network of collection containers for separate collection of plastics, and, in particular, the intensification of separate collection of plastics through door-to-door systems.** An economic analysis shows that in order for the separate collection network to be sufficient, investment in container collection should be around CZK 3.5 billion by 2035 (scenarios T1 and T2). However, given the possible introduction of a deposit system for PET bottles in the coming years, it can be expected that this part of the waste will gradually disappear from collection containers, and it will therefore depend on the extent to which the network of plastic collection containers will need to be expanded. The expansion of the door-to-door network should also be helped by subsidies for these systems, with CZK 1.32 billion allocated for the 2021-2027 programming period under the OPŽP calls, including support for door-to-door systems.
	Measures	▪ Introduction of a deposit system for beverage containers – plastic beverage bottles (especially PET).

		▪ Need to increase separate collection of plastics and further strengthen the collection network. ▪ Development of door-to-door collection in family housing, apartment buildings, and residential areas, followed by the development of collection points. ▪ In areas where modern mechanical sorting technologies are available that are capable of sorting multiple types of waste within a single waste stream, joint collection (multi-commodity collection) may be chosen, linked to the quality of the treated waste and the possibilities for sale. ▪ Address the issue of toys with portable batteries and their separate collection as part of the take-back of batteries or electrical equipment, as there is a high risk of fire due to mechanical damage to the battery during the sorting and treatment of plastics. ▪ Enable the disposal of toys at collection yards and consider introducing an EPR system (e.g., take-back points within the retail network).
Paper and cardboard	**Overview**	In 2022, over 310,000 containers for separate paper collection were placed in public spaces in the Czech Republic. Of this number, more than 210,000 containers were placed within door-to-door systems (67.8%). In general, bag and container collection dominates separate paper collection in the Czech Republic. The network for separate paper collection is very dense in the Czech Republic, and separate collection of this commodity is very convenient for citizens, with an average walking distance to collection points (collection points) of 87 meters in 2022. In 2022, each citizen of the Czech Republic sorted an average of 30.6 kg of paper and cardboard.
	Evaluation	**The network for separate collection of paper and cardboard in the Czech Republic appears to be sufficient for current production levels**. Between 2020 and 2022, the number of paper collection containers more than doubled, particularly in door-to-door systems (210,000 in 2022). The walking distance to collection containers is decreasing every year and reached 87 meters in 2022. Nevertheless, the Czech Republic will continue to expand its separate paper collection network (especially collection containers) in the future, also thanks to support from the OPŽP. Development is expected with the introduction of door-to-door collection in residential areas and an increase in separate collection from other municipal waste producers (businesses, public institutions, etc.).
	Future development	**In the coming years, we can expect to see an intensification of the already relatively dense network of collection containers for separate paper collection, and in particular an intensification of separate collection of paper and cardboard through door-to-door systems.** Economic analysis shows that in order for the separate collection network to be sufficient, investment in container collection should be around CZK 3.5 billion by 2035 (scenarios T1 and T2). The expansion of the door-to-door network should also be supported by subsidies for these systems, with CZK 1.32 billion allocated for the 2021-2027 programming period under the OPŽP calls, including support for door-to-door systems.

	Measures	▪ Development of door-to-door collection in family housing estates, in apartment buildings apartment buildings and housing estates, and the development of collection points. ▪ In areas where modern mechanical sorting technologies are available that are capable of sorting multiple types of waste within a single waste stream, joint collection can be chosen, linked to the quality of the treated waste and the possibilities for sale. ▪ Maintain the collection and purchase of paper waste due to the link between these Waste collection directly to recyclers.
Glass	**Overview**	In 2022, over 99,000 containers for separate glass collection were placed in public spaces in the Czech Republic. Of this number, more than 5,000 containers were placed within door-to-door systems (5.2%). In general, container and collection dominate separate glass collection in the Czech Republic. The network for separate glass collection is very dense in the Czech Republic, and separate collection of this commodity is very convenient for citizens. The walking distance to collection points (collection points) in 2022 averaged 87 meters. In 2022, each citizen of the Czech Republic sorted an average of 15.2 kg of glass.
	Evaluation	**The separate glass collection network in the Czech Republic appears to be sufficient.** Since 2016, the number of collection containers has been growing at a rate of approximately 2,000 per year (99,000 in 2022). The walking distance to collection containers is decreasing every year and reached 87 meters in 2022. A large proportion of glass waste (deposit bottles) is then handled in the Czech Republic through a deposit system. Nevertheless, the Czech Republic will optimize its separate glass collection network (especially collection containers) in the future in view of the expected increase in glass sorting, also thanks to support from the OPŽP. An increase in separate collection is expected from other municipal waste producers (businesses, public institutions, etc.).
	Future developments	**In the coming years, the already relatively dense network of collection containers for separate glass collection is expected to be intensified, partly through the intensification of separate glass collection via door-to-door systems.** An economic analysis shows that in order for the separate collection network to be sufficient, investments in container collection should be around CZK 3.5 billion by 2035 (scenarios T1 and T2). Part of the glass waste (bottles) in the Czech Republic is collected through a deposit system. The expansion of the door-to-door network should also be supported by subsidies for these systems, with CZK 1.32 billion allocated for the 2021-2027 programming period under the OPŽP calls, including support for door-to-door systems.
	Measures	▪ Development of collection points for glass in residential areas and housing estates, while ensuring the effective placement of collection points linked to a door-to-door system to prevent a decline in residents' interest in separate glass collection. ▪ Enable small broken glass to be disposed of in collection points designated for glass collection. ▪ Create and develop conditions for the collection of flat glass in collection yards yards and collection points.

		▪ Analyze the possibilities and consider introducing an EPR system (within the retail network, e.g., glass return at glaziers).
Composite waste (beverage cartons)	**Overview**	In 2022, just under 10,000 containers for the separate collection of beverage cartons, which are a typical example of composite packaging waste, were placed in public spaces in the Czech Republic. Of this number, only 295 containers were placed in door-to-door systems (3%). In general, container and bag collection dominates the separate collection of beverage cartons in the Czech Republic. The network for the separate collection of beverage packaging is relatively dense in the Czech Republic, and separate collection of this commodity is very convenient for citizens. Beverage cartons are also often collected together with plastics as part of multi-commodity collection. The walking distance to collection points (collection points) in 2022 averaged 87 meters. In 2022, each citizen of the Czech Republic sorted an average of 0.4 kg of beverage cartons.
	Evaluation	**The network for separate collection of beverage cartons appears to be sufficient in the Czech Republic.** Beverage cartons are often collected as part of multi-commodity collection together with plastics, for which the number of collection containers almost doubled between 2019 and 2022 (especially in door-to-door systems), particularly in door-to-door systems (402,000 in 2022). The walking distance t o collection containers is decreasing every year and reached 87 meters in 2022. Nevertheless, the Czech Republic will continue to expand its network of separate collection of beverage cartons, or together with plastics, especially collection containers, also thanks to support from the State Environmental Fund.
	Future developments	**In the coming years, we can expect to see an increase in the network of collection containers for the separate collection of beverage cartons, particularly as part of multi-commodity collection together with plastics and metals.** Economic analysis shows that in order for the separate collection network to be sufficient, investment in container collection should be around CZK 3 .5 billion by 2035 (scenarios T1 a n d T2). The expansion of the door-to-door network should also be supported by subsidies for these systems, with CZK 1.32 billion allocated for the 2021-2027 programming period under the OPŽP calls, including support for door-to-door systems.
	Measures	▪ Development of joint separate collection beverage cardboard, known as multi-commodity collection, together with plastic or metals in cases where modern sorting lines are capable of sorting these commodities highly efficiently and to a high standard. ▪ Development of door-to-door systems for separate collection in residential areas, development of collection points in apartment buildings and housing estates, and development of a network of collection bins in areas with higher population density.
Ferrous metals (and aluminum)	**Overview**	In 2022, there were just under 17,000 containers for separate collection of metals in public spaces in the Czech Republic. Of this number, only 121 were located within door-to-door systems (0.7%). The dominant method of ferrous metal collection in the Czech Republic is waste collection a n d purchase facilities (79.9 %), followed by collection collection yards and collection points (15.9%) and, increasingly,

		increased collection in containers and bags (3.3%). The network for separate collection of metals is relatively dense in the Czech Republic, and collection containers for separate collection of this commodity are standardly part of collection points (collection points), or metals are collected as part of multi-commodity collection together with plastics or beverage cartons. The walking distance to collection points was approximately 87 meters in 2022. In 2022, each citizen of the Czech Republic sorted an average of 40 kg of metals.
	Evaluation	**The network for separate collection of ferrous metals appears to be sufficient in the Czech Republic.** Metals are also collected as part of multi-commodity collection together with plastics, for which the number of collection containers almost doubled between 2019 and 2022 (especially in door-to-door systems), particularly in door-to-door systems (402,000 in 2022). The walking distance to collection containers is decreasing every year and reached 87 meters in 2022. Nevertheless, the Czech Republic will continue to expand its network of separate collection of beverage cartons, or together with plastics, especially collection containers, also thanks to support from the State Environmental Fund.
	Future developments	**In the coming years, the network of collection containers is expected to intensify, particularly through multi-commodity collection together with plastics and beverage cartons, both in public spaces and door-to-door systems.** An economic analysis shows that in order for the separate collection network to be sufficient, investment in container collection should be around CZK 3.5 billion by 2035 (scenarios T1 and T2). However, given the proposal to introduce a deposit system for cans in the coming years, it can be expected that this type of waste will gradually disappear from collection containers, and it will therefore depend on the extent to which the network of metal collection containers will need to be expanded. The expansion of the door-to-door network should also be helped by subsidies for these systems, with CZK 1.32 billion allocated for the 2021-2027 programming period under the OPŽP calls, including support for door-to-door systems.
	Measures	▪ Introduction of a deposit system for metal beverage containers (especially aluminum cans). ▪ Development and expansion of the network of containers for separate collection of metals. ▪ Development of joint separate collection of metals – multi-commodity collection together with plastics in cases where modern sorting lines are capable of sorting these commodities highly efficiently and to a high standard. Multi-commodity collection of metals together with plastics can ensure high coverage of metal collection within the scope of plastic collection. ▪ Maintain the collection and purchase of metal waste due to the link between these waste collection points directly to recyclers.
Textiles	**Overview**	From 2025, municipalities will be required to designate locations for the separate collection of waste textiles, and collection containers for the separate collection of textiles are already available in many places. Currently, 71% of municipalities in the Czech Republic collect textiles. There are approximately 6,240 textile containers located in municipalities, which are provided by several different companies. Textiles can also be collected separately at collection yards and collection points. The companies with the largest number of textile collection containers in the Czech Republic include Diakonie Broumov, Potex, Dimatex,

		Czech Red Cross, Salvation Army. In 2024, Diakonie Broumov registered 991 collection points for the separate collection of textiles, including collection yards, containers of various sizes, and textile collection cages. In the same year, Potex registered 273 containers, Dimatex over 3,700 containers (including 2,500 company containers), and Textileco registered over 7,000 collection points. Reusable textiles can also be collected at reuse centers or reuse points. For the 2021-2027 programming period, over CZK 470 million has been allocated under OPŽP calls to support reuse centers and projects to prevent textile and clothing waste.
	Evaluation	**The network for the separate collection of textiles in the Czech Republic appears to be sufficient.** The evaluation after 2025 will be key, when all municipalities in the Czech Republic will be required to set up a place for separate collection of textiles. After 2025, data on the number of collection containers will also be available, making it easier to assess the adequacy of the network for separate collection of textiles.
	Future developments	**The collection network is expected to develop in the coming years, given the obligation of municipalities from January 1, 2025, to provide residents with the option of separate collection of waste textiles.** For the 2021-2027 programming period, over CZK 470 million has been allocated under OPŽP calls to support reuse centers and projects to prevent textile and clothing waste.
	Measures	▪ Development separate collection through specialized waterproof containers within the collection network. ▪ Development of separate collection through collection yards and collection points. ▪ Development of mobile collection options. ▪ As part of preventing the generation waste , development separate collection through containers and bags.
Biological waste	**Overview**	Biological waste (separately collected and contained in mixed municipal waste) is estimated to account for between 25% and 30% of mixed municipal waste production. Separate collection of biological waste in the Czech Republic is dominated by the collection of plant-based bio-waste from gardens and parks. The collection of kitchen bio-waste and waste oils is developing. Details for these sub-streams are provided below.
	Evaluation	**The network for the separate collection of the plant component of biological waste is sufficient in the Czech Republic, even with a slight increase in the production of this waste.** On the other hand, for biological waste of animal origin, a balance is being established between the size of the collection network and the capacity of facilities capable of processing this specific stream. In the future, it will therefore be necessary to build biogas plant capacity and set up a system for the separate collection of the animal component of biowaste.

	Future developments	**In the future, it will be necessary to build biogas plant capacity and set up a system for the separate collection of the animal component of biological waste. In** the coming years, it is also expected that the collection of plant-based biowaste in family homes will develop, with waste being placed directly into collection containers allocated to individual households (or groups of households) with varying collection frequencies (most often once every 14 days). For the collection of animal-based bio-waste and kitchen bio-waste from households (plant-based without garden waste+ animal-based), door-to-door collection in residential areas using buckets or baskets, most often lined with biodegradable bags, with a higher collection frequency (usually once or twice a week). In residential areas, containers within collection points with a controlled access system (chip or lock) can be considered, most often of various volumes (120 l, 240 l, 1,100 l) with collection frequency depending on the nature of the waste (plant-based only – once every 14 days, with animal components – once or twice a week).
- Food waste	Overview	In the Czech Republic, separate collection of biodegradable waste from kitchens and catering facilities is developing. The number of municipalities participating in separate collection of kitchen waste is constantly growing. The Ministry of the Environment clearly declares the importance of this waste stream and the need for education and awareness-raising to expand separate collection of kitchen waste from households, its treatment with a preference for subsequent use in biogas plants. A number of projects are emerging, such as "Třídím gastro" (I sort food waste), which aims to use kitchen and food waste as a renewable resource instead of landfilling it and processing it in biogas plants. Kitchen waste of plant origin from households can also be collected in some municipalities through the collection of biodegradable waste from gardens and parks. An important option for the use of biological waste is its processing into biogas in biogas plants. For the 2021-2027 programming period, over CZK 740 million has been allocated for calls related to the modernization and construction of biogas plants.
	Evaluation	**The separate collection of bio-waste from kitchens and catering facilities in the Czech Republic is growing. The separate collection of kitchen waste from households is insufficient.** It can be said that a balance is currently being established between the size of the collection network and the capacity of facilities capable of processing this specific stream. The collection network is developing mainly in towns and municipalities that fall within the collection area of existing projects (biogas plants). In the future, a significant increase in the production of this stream is expected, and thus also the need for collection containers for separate collection.
	Future development	**In the future, a significant increase in the production of biological waste from kitchens and catering facilities and kitchen waste from households is expected, and thus also the need for collection containers for separate collection.** The collection of kitchen waste containing animal-based bio-waste is expected to develop in apartment buildings and housing estates in urban agglomerations. An increase in production is expected, and therefore the need to develop the collection network as a result of the involvement of small businesses,

		restaurants, schools, soup kitchens, hospitals, and retirement homes into the municipal system.
	Measures (including kitchen waste)	▪ Development of separate collection primarily through door-to-door systems. door systems. ▪ Development of separate collection of kitchen waste and food waste from households through specialized collection containers in residential areas. ▪ Development of separate collection in collection containers at apartment buildings in collection points. ▪ Development of separate collection of catering waste from restaurants, canteens, and other entities.
- edible oils	**Overview**	Containers for edible oils are often part of collection points, and oils can also be handed in at collection yards and collection points.
	Evaluation	**The network for the separate collection of edible oils and fats in the Czech Republic appears to be sufficient in terms of current production.** According to estimates, the volume of separately collected used edible oils and fats is expected to double in the next five years, which will require adjustments to the collection network.
	Future develop ments	**According to estimates, the amount of separately collected used edible oils and fats should double in the next five years, so the collection network will need to be expanded accordingly.**
	Measures	▪ Development separate collection through specialized containers within the collection network. ▪ Development of separate collection through collection yards and collection points. ▪ Development of mobile collection options.
- garden waste	**Overview**	Separate collection of biological waste from gardens and parks in the Czech Republic is most often provided through collection yards, collection containers at collection points (collection nests), door-to-door systems, and large-volume containers. Separate collection of biological waste through collection yards is more widespread in smaller municipalities, while mobile collection of biological waste is gradually becoming more widespread in larger municipalities. The network of composters in the Czech Republic is expanding thanks to the OPŽP. A dense network of composting plants has also been created with support from the OPŽP.
	Evaluation	**The network for the separate collection of biodegradable waste from gardens and parks in the Czech Republic appears to be sufficient in terms of current production.** The production flow is expected to continue to grow, which will require adjustments to the collection network. The need for development also depends on the approach to preventing bio-waste from gardens and parks; some small municipalities prefer home composting to the more expensive system of collecting bio-waste using collection containers.
	Future development	**The need to develop a collection network for bio-waste from gardens and parks depends on production and on the approach to and interest in preventing bio-waste from gardens and parks, with some municipalities preferring home** **composting over a bio-waste collection system using collection**

		. Door-to-door collection of bio-waste from gardens and parks is expected to develop, particularly in individual housing.
	Measures	▪ Development of separate collection primarily through door door systems. ▪ Development of separate collection through collection yards and collection points. ▪ Development of mobile collection options.
Wood	**Overview**	Wood and wood products can be handed over in the Czech Republic at collection yards and collection points, or in containers for bulky waste. The network for separate collection of wood therefore depends on the network of collection yards or on systems for placing bulky containers in individual municipalities. Waste wood can also be used as an additive in compost production ("new wood"), recycled to produce chipboard or other products ("dead wood"), or used for energy.
	Evaluation	**The network for separate collection of wood in the Czech Republic appears to be sufficient, as most wood is handed over at collection yards.**
	Future	**In the coming years, interest in wood recycling and the development of wood processing capacities for recycling is expected to increase.** An economic analysis shows that in order for the network of collection yards and collection points to be sufficient, investments in collection yards a n d collection points should range between CZK 3 and 4 billion by 2035.
	Measures (including furniture)	▪ Development of separate collection through collection courtyards and collection points. ▪ Consider introducing an EPR system with the option of returning furniture to furniture stores. ▪ As part of waste prevention, develop furniture banks, re-use centers, and reuse points.
Hazardous waste	**Overview**	Hazardous waste in the Czech Republic is mainly collected separately at collection yards and collection points. Collection is also provided by regular mobile collection in municipalities.
	Assessment	**The network for the separate collection of hazardous waste in the Czech Republic appears to be adequate, as most hazardous waste is handed over at collection yards**.
	Future	**In the future, it can be expected that new collection yards will be built and existing ones modernized to expand this network.** An economic analysis shows that in order for the network of collection yards and collection points to be sufficient, investments in collection yards and collection points should range between CZK 3 and 4 billion by 2035. Funds have been allocated under the OPŽP for the 2021-2027 programming period to support these facilities.
	Measures	▪ Maintaining existing systems separate collection through collection yards and collection points and their development with the aim of achieving greater comfort for residents. ▪ Accessible mobile collection with higher frequency per year.
Bulky waste	**Overview**	Bulky waste is collected separately in the Czech Republic at collection yards and collection points. Bulky waste collection is also provided in municipalities

		by mobile collection. The sorting of bulky waste into individual usable fractions (especially wood) is gradually developing. Some municipalities require such basic sorting from citizens. In other cases, sorting is carried out by the staff of collection yards.
	Evaluation	**The network for the separate collection of bulky waste in the Czech Republic appears to be sufficient, as most bulky waste is handed over at collection yards.**
	Future	However, the construction of new collection yards and the modernization of existing ones can be expected in the future to expand this network. Funds have been allocated under the OPŽP for the 2021-2027 programming period to support these facilities.
	Measures	▪ Development of the infrastructure of collection yards and their equipment for sorting recyclable and reusable components by commodity and producing only residual bulky waste.
Construction and demolition waste	**Overview**	The dominant producers of construction and demolition waste are self-employed individuals. Citizens and municipalities are also producers to a negligible extent. Construction and demolition waste is not classified as municipal waste and is therefore not included among the types of waste that municipalities are required to collect separately under Act No. 541/2020 Coll. Nevertheless, 31% of municipalities allow citizens to separate this waste and have introduced municipal systems for the collection of construction and demolition waste from citizens. Collection in municipalities takes place at collection yards.
	Evaluation	The network for the separate collection of small construction waste from citizens appears to be sufficient in the Czech Republic, as most construction waste is handed over at collection yards.
	Future developments	**In the future, it can be expected that new collection yards will be built and existing ones modernized to expand this network. An economic analysis shows that in order for the network of collection yards and collection points to be sufficient, investments in collection yards and collection points should range between CZK 3 and 4 billion by 2035.** Funds have been allocated under the OPŽP for the 2021-2027 programming period to support these facilities.
Waste electrical equipment	**Overview**	In 2022, just under 322,000 tons of electrical equipment were placed on the Czech market, and over 99,000 tons (57%) were collected for recycling. The Czech Republic thus failed to meet the mandatory take-back rate for waste electrical equipment. The take-back rate for waste electrical equipment has been growing in the long term, and it can therefore be assumed that the Czech Republic will meet the mandatory take-back rate in the coming years. In 2023, a total of 13 collective systems ensured the take-back of waste electrical equipment. Among the collective systems with the largest share in take-back in 2023 were ELECTROWIN a.s., REMA Systém, a.s. and ASEKOL a.s. In the Czech Republic, waste electrical equipment can be returned to collection points via collection yards and collection points, containers for small appliances, mobile collection services, or electrical equipment retailers. The list of collection points for waste electrical equipment is continuously updated and published for residents in the VISOH2 database.

	Evaluation	**The network for the separate collection of waste electrical equipment in the Czech Republic appears to be adequate.** Waste electrical equipment can be handed in free of charge at collection yards or to manufacturers or retailers. In the case of smaller electrical appliances, collection containers for small waste electrical equipment are often located at collection points and are also frequently found in retail chains.
	Future developments	**In the coming years, we can expect to see an intensification of the already dense network of collection points, but above all, awareness-raising in the area of waste electrical equipment collection and an increase in public awareness of this option.**
	Measures	▪ Development of separate collection at collection points within retail chains and publicly accessible specialized collection containers for small waste electrical equipment. ▪ Maintaining existing systems for setting up collection points at recycling centers and developing them to achieve greater convenience for residents.
Waste batteries	**Overview**	In 2022, more than 46,000 tons of batteries were placed on the Czech market, of which less than 25,000 (50.2%) were collected for recycling, meaning that the Czech Republic achieved the 45% collection rate for waste batteries. In 2023, two collective systems ensured the collection of waste batteries: ECOBAT s.r.o. and REMA Battery, s.r.o. In the Czech Republic, waste batteries can be collected at collection points, a list of which is continuously updated and published for residents in the VISOH2 database or on the websites of collective systems. Collection points can be found at collection yards and collection sites, but there are also collection containers, for example in shopping centers. Waste batteries can also be handed over to the last seller; in the case of industrial batteries, they can also be handed over to persons authorized to take them over in accordance with the Waste Act.
	Evaluation	**The separate collection network in the Czech Republic appears to be sufficient.** In addition to collection yards, waste batteries can be handed over to the last seller; industrial batteries can also be handed over to persons authorized to take them over.
	Future	**In the coming years, we can expect to see an intensification of the already dense network of collection points, but above all, awareness-raising in the area of waste battery collection and greater public awareness of this option.**
	Measures	▪ Development of separate collection at collection points within retail networks and publicly available specialized collection containers with the option of collecting waste batteries together in special capsules on containers for small waste electrical equipment. ▪ Maintaining existing systems for setting up collection points at collection yards and developing them to achieve greater convenience for residents.
Waste tires	**Overview**	In 2022, just under 109,000 tons of tires were placed on the Czech market, and just under 85,000 tons (83.6%) were collected, meaning that the Czech Republic achieved the 80% collection rate for waste tires.

		In 2023, the take-back of waste tires was ensured by a single collective system – ELT Management Company Czech Republic, s.r.o. In the Czech Republic, waste tires can be taken back at collection points, the list of which is continuously updated and published in the VISOH2 database. Tyres can be handed in at collection yards and collection points in municipalities, car repair shops and tyre repair shops.
	Evaluation	**The separate collection network in the Czech Republic appears to be sufficient.** Waste tire collection points can be tire repair shops, car repair shops, but also municipal collection yards. There are currently around 2,000 such collection points in the Czech Republic.
	Future developments	**In the coming years, we can expect to see an intensification of the already dense network of collection points, but above all, awareness-raising in the area of waste tire collection and increased public awareness of this option.**
	Measures	▪ Development of separate collection, primarily through take-back points at car repair shops and tire service centers, and possibly also at collection yards and collection points in municipalities.
Vehicles End-of-life vehicles	**Overview**	End-of-life vehicles are registered in the MAISOH database in the Czech Republic at the moment they are accepted for processing by a facility that has the necessary permit for handling end-of-life vehicles. In 2023, more than 123,000 end-of-life vehicles were registered in MA ISOH. In 2024, the MAISOH system registered 447 facilities designated for the handling of end-of-life vehicles. The network for handling end-of-life vehicles is therefore relatively dense in the Czech Republic and convenient for residents to use.
	Evaluation	**The separate collection network in the Czech Republic appears to be sufficient.** There are currently 445 active sites authorized to handle end-of-life vehicles in the Czech Republic. The densest network of these facilities was in the Central Bohemian (57), Pardubice (44), and South Moravian (43) regions.
	Future	**In the future, changes are only expected in connection with changes in legislation. Furthermore, the network may be streamlined (reduced) in terms of the number of sites where end-of-life vehicles can be processed.**
Mixed municipal waste (MMW)	**Overview**	Mixed municipal waste in the Czech Republic is collected mainly through container collection (92% of the population) and, to a lesser extent, through bag collection (8%). The collection system can be described as door-to-door, except in apartment buildings, where containers are located in collection points shared by several buildings with the same house number. Walking distances are short (maximum of a few dozen meters). In the context of the development of separate collection of recyclable components and the goal of reducing the production of mixed municipal waste, the size of containers for mixed municipal waste is being reduced and the allocated volume limited. A number of municipalities are introducing these principles together with PAYT municipal waste payment.

	Evaluation	**The MSW collection network in the Czech Republic appears to be adequate.** Container collection dominates. Individual collection networks in detached houses, apartment buildings, and housing estates use 1,100-liter containers located in collection points. In the future, MSW production is expected to decrease as a result of increased sorting of recyclable components. The volume of MSW containers will decrease. A reduction in the number of containers is expected in apartment buildings.
	Future developments	**By future with it is expected a reduction in the production of municipal waste due to increased sorting of recyclable and reusable components**. The allocated volume of municipal waste containers should therefore be reduced in favor of containers for separate collection. A reduction in the number of containers is expected, particularly in residential buildings.
	Measures	▪ Limiting the size of containers and the allocated volume of containers for the collection of mixed municipal waste with a gradual reduction in collection frequency.

Source: own processing

2.5 Evaluation of waste management

As mentioned above in section 2.2.1, the state of waste management in the Czech Republic is very good. The network of facilities is well developed and enables the safe handling of all types of waste. The Czech Republic also has experience with energy recovery, with four energy recovery facilities (ZEVO) in operation with a total processing capacity of 858,000 tons. The Czech Republic has an extensive network of modern landfills for inert, hazardous, and other waste. Waste management in the Czech Republic is undergoing significant changes towards more sustainable management. The production of all waste in the Czech Republic has been growing in the long term, and it is therefore necessary to expand the capacity of facilities for handling this waste. Various methods of waste management are used in the Czech Republic, depending on the nature of the waste. In the Czech Republic, most waste has long been recycled, mainly in terms of materials.

In 2021, 87% of all waste was recycled in the Czech Republic, of which 84% was recycled as material and 3% as energy. In 2022, this ratio remained very similar, with 86% of all waste recycled, of which 83% was recycled as material and 3% as energy.

A smaller portion of waste is then disposed of in the Czech Republic, with a total of 13% of waste disposed of in both 2021 and 2022. Landfilling of waste in the Czech Republic has grown in recent years, stabilizing at the aforementioned 13% in 2021 and 2022. Reducing the amount of waste disposed of in landfills in favor of waste recovery is one of the biggest challenges for waste management in the Czech Republic in the coming years, not only in connection with the ban on landfilling certain types of waste after 2030.

2.5.1 Waste recovery

In the Czech Republic, biowaste is recycled through composting in composting plants and anaerobic digestion in biogas plants. Compost, digestate, and sludge from wastewater treatment plants are applied to the soil, returning organic matter to the cycle. The nutrients and humus components supplied help improve and maintain soil quality, contribute to water retention and erosion control, and maintain agricultural land use, which is essential for adaptation to ongoing climate change. The use of biowaste and its conversion into biogas in biogas plants produces green energy, thereby reducing the Czech Republic's dependence on fossil fuels. At the same time, modern technologies for purifying biogas into bioCNG are being developed.

Construction waste and excavated soil are successfully utilized in land reclamation, landscaping, and backfilling. Facilities for the treatment and recycling of construction waste are widely available.

intensive development of recycling centers that process construction waste into recyclables, thereby ending the waste regime (transition from waste to product).

Furthermore, waste is mechanically treated before use, e.g. by sorting on suitable sorting and re-sorting lines and, if necessary, by physical pressing. Currently, these lines are less efficient and will need to be further modernized to increase the efficiency of sorting usable waste components. The production of solid alternative fuels, known as TAP, is also developing for energy use, mainly in cement plants or multi-fuel boilers.

Residual municipal waste is used for energy in waste incineration plants (there are four large plants in operation in the Czech Republic with a total annual processing capacity of 858,000 tons), where heat and electricity are generated in a cogeneration process using steam turbines. Waste incineration plants also play an irreplaceable role in the safe management of healthcare waste, as demonstrated during the COVID-19 pandemic, and are therefore important for increasing preparedness and resilience to similar crises and emergencies.

In the Czech Republic, waste edible oils and fats are also processed, and plastic, glass, wood, and paper waste are recycled. Valuable raw materials are successfully recovered from end-of-life products. In metallurgy, metal waste, including critical raw materials, is recycled. The metallurgical industry processes ferrous metals, non-ferrous metals (copper, aluminum, lead, zinc, tin, nickel) and other precious metals (gold, rhodium, silver).

Special waste treatment includes, for example, solvent regeneration, waste oil refining, and catalyst recycling.

The most common problems in the Czech Republic are illegal disposal of construction waste and excavated soil, landscaping with unsuitable waste such as tires, and illegal dismantling of end-of-life vehicles.

2.5.1.1 Material utilization

Mineral waste in group 17, especially subgroup 17 05 Soil (15.8 million tons), contributes significantly to material recovery. The dominant stream 17 05 04 is not part of the Construction and demolition waste stream, therefore the construction and demolition waste stream, consisting of other wastes from group 17, adds another 8 million tons to material recovery. If soil is used for backfilling, in the case of construction and demolition waste, this is mainly recycling. Ferrous metals are also recycled. In addition to metals from subgroup 17 04 (1.1 million tons), metal waste from the iron and steel industry (subgroup 10 02 (1.2 million) and other waste from group 10 in the amount of 0.6 million tons (10 01 waste from thermal processes, 10 09 waste from casting). Industrial waste production is 2.5 million tons, and 1.4 million tons/year is recycled, which is approximately 57% of its production. The third most significant group of recycled waste is group 19 (1.3 million tons). Municipal waste also contributes to recycling, with approximately 2.2 million tons recycled in recent years, which is 41% of its production.

2.5.1.2 Energy use

Energy recovery in the Czech Republic reached only 3% in 2022. Municipal waste is predominantly used for energy recovery. Energy recovery from municipal waste amounted to 12% in 2022. Waste-to-energy plants mainly use mixed municipal waste, category no. 20 03 01 (0.6 million tons), and to a lesser extent bulky waste 20 03 07 (40,000 tons). As no new waste-to-energy plants have been commissioned since 2016, energy recovery has remained constant in recent years. Further energy recovery takes place in cement plants, where mainly combustible fractions from waste treatment and combustible waste listed in group 19 (0.4 million tons), specifically 19 12 10, 19 12 04, and 19 12 12, are used.

2.5.2 Waste disposal

The basic method of waste disposal in the Czech Republic is landfilling and incineration in incinerators without energy recovery. Before disposal, waste is often treated physically or chemically in waste treatment facilities using methods such as decontamination, biodegradation, stabilization, solidification, demulsification, and neutralization. Bitumenization and vitrification are also used.

Unfortunately, the main method of municipal waste disposal in the Czech Republic remains landfill. However, landfill sites now often function as regional waste centers for "comprehensive" waste management and, in addition to landfilling, include a whole range of other activities and other types of facilities such as associated operations with methods of waste management such as collection, storage, sorting - sorting areas, transfer stations, or even licensed sorting lines, production of solid alternative fuels, biodegradation, solidification, and other decontamination technologies. Some sites also have authorised composting facilities.

Landfills are very often inspected by the supervisory authorities, especially landfills for hazardous waste, other waste in the first phase of operation, i.e., actively operated landfills, as well as reclaimed parts of landfills in the second phase of operation, with priority given to inspections of facilities with integrated permits. Attention is also focused on landfills in the third phase of operation, which are already in the after-care regime. Regular inspections are carried out to ensure that landfills are degassed and that landfill gas is collected and treated in accordance with the relevant ČSN standards. A problem that often occurs at municipal waste landfills is the escape of light waste fractions into the surrounding area and outside the landfill site. There are also still frequent cases of waste ignition at landfills with environmental and economic impacts. Some operators have already installed thermal imaging cameras to monitor temperatures in the landfill body, which can detect the source of a fire in the landfill in a timely manner.

The incineration of hazardous waste, chemical, toxic, industrial waste, and infectious waste from health and veterinary care takes place in hazardous waste incinerators. These facilities play an irreplaceable role in waste management and are very important for the self-sufficiency of the Czech Republic and its ability to ensure the safe and rapid disposal of hazardous waste.

The most common problems encountered are serious deficiencies in the storage of hazardous waste (oils, mercury, chemicals, etc.), which can pose a threat to the environment. Another problem is the improper disposal of waste, i.e., the disposal of waste in places not designated for this purpose, various methods of loose storage, dumping, discharge, and storage of waste. A specific form of illegal waste management is the burning of waste in open fires or the unauthorized burning of waste in unsuitable boilers and facilities.

2.5.2.1 Landfilling

In 2022, 13% of all waste (i.e., 4.5 million tons) and 45% of municipal waste (2.8 million tons) was landfilled. The landfilling of mixed municipal waste (2.0 million tons) and bulky waste (0.5 million tons) is significant. Of the waste outside group 20, construction and demolition waste (0.9 million tons) is landfilled. Specifically, this includes mixed waste 17 09 04 (0.3 million tons), but also mixtures or separate fractions of concrete, bricks, and tiles 17 01 07. A change in the handling of these wastes is necessary, for example, due to the increased use of selective demolition. Waste from group 19 (0.5 million tons) is also landfilled, in particular 19 12 12 in subgroup 19 12, as well as subgroup 19 03 (solidified and stabilized waste) and 19 01 (combustion waste). Waste from groups 10 (160,000 tons) and 15 (120,000 tons) is landfilled to a lesser extent.

2.5.2.2 Incineration

In 2022, only 0.2% (78,000 tons) of all waste produced was incinerated, with almost all of it being hazardous waste. Almost half of the incinerated waste (41% and 32,000 tons) consists of waste from healthcare and veterinary care, i.e., waste from group 18. Another source of hazardous waste that is incinerated is industry, specifically the chemical industry and waste in group 07 (Waste from organic chemical processes, 14,000 tons incinerated), in group 08, or subgroup 08 01 (Waste from the manufacture, processing, distribution, use, and disposal of paints and varnishes, 4,000 tons incinerated in 2022). Waste in group 15 is also incinerated (9,000 tons). Incineration of municipal waste is negligible compared to its production (4,000 tons).

2.6 Evaluation of the waste management network

At the time of processing the POH ČR, the ISOH register contained more than **6,200 stationary facilities** with a waste management permit. Facilities are often permitted to handle a large number of waste types according to the Waste Catalogue, while the entries in the Register of Facilities record the annual projected capacity, which does not distinguish between waste types. The distinction between capacities is focused on waste management activities. The analysis of data from the Register of Facilities was also complicated by the process of re-licensing facilities in accordance with Act No. 541/2020 Coll. It is difficult to assess the adequacy of the network of facilities on the basis of permitted annual projected capacities for individual waste streams. Therefore, procedures combining data from the register with data on actual waste management reported by facility operators in their annual reports were used in the POH ČR. The analysis was limited to so-called "active facilities." An active facility is considered to be a facility that handled at least some amount of the assessed stream in 2022. Facilities can be divided into:

- Stationary facilities
  - Dominant transfer: waste collection points
  - Dominant treatment: end-of-pipe facilities
  - Combined treatment: combined facilities
- Mobile facilities

The first level of classification is defined based on the location of the equipment and its fixed connection to the ground or its portability. Mobile equipment (capable of movement) and stationary (fixed to the ground). Stationary equipment is further classified according to the nature of the flow handled. This classification was based on a ratio calculated as the proportion of output flows from equipment classified as export or transfer and input flows (including production) to the equipment. The analysis of individual flows provides detailed information on the proportions of treatment methods in each of the above-mentioned types of equipment.

In presenting the current state of the network in this chapter, an approach respecting the waste management hierarchy has been chosen. The status of selected significant types of facilities that:

- contribute to the material recovery of waste:
  - composting plants and biogas plants for biological waste,
  - recycling lines for construction and demolition waste,
  - facilities for recycling metal waste,
  - paper recycling equipment,
  - plastic sorting and recycling equipment,
- enable energy recovery from waste,
- operated for the purpose of waste disposal:
  - facilities for handling hazardous waste (outside landfills),
  - landfills.

Given that facilities usually handle a large (in some cases very large) number of waste types and their activities therefore affect multiple streams, an assessment approach for individual streams is not appropriate here. An assessment of the network of facilities from the perspective of individual streams was carried out in a detailed analysis of individual waste streams. The aim is not to list all technologies; the text focuses on key technologies.

2.6.1 Composting plants and biogas stations for biological waste

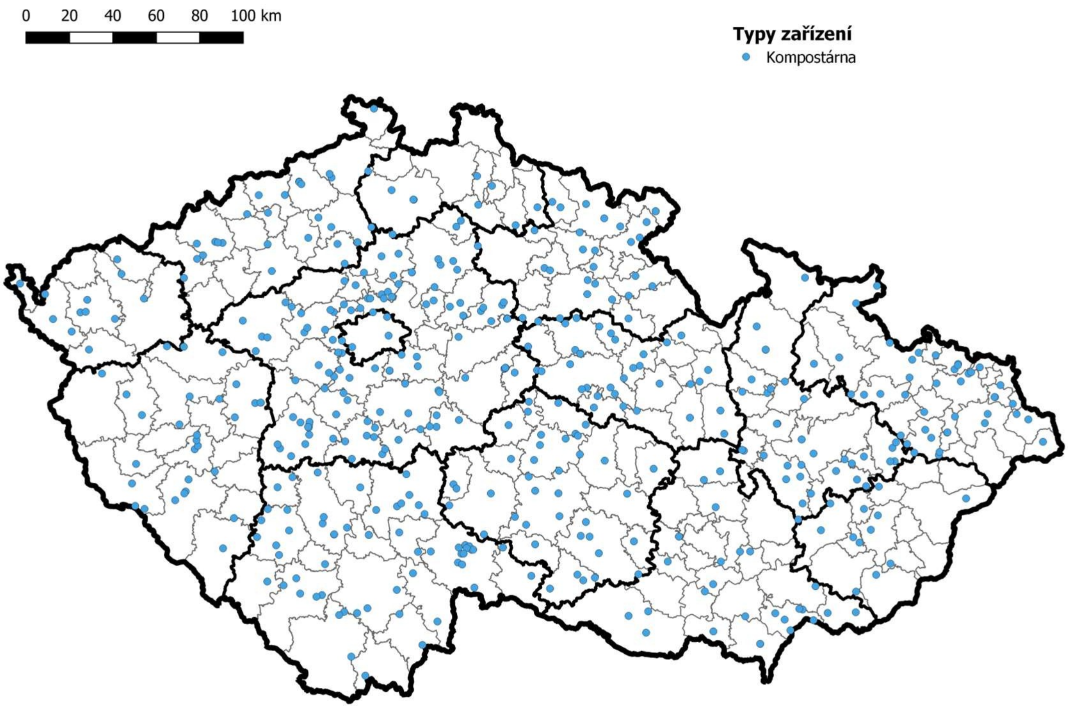
Composting plants are the key type of facility for biological waste management, processing most of the waste stream. Approximately 40% of the 20 01 08 stream (17,000 tons) was used for energy in biogas plants. Given that the biological waste stream (20 01 08, 20 02 01 excluding 20 01 25) is handled in the preferred manner, it can be concluded that the capacity of the facilities is sufficient for the current production of the stream. However, the capacity is limited by the capacity of the composting plants. The network of biogas plants adapted for the treatment of waste category 20 01 08 is insufficient (see below).

According to the ISOH Register, composting plants have an annual processing capacity of 686,000 tons. There are 70 small composting plants operating in the Czech Republic. With a maximum annual capacity of 150 tons as stipulated by law, their capacity is approximately 10,500 tons. During the 2007–2013 European funding period, dozens of projects were implemented to build, modernize, and expand the capacity of composting plants. The last call for proposals took place in the 2014–2020 funding period. It was subsequently assessed that the network within the Czech Republic is sufficient (in most of the territory) and does not need further subsidy support. In 2023, a call for proposals was announced under the National Recovery Plan, which enabled the purchase of technology for existing composting plants, primarily in the area of enabling the acceptance of sludge from wastewater treatment plants and its application to agricultural land. This also included the construction of new composting plants. Biogas plants have a registered capacity of 457,000 tons. In the case of biogas plants, it should be emphasized that the permitted capacity applies to several types of waste, i.e., also waste that is not part of the biological waste stream.

The production of biological waste will increase in the future (see Chapter 2.3.1.8). Projections assume continued growth in the production of category 20 02 01 due to the expansion of individual container collection and a sharp increase in the production of category 20 01 08 due to the separate collection of bio-waste from the catering sector and the expansion of the collection of kitchen waste of plant and animal origin from households, which will lead to a decrease in the production of mixed municipal waste. The total production of the biological waste stream should double by 2035 from the current production value of 900,000 tons to 1.9 million tons. The necessary infrastructure will need to be built for the collection of both streams in the form of collection containers, collection yards, collection vehicles, and, in particular, end-of-life facilities for the utilization of this waste. These include composting plants and biogas stations. The method of collecting bio-waste will be set up in interaction with the end-of-life facility, where processing under category 20 01 08 will be preceded by a sanitation process. Use in biogas stations or special reactors is preferred, but after sanitation it can also be processed in a composting plant. Plant bio-waste can be processed at a composting plant without prior treatment. According to the Ministry of the Environment's analysis of mixed municipal waste (TIRSMZP19)[31], the bio-waste content in MSW was 23%. A more detailed analysis shows that the non-plant portion is approximately 11%. Given the current production of municipal solid waste and the impact of prevention activities, this may mean a need for sanitation in the range of approximately 200,000 tons per year. To this must be added food waste from the catering sector, where the forecast is for an increase of approximately 100,000 tons per year. If approximately 400,000 tons of biological waste were to be sent to biogas plants, the capacity of composting plants would need to be increased by 600,000 tons.

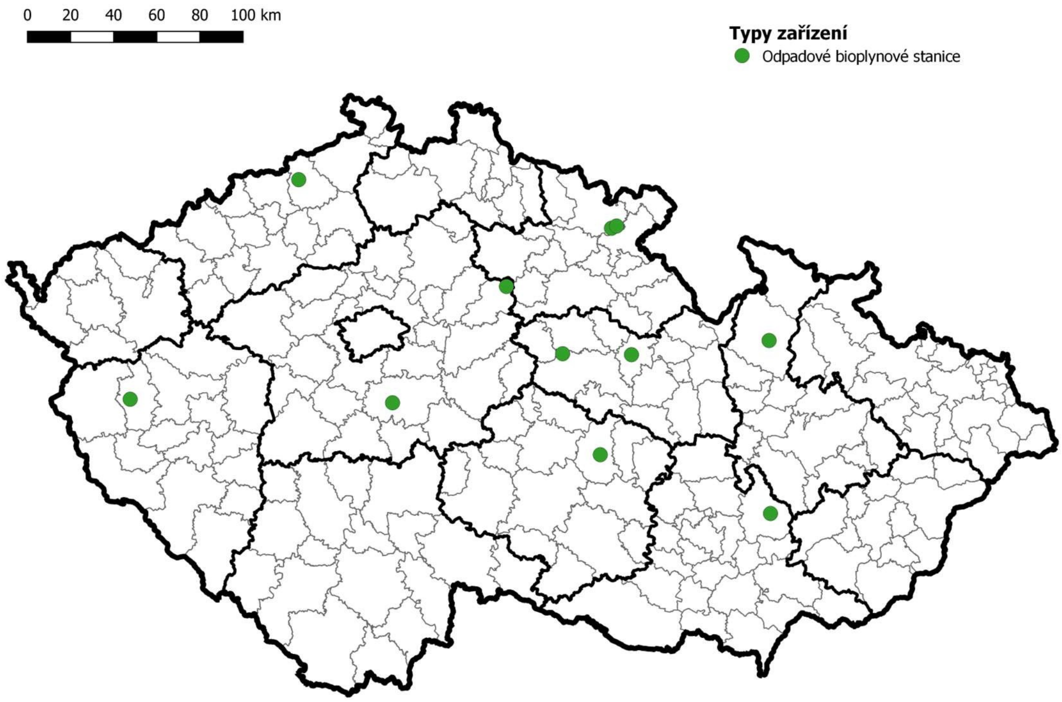
[31] Gregor J. Kropáč J. Results of the average composition of mixed municipal waste in the Czech Republic, 2022 (Summary report of the Ministry of the Environment), Brno University of Technology, result of project TIRSMZP719, available at: https://www.mzp.cz/cz/prumerne_slozeni_sko.

Figure 12: Map of active facilities treating biodegradable waste designated as composting plants



Source: ISOH Register of Facilities

Figure 13: Map of active facilities treating biodegradable waste marked as biogas plants

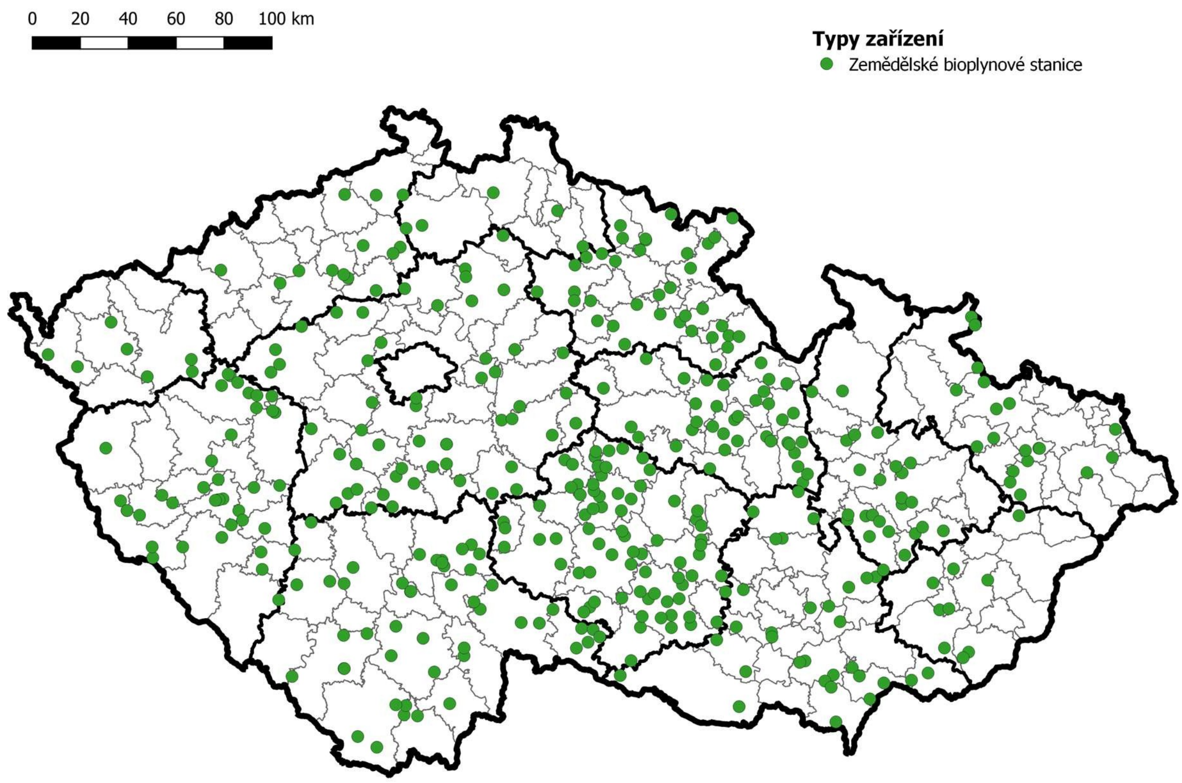


Source: processed based on ISOH

Furthermore, the website of the Czech Biogas Association lists more than 700 agricultural biogas plants. Some of these could be expanded to enable the use of biodegradable waste.

. Expansion is associated with investment costs for waste reception and treatment technologies, sanitation or pre-fermentation technologies, sludge treatment, and expenses related to construction modifications.

Figure 14: Map of agricultural biogas stations



Source: Czech Biogas Association https://www.czba.cz/mapa-bioplynovych-stanic.html?strana=6#table

2.6.2 Recycling lines for construction and demolition waste

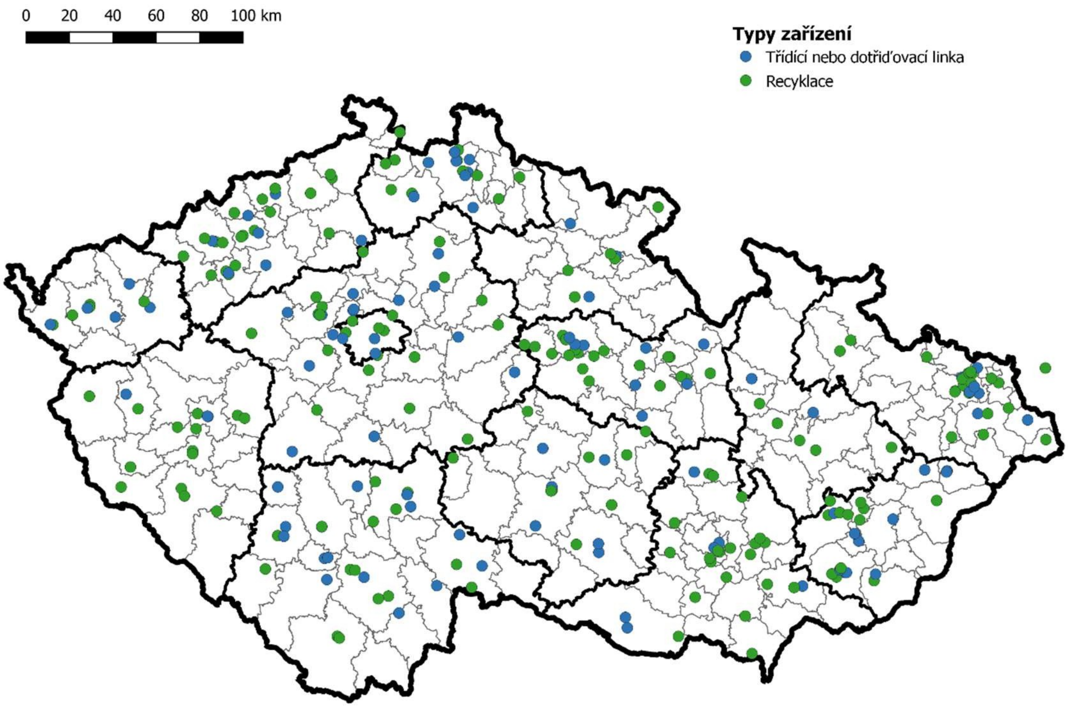
Of the total number of more than 6, 200 stationary facilities, 4,044 facilities had a permit to handle a waste catalog number belonging to the construction and demolition waste stream in 2022**.** There were **3,311** active **facilities** in terms of construction and demolition waste streams**.** In addition to stationary facilities, there were also 777 mobile facilities operating in the Czech Republic that recorded the handling of construction and demolition waste in 2022.

The current capacity of recycling lines for construction and demolition waste appears to be sufficient for current production. Mobile facilities are common and are used almost exclusively for the recycling of mineral construction waste during the construction season, and in winter it is common for these facilities to be used in cooperation with quarry operators. In order to achieve the recycling targets for construction and demolition waste in 2030 and, in particular, 2035, when the amount of recycled construction and demolition waste will need to be increased by approximately 600,000 tons, processing capacities will need to be increased. Based on market experience, it is expected that 30% of the required increase will be covered by current technologies. The remaining 400,000 tons will require new recycling lines. A typical recycling line with a medium-sized crusher has an hourly processing capacity of 60 to 80 tons of input material. With a considered working time of 2,000 hours/year, the annual processing capacity is between 100,000 and 125,000 tons. A recycling line for construction and demolition waste can be approved as a mobile facility (travels to the waste producer) or a stationary facility (waste is brought to the facility).

In the event of an increase in construction and demolition waste of approximately 2.4 million tons, as predicted, with up to 1.8 million tons predicted for subgroup 17 01, it will be necessary to recycle an additional **2.7 million tons of construction and demolition waste** compared to today's levels. In such a case, most of the newly generated construction and demolition waste would have to be recycled, which requires adequate technology and also considerable investment.

There is a significant deficit in technologies for the utilization of metals from construction and demolition waste (subgroup 17 04). This deficit amounts to 600,000 tons for the entire Czech Republic. Significant capacity is only available in the Moravian-Silesian Region, while other regions are in deficit. A large amount of metals is therefore exported. Investment in the development and maintenance of current processing capacities for metal recycling would reduce the Czech Republic's dependence on imports of primary raw materials for the steel industry (see also section 2.6.3 below).

Figure 15: Map of active facilities handling construction and demolition waste designated as recycling and sorting or re-sorting lines



Source: processed on the basis of ISOH

2.6.3 Recycling of metal waste

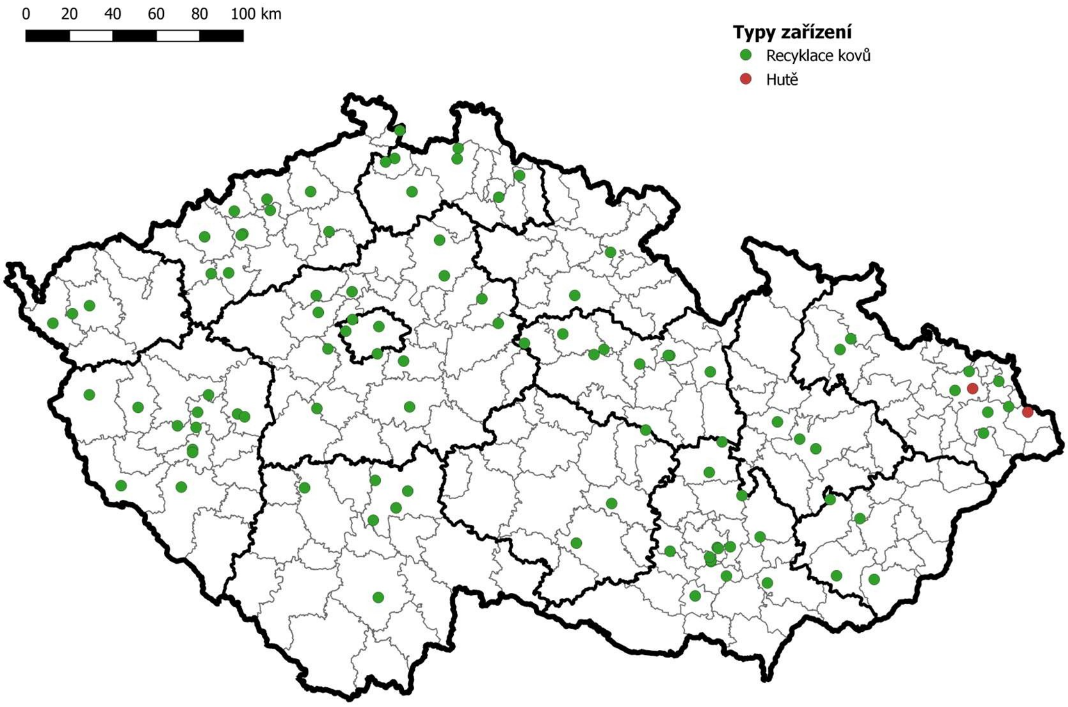
There is a significant lack of capacity for recycling metal waste from industry (including metals in construction and demolition waste, see above) in all regions except Moravia-Silesia (based on data for 2022), where capacity is concentrated in two metallurgical plants, Liberty Ostrava a.s. (which is currently facing significant operational and existential problems) and TŘINECKÉ ŽELEZÁRNY a.s.

The issue of iron recycling was also addressed in detail in a study[32], which mentions the intention of steelworks to switch to electric arc furnaces in order to reduce greenhouse gas emissions and decarbonize the sector. The installation of new technologies will enable a significant increase in the addition of scrap iron to up to 3.5 times the current levels. The study states the current consumption of scrap from sources other than own steel production at

[32] INCIEN: Risks, obstacles and priorities for maximising the production and consumption of recycled steel (October 2023), available at: https://incien.org/wp-content/uploads/2023/11/Prilezitosti-cirkularni-ekonomiky-pro-dekarbonizaci-ceskeho-prumyslu-OCEL.pdf

level of 800 to 900 thousand tons per year. These figures confirm the recycling rates for the Moravian-Silesian Region. The implementation of electric arc furnace plans should ensure the necessary processing capacity for emerging ferrous metal (steel) waste, thereby reducing exports of this strategic raw material outside the Czech Republic. Recycling capacities and their existence are highly dependent on the decisions of owners regarding the development or decline of steel production in the Czech Republic.

Figure 16: Map of active metal handling facilities marked as smelters and metal recycling facilities



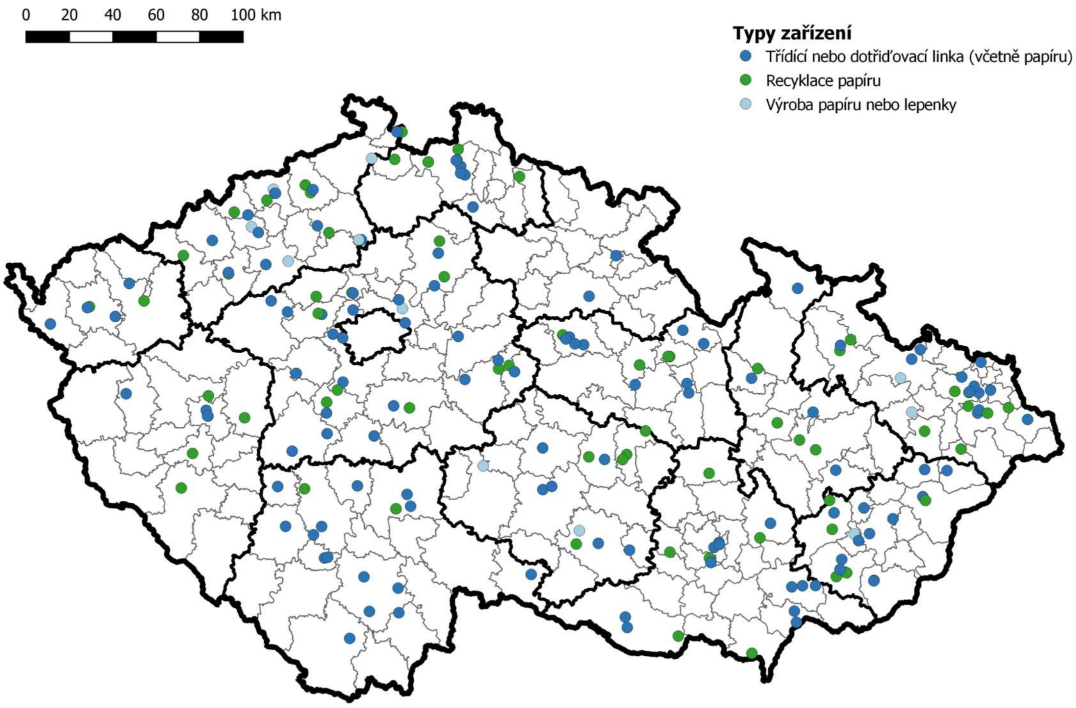
Source: processed on the basis of ISOH

2.6.4 Paper recycling

A capacity deficit was identified for the entire Czech Republic for all categories 20 01 01, 15 01 01, and 03 03 08, totaling over 400,000 tons, which roughly corresponds to the amount of waste paper exported from the Czech Republic. Only the Ústí nad Labem Region has sufficient capacity to handle waste paper at current production levels. Current production in 2022 was 1.1 million tons. The scenarios developed anticipate a future increase in waste paper production to around 1.4 million tons in 2035. The production projection is the result of a combination of expected effects of higher sorting rates by citizens in households, companies, and public spaces, digitization trends (lower production of printed materials, leaflets, company promotional materials, etc.), the development of e-commerce and the necessary trend towards changing the structure of consumer packaging, where paper can contribute to the greater sustainability of new-generation packaging. In the long term, by 2035, waste paper production is expected to increase by 300,000 tons, which will deepen the deficit for domestic material use of paper to 700,000 tons. In terms of paper recycling, primarily in paper mills, recycling is linked to the capacity of these facilities in the Czech Republic and the EU. Paper has long been a highly marketable commodity, and it can therefore be expected that the processing capacity deficit in the Czech Republic can be covered by capacity abroad. Over the past decade, several recycled paper machines in domestic paper mills have become obsolete and been decommissioned, but new investments have focused on improving quality and capacity based on primary softwood pulp. A significant amount of paper is exported. During the same period, there were a number of investments in new paper recycling capacities in neighboring countries, which further increased dependence.

The Czech Republic in foreign trade with this commodity. Given the high share of packaging paper and cardboard in the national production mix and the low current use of domestic waste paper for recycling, significant investment incentives for new capacity will be needed in the coming years to ensure that this raw material is used in the Czech Republic.

Figure 17: Map of active paper handling facilities designated as sorting or re-sorting lines, recycling and paper or cardboard production



Source: processed on the basis of ISOH

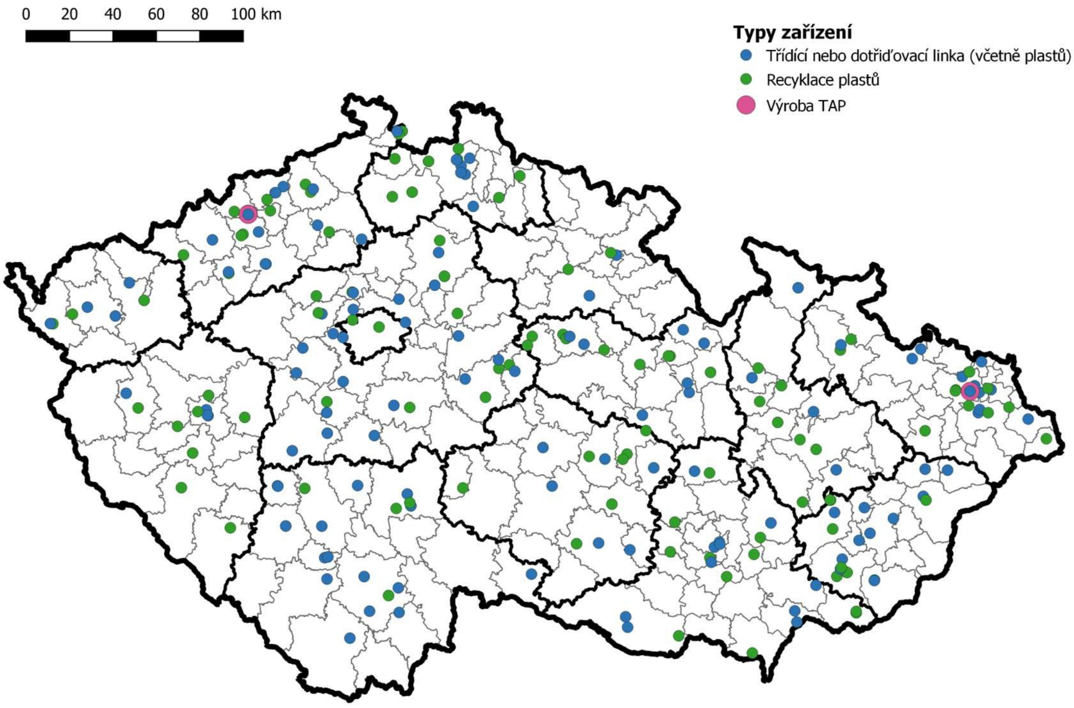
2.6.5 Sorting and recycling of plastics

Sorting lines are an important element in the handling of recyclable and recoverable waste, especially separately collected fractions. These facilities ensure the treatment of waste and the preparation of secondary raw materials in accordance with the requirements of the recycling industry in terms of material composition and required quality. The Czech Republic has a relatively dense network of sorting lines, many of which sort multiple commodities together. Based on a combination of data from the Register of Facilities and data provided by EKO-KOM a.s., it was found that in 2022, there were **119 facilities** in operation in the Czech Republic **for the sorting of waste from** the separate collection of plastics, paper, metals, and beverage cartons. Another 14 facilities provide only partial treatment, such as pressing. The capacity of the facilities varies, most often in the thousands of tons per year. In terms of the sorted commodities that are processed on the lines, there are various combinations, the most common being plastic, paper, beverage cartons, and metals, which are handled by 43 facilities. The combination of plastic, paper, and beverage cartons is accepted by 38 facilities, while the combination of plastic and paper is accepted by 16 facilities. Only a few facilities are dedicated exclusively to individual commodities.

The total capacity of all sorting facilities designed to sort separately collected paper and plastic commodities is 3.1 million tons. The current network of plastic sorting facilities appears to be sufficient. In terms of technology for sorting separately collected plastic and paper waste, manual sorting is the preferred method in the Czech Republic. In 2024, only two automated sorting facilities were in operation.

lines for plastic originating from separate collection, one of which is hybrid, i.e. also designed for sorting mixed municipal waste in the second shift. However, the facilities do not meet the requirements in terms of performance, efficiency, operating costs, scope, and quality of the sorted and processed commodities produced. It is recommended to support the construction and efficient operation of modern automated sorting lines, which will ensure high-quality outputs suitable for recycling and reuse in the plastics industry. The aim is to build sophisticated facilities with high flexibility and the ability to respond to future changes and market needs. The aim is to have a smaller number of facilities that will be able to sort relatively specific streams for which recycling technologies already exist. In the future, it will be necessary to monitor the development of new thermochemical technologies and support the emergence of related integrated sorting technologies.

Figure 18: Map of active plastic handling facilities designated as sorting or post-sorting lines, recycling and production of solid alternative fuels



Source: processed based on ISOH

2.6.6 Waste-to-energy facilities

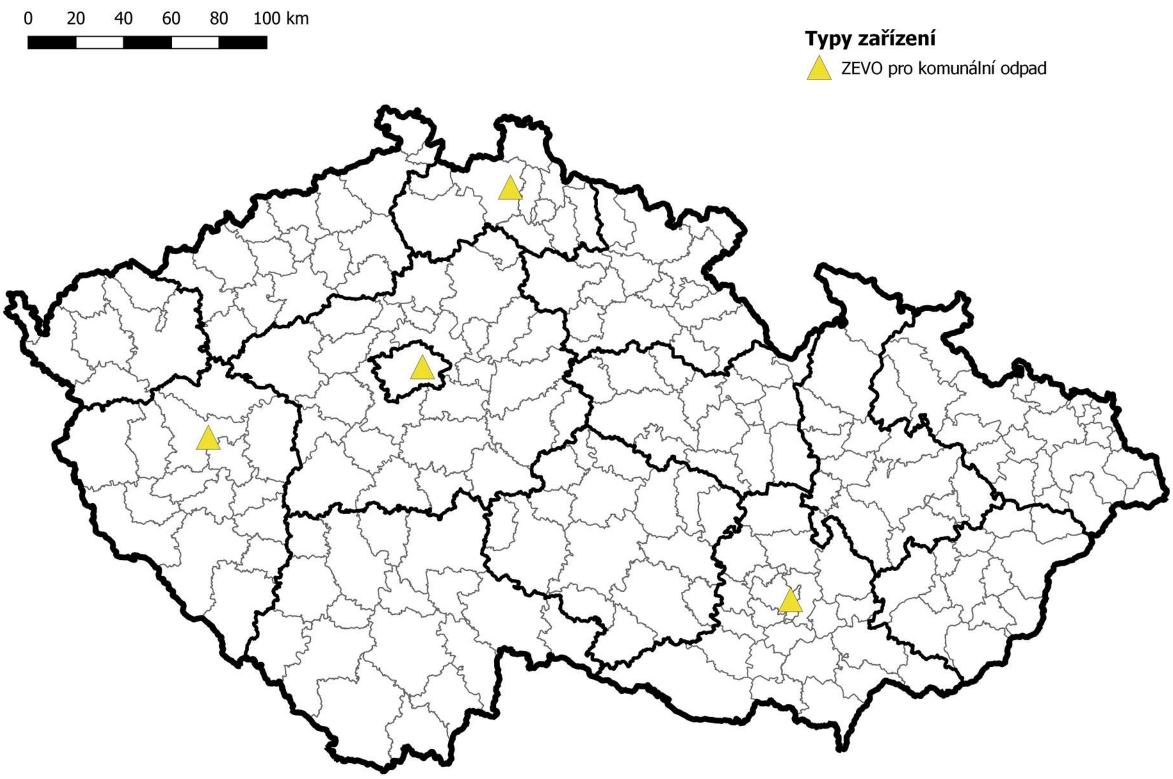
There are currently four waste-to-energy plants in the Czech Republic. The waste they are authorized to process includes mainly mixed municipal waste. These are the Malešice waste-to-energy plant operated by Pražské služby, a.s. (394,000 tons per year), the Brno waste-to-energy plant (248,000 tons per year), and the Chotíkov waste-to-energy plant (120,000 tons per year). There is also another stationary facility licensed under Act No. 185/2001 Coll., which is licensed to process mixed municipal waste – the Liberec waste-to-energy plant (96,000 tons per year). The total licensed annual capacity of all four existing facilities is currently (2024) 858,000 tons per year.

A number of other facilities are currently in preparation. Four facilities are at an advanced stage of preparation and have already been approved for investment subsidies from the Modernization Fund. Specifically, these are a waste-to-energy plant in Mělník (320,000 tons per year), a waste-to-energy plant in

Komořany (150,000 tons per year), a waste-to-energy plant in Planá nad Lužnicí (80,000 tons per year), and a waste-to-energy plant in Písek (50,000 tons per year). The total processing capacity of all current and planned projects is 1,458,000 tons per year.

In 2022, the waste used for energy in these facilities consisted mainly of mixed municipal waste (84.6%). Other significant waste streams included bulky waste (6.6%) and waste under category 19 12 12 (6.2%).

Figure 19: Map of active facilities processing mixed municipal waste designated as waste-to-energy facilities



Source: processed based on ISOH

A number of other facilities are currently in preparation. Five facilities are at an advanced stage of preparation and have already been approved for investment subsidies from the Modernization Fund. These are:

- waste-to-energy plant in Mělník (320,000 tons per year),
- waste-to-energy plant in Komořany (150,000 tons per year),
- waste-to-energy plant in Planá nad Lužnicí (80,000 tons per year),
- waste-to-energy plant in Písek (50,000 tons per year) and
- energy recovery facility in Vráto (150,000 tons per year).

The total processing capacity of all current waste-to-energy plants (ZEVO) and these four planned ZEVO projects is 1,458,1608 thousand tons per year.

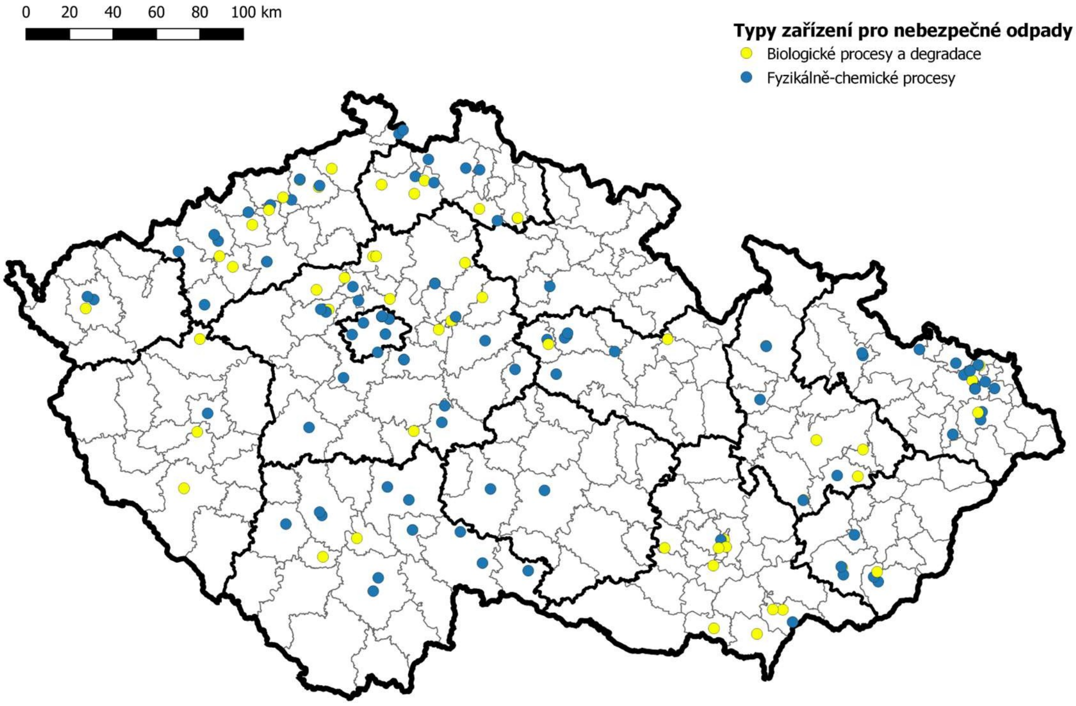
2.6.7 Hazardous waste treatment facilities (excluding landfills)

Chapter 2.3.13 evaluated the production and handling of hazardous waste. The following text supplements this information with conclusions on hazardous waste handling facilities. The capacity of demulsification stations is almost sufficient for current production. The capacity of neutralization stations is sufficient for current production. The network of neutralization stations and demulsification stations is uneven. There is a capacity deficit in the Vysočina, Liberec, Olomouc, and Plzeň regions.

The capacity of biodegradation areas is not sufficiently distributed across the Czech Republic. There is only surplus capacity in the Central Bohemian and South Bohemian regions and, to some extent, in the Zlín region. The capacity of stabilization lines is insufficient for the current production of hazardous waste suitable for stabilization and, from a national perspective, there is a deficit of 25,000 to 30,000 tons. Sufficient capacity of stabilization lines in relation to future production appears to be available in the South Bohemian and Olomouc regions. There is a significant deficit in the South Moravian and Zlín regions. In other regions, the balance is approximately even, but capacities should be increased if the hazardous waste forecast is met.

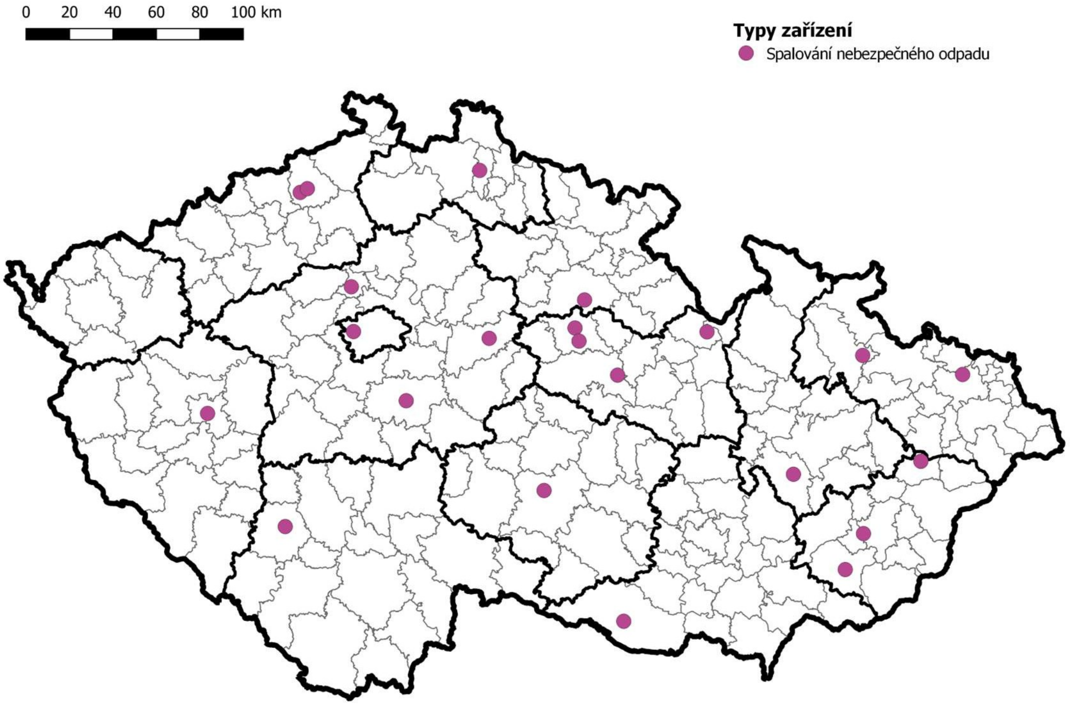
Hazardous waste incinerators are a key technology for the safe disposal of combustible hazardous waste. There are 21 hazardous waste incinerators in operation in the Czech Republic with a total processing capacity of 104,000 tons. Six of these are hospital incinerators with a capacity of 8,500 tons. Given the current production of hazardous waste, there is a shortfall in capacity for the incineration of hazardous waste of approximately 45,000 tons. The amount of this waste is still growing. At the same time, almost 16% of this waste is processed by non-preferred methods *of disposal at or below ground level (landfilling) and disposal of waste as technological material to secure landfills.* The South Bohemian, Pardubice, and Karlovy Vary regions have sufficient capacity for the preferred treatment of combustible waste. Although the capacity of hazardous waste incinerators in these regions is insignificant or zero (Karlovy Vary Region), the balance is positive due to the high material recovery of hazardous waste (South Bohemian and Karlovy Vary Regions) or the treatment of this waste for subsequent energy recovery (Pardubice Region).

Figure 20: Map of active facilities treating hazardous waste classified as biological processes and degradation and physical-chemical processes



Source: processed based on ISOH

Figure 21: Map of active facilities treating hazardous waste classified as waste incineration



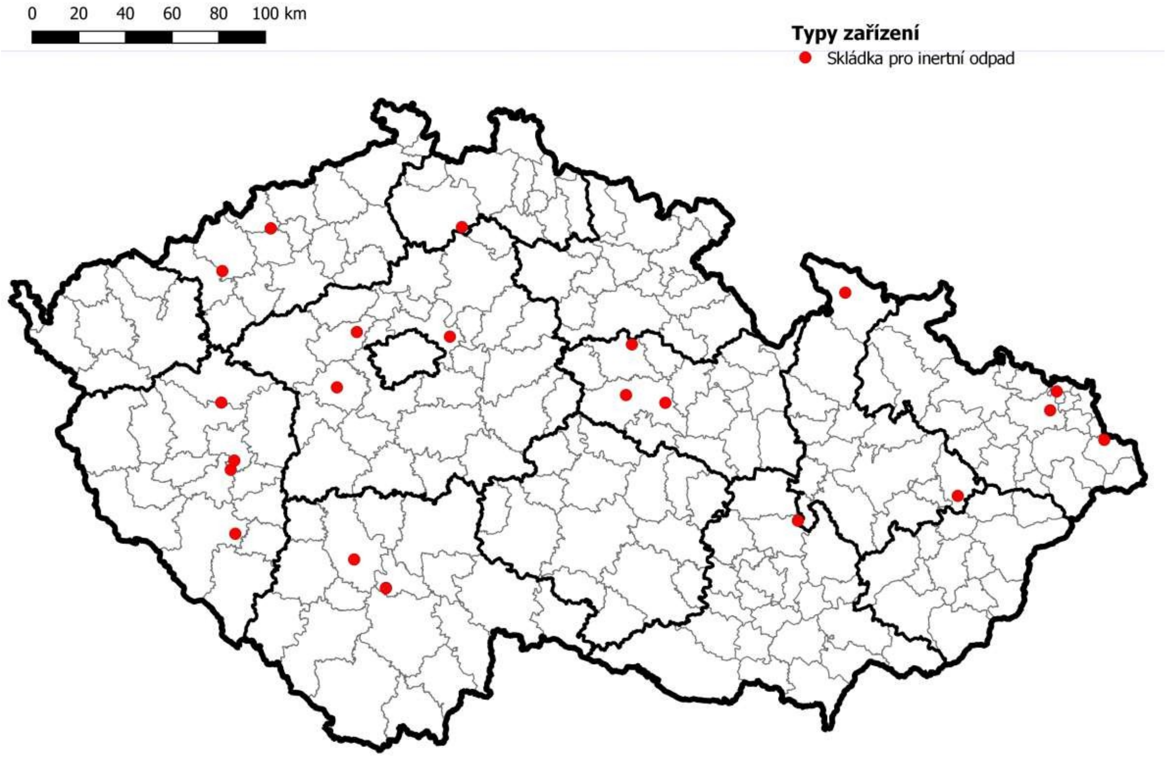
Source: processed based on ISOH

2.6.8 Landfills

The Czech Republic has a dense network of landfills. Landfills are divided into types S-IO (landfills for inert waste), S-OO (landfills for other waste) and S-NO (landfills for hazardous waste).

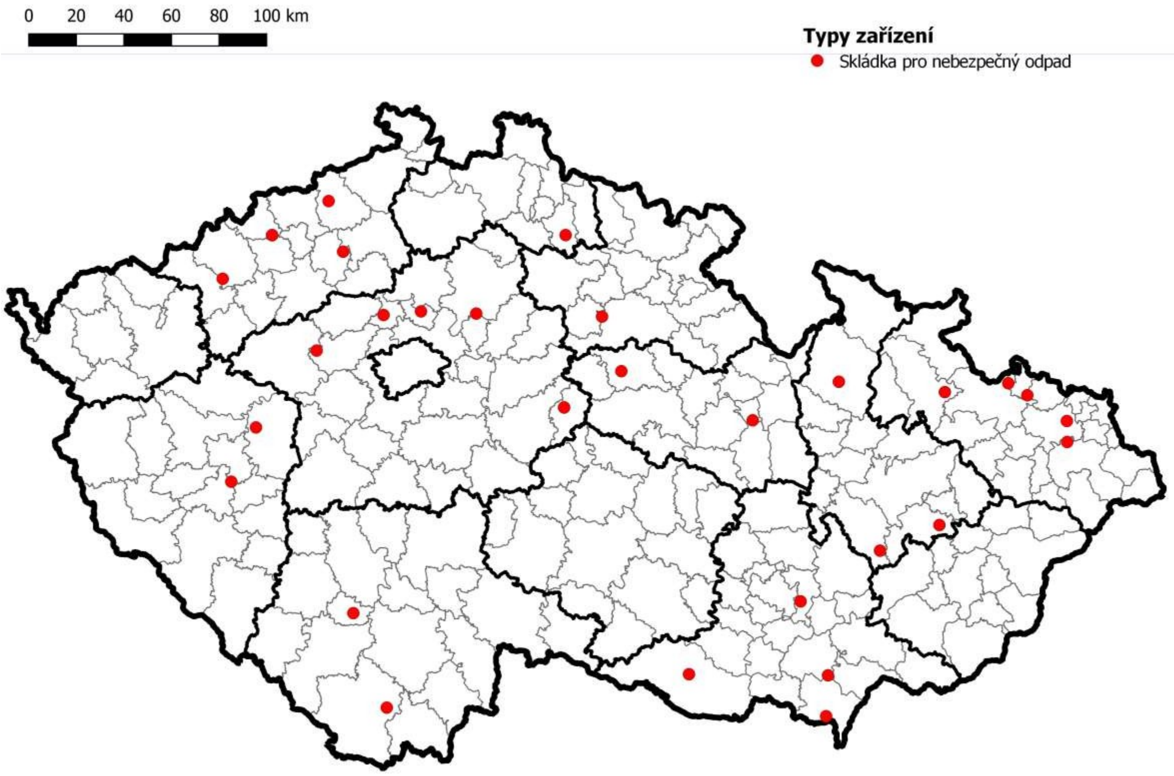
Hazardous waste landfills, as well as inert waste landfills, are lacking in some regions. In addition, information on their available capacity is not available for some of them. As mentioned above, in 2022, approximately 4.5 million tons of all waste was landfilled, of which 2.8 million tons was municipal waste. Outside group 20, mainly construction and demolition waste and soil, i.e. inert waste, is landfilled in S-IO, S-OO and S-NO landfills. Landfilling of municipal waste will be banned from 2030. A significant proportion of residual waste will be used for energy recovery. The production of waste in group 19 will therefore increase. This will again mainly be inert materials.

Figure 22: Map of landfills for inert waste (S-IO)



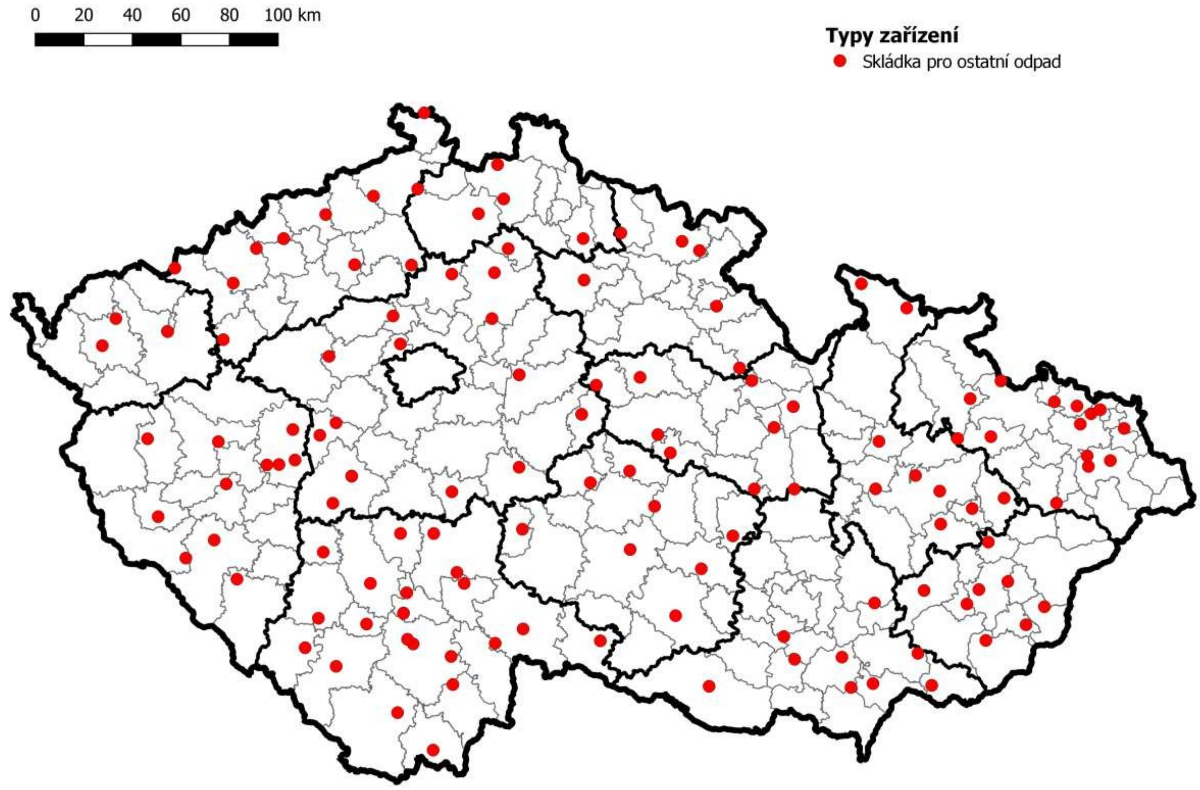
Source: processed based on ISOH

Figure 23: Map of landfills for hazardous waste (S-NO)



Source: processed based on ISOH

Figure 24: Map of *landfills for other waste (S-OO)*



Source: compiled based on ISOH

2.6.9 Summary of the waste management network

The SWOT analysis of the waste management network is based on the summary information provided in the previous chapters and on the conclusions of detailed analyses of the adequacy of the network and the future management of individual waste streams. The Czech Republic has a very good network of facilities for separate waste collection. In addition to collection yards, mobile waste collection facilities are also widely used, even in cases where their use is unjustified, as they are only used for waste transport (collection of mixed municipal waste, etc.). The waste then travels through a network of facilities, where it is transferred between facilities, treated, or otherwise handled. In addition to waste treatment facilities (which produce waste group 19), end-of-pipe facilities play a key role. The analysis showed that there is sufficient capacity for the preferred treatment of waste streams such as construction and demolition waste, biodegradable waste, recyclable waste (where domestic capacity is lacking and is replaced by exports in the case of paper and metals), agricultural waste, and sewage sludge. On the other hand, a lack of capacity was noted for mixed municipal waste, where there is a lack of capacity for energy recovery, bulky waste, collection yards, facilities for mechanical sorting of bulky waste, and subsequent energy recovery of non-recyclable parts. There is also a lack of capacity for the treatment of selected groups of hazardous waste, specifically hazardous waste suitable for incineration, i.e., there is a general lack of hazardous waste incineration capacity, including medical waste incinerators. Another important aspect is the modernization of existing capacities with the aim of increasing their efficiency, performance, and competitiveness in the developing market for appropriately treated waste and prepared secondary raw materials of high purity, with a declarable origin, in accordance with the principles of circularity.

Table 61: SWOT analysis of waste management facilities

Strengths (S – Strengths)	**Weaknesses** (W – Weaknesses)
▪ The existing network of facilities enables waste to be managed in accordance with legislation, in a controlled and controlled manner. Uncontrolled waste management occurs only in isolated cases. ▪ Existence of competition and a market environment in all segments of the facilities. ▪ Increase in capacity and modernization of facilities as a result of subsidy programs. ▪ Developing network of collection yards as a supplementary system to container collection for waste concentration. ▪ Functioning network facilitiesfor network of sorting usable components from separated concentration of waste ▪ Implementation of the automated sorting line projects ▪ Sufficient capacity of the facility for preferred treatment of the following streams (with current waste production and export acceptance): construction and demolition waste, biological waste, recyclable materials	▪ Insufficient capacity of facilities for the preferred treatment of the following streams or sub-streams (with current production): mixed municipal waste – capacity of facilities for energy recovery; bulky waste – capacity of collection yards, facilities for mechanical sorting of bulky waste; hazardous waste suitable for incineration – capacity of hazardous waste incinerators; waste from healthcare and veterinary care – lack of incinerator capacity; biodegradable waste from kitchens and canteens; mining waste and textile waste. ▪ Insufficient capacity for energy recovery from non-recyclable municipal waste and other combustible waste outside group 20. ▪ Excessive use of mobile equipment. Lack of transparency and in the management of waste in mobile equipment.

Strengths
(S – Strengths)

Waste waste containing asbestos and agricultural waste.

- Long-term experience in energy recovery from waste.
- Free capacity of all types of landfills in most regions.

Weaknesses
(W – Weaknesses)

Opportunities
(O – Opportunities)

- and improvement technologies with an emphasis on efficiency and performance and with the aim of launching a circular economy.
- Implementa tion network s automated lines of sorting machine sorting and waste treatment.
- Implementation of waste treatment facilities for processing into high-quality raw materials in accordance with the requirements of the recycling industry.
- Modernization of recycling lines for construction and demolition waste with the aim of increasing the quality of recycled materials.
- Support for investments in recycling technologies for maximum recycling of waste and raw materials in the Czech Republic.
- Shifting waste management from export to domestic production of products with higher added value.
- Investment in technologies for processing paper waste.
- Self-sufficiency of the Czech Republic in metal waste processing (scrap) during implementation of plans electric electric arc furna ces in steelworks.
- Capacity capacity sorting lines as a result of the implementation of a deposit system for selected packaging.
- Developme nt thermochemical (chemical recycling) technologies for waste Especially with plastic waste.
- Development automation, digitization, and modern technologies for management and control of safe waste management.

Threats
(T – Threats)

- Lack of landfill and incineration capacity in some regions. If landfill and incineration of certain types of waste is necessary, or in times of crisis or natural disasters, the longer distance for transporting waste for disposal.
- If production develops according to the set scenarios, there will be a lack of capacity for the flows listed in the weaknesses section and for biodegradable waste – composting plants and biogas stations (up to 1 million tons in total).

Source: own processing

2.7 Assessment of cross-border waste transport

Cross-border waste transport is one of the tools of the free market, but in certain cases it is subject to regulation in the form of legislation. Some waste may be excluded from cross-border transport and is prohibited. This applies, for example, to waste intended for disposal (D-codes) imported into the Czech Republic. Another part of waste is subject to the Prior Informed Consent (PIC) procedure, i.e. prior written notification and consent (see below), and some waste can be transported outside the PIC procedure.

2.7.1 Cross-border transport of waste subject to the PIC procedure

According to Regulation (EC) No. 1013/2006 of the European Parliament and of the Council on shipments of waste (hereinafter referred to as the "Waste Shipment Regulation"), cross-border shipments of defined groups of waste must be notified in advance in writing and the consent of the authorities concerned must be obtained (PIC procedure). The following points apply to cross-border shipments within the EU or OECD countries that have ratified the Basel Convention[33].

Each specific shipment must be notified in advance in writing and consent must be obtained if the waste is:

- intended for disposal – all waste,
- SKO (20 03 01) intended for recovery or disposal,
- intended for recovery.
    - waste listed in Annex IV to the Waste Shipment Regulation, which includes, inter alia, waste listed in Annexes II and VIII to the Basel Convention – the "yellow" list of wastes,
    - waste listed in Annex IVA of the aforementioned Regulation,
    - waste not classified under a single entry in Annex III, IIIB, IV or IVA of the aforementioned Regulation,
    - mixtures of wastes not classified under a single entry in Annex III, IIIB, IV or IVA of the aforementioned Regulation, unless they are listed in Annex IIIA.

A single notification may also be used for multiple shipments if the cross-border shipment of waste meets the following conditions:

- the waste has essentially the same physical and chemical properties,
- the waste is transported to the same consignee and the same facility,
- the transport route specified in the notification form is the same.

Annex IV to the Waste Shipment Regulation contains a "yellow" list of wastes based on the OECD Decision[34], which includes, among other things, Annex II and Annex VIII to the Basel Convention (List A). Individual wastes are identified by a code, most commonly in the format Axxxx, AXxxx, but also RBxxx or EUxx.

The specific requirements of the PIC procedure are specified in the Waste Shipment Regulation and its annexes.

2.7.2 Transboundary shipment of waste subject to general information requirements

Outside the PIC procedure, there is a regime for shipments subject to general information requirements. This regime applies if the waste is:

- intended for recovery, if the quantity of waste transported exceeds 20 kg,
    - listed in Annex III to the Waste Shipment Regulation – the "green" list of waste,
    - waste listed in Annex IIIB or mixtures listed in Annex IIIA of the Waste Shipment Regulation,

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[33] Czech translation available from 6/2015 Coll. m. s. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (zakonyprolidi.cz).

[34] Available from OECD Council Decision C(2001)107/final revising Decision C(92)39/final on the control of transboundary movements of wastes destined for recovery.

- intended for laboratory analysis to assess its physical or chemical properties or to determine its suitability for recovery or disposal in quantities not exceeding 25 kg.

Annex III to the Waste Shipment Regulation contains a "green" list of wastes based on the OECD Decision, which includes, inter alia, Annex IX to the Basel Convention (List B). Individual wastes are identified by a code, most commonly in the format Bxxxx, but also GXxxx or EUxx.

If waste on the "green" list contains material that makes it hazardous, the shipment of such waste will be subject to the PIC procedure.

Waste subject to general information requirements must be accompanied by a document in accordance with the Waste Shipment Regulation. It is also necessary to conclude a waste recovery contract, which must be valid at the time of shipment.

2.7.3 Ratio of imports to exports

Cross-border waste transport has long been focused more on exports than imports, but the difference has been narrowing in recent years. Exports stagnated between 2018 and 2020, with a slight downward trend. There was a more significant increase in 2021, but this did not continue in 2022, and there was a decline to roughly the 2019 level. Imports have been growing significantly since 2019, increasing by around 20% between 2019 and 2021. As with exports, imports also declined in 2022. In 2022, the ratio of waste exports to imports was 53% to 47%. The values of the quantities of waste transported are shown in Graph 49, and the development between 2018 and 2022 is shown in Graph 50.

Graph 49: Waste imports and exports (Czech Republic, 2022)

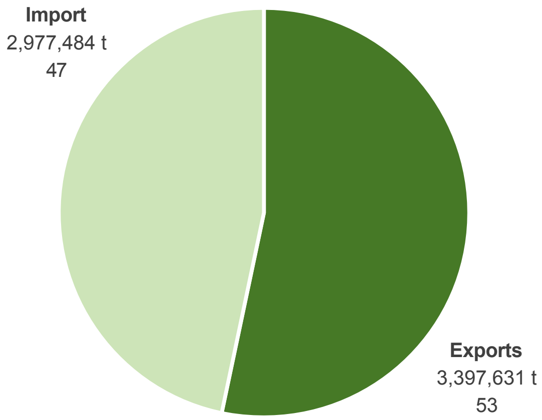
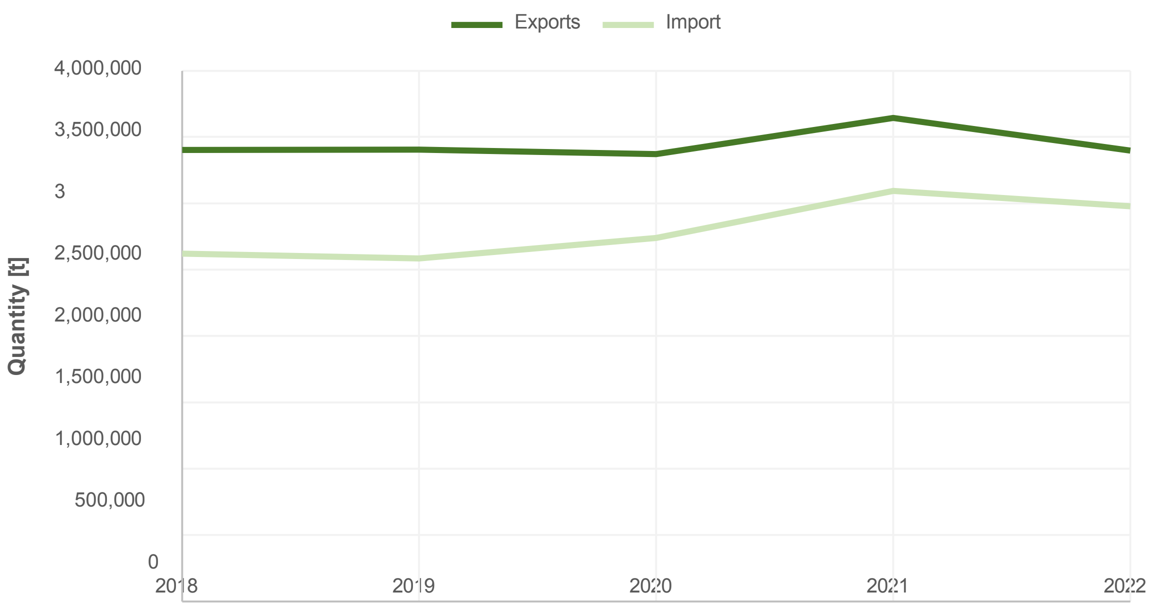


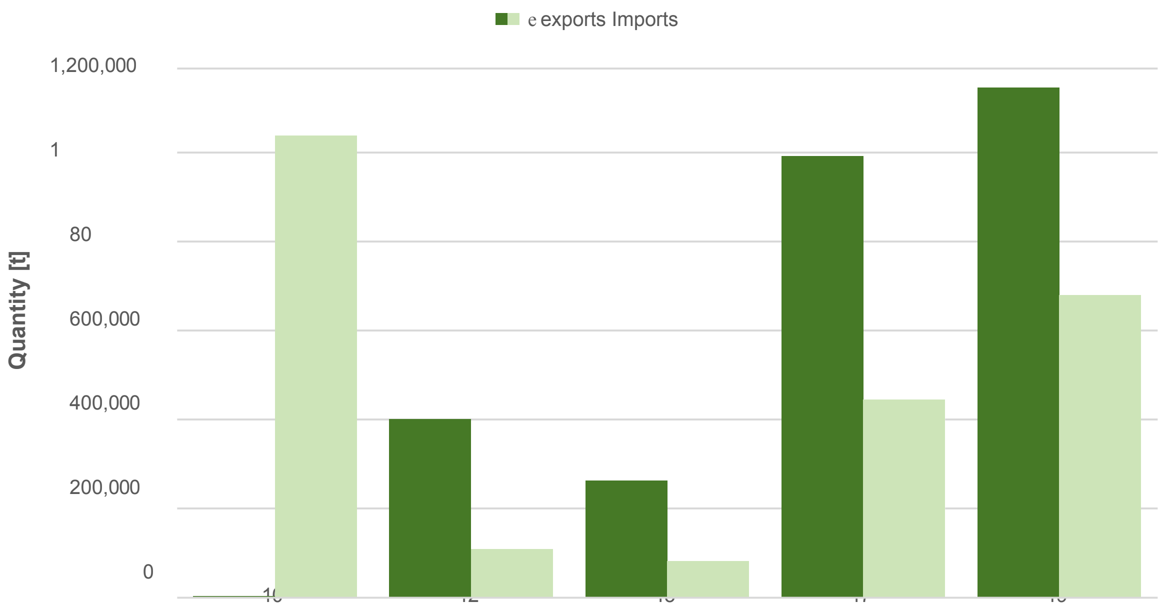
Chart 50: Development of cross-border waste transport in the Czech Republic between 2018 and 2022



Source: processed based on ISOH

The most represented waste groups include groups 10, 12, 15, 17, and 19 (no long-term change). Overall, the most represented waste groups are groups 19 and 17.

Chart 51: Ratio of waste imports and exports in the Czech Republic for the five most common waste groups in 2022

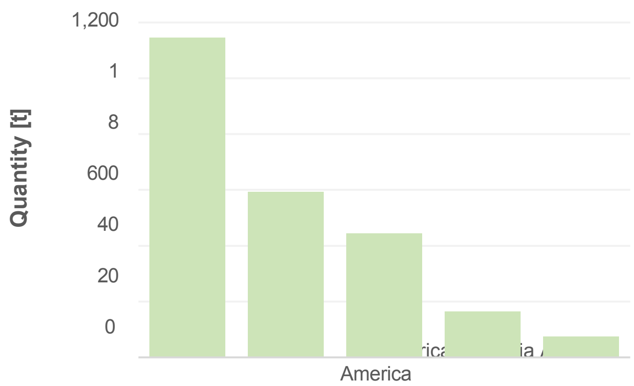


Source: processed based on ISOH

2.7.4 Import

Waste imports come mainly from Europe, specifically from countries of the European Union. In 2022, accounted for total imports to the Czech Republic of 2,977,484 tons. Compared to 2021, this represents a decline of approximately 4% . Of this, 2,953,867 tons came from the EU (99.2%). Imports from European countries outside the EU amounted to 21,197 tons (0.7%), primarily from Switzerland. Imports from countries outside Europe then amounted to 2,420 tons (0.1%) and thus represented a negligible share. Outside Europe, the largest imports in 2022 came from South America, specifically Chile. Compared to 2021, imports from countries outside Europe decreased by 20%.

Chart 52: Imports of waste to the Czech Republic from countries outside Europe in 2022



Source: processed based on ISOH

From the perspective of countries, waste in 2022 was most frequently imported from Austria (38%), Germany (28%), Poland (17%) and Slovakia (10%), i.e. from all neighbouring countries. The fifth most represented country was Italy (2.8%). Other countries have a share of less than 1%.

The ten most represented countries are listed in Table 62.

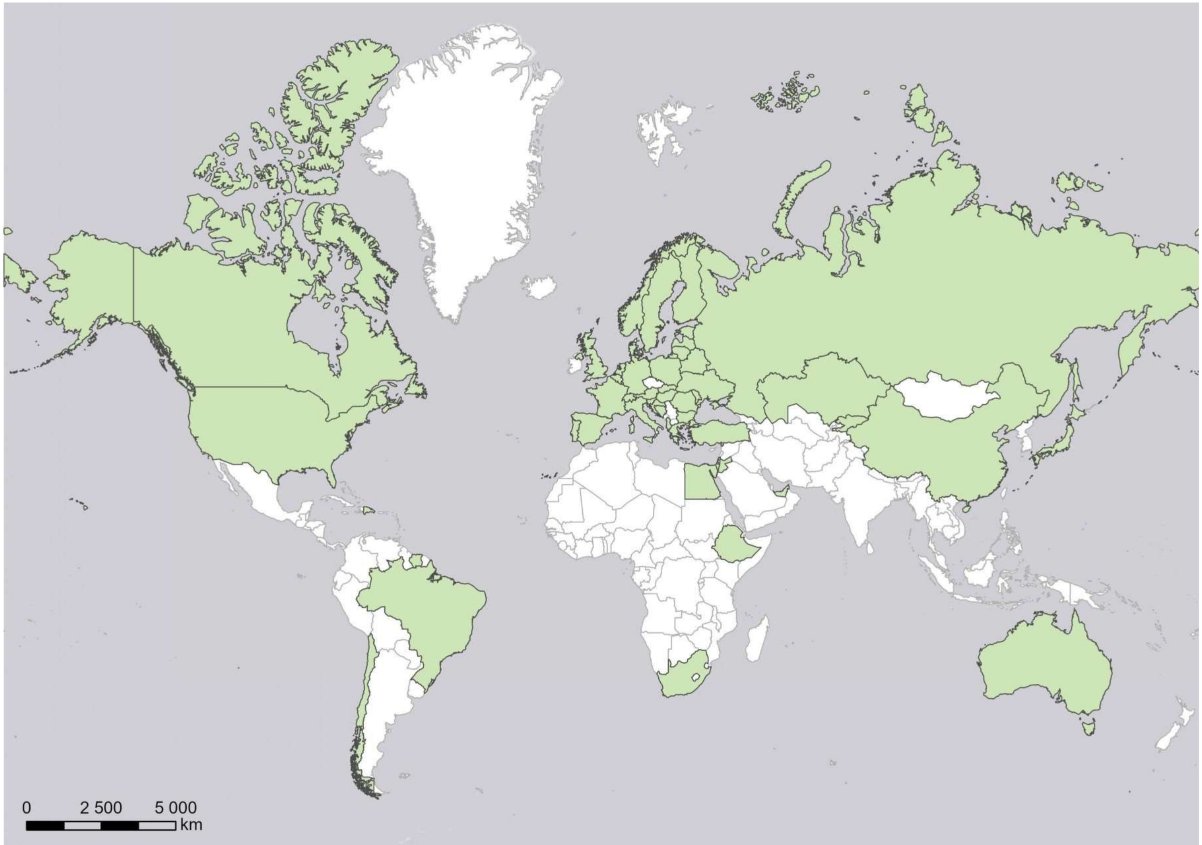
Table 62: Waste imports to the Czech Republic by country in 2022 – top 10

Country	Quantity [t]	Share [%]
Austria	1,125,999	3
Germany	835,344	2
Poland	514,602	17
Slovakia	293,571	9
Italy	84,783	2
Netherlands	24,228	0
Hungary	21,219	0.7
Switzerland	16,193	0
Lithuania	11,933	0
France	7,284	0
Other	42,327	1

Source: processed based on ISOH

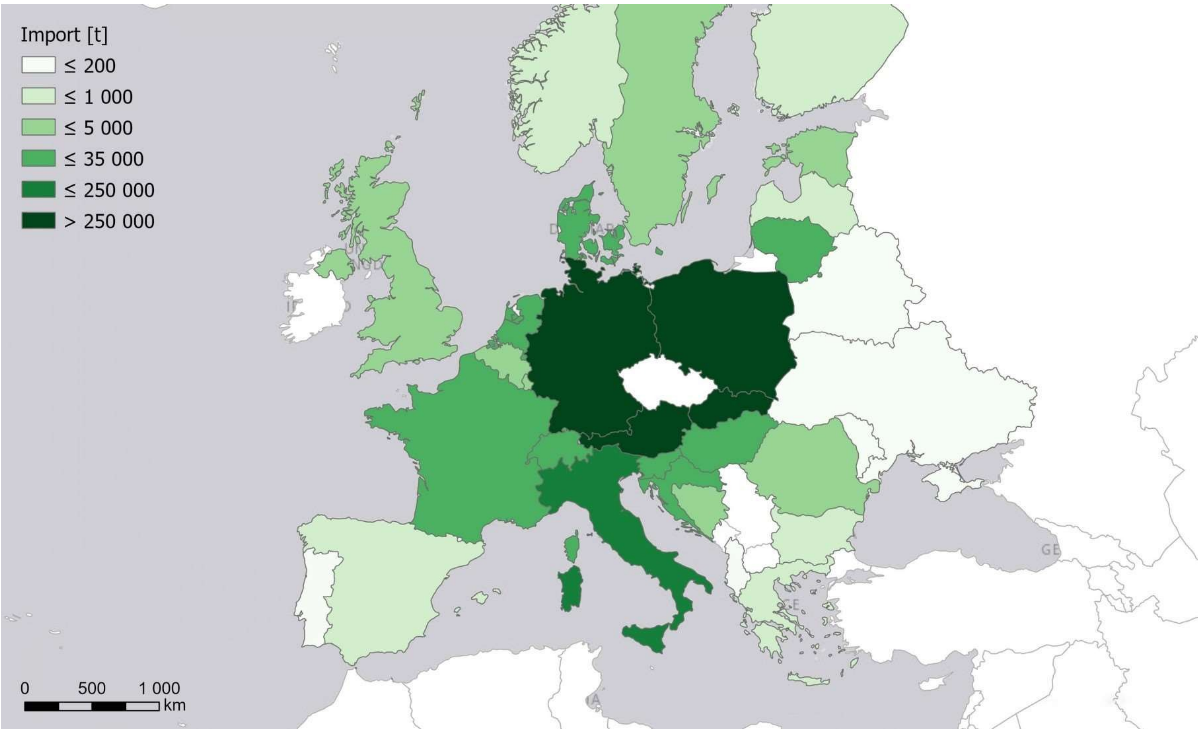
In 2022, the most imported items from Austria were category numbers 10 02 02 (84%), 19 12 10 (4.6%) and 17 02 01 (4.2%). From Germany, the most imported items were category numbers 19 12 04 (18%), 17 08 02 (16.4%) and 19 12 07 (13.3%). The most frequently imported categories from Poland were 17 04 05 (55%), 19 12 04 (10%) and 10 02 10 (6.3%).

Figure 25: Map of countries from which waste was imported to the Czech Republic in 2022



Source: processed based on ISOH

Figure 26: Map of countries from which waste was imported to the Czech Republic in 2022 – Europe



Source: processed based on ISOH

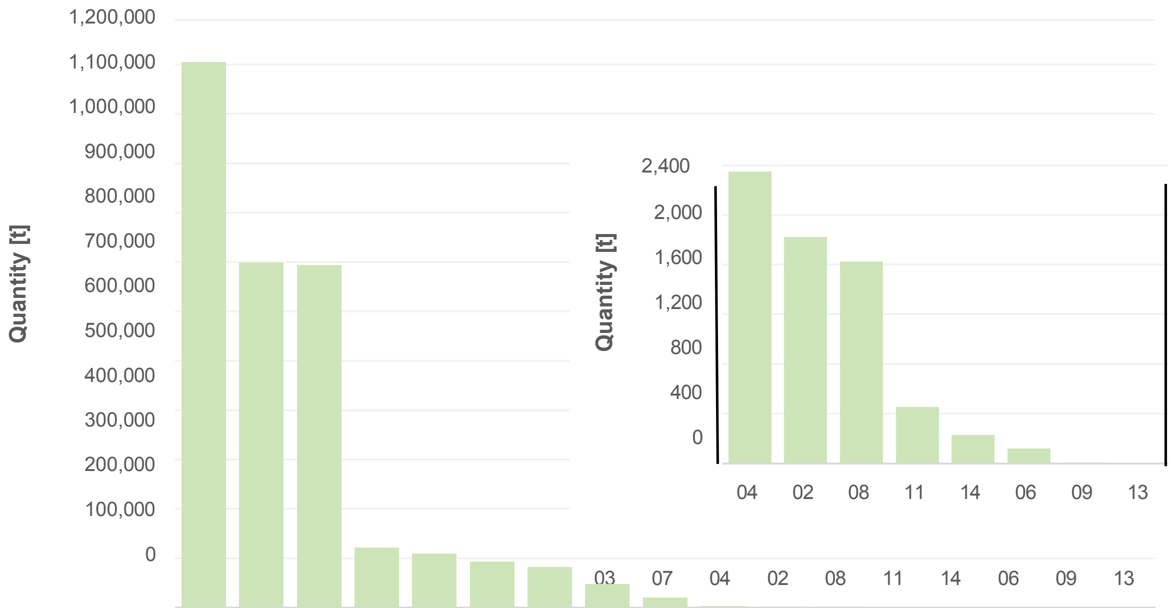
In terms of waste groups, the most imported groups are 10 (37%), 19 (23%) and 17 (23%). In 2022
, imports of group 10 amounted to 1,104,700 tons. Within group 10, subgroup 10 02 (Waste from the iron and steel industry) is significant, accounting for 94%. The most represented category number is 10 02 02 (Unprocessed slag), with imports amounting to 1,003,301 tons, which accounted for 91% of group 10 and 34% of total imports to the Czech Republic.

In 2022, imports of group 19 amounted to 698,769 tons. The majority share is held by subgroup 19 12 (Waste from waste treatment not elsewhere specified, e.g. sorting, crushing, pressing, pelletizing), accounting for 88%. These are mainly category number 19 12 04 (Plastics and rubber) with a share of 40%, 19 12 10 (Combustible waste) with a share of
16.5% and 19 12 07 (Wood not specified under 19 12 06) with a share of 16.4%.

In 2022, imports of group 17 amounted to 693,420 tons. The primary representation is subgroup 17 04 (Metals, including their alloys), which accounts for 64%. Subgroup 17 08 (Gypsum-based building materials) is also represented, accounting for 20%, and 17 02 (Wood, glass and plastics), with a share of 8.1%. The most represented category number is 17 04 05 (Iron and steel) with imports of 401,028 tons, accounting for 58% of group 17.

Other waste groups have been significantly less represented for a long time. The representation of waste groups in imports is shown in Figure 53.

Graph 53: Waste imports to the Czech Republic by waste group in 2022



Source: processed based on ISOH

Table 63 shows their representation in terms of specific catalog numbers. These are the 10 most represented imported wastes by catalog number.

Table 63: Waste imports to the Czech Republic by catalog numbers in 2022 – top 10

Cat. no.	Waste name	Quantity [t]	Share [%]
10	Unprocessed slag	1,003,301	3
17 04 05	Iron and steel	401,028	13
19 12 04	Plastics and rubber	275,698	9.3
17 08 02	Gypsum-based construction materials not specified under 17 08 01	137,710	4
19 12 10	Combustible waste	115,277	3.9
19	Wood not listed under heading 19 12 06	114,534	3.8
19 12 02	Ferrous metals	54,797	1
12 01 03	Sawdust and shavings of non-ferrous metals	53,252	1.8
17 02 01	Wood	52,562	1.8
12 01 01	Sawdust and chips from ferrous metals	42,867	1
Other		726	24

Source: processed based on ISOH

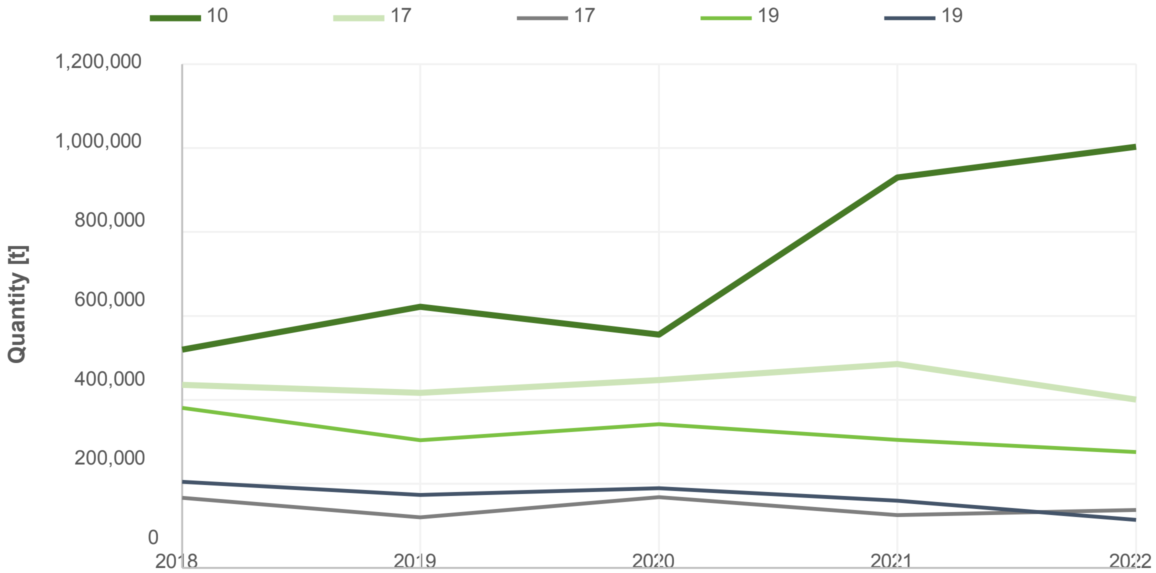
The most significantly represented catalogue number is 10 02 02 (Unprocessed slag), which accounts for almost 34% of imports. It is most frequently transported from Austria (94%) and Germany (6%). The volume of imports is almost five times the production in the Czech Republic (imports cat. no. 10 02 02: 1,003,301 tons, Czech production cat. No. 10 02 02: 201,448 tons).

The second most represented category number is 17 04 05 (Iron and steel) with a share of approximately 13.5%. It is most frequently imported from Poland (71%), Slovakia (24%) and Austria (2.3%). Imports from other countries amount to hundreds or thousands of tons, with individual shares of less than 1%. The volume of imports corresponds to 17% of production i n the Czech Republic (imports cat. no. 17 04 05: 401,028 tons, Czech production cat. 17 04 05: 2,320,702 tons).

The third most represented category number is 19 12 04 (Plastics and rubber) with a share of approximately 9.3%. It is primarily imported from Germany (55%), Poland (19%) and Italy (16%). The volume of imports is 2.7 times the production in the Czech Republic (imports cat. no. 19 12 04: 275,698 tons, Czech production cat. no. 19 12 04: 157,506 tons).

The development of imports of the most represented category numbers is shown in graph 54.

Chart 54: Development of waste imports to the Czech Republic by catalogue numbers – top 5



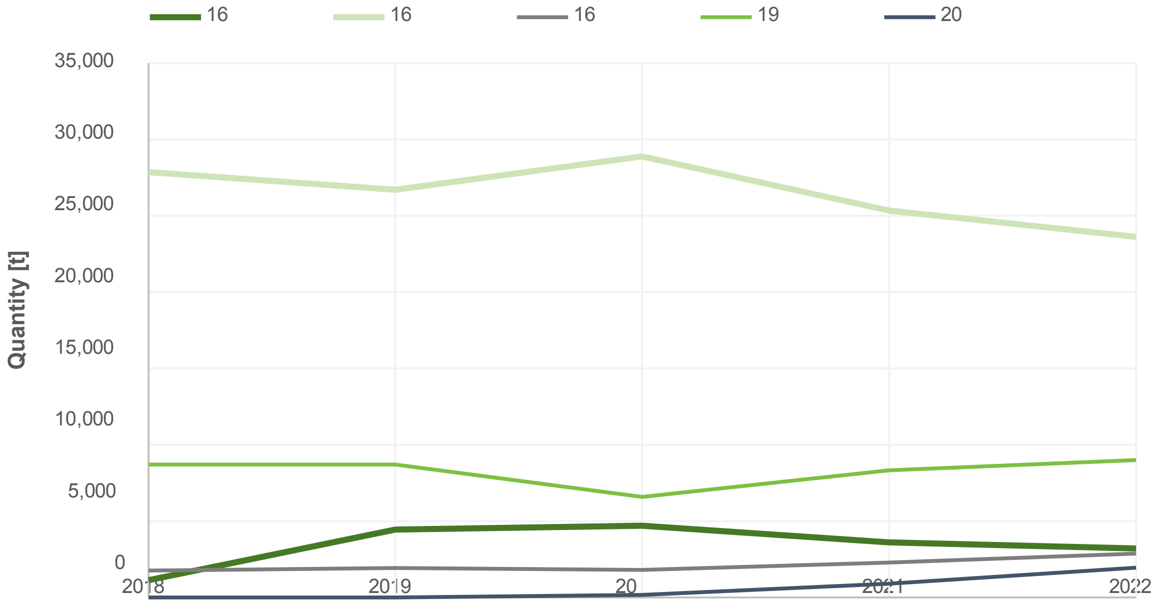
Source: processed based on ISOH

2.7.4.1 Import of hazardous waste

Imports of hazardous waste in 2022 amounted to 43,582 tons. The most frequently imported hazardous wastes include categories 16 02 13, 16 06 01, 16 08 02, 19 12 11, and 20 01 33. The development of their imports is shown in Graph 55.

Hazardous waste is imported primarily from Europe (in 2021 and 2022 only from Europe), with hundreds of tons also coming from Asia (between 2018 and 2020, this was primarily China). Hazardous waste is most often imported from Germany (65%), with Lithuania, Slovakia, Hungary, and China among other frequent countries. Hazardous waste is imported from other countries only in hundreds of tons.

Chart 55: Development of imports of hazardous waste to the Czech Republic by catalogue numbers – top 5

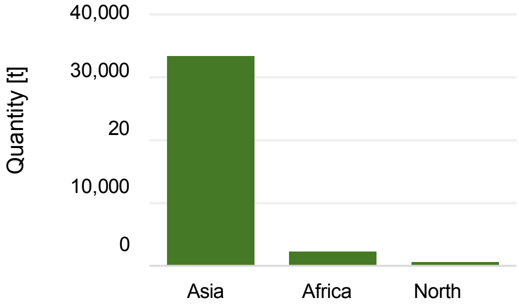


Source: processed based on ISOH

2.7.5 Export

As with imports, waste exports from the Czech Republic are mainly within Europe, specifically to European Union countries. In 2022, total exports from the Czech Republic amounted to 3,397,631 tons, which was a decrease of approximately 7% compared to 2021. Exports to EU countries amounted to 3,343,565 tons (98.4%). Exports to European countries outside the EU amounted to 14,619 tons, which corresponds to 0.4%, and most often involved exports to Switzerland (36%), Montenegro, and Ukraine. Exports to countries outside Europe amounted to 39,447 tons, accounting for 1.1% of total exports. The largest exports are to Asia, specifically to Pakistan (most commonly category number 19 10 01).

Chart 56: Waste exports from the Czech Republic to countries outside Europe in 2022



Source: processed based on ISOH

In terms of countries, waste is most often exported to Germany (43%), Austria (16%), Italy (14%), Poland (13%) and Slovakia (6%). Other countries account for less than 1.5%.

The ten most represented countries are listed in Table 64.

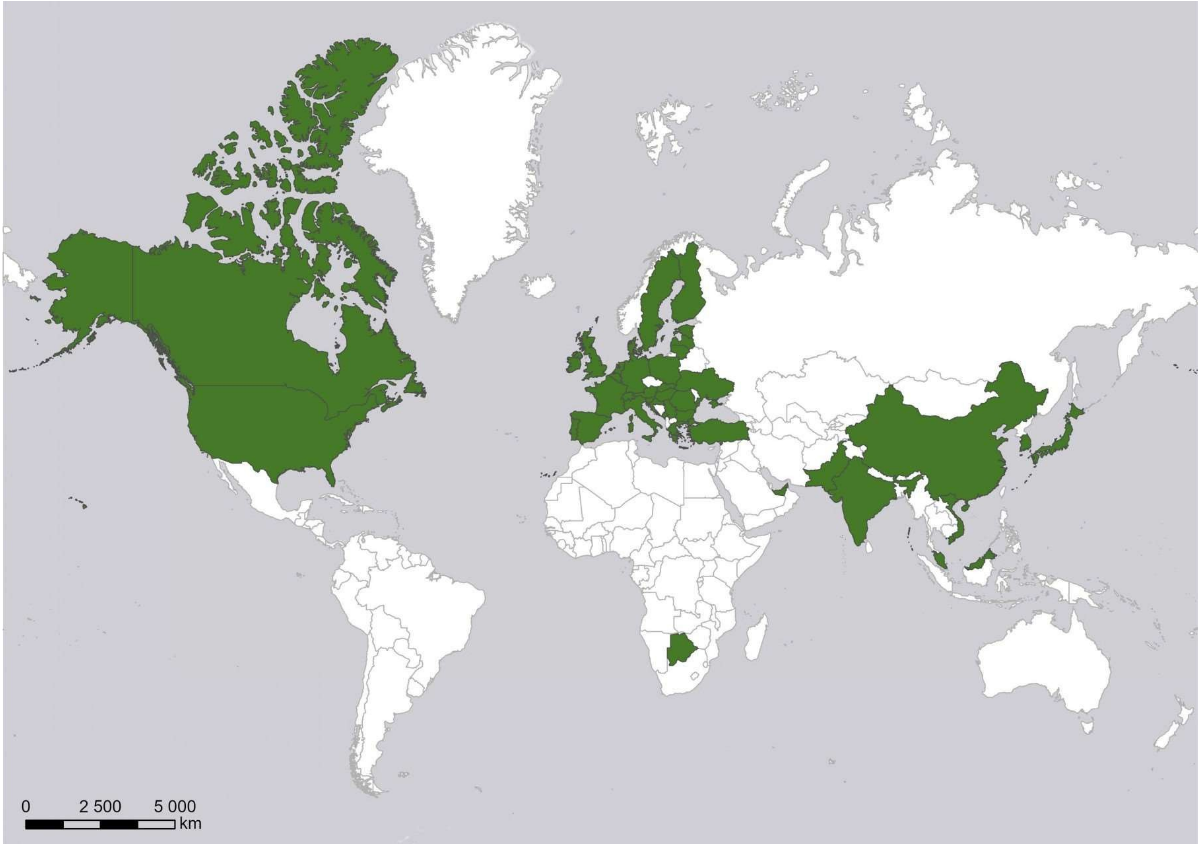
Table 64: Waste exports from the Czech Republic to other countries in 2022 – top 10

Country	Quantity [t]	Share [%]
Germany	1,445,232	42
Poland	545,263	1
Austria	487,963	14
Italy	437,929	12
Slovakia	205,170	6
Netherlands	60,062	1
Slovenia	59,364	1
Pakistan	29,586	0
Hungary	29,207	0
Croatia	23,985	0
Other	73,870	2

Source: processed based on ISOH

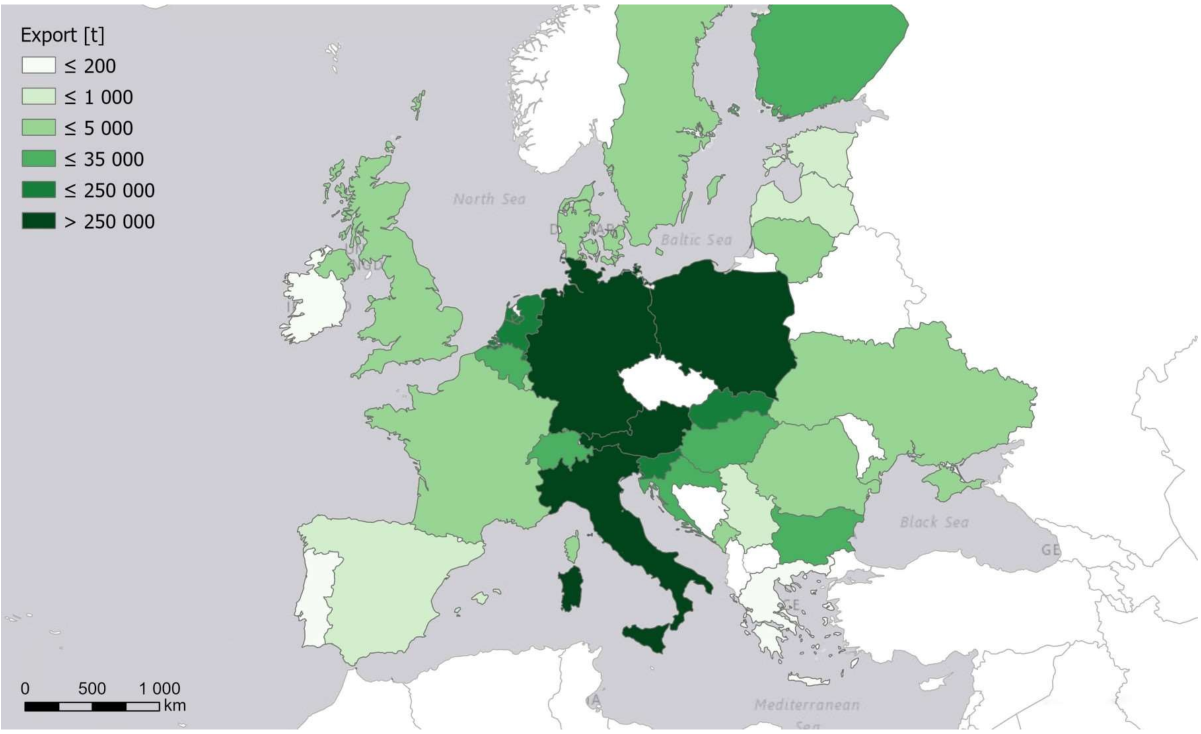
In 2022, the most frequently exported categories to Germany were 19 12 02 (33%), 17 04 05 (15.6%) and 19 12 01 (13.3%). The most exported categories to Poland were 17 04 05 (35%), 19 12 02 (9.8%) and 12 01 01 (8.7%). The most frequently exported categories to Austria were 17 04 05 (32%), 19 12 02 (21%) and 20 01 01 (14.7%).

Figure 27: Map of countries to which waste was exported from the Czech Republic in 2022



Source: processed based on ISOH

Figure 28: Map of countries to which waste was exported from the Czech Republic in 2022 – Europe

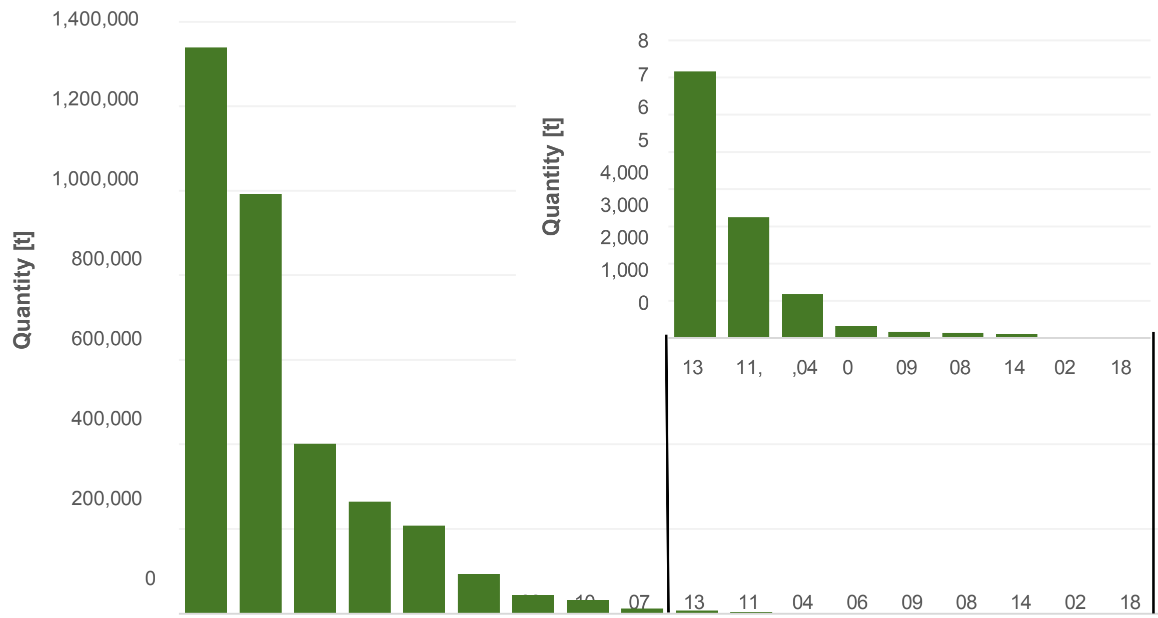


Source: processed based on ISOH

In terms of waste groups, groups 19 (39%) and 17 (29%) were exported most frequently. Exports in other groups are significantly lower. In 2022, exports in group 19 amounted to 1,339,008 tons. This primarily concerned subgroup 19 12 (Waste from waste treatment not elsewhere specified, e.g., sorting, crushing, pressing, pelletizing), which accounted for 85.6%. Within group 19, the most exported category was 19 12 02 (Ferrous metals), which accounts for 55% of the total, followed by 19 12 01 (Paper and cardboard) with a share of 24.4% and 19 10 01 (Iron and steel waste) with a share of 13%.

In 2022, exports in group 17 amounted to 992,351 tons, which is a significant decrease compared to 2021 (1,330,516 tons), and the majority was in subgroup 17 04 (Metals, including their alloys) with a share of 99.95%. The most represented category number was 17 04 05 (Iron and steel) with a share of 92% within group 17 and almost 27% of total exports from the Czech Republic (in 2021 it was 34%).

Chart 57: Waste exports from the Czech Republic by waste group in 2022



Source: processed based on ISOH

Table 65 shows the representation in terms of specific catalogue numbers for exports from the Czech Republic.

Table 65: Waste exports from the Czech Republic by catalogue numbers in 2022 – top 10

Cat. no.	Waste name	Quantity [t]	Share [%]
17 04	Iron and steel	912	2
19	Ferrous metals	728	21.4
12 01 01	Iron filings and turnings	366,000	10.8
19 12 01	Paper and cardboard	326,257	9.
15 01 01	Paper and cardboard packaging	237	7
20 01 01	Paper and cardboard	189,297	5.6
19 10 01	Iron and steel waste	174,761	5
19 12 04	Plastics and rubber	54,658	1
03 03 08	Waste from sorting paper and cardboard intended for recycling	43,828	1
16 01 17	Ferrous metals	39,863	1
Other		325	9.

Source: processed based on ISOH

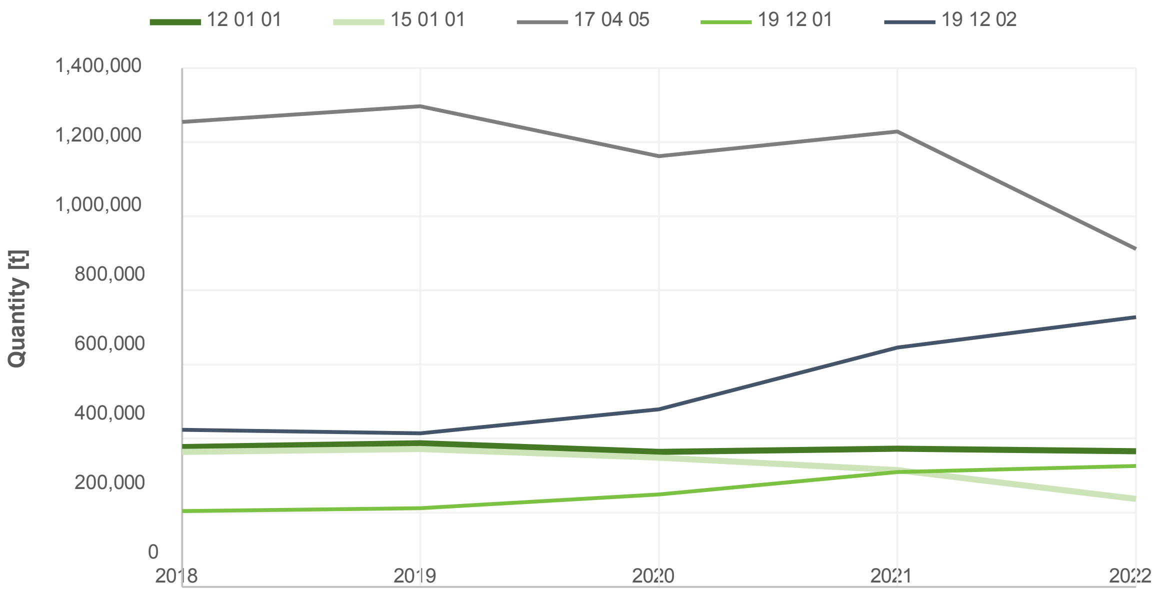
The most represented category number is 17 04 05 (Iron and steel), which accounts for almost 27% of exports. The most frequent export destinations were Germany (25%), Poland (21%) and Italy (20%). Exports account for almost 40% of production of the Czech Republic (exports category no. 17 04 05: 912 112 tons, production of the Czech Republic category
17 04 05: 2,320,702 tons).

The second most represented category number is 19 12 02 (ferrous metals) with a share of over 21%. The most common export destinations were Germany (65%) and Austria (14%). The volume of exports accounts for 76% of Czech production (exports cat. no. 19 12 02: 728,494 tons, Czech production cat. no. 19 12 02: 953,577 tons).

The third most represented category number is 12 01 01 (Iron metal filings and turnings) with a share of almost 11%. The largest exports went to Italy (45%), Germany (36%) and Poland (13%). The volume of exports accounts for 72% of Czech production (exports of category 12 01 01: 366,000 tons, Czech production of category 12 01 01: 508,048 tons).

The development of exports of the most represented category numbers is shown in Graph 58.

Chart 58: Development of waste exports from the Czech Republic by catalogue numbers – top 5

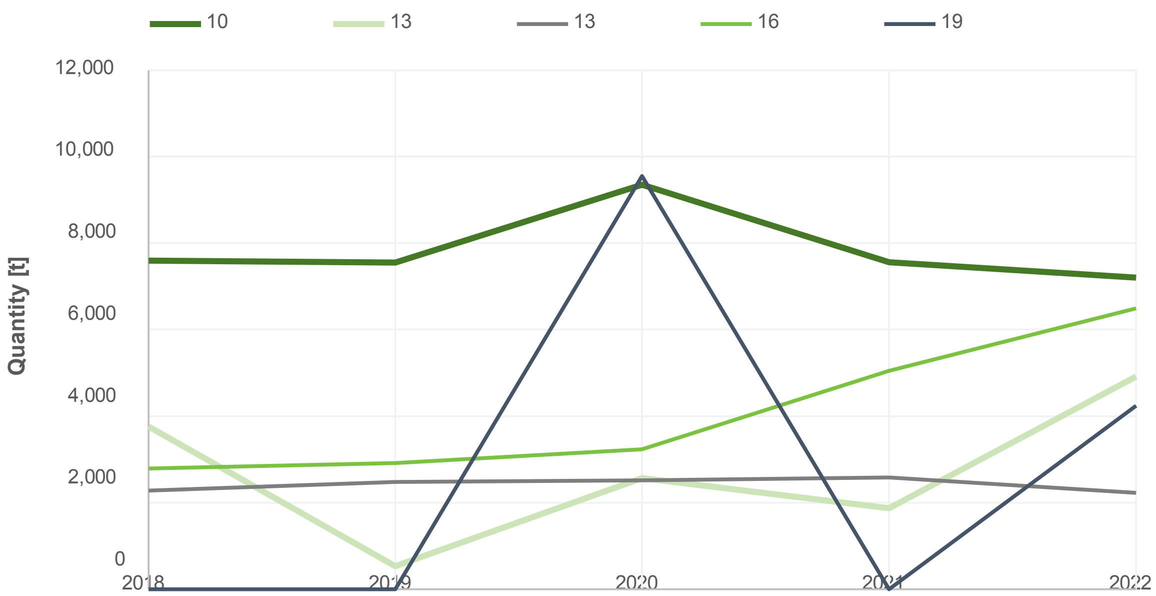


Source: processed based on ISOH

2.7.5.1 Export of hazardous waste

Exports of hazardous waste in 2022 amounted to 30,282 tons. The most frequently exported hazardous wastes include categories 10 03 08, 13 02 05, 13 02 08, 16 06 01, and 19 03 04. The development of their exports is shown in graph 59.

Chart 59: Development of exports of hazardous waste from the Czech Republic by catalogue numbers – top 5



Source: processed based on ISOH

Hazardous waste is exported primarily to European countries, with tens of tons also going to Asia (between 2018 and 2022, this was only South Korea – cat. no. 19 12 11). The most common types of hazardous waste are exported to Germany (72%), with Poland and Bulgaria among other frequent destinations. Only hundreds of tons of hazardous waste are exported to other countries.

2.8 Evaluation of the implementation of the Waste Prevention Program

Waste prevention is at the top of the waste management hierarchy, and compliance with the hierarchy is a legal obligation for citizens and businesses. The evaluation of the Waste Prevention Program (WPP) presents conclusions on the implementation of preventive measures by 2022.

The Czech Republic's Waste Prevention Program until 2024 contains **one main objective**, **"To prevent waste generation as much as possible, reduce waste production and consumption of primary resources," as well as 12 sub-objectives and 33 measures** to achieve these objectives.

The implementation of the Waste Prevention Program was evaluated with the following conclusions:

Evaluation

10 of the 12 objectives have been fully achieved.

- Information support for waste prevention was provided by state organizations and non-profit organizations. Despite awareness campaigns supported by the Ministry of the Environment, interest in voluntary labels and registration has stagnated. Educational, informational, and other activities by collective system operators contribute significantly to the trend of increasing the level of take-back of end-of-life products**.**
- Reducing resource requirements is addressed at the strategic, legislative, methodological, and investment levels. Significant support is provided for innovation in waste management and waste prevention through operational programs (OP ŽP and OP PIK), as well as programs run by TAČR, MPO, and MZe.
- Legislation, funding and the activities of the non-profit sector have contributed to a reduction in food waste production. The production of mixed municipal waste is also declining.
- Through the national program and OP ŽP, the public administration supports a number of activities and organizations focused on product reuse. The non-profit sector is also active outside the area of support.
- In the Czech Republic, glass accounts for the largest share of litter waste by weight (30%), followed by plastic (28%) and metals (19%). The main reason for littering is the lack of infrastructure (e.g., trash cans). The development of this infrastructure has been supported in the long term through the OP Environment.

Two of the 12 targets are partially fulfilled.

- The use of secondary raw materials (which may include critical raw materials) has been supported mainly through the OP PIK. Support continues in the follow-up OP TAK program. However, no activities systematically targeting the management of critical raw materials have been implemented in the Czech Republic to date.
- Despite the strategic, legislative, and investment attention of public authorities, it has not been possible to stabilize the production of construction and demolition waste, especially hazardous construction and demolition waste.
- The growth in the production of hazardous waste has been stabilized. Through the implementation of European legislation, the content of hazardous substances in materials and products is being continuously reduced.

The conclusions of the evaluation were used as one of the sources for the preparation of the new Waste Prevention Program, which will be valid from 2025. A schematic evaluation, including a brief assessment of individual prevention targets, is provided below.

Table 66: Evaluation of the achievement of the Waste Prevention Program objectives

	Objective No. 1: Provide comprehensive information support on waste prevention issues.
Information support for waste prevention was provided by state organizations and non-profit organizations. Activities were primarily aimed at the general public and schools, and partly at the business sector. Waste prevention was also the subject of a TA CR research program.	
	Objective 2: Support sustainable production and consumption models, focusing on products containing critical raw materials (the European Commission considers critical raw materials to be those that are of major economic importance but cannot be reliably extracted within the European Union and must therefore be imported to a large extent).
The use of secondary raw materials (which may include critical raw materials) was supported in particular through the OP PIK. Support continues in the follow-up OP TAK program. However, no activities systematically targeting the management of critical raw materials have yet been implemented in the Czech Republic.	
	Objective No. 3: Create conditions for reducing raw material and energy resources in manufacturing industries and promote the use of "secondary raw materials."[(35)]
Reducing resource needs is addressed at the strategic level (Strategic Framework for the Czech Republic 2030, Circular Czech Republic 2040, Update of the Czech Republic's Secondary Raw Materials Policy for 2019–2022), legislative (amendment to the Public Procurement Act of 2021), methodological (Responsible Procurement in a Nutshell and others) and investment levels (OP PIK OP ŽP). Through OP PIK and OP ŽP, almost CZK 38 billion was allocated to reducing resource needs. The operational programs have thus created strong conditions for reducing raw material and energy resources in production and supported the use of secondary raw materials.	
	Objective 4: Support the introduction of low-waste and waste-free innovative technologies that save raw materials and materials.
Waste management and waste prevention are not the subject of the Czech Republic's top innovation strategies. The direction of research and development in these areas is concentrated in the document Circular Czech Republic 2040. There is significant support for innovation in waste management and waste prevention through operational programs (OP ŽP and OP PIK).	
	Objective No. 5: Actively use voluntary instruments.
During the Waste Prevention Program (2014–2023), the Ministry of the Environment ran a systematic info campaign focused on voluntary tools and let companies, the public sector, and individuals sign up for voluntary commitments. The campaign led to a slight increase in interest in voluntary eco-labels and related registrations after a period of stagnation. In 2024, the Ministry of the Environment launched a new website on plastic prevention. Recently, interest in voluntary eco-labels and registrations has been stagnating.	
	Target 6: Reduce food waste.
Between 2018 and 2022, food waste production was reduced by 5%. This development was aided by the introduction of mandatory food donation, the possibility of donating hot meals, and the provision of financial support to food banks. Information and awareness-raising activities, such as the annual Waste Prevention Conference, and initiatives such as Meníčka pro bezdomovce (Meals for the Homeless) and the Nesnězeno.cz app, also contributed to the prevention of food waste. Despite all these activities, however, there is still considerable scope for further reduction of food waste—in 2022, 1,081,000 tons of food were wasted at various stages of the food chain.	

35 In connection with other strategic documents, in particular the Czech Republic's Secondary Raw Materials Policy.

Objective No. 7: Stabilize and subsequently reduce the production of municipal waste components that are not suitable for preparation for reuse or recycling.

Activities aimed at reducing the amount of mixed municipal waste are being implemented at both central and regional levels of public administration. The production of mixed municipal waste unsuitable for recycling is steadily decreasing.

Objective 8: Stabilize the production of hazardous waste, construction and demolition waste, and reduce the content of hazardous substances in materials and products without affecting harmonized legal requirements for these materials and products.

Despite the strategic, legislative, and investment attention of public authorities, it has not been possible to stabilize the production of construction and demolition waste, especially hazardous construction and demolition waste. The growth in the production of hazardous waste has been stabilized. Through the implementation of European legislation, the content of hazardous substances in materials and products is being continuously reduced.

Objective 9: Support the activities of charitable centers and organizations, service and repair services to extend the life and reuse of products and materials, in particular electrical equipment, textiles, furniture, and building materials.

Through the national program and the OP Environment, the public administration supports a number of activities and organizations focused on the reuse of products (e.g., the creation of reuse centers, awareness campaigns). The non-profit sector is also active outside the area of support (e.g., reuse center and furniture bank initiatives).

Objective 10: Stabilize the production of end-of-life products and increase the promotion of waste prevention in the activities and operations of collective systems and take-back systems.

Despite the growing volume of end-of-life products placed on the market, the level of take-back is increasing. Educational, informational, and other activities carried out by collective system operators contribute significantly to this trend.

Objective 11: Support the active role of research, experimental development and innovation in the field of waste prevention.

Support for research and development in the field of waste prevention is ongoing. Programs run by the Technology and Innovation Agency of the Czech Republic, the Ministry of Industry and Trade, and the Ministry of Agriculture play a key role in this area, with a large number of projects having been implemented.

Objective 12: Identify products that are major sources of waste pollution in the living and marine environment, take appropriate measures to prevent and reduce environmental pollution from these products, and thereby contribute to the United Nations Sustainable Development Goal of preventing and significantly reducing all types of marine pollution.

In the Czech Republic, glass accounts for the largest share of litter waste by weight (30%), followed by plastic (28%) and metals (19%). The main reason for littering is the lack of infrastructure (e.g., trash cans). The construction of this infrastructure has been supported in the long term through the OP Environment. In 2014-2020, the capacity of containers or bags for waste separation was increased by 229,000 tons per year.

Furthermore, legislation (Act on the Reduction of the Impact of Certain Plastic Products on the Environment) is coming into force that has the potential to significantly reduce the generation of this waste. The reduction of the impact of environmental pollution is also addressed by the draft amendment to the Packaging Act, which, among other things, paves the way for the introduction of a deposit system for PET bottles and cans from mid-2025.

During the period under review, a number of activities were carried out that have a positive impact on waste prevention in the Czech Republic:

- Support for research and development – research focused on prevention financed primarily by TA ČR, individual research projects were also supported from ministry resources.
- The life cycle assessment (LCA) method was used for partial studies (e.g., the use of different materials for carrier bags).
- Currently and in the future, attention is focused on the durability, reusability, reparability, and recyclability of products.

- Extended producer responsibility and eco-modulation tools are used to help reduce waste generation and manage waste in line with the waste management hierarchy.
- An amendment to the Public Procurement Act has been adopted, requiring public contractors to also assess the environmental aspects of public contracts when evaluating bids. This has created an environment for the use of green public procurement to prevent waste generation.
- The Ministry of the Environment has annually supported non-profit organizations in activities aimed at informing and preventing waste generation.
- The Ministry of the Environment provided financial support for projects to set up reuse centers in municipalities and cities in the Czech Republic.
- The non-profit sector is also active in the area of reuse centers, furniture banks, and food banks. In view of upcoming legislation (the so-called right to repair directive), the role of repair shops is expected to grow.

Recommendations for the next period:

The evaluation of the implementation of the Waste Prevention Program's objectives identifies the following areas on which the Waste Management Plan for 2025-2035 and the related Waste Prevention Program should focus:

1. **Ensuring the systematic management of critical raw materials** (in accordance with EU Regulation 2024/1252 establishing a framework for securing the supply of critical raw materials).
2. **Continuing to support waste management issues through operational programs.**
3. **Preventing food waste.**
4. **Selective demolition and proper separate collection of construction and demolition waste and reduction of the production of such hazardous waste.**
5. **Adherence to the principles of environmentally responsible public procurement** (e.g. through minimum standards for responsible public procurement).
6. **Support food banks, furniture banks, and reuse centers.**

2.9 Evaluation of the fulfillment of the Czech Republic's Waste Management Plan targets for 2021-2022

The following chapters evaluate the strategic objectives, objectives for priority waste streams, and objectives for specific areas of waste management set out in the Waste Management Plan of the Czech Republic for 2015–2024 with a view to 2035. In this chapter, the objectives of the Czech Waste Management Plan are evaluated only schematically; a detailed description of the achievement of the objectives is provided in a separate document of the Ministry of the Environment***, Report on the Achievement of the Objectives of the Czech Waste Management Plan for the period 2021-2022.***

The following symbols are used to evaluate the targets

🔴 if this symbol is used, the target has not been achieved or is not being achieved; if

🟡 this symbol is used, the target is being partially achieved;

🟢 If this symbol is used, the objective has been achieved or is being achieved.

2.9.1 Strategic objectives

The list and fulfillment of the strategic objectives of waste management in the Czech Republic within the Waste Management Plan of the Czech Republic for 2015-2024 with a view to 2035 is as follows.

Table 67: Strategic objectives of the Czech Republic's Waste Management Plan

Strategic objectives	
	Objective No. 1: Waste prevention and reduction of specific production.
	Objective No. 2: Minimizing the adverse effects of waste generation and management on human health and the environment.
	Objective No. 3: Sustainable development of society and transition to a circular economy.
	Objective No. 4: Maximizing the use of waste as a substitute for primary resources.

2.9.2 Evaluation of strategic objectives and objectives for priority flows of the Czech Republic's National Waste Management Plan

The evaluation of the fulfillment of the Czech Republic's Waste Management Plan objectives for 2020-2022 showed that by 2022:

- **2 of the 4 strategic objectives will be achieved.** The Czech Republic is succeeding in minimizing the adverse effects of waste generation and management on human health and the environment, as it has appropriate legislation in place in this area. Hazardous waste is treated in such a way as to significantly reduce its hazardousness. The Czech Republic is also moving closer to a circular economy every year, as it has a high rate of material recovery from waste. On the contrary, landfilling of waste has been declining in the long term in favor of the aforementioned waste recovery. For almost all end-of-life products, the take-back rate, recycling rate, and recovery rate have been increasing in the long term.
- **Two of the four strategic objectives have been partially achieved.** The Czech Republic is also successful in preventing waste generation, thanks in part to significant subsidy support from operational programs (e.g., the Operational Program Environment, the Operational Program Enterprise and Innovation for Competitiveness). Waste prevention is also improving in the area of food waste and end-of-life products. The aforementioned subsidy programs also support investment projects that help process waste at a higher level of the waste management hierarchy. Waste can thus be used as a substitute for primary resources. However, in the coming years, the Czech Republic will have to focus on reducing the share of municipal waste going to landfill in view of the landfill ban from 2030.
- **43 of the 54 main and sub-targets have been fully achieved.** Most of the Czech Republic's waste management targets were successfully achieved or continuously fulfilled during the period under review. A total of 43 out of 54 targets were achieved. The achievement of these targets is described in the following table (Table 68).
- **Nine of the 54 main and sub-targets are partially fulfilled.** The partially fulfilled targets mainly concern the landfilling of mixed waste, biological waste, the fulfillment of targets set for end-of-life products, and the removal of environmental burdens. In most of these cases, however, the Czech Republic is on track to meet these targets in the future.
- **Two of the 54 main and sub-targets have not been met.** During the period under review, the Czech Republic did not succeed in increasing the share of energy recovery from mixed municipal waste, mainly due to insufficient capacity of facilities for processing this waste. However, during the period under review

several projects for waste-to-energy facilities were supported, so capacity should increase in the future. During the period under review, it was also not possible to increase the share of hazardous waste recovery, which is again related to insufficient facility capacity. The Czech Republic plans to invest in the missing facility capacity in the future.

Table 68: Evaluation of waste management targets for 2021 and 2022

Municipal waste	
🟢	**Target No. 1: Develop and intensify separate waste collection for paper, plastics, glass, metals, and biological waste. Introduce separate waste collection (sorted collection) for by January 1, 2025.**
The target is being met. The collection network for separately collected waste is being intensified. The number of containers for recyclable commodities (metal, beverage cartons, paper, plastic, glass) increased by 22% in 2021 and by a further 24% in 2022. Overall, this represents an increase of more than 280,000 containers of various sizes in two years. According to Act No. 541/2020 Coll. on waste, municipalities are required to January 1, 2025, designate locations for the separate collection of textiles.	
🟢	**Target 2: By 2020, increase the overall level of preparation for reuse and recycling to at least 50% by weight for at least waste materials such as paper, plastic, metal, glass from households from households and, where appropriate, other sources, where these waste streams are similar to household waste.**
The **target has been met.** Paper, metals, glass, and plastics were predominantly recycled. This target was already assessed as achieved in 2020.	
🟡	**Target No. 3: Increase the level of preparation for reuse and recycling of municipal waste according to the table in the annex.**
The target is partially met. In 2021, the municipal waste recycling rate reached 40%, and in 2022 it reached 41%, showing clear growth, but the pace is slow. By 2025, the Czech Republic should achieve a level of preparation for reuse of 55%, in which case the Czech Republic will have to significantly intensify its preparations for reuse and recycling of municipal waste. However, according to a report by the European Commission, the Czech Republic is on track to achieve this target. Achieving this will require a significant change in the way municipal waste is managed and increased sorting by residents.	
🟡	**Target 4: By 2035, reduce the amount of municipal waste landfilled to 10% (by weight) or less of the total amount of municipal waste generated.**
The target is partially fulfilled. Landfilling is still the most widespread method of municipal waste management, and its share is declining only very slowly. Only a partial reduction can be expected in the next few years due to the expected decline in the production of mixed municipal waste and an increase in the separate collection of waste that is preferably recycled. A significant reduction in municipal waste landfilling will only occur when technologies for waste-to-energy (WtE) or fuel production through the sorting of mixed municipal waste with subsequent energy recovery are put into operation.	
Mixed municipal waste	
🟢	**Objective No. 1: Reduce the production of mixed municipal waste per capita.**
The target is being met. Following a significant decline in mixed municipal waste production per capita between 2010 and 2015, there has been a very gradual decline. The significant decline in 2022 promises a return to the downward trend as a result of the introduction of a series of measures to divert recoverable components from mixed municipal waste.	
🔴	**Target 2: Mixed municipal waste (after sorting out recyclable and recoverable components, hazardous components, and biological waste) should be used primarily for energy in facilities designed for this purpose in accordance with applicable legislation.**
The target for the period under review has not been met. Between 2018 and 2022, the amount of mixed municipal waste used for energy remained virtually unchanged. Since 2016, there has been no increase in the capacity for energy recovery from mixed municipal waste in the Czech Republic, and therefore no increase in its energy recovery. Only 23.1% of mixed municipal waste is used for energy. Landfilling dominates the management of mixed municipal waste. A positive change can be seen in	

consider the launch of an automatic sorting line in the Czech Republic for mixed municipal waste intended for the sorting of energy-recoverable components from mixed municipal waste and the production of TAP in 2023.

Biodegradable waste and biodegradable municipal waste

Target 1: Reduce the maximum amount of biodegradable municipal waste landfilled so that by 2020 this fraction does not exceed 35% by weight of the total amount of biodegradable municipal waste produced in 1995.

The target is partially achieved. This target was assessed as already achieved by 2020.

Target 2: Reduce the amount of biodegradable municipal waste going to landfills (from 2021 onwards).

The target has been met. In 2021, there was a significant decrease in the amount of biodegradable municipal waste sent to landfills as a result of a review of the biodegradable content in the main streams of mixed municipal waste and bulky waste. In 2021, a total of 817,958 tons of biodegradable municipal waste was landfilled, compared to 762,437 tons in 2022. This represents a slight year-on-year decrease of 55,521 tons.

Food waste

Target 1: Prevent food waste and reduce its quantity at all levels of the food chain.

The target has been met. In 2024, the Czech Federation of Food Banks had 15 members. In 2022, food banks redistributed over 11,000 tons of food with a total value of CZK 683 million. Thanks to these organizations, among others, aid was directed to a total of 313,000 people who generally live below the income poverty line. Further support for food banks is planned under OPŽP calls.

Construction and demolition waste

Objective 1: By 2020, increase the rate of preparation for reuse and recycling of construction and demolition waste and other types of material recovery to at least 70% by weight for construction and demolition waste in the category "other," with the exception of naturally occurring materials listed in the Waste Catalogue under catalogue number 17 05 04 (soil and stones).

The target has been achieved. This target was assessed as already achieved in 2020.

Objective No. 2: Increase the material recovery of construction and demolition waste, excluding soil, stones, barren rock, and tailings (2021 and beyond).

The target is being met. The recycling rate for construction and demolition waste has been high for a long time, reaching 77.8% in 2021 and 80% in 2022. Although the recycling rate of construction and demolition waste fluctuates slightly, it has remained around 80% in the long term. The material recovery rate of construction and demolition waste is high in the long term, significantly exceeding 90%. The values are also sensitive to the amount of construction and demolition waste produced in a given year, its import, export, and storage. Material recovery reached 98.1% in 2020, 91.8% in 2021, and 92.9% in 2022.

Hazardous waste

Target 1: Reduce the specific production of hazardous waste.

The target is being met. Hazardous waste production in the Czech Republic stagnated from 2018 to 2020, with a slight decrease recorded in 2021 and 2022. The specific production of hazardous waste is also declining. In 2020, it was 169 kg/capita, in 2021 157 kg/capita, and in 2022 151 kg/capita. The trend is positive.

Objective No. 2: Increase the proportion of hazardous waste recycled.

The target is not being met. The recovery of hazardous waste is declining. The development of treatment technologies that enable hazardous waste to be stripped of its hazardous properties, thereby enabling its subsequent material recovery, is essential for increasing the recovery of hazardous waste. In 2020, the recovery of hazardous waste reached 25%, in 2021 it reached 24%, and in 2022 it reached 21%.

Objective 3: Minimize the negative effects of hazardous waste management on human health and the environment.

The target is being met. Since 2020, the specific production of hazardous waste has been declining slightly, including production per capita. Most hazardous waste is treated to reduce its hazardousness and its impact on the environment. Hazardous waste is treated at source or subsequently in other waste treatment facilities.
for waste treatment. Legislative requirements for the management of hazardous waste are monitored and enforced by state authorities.

Objective No. 4: Remove old burdens where hazardous waste is located.

The objective has been partially achieved.

According to data from the Supreme Audit Office, the process of removing old burdens has been ongoing since 1991, and over CZK 66 billion has been spent on it by 2023. Between 2018 and 2022, this process did not accelerate, and unless effective measures are taken, the removal process may continue until 2042. In 2021, the National Inventory of Contaminated Sites (NIKM2) project was completed, mapping most contaminated and potentially contaminated sites. Under the OPŽP calls, funds are provided to support the remediation of contaminated sites and risk analyses of potentially contaminated sites.

Packaging waste

Target 1: Increase the overall recycling rate for packaging to 70% by 2025.

The target has been met. In 2021, the total recycling rate for packaging was 69.4%, and in 2022 it reached 71.6%.

Target 2: Increase the overall recycling rate for packaging waste to 75% by 2025.

The target has been met. In 2020, the packaging waste recovery rate was 77.6%, and in 2022 it reached 82.0%.

Target 3: Increase the overall recycling rate for packaging to 75% by 2030.

The target has been met. In 2021, the total recycling rate for packaging was 69.4%, and in 2022 it reached 71.6%. The trend in waste recycling is increasing every year, and the Czech Republic is well on track to increase total packaging recycling to at least 75% by 2030.

Target 4: Increase the overall recovery rate for packaging waste to 80% by 2030.

The target has been met. In 2022, the packaging waste recovery rate reached 77.6%, and in 2022 it reached 82.0%. The overall packaging waste recovery rate in the Czech Republic has been high for a long time and is growing every year. Thus, in 2022, the Czech Republic already met the target for total packaging waste recovery of 80% set for 2030.

Target 5: Ensure recycling of 75% of paper/cardboard and glass waste, 55% for metal waste, 50% for plastic waste, and 15% for wood waste, and to ensure a total recycling rate for packaging waste of at least 70% and a recovery rate of 80% by 2020.

The target has been partially achieved. In 2021, the recycling rate for paper and cardboard packaging was 88.4%, glass packaging 81.4%, plastic 45.1%, metal packaging 67.4%, wooden packaging 39.4%, and the overall recycling rate was 69.4%. The recovery rate reached 77.6%.

In 2022, the recycling rate for paper and cardboard packaging was 91.2%, glass packaging 84.6%, plastic packaging was 47.2%, metal packaging 67.8%, wooden packaging 36.9%, and the total recycling rate reached 71.6%. The utilization rate reached 82.0%.

The Czech Republic thus met the target for cardboard/paper, glass, metal, and wooden packaging in both 2021 and 2022, and also met the overall recycling rate target in those years. Only in the case of plastics did it fail to meet the recycling target in 2021 and 2022, but the recycling rate for plastic packaging has been growing since 2021 and the Czech Republic is on track to meet the target in the coming years for this commodity as well.

Target 6: Ensure separate collection (sorted collection) of 77% of single-use plastic beverage bottles placed on the market by 2025.

The target is being met. The separate collection rate for single-use plastic bottles reached a total of 76% in 2023. The Czech Republic is therefore well on track to achieve its targets. This trend will be further supported in the future by the introduction of a deposit system for single-use plastic beverage bottles.

Target 7: Ensure separate collection (sorted collection) of 90% of single-use plastic beverage bottles placed on the market by 2029.

The target has been met. The separate collection rate for single-use plastic bottles reached a total of 76% in 2023. The Czech Republic is therefore well on track to achieve its targets. This trend will be further supported in the future by the introduction of a deposit system for single-use plastic bottles.

Target 8: Ensure that the recycled content of PET beverage bottles is at least 25% by 2025

The target has been met. The proportion of recycled materials used in plastic beverage bottles reached 11% in 2023, all of which was rPET. The increase in the use of recycled materials in this type of product should be accelerated in the coming years by the introduction of a deposit system and the adoption of new European legislation setting conditions for manufacturers on the use of recycled material in plastic beverage bottles (revision of Implementing Decision 2023/2683/EC).

Target 9: Ensure that plastic beverage bottles contain at least 30% recycled content by 2030.

The target has been met. The proportion of recycled materials used in plastic beverage bottles in 2023 reached 11%, all of which was rPET. The increase in the use of recycled materials in this type of product should be accelerated in the coming years by the introduction of a deposit system and the adoption of new European legislation setting conditions for manufacturers on the use of recycled material in plastic beverage bottles (revision of Implementing Decision 2023/2683/EC).

Target 10: Ensure that, by July 2024, beverage containers with caps and lids made of plastic can only be placed on the market if the caps and lids remain attached to the container during the intended use of the products.

The target has been met. On August 31, 2022, Act No. 244/2022 Coll. came into force, amending certain acts in connection with the adoption of the Act on the reduction of the impact of selected plastic products on the environment. Under this Act, persons placing single-use plastic packaging listed in the annex to the Act on the market are obliged to place such packaging on the market only in such a way that the closure or lid made of plastic remains attached to the container throughout the intended use of the product.

Waste electrical equipment

Target No. 1: Achieve a waste electrical equipment collection rate of 65% for groups 1-6 as a whole and separately for groups 1, 2, and 3 from 2021 onwards.

The target has been partially achieved. In 2021, the take-back rate for waste electrical equipment in the Czech Republic was 57.5%, and in 2022 it was 57%, meaning that between 2021 and 2022, the Czech Republic did not achieve a total take-back rate of 65% for all groups of electrical equipment.

In 2022, the take-back rate for waste electrical equipment in group 1 was 66.5%, the take-back rate for waste electrical equipment in group 2 was 56.5%, and the take-back rate for waste electrical equipment in group 3 was 75.5%. The required collection rate of 65% was therefore not achieved for waste electrical equipment in group 2, while the target was achieved for waste electrical equipment in groups 1 and 3.

Objective No. 2: Ensure a high level of preparation for reuse, recycling, and recovery of waste electrical and electronic equipment.

The target has been met. In 2021, the recovery rate for waste electrical equipment in group 1 was 91.4%, in group 2 it was 99.0%, in group 4 it was 98.0%, in group 5 it was 94.0% and in group 6 it was 105.4%. In 2022, the recovery rate for waste was 95.3% for group 1, 100.2% for group 2, 93.6% for group 4, 88.3% for group 5, and 94.8% for group 6. In both 2021 and 2022, the set recycling rate for waste electrical equipment, which is different for each group, was therefore met.

Waste batteries

Target 1: Increase the collection rate of waste batteries and accumulators. Achieve a minimum collection rate of 45% for waste portable batteries and accumulators from 2020 onwards.

The target has been met. In 2020, the collection rate for portable waste batteries was 48.6%, in 2021 it was 50.5%, and in 2022 it was 50.2%. The Czech Republic therefore achieved the minimum collection rate for waste batteries of 45% in all the years mentioned.

Target 2: Achieve high recycling efficiency for waste battery and accumulators from 2020 onwards. Specifically, 65% for lead-acid accumulators, 75% for nickel-cadmium accumulators, and 50% for other batteries and accumulators.

The target has been met. In the case of lead batteries, the recycling efficiency reached 83.6% in 2020, 83.0% in 2021, and 83.8% in 2022. In all these years, the Czech Republic met the minimum recycling rate of 65%. In the case of nickel-cadmium batteries, the recycling efficiency reached 94.1% in 2020, 94.0% in 2021, and 93.8% in 2022. The Czech Republic therefore also met the minimum recycling target of 75% for nickel-cadmium batteries. For other batteries, the recycling rate was 61.8% in 2020 and 65% in both 2021 and 2022.
In this case, too, the Czech Republic met the minimum recycling target of 50%.

Waste tires

Target 1: Increase the collection rate of waste tires to at least 65% in 2020, at least 70% in 2021, and at least 80% in 2022 and beyond.

The target has been met. In 2020, the Czech Republic achieved a waste tire collection rate of 82.3%.
in 2021 at 81.9% and in 2022 at 83.6%. The Czech Republic therefore met the minimum collection rate for waste tires in all the years mentioned, while also increasing the collection rate each year.

Target 2: Achieve a high recovery rate for waste tires of at least 10% in 2021, 15% in 2022, 25% in 2023, and 30% in 2024.

The target has been met. In 2021, the Czech Republic achieved a waste tire processing rate of 99.4%.
in 2022, it will be 1% less, i.e. 98.4%. Although the waste tire utilization rate decreased slightly between 2021 and 2022, it is generally at a high level, and the Czech Republic is on track to continue meeting this target in the coming years.

Target 3: Achieve a recycling and preparation for reuse rate of 10% by 2021, 15% by 2022, 25% by 2023, and 30% by 2024.

The target has been met. In 2021, the Czech Republic achieved a recycling and preparation for reuse rate for waste tires of 65%, and in 2022, 68.5%. Between 2021 and 2022, the rate of recovery and preparation for reuse of waste tires increased by 3.5%, and it is very likely that the Czech Republic will meet the targets set for future years.

End-of-life vehicles

Target 1: Achieve high recovery rates for end-of-life vehicles, with a minimum of 90% recovery and reuse and 85% recycling and reuse from 2020 onwards.

The target is partially met. Between 2020 and 2022, the Czech Republic always achieved the minimum required level of recycling and reuse of end-of-life vehicles. In 2020, the level of 90.16% was achieved, in 2021 the level of 91.19%
%, and 89.49% in 2022.

Between 2020 and 2022, the Czech Republic only achieved the minimum required levels of recovery and reuse of waste from end-of-life vehicles in 2021 (96.13%). In 2020 (94.83%) and 2022 (94.34%), it did not reach this level. However, the level of recovery and reuse of waste from end-of-life vehicles in the Czech Republic is generally high, and it can therefore be assumed that this target will be met again in the coming years.

Sludge from municipal wastewater treatment plants

Objective No. 1: Utilize sludge from municipal wastewater treatment plants as a material, with a particular focus on phosphorus, apply high-quality sludge to soil, and use sludge for energy.

The objective has been achieved. Sludge is now handled in the preferred manner. Most sludge was applied to agricultural land in 2021 and 2022, with the share remaining at 27%. Sludge is also composted (recycling and composting accounted for 52% in 2021 and 46% in 2022), and around 3% of sludge is used for energy. Sludge from municipal wastewater treatment plants is not landfilled.

Objective 2: Reduce the amount of hazardous substances in sludge from municipal wastewater treatment plants.

The target is partially met. With the development of knowledge and new analytical methods, new types of contaminants are emerging, such as residues of pharmaceuticals and personal hygiene products, microplastics, and a group of substances known as PFAS. The CEVOOH project monitored the occurrence of pharmaceuticals in the inflow and outflow from WWTPs in its report[36]. In general, the preferred approach to dealing with pollutants is to eliminate the sources of pollutants rather than implementing costly technologies at WWTPs. In the case of pharmaceutical residues, the main sources are hospitals and social service facilities and the management of urine and incontinence aids.

Waste oils

Target No. 1: Increase the material and energy recovery of waste oils.

The target has been met. The use of waste oils in the Czech Republic has been growing in recent years. Waste oil recycling reached 64% in 2021 and 57% in 2022. Energy recovery from waste oils was 11% in 2021 and 8% in 2022.

There was a slight decline in 2022, so it will be necessary to monitor whether this was a one-off decline or a trend and, if necessary, seek appropriate measures to increase the recycling and energy recovery of waste oils.

Waste from health and veterinary care

Target 1: Minimize the negative effects of healthcare and veterinary waste management on human health and the environment.

The objective has been achieved. Obligations for the management of waste from healthcare and veterinary care have been laid down in detail in the Waste Act and the new implementing regulation, Decree No. 273/2021 Coll., on details of waste management. Compliance with all rules should not only minimize the negative effects of healthcare and veterinary waste management on human health and the environment, but also minimize the generation of such waste.

Waste containing polychlorinated biphenyls

Objective No. 1: Transfer all equipment and waste containing polychlorinated biphenyls to waste treatment facilities by the end of 2025 and decontaminate waste containing polychlorinated biphenyls by that date.

The target has been met. According to Act No. 541/2022 Coll., on waste, owners of equipment containing polychlorinated biphenyls are required to hand over such equipment to waste treatment facilities by the end of 2025. All equipment in operation in the Czech Republic as of November 2023 was in compliance with the legislation, i.e., the content of polychlorinated biphenyls did not exceed 500 ppm. All locations of such equipment (or companies) were precisely known, and the decontamination of all such equipment was carried out continuously according to the decontamination plan.

Target 2: Eliminate waste containing polychlorinated biphenyls held by waste treatment facilities by the end of 2028.

The target has been met. As of March 29, 2023, there were 185 large pieces of large equipment containing more than 5 liters in total weight of 64 tons in the Czech Republic. There were also devices containing polychlorinated biphenyls in the Czech Republic, which were located in private facilities owned by ČEZ Distribuce, a.s. (11,101 units) and E.ON. Česká republika s.r.o. (3,230 units). In 2020, there were 17,635 devices with a possible content of polychlorinated biphenyls in the Czech Republic, representing a significant decrease.

Waste containing persistent organic pollutants

[36] Váňa M., Krystyník P., Cajthaml T., Najser J. - Research Report for 2023 – CEVOOH Project, Work Package 2.A Contamination of the Water Environment, 02/2024. Available at: https://cevooh.cz/wp-content/uploads/2024/02/V86.pdf

	Objective No. 1: Raise awareness of persistent organic pollutants and their effects on human health and the environment.

The objective has been achieved. In the Czech Republic, the National Centre for Toxic Substances operates in the field of persistent organic pollutants. Its main task is to coordinate activities related to chemical substances at the national level (based, for example, on the Stockholm Convention). As part of its educational and awareness-raising activities, the National Centre for Toxic Substances organises the annual RECETOX Summer School, which includes lectures, workshops and themed events. To share information about persistent organic pollutants, the National Center also uses its website and the RECETOX printed and electronic newsletter.

	Objective 2: Reduce the entry of persistent organic pollutants from waste with Regulation (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants (recast), as amended.

The objective has been achieved. In 2021, with the new Waste Act and implementing regulation No. 273/2021 Coll., on details of waste management, a reporting obligation on the content of persistent organic pollutants in waste was introduced for waste holders. In line with the requirements of Regulation (EU) 2019/1021 on persistent organic pollutants, parameters from waste incineration ash are monitored during landfilling. One of the main strategic objectives for the implementation of the Stockholm Convention within *the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants in the Czech Republic for 2024-2029* is to eliminate POP inputs into the environment and reduce exposure to these substances.

Waste containing asbestos

	Objective No. 1: Minimize the potential negative effects of handling waste containing asbestos on human health and the environment.

The objective has been achieved. In connection with this objective, the Ministry of the Environment prepared *Methodological Guidelines for the Management of Waste Containing Asbestos during the Construction, Demolition, and Handling of Buildings* in 2018. One of the objectives of this document is to describe the procedure that will lead to the minimization of health risks when handling construction materials containing asbestos and subsequently construction and demolition waste containing asbestos. Furthermore, the Ministry of the Environment has developed *Methodological Guidelines of the Waste Department of the Ministry of the Environment for the management of construction and demolition waste and its disposal.* At the legislative level, therefore, an environment has been established for the safe management of waste containing asbestos.

Animal by-products and biological waste from kitchens and catering facilities

	Objective No. 1: Reduce the amount of biological waste from kitchens and catering facilities and animal by-products in mixed municipal waste originating from households, public catering facilities (restaurants, snack bars) and central kitchens (hospitals, schools, and other similar facilities).

The target has been partially achieved. Since 2020, legislation in the Czech Republic has required municipalities to provide year-round facilities for the separate collection of edible oils and fats. Between 2020 and 2022, the Ministry of the Environment focused on awareness-raising activities and raising awareness about preventing food waste and handling it properly (e.*g., "Ten Tips for Not Wasting Food"*). Even so, this waste still shows up in mixed municipal waste. In the Czech Republic, the network of domestic and community composters for plant residues is also expanding between 2020 and 2022, mainly thanks to financial support from OPŽP programs. The number of collection containers for edible oils and fats is also increasing every year, reducing the negative effects on human health and the environment.

	Objective 2: Properly manage biological waste from kitchens and catering facilities and animal by-products, thereby reducing the negative effects of their management on human health and the environment.

The target has been met. The production of waste category 20 01 08 (Biodegradable waste from kitchens and catering facilities) is increasing, as is its utilization. When handling this waste, it is necessary to proceed in accordance with Regulation (EC) No. 1069/2009 of the European Parliament and of the Council on hygiene rules for animal by-products and derived products not intended for human consumption, and it is also necessary to comply with the permit issued by the Regional Veterinary Administration. This ensures that negative effects on human health and the environment are minimized.

Ferrous and non-ferrous metal waste

	Objective No. 1: Process metal waste and end-of-life products into materials to replace primary raw materials.

The objective has been achieved. Ferrous and non-ferrous metal waste has been recycled at a rate of almost 100% for a long time, i.e., it serves as a substitute for primary raw materials.

Waste electrical equipment also has a high recycling rate, which in 2022 reached 94.7% for electrical equipment in group 1, 100.1% for electrical equipment in group 2, 84.2% for electrical equipment in group 3, 93.5% for electrical equipment in group 4, 86.6% for electrical equipment in group 5, and 91.5% for electrical equipment in group 6.

Waste batteries were recycled to a large extent in 2022, especially groups 3 (100.04%) and 2 (92.89%). Approximately half of group 1 was recycled (51.23%), with a large proportion exported for processing to European Union countries (38.50%).
There is therefore room for increasing the share of processing in the Czech Republic for waste batteries.

In the case of waste tires, the share of material recovery is growing every year compared to energy recovery. In 2022, 67.4% of waste tires were recovered as material and 29.5% as energy.

The Czech Republic also achieved good results in the end-of-life vehicle management in 2022, with reuse and recovery reaching 94.34% and reuse and recycling reaching 89.49%.

2.9.3 Evaluation of specific waste management targets

Table 69: Specific waste management targets of the Czech Republic's Waste Management Plan

Creating a waste management network

	Objective No. 1: To create and coordinate a comprehensive, adequate, and efficient network of waste management facilities in the Czech Republic.

The objective has been partially achieved. The network of facilities is insufficient for certain waste streams. A lack of capacity has been identified for mixed municipal waste, where there is a lack of capacity for energy recovery, bulky waste, where there is a lack of capacity at collection yards, and facilities for mechanical sorting of bulky waste and subsequent material and energy recovery. There is also a lack of capacity for the treatment of selected groups of hazardous waste, specifically hazardous waste intended for incineration, where there is a lack of hazardous waste incineration facilities, including medical waste incinerators.
Another important aspect is the possible modernization of existing capacities or the construction of new ones in order to increase their competitiveness. For example, there is a lack of highly efficient and powerful sorting and re-sorting lines for sorting and treating waste to achieve high purity and declarable origin. Secondary raw materials can then enter high-quality recycling in accordance with the principles of the circular economy.

Decision-making on cross-border transport, import and export of waste

	Objective No. 1: Not to endanger human health, the environment, or the fulfillment of obligations or binding targets of the Czech Republic arising from European legislation as a result of cross-border waste shipments

The objective is being met. Cross-border transport of waste to the Czech Republic is only permitted for use in facilities operating under a permit. Similar considerations apply to cross-border transport of waste from the Czech Republic. Compliance with the rules on transboundary movement of waste is monitored regularly. The Ministry of the Environment and the inspection authorities cooperate on an ongoing basis within the Czech Republic and with the authorities of neighboring countries to prevent, detect, and punish illegal shipments of waste.

Restricting the disposal of waste outside designated sites and ensuring the management of waste whose owner is unknown or has ceased to exist

	Objective No. 1: Reduce the disposal of waste outside designated sites.

The objective has been achieved. Act No. 541/2020 Coll., on waste, has been in force since January 2021, clearly defining responsibility for this waste. The Act introduces an obligation for waste producers or facility operators to remove waste collected at their premises or facilities in the event of the closure of the premises or facilities, and to transfer responsibility for this waste to the next owner of the premises or facilities.

Illegal dumps are often caused by undisciplined citizens or illegal activities, which can only be eliminated to a certain extent. However, awareness-raising is helping to reduce the number of illegal dumps. In addition, timely intervention by municipalities or waste collection companies helps to remove illegal dumps, especially in the vicinity of collection points and nests.

Objective No. 2: Ensure the proper handling of waste disposed of outside designated sites and waste whose owner is unknown or has ceased to exist.

The objective is being met. Since January 2021, Act No. 541/2020 Coll., on waste, has set rules for the management of waste that is concentrated outside designated sites. In the event of inaction on the part of the landowner, the municipal authority with extended powers has the option, at its own expense, to secure waste that poses a threat to the environment against the release of harmful substances into the surrounding environment or, in the case of illegal waste, to remove it and transfer it to a facility designated for waste management. In 2021, As part of the NPŽP, a call for proposals was issued for the removal of illegal waste dumps with a total allocation of CZK 50 million. An additional CZK 166 million was allocated for calls related to the clean-up of environmental accidents and illegal waste dumps. These resources helped to speed up the removal of some illegal waste dumps.

Reducing the environmental impact of certain plastic products

Objective No. 1: Achieve a reduction in the consumption of selected single-use plastic products by 2026 compared to 2022.

The target is being met. Decree No. 95/2023 Coll., to the Packaging Act, came into effect in 2023. Based on this decree, an authorized packaging company has a legal obligation to report data on the consumption (or placing on the market) of single-use plastic cups and food containers. The first reporting year is 2023. For 2022, AOS provided data on the basis of which a slight decrease in consumption (placing on the market) was assessed in both product categories.

Objective No. 2: Do not place products made from oxo-degradable plastics and selected single-use plastic products on the market.

The target has been achieved. In 2022, Act No. 243/2022 Coll. on the reduction of the impact of selected plastic products on the environment came into force. Under this Act, legal entities and natural persons engaged in business activities may not place on the market or put into circulation selected plastic products defined by this Act or products made from oxo-degradable plastic.

Objective No. 3: Correctly label selected single-use plastic products on their packaging or on the products themselves.

The objective has been achieved. In 2022, Act No. 243/2022 Coll. on the reduction of the impact of selected plastic products on the environment came into force. Under this Act, manufacturers must ensure that each selected plastic product defined by this Act that they place on the market is marked with a visible, clearly legible, and indelible label on its packaging or on the product itself. This marking is intended to provide end users with information on the appropriate procedures for handling this product once it has become waste, or on the methods for disposing of this waste. The marking also contains information on the presence of plastics in the product and the resulting negative impacts of disposing of such waste outside designated waste disposal sites on the environment.

Objective No. 4: Introduce extended producer responsibility systems for selected single-use plastic products.

The target has been met. In mid-2024, one extended responsibility system was introduced in the Czech Republic, specifically by NEVAJLGUJ, a.s. This company was established to operate a collective system for fulfilling obligations for tobacco products with filters and filters placed on the market for use in combination with tobacco products. In the future, it will be necessary to ensure collective systems also for other products subject to Act No. 244/2022 Coll., on reducing the impact of selected plastic products on the environment. It is also expected that further extended producer responsibility systems will emerge on the market with the expansion of products covered by the extended responsibility system.

Objective 5: Ensure consumer education and awareness and encourage responsible consumer behavior in order to reduce the amount of waste from single-use plastic products.

The objective has been achieved. Several information campaigns have been carried out in the area of single-use products, such as the Ministry of the Environment's #dostbyloplastu campaign and Ukliďme Česko (Let's Clean Up the Czech Republic), of which the Ministry of the Environment is a partner. In addition, *a case study on the transition from single-use to reusable packaging and tableware at farmers' markets on the Prague embankment and a general methodology for farmers' markets in the Czech Republic* were developed. The Ministry of the Environment is currently running an ongoing campaign on the website "Česko bez plastu" (Czech Republic without plastic) https://www.ceskobezplastu.cz/.

Another important element was the ban on selected single-use plastic products. This reduced both their production and the associated littering.

2.9.4 Waste management indicator system 2022

Indicators are basic indicators used to continuously assess the status and development of waste management in the Czech Republic. Quantitative and qualitative indicators make it possible to monitor the fulfillment of the objectives of the Czech Republic's Waste Management Plan. The Ministry regularly evaluates the Waste Management Indicator System and ensures that it is updated. For the evaluation of waste management indicators for 2022, the Ministry of the Environment prepared the Methodology of the Waste Management Indicator System in 2023. Data from the Waste Management Information System (new ISOH2), containing data from entities subject to the Waste Act and the End-of-Life Products Act, was used to calculate the indicators for 2022. The basic quantitative indicators of the System of Indicators enable a basic assessment of waste management at the level of the Czech Republic.

Since 2024, the Ministry of the Environment has been publishing basic indicators on the website of the Public Waste Management Information System (VISOH2) https://visoh2.mzp.cz under the heading "Production and disposal in the Czech Republic", where the basic indicators can be viewed.

2.10 Evaluation of waste management tools

Selected waste management tools were used to support and achieve the objectives, principles, and measures of the Czech Waste Management Plan, motivating individual entities to engage in activities that are desirable for fulfilling the principles and adopted objectives. These tools were combined to achieve maximum effect. The principles of free movement of goods in the EU single market were respected when developing the tools, and some of the tools are enshrined in the Waste Act, the End-of-Life Products Act, the Packaging Act, and other related laws. The following chapters contain an evaluation of the effectiveness of these tools as set out in the previous plan.

2.10.1 Legal instruments

a) The legal system of the Czech Republic, in particular the set of legal regulations governing the environment, waste and circular economy, and the relevant technical standards.

The most important legal regulations in the field of waste are

- Act No. 541/2020 Coll., on waste,
- Act No. 542/2020 Coll., on end-of-life products, and
- Act No. 477/2001 Coll., on packaging.

Act No. 541/2020 Coll., on waste, did not come into effect until January 1, 2021, i.e., in the second half of the period covered by the previous Waste Management Plan of the Czech Republic 2015-2024 with a view to 2035. This Act amended a number of obligations in the field of waste management. Compared to the original Waste Act (185/2001 Coll.), it amended the obligations of waste producers (e.g. in the area of construction and demolition waste). Furthermore, the Act expressly regulates the issue of waste collection outside designated sites (so-called illegal dumps), and fees for participation in the municipal system are now regulated only by the Act on Local Fees (252/2023 Coll.). The Waste Act also includes changes relating to landfills, such as the introduction of different fees for different categories of waste, which will be increased annually until 2030. From 2030, there will be a ban on landfilling recoverable waste, which reflects the approach in line with the waste management hierarchy, where landfilling is the last resort for waste management. The Act also describes obligation of municipalities to designate locations for the separate collection of recyclable components of municipal waste and sets minimum rates for the use and recycling of such waste. This places higher demands on municipalities in terms of waste sorting than before. Data for 2022 show a slight decrease in mixed municipal waste and an increase in the amount of separately collected waste components. The total amount of waste also decreased slightly. However, a one-year decline cannot be used to determine whether this is a trend or an aftereffect of the COVID-19 pandemic. A more detailed assessment of the effectiveness of the Waste Act will be possible with more time.

Act No. 542/2020 Coll., on end-of-life products, also came into effect on January 1, 2021. This act removed selected products and equipment subject to take-back from the original Waste Act (185/2001 Coll.). The aim of this Act was to clarify the original definition of take-back and to specify selected products subject to this regime. The Act newly defines a public take-back point (collection yards, containers, etc.), i.e., a place that is accessible to every citizen throughout the year during specified operating hours, where they can return their end-of-life products. The Act also clearly defines that no fees may be charged to the end user for ensuring take-back. Furthermore, the Act addresses, for example, the obligations of final sellers, the extension of information obligations on take-back systems, the setting of minimum take-back levels and minimum levels of use of end-of-life products, and other changes.

Act No. 541/2020 Coll., on waste, and Act No. 542/2020 Coll., on end-of-life products, contain a number of changes compared to the original waste act, reflecting the principles of waste management hierarchy. Given that it only entered into force in 2021 and contains a number of transition periods, after which the desired effect should be achieved, it is difficult to evaluate these instruments at this stage. The changes in the laws are not yet visible in the data for 2022, which is the latest available data, and it is therefore not possible to evaluate this instrument quantitatively.

During 2024, Act No. 477/2001 Coll. on packaging will be amended. The draft law is based on a preliminary agreement between the Council and the European Parliament, which should result in a new EU regulation on packaging. The Czech Republic is preparing this law in advance and it is possible that its wording will undergo a number of changes. However, according to the draft law, a deposit system for PET bottles, cans, and other single-use beverage containers is to be introduced in the coming years. This means that only packaging registered with a deposit system operator will be allowed on the market. However, the introduction of a mandatory deposit system has not yet been legislated in the European Union. This obligation is not expected to come into force until 2029. The draft law is therefore a preliminary response to this potential obligation. The aim of the amendment is to promote the circular economy, increase the proportion of returned packaging, and reduce the amount of waste generated by the use of single-use packaging.

b) Strategic documents of the Czech Republic

These are strategic documents related to waste and waste management, or topics such as raw materials and energy policy, development and operational programs that include waste issues, etc. The main documents in the field of waste management are

- State Environmental Policy 2030 with a view to 2050 (approved in 2021),
- Strategic Framework for the Czech Republic 2030 (approved in 2017, continuously updated),
- Strategic Framework for the Circular Economy of the Czech Republic 2040 – "Circular Czech Republic" (approved in 2021),
- Raw Materials Policy of the Czech Republic (approved in 2017),
- Secondary Raw Materials Policy of the Czech Republic (approved in 2019), and
- Energy Concept of the Czech Republic (planned update in 2024).

There are sufficient strategic documents in the field of waste management, but these are long-term strategies with a time horizon of several decades. For this reason, it is not possible to evaluate these long-term legal instruments, or only documents with a shorter strategic horizon (Raw Materials Policy of the Czech Republic, Secondary Raw Materials Policy of the Czech Republic, Energy Concept of the Czech Republic), in which waste management is not the main topic. In recent years, subsidies have been used to change waste management, making it easier to achieve some of the objectives and measures. This document should therefore be the key document in the field of waste management in the Czech Republic for the coming years. Strategic documents primarily serve to guide entities towards a certain vision and set goals. The success of the vision can be assessed on the basis of the achievement of the goals. The strategic documents mentioned above fulfill this role.

c) Regional waste management plans

The waste management plans of individual regions of the Czech Republic are strategic documents in the field of waste and circular economy and serve as a basis for further documentation by regions and municipalities (spatial plans, etc.). Waste management plans are based on national targets, principles, and measures set out in the national waste management plan. They should also focus on decisions regarding the financing of larger local projects. Regions have greater local knowledge in this area. In the past, regional waste management plans played a rather passive role.

d) Exercise of public administration control powers

Obligations in the area of circular economy and waste management laid down by law are subject to penalties. However, control activities have long been hampered by a lack of human (or professional) resources across control bodies. Nevertheless, thanks to the functioning of the state administration (e.g., the Czech Environmental Inspectorate), there has been an improvement in the environmental performance of businesses and companies and in proper record-keeping, with a positive impact on waste management planning. In addition, ongoing control activities are improving the quality of waste management, as it is more difficult to circumvent the laws, thus increasing the preventive effect. In general, it is necessary to continue improving the conditions for supervisory bodies and to strengthen the practical implementation of supervisory powers and the enforcement of legal obligations by all relevant authorities. In the 21st century, it is also necessary to improve the digitization and automation of control mechanisms.

2.10.2 Economic instruments

a) Landfill tax

An increase in landfill fees has been recommended by the European Commission for some time, and the new Waste Act (No. 541/2020 Coll.) has now actually increased this fee. Gradual inflation meant that there was effectively no increase in landfill fees. The fee rate is set by this law and will increase annually until 2030. After 2030, the landfilling of recyclable waste will be banned, and the increasing price is intended to encourage a gradual reduction in the landfilling of such waste. On the contrary, the fee for hazardous waste has been reduced, as the high fee led to illegal disposal of such waste.

Although it is difficult to evaluate this economic instrument given the short time since the Waste Act came into force, it can be said that the landfill tax (and its increase) is working and helping to achieve the objectives and principles set out in the previous POH ČR. In the past, landfilling was essentially the cheapest method of waste disposal, although it is at the bottom of the waste management hierarchy. The increase in the fee has thus made this method of waste management less attractive and encouraged the development of technologies for waste management at a higher level of the waste management hierarchy (waste-to-energy technologies, sorting lines, etc.), some of which have been implemented thanks to the revenue from these fees. Other projects are waiting for the fee to increase to a higher level in the coming years, after which they will be able to be implemented thanks to higher revenues from the fees. In the event of changes to other waste management instruments (e.g., emission allowances), it is necessary to ensure sufficient motivation for investors through reactive changes to the landfill fee.

b) Discount for municipalities for municipal waste disposal

According to the new Waste Act (No. 541/2020 Coll.), the fee for municipal waste disposal for the partial basis of the municipal waste disposal fee is CZK 500 per ton of waste. Once this amount is exceeded, the municipality must pay a fee for recyclable waste. Until 2029, municipal waste that meets the conditions for recyclability and is produced by the municipality (with the exception of hazardous waste) will be included in the partial basis for the municipal waste disposal fee instead of the partial basis for the recyclable waste disposal fee, provided that the total weight of such waste deposited in any landfill does not exceed the amount specified in the annex to this Act during the period specified by law. The limit for such waste deposited in landfills is set on a degressive basis in order to support the intention to reduce the landfilling of recyclable waste and thus the principles of waste management hierarchy.

Although it is difficult to evaluate this economic instrument given the short time since the Waste Act came into force, it can be said that the so-called discount for municipalities is working and helping to achieve the objectives and principles set out in the previous POH ČR. Municipalities are looking for ways to reduce costs and are generally motivated to reduce municipal waste production. This is linked to the expansion of the separate collection network, not only in terms of the number of collection containers, but also in terms of the range of commodities that can be sorted. The discount thus has a positive impact on municipalities in terms of increasing sorting and reducing the amount of mixed municipal waste sent to landfills.

c) Extended producer responsibility

Extended producer responsibility is absolutely essential for waste management (especially municipal waste management). Waste covered by extended producer responsibility is cheaper than waste not covered by this scheme. The application of extended producer responsibility motivates municipalities, which, thanks to separate collection and transport systems for this waste (provided by the authorized packaging company EKO-KOM, a.s.), significantly reduce costs because they receive contractual remuneration. Although this contractual remuneration does not usually cover 100% of the waste management costs incurred by municipalities, this possibility of reducing the overall costs for municipalities is nevertheless significant. The full costs of waste management are rarely passed on to citizens. Extended producer responsibility appears to be an important stabilizing factor in waste management in the face of price and cost changes in this sector. It also provides significant economic support to municipalities, which is why the application of this principle to other waste streams with a direct impact on municipal budgets can be recommended.

In addition, thanks to the functioning sorting system, raw materials are obtained for the production of products from recycled raw materials (or for energy recovery), thus shifting towards a more preferred method of waste management within the waste management hierarchy. The increase in landfill fees and the associated discount had an impact on the growth of investment plans in waste management (sorting, energy recovery) and on the perception of waste management (expansion of separate collection systems, door-to-door systems, change in collection frequency, etc.).

d) Financial guarantee for cross-border transport

The Ministry of the Environment uses the financial guarantee to finance alternative use or disposal of waste, including necessary preliminary procedures, waste storage and transport costs, if the notifier, consignee or other responsible person fails to fulfill all their obligations under the Waste Shipment Regulation at their own expense. The financial guarantee is calculated by the Ministry in accordance with the relevant annex to the Waste Act and must be valid for the entire duration of the notification of cross-border waste shipment and for a further 16 months after the shipment has been completed.

This is a long-standing economic instrument based on Regulation (EC) No 1013/2006 of the European Parliament and of the Council on shipments of waste, which was already included in the previous Waste Act (No. 185/2001 Coll.). Financial guarantees for cross-border shipments work well and help to achieve the objectives, measures, and principles set out in the previous POH ČR. The notifier of cross-border shipments of waste must arrange for a financial guarantee to be provided by a bank that is directly linked to the Ministry of the Environment. This gives the Ministry of the Environment greater control over the flows of such waste, which is primarily a matter of monitoring exports due to the state's responsibility.

e) Financial guarantee and insurance for the first phase of landfill operation under the Waste Act

Financial guarantees and insurance for the first phase of landfill operation were already included in the previous Waste Act (No. 185/2001 Coll.), so this is a tool that has been in use for some time. The landfill operator has a legal obligation to secure funds for the first phase of landfill operation before commencing the first phase of landfill operation by taking out insurance against damage to the environment, human health, and property caused by landfill operation (in the first phase of landfill operation and for damage caused by the termination of operation during the first phase of landfill operation). The operator is also required to deposit into a special account or provide a bank guarantee in the amount of the costs necessary to remedy any damage, as determined by an expert opinion.

The financial guarantee and insurance for the first phase of landfill operation is a long-term and effective tool that helps to achieve the objectives, measures, and principles set out in the previous POH ČR. The legal obligation to secure financial resources for environmental liability insurance increases the likelihood that damage to the environment, human health or property will be covered by a source of funding if such damage occurs, or that compensation will be paid for damage caused by the closure of the landfill during the first phase.

f) Financial reserve for reclamation and subsequent care after the closure of the landfill

A financial reserve for recultivation and subsequent care after the closure of a landfill is also a long-standing instrument, as it was already part of the previous Waste Act (No. 185/2001 Coll.). During the first phase of operation, the landfill operator creates and maintains a reserve to ensure recultivation and subsequent care of the landfill and its closure after the end of the first phase. The reserve is created by the operator as part of its costs, with the method of creating and drawing on this reserve being laid down in the Waste Act.

The financial reserve for landfill reclamation and insurance for the first phase of landfill operation are long-term and functional tools that help to achieve the objectives and principles set out in the previous POH ČR. Financial reserves for landfill reclamation are a good tool, provided they are firmly linked to the purpose (reclamation) and their use is restricted until that purpose is achieved, as they give the regions concerned sufficient certainty that the landfill will actually be reclaimed and the environment protected.

g) Advance payment systems for returnable packaging under the Packaging Act

Manufacturers in the Czech Republic may voluntarily introduce a deposit system for their packaging. A voluntary deposit system for reusable packaging is still in place in the Czech Republic. Under an amendment to the Packaging Act, which is expected to come into force in 2024 or 2025, a mandatory deposit system is planned for selected packaging (PET bottles and beverage cans). A voluntary deposit system for glass packaging has been operating successfully in the Czech Republic for many years, based on long-standing practice.

h) Ecomodulation

Ecomodulation is an extended responsibility system tool that applies not only to packaging but also to end-of-life products such as electrical equipment, batteries, and tires. Eco-modulation allows extended responsibility systems to set fees in such a way as to encourage manufacturers to use appropriate solutions that have a minimal negative impact on waste management and a positive impact on the circular economy and životní environment. The basic principle of eco-modulation is to motivate producers to give preference to packaging that has lower collection and recycling costs and is therefore easier to sort and recycle. The calculation of fees takes into account the environmental impact of packaging (and other products), recyclability, the content of hazardous substances, and the overall material composition of the product.

Although the eco-modulation obligation is defined by Act No. 542/2020 Coll., on end-of-life products, eco-modulation is currently applied to a lesser extent in the Czech Republic, for example in the context of packaging reduction. Ecomodulation is an effective tool for streamlining recycling, and its application also makes waste management more efficient, as it does not require the use of such a large number of technological processes and solutions. A greater impact on manufacturers and the application of ecomodulation principles is expected once the regulation on packaging and packaging waste comes into force.

Ecomodulation has had the greatest impact in the Czech Republic since July 2021, when fees for almost all packaging increased. Companies paid about a third more for plastic and metal packaging (cans), while fees for transparent PET bottles, which are more recyclable, were reduced. These fees are part of the eco-modulation measures stemming from the applicable legislation. Eco-modulation helps to ensure that the costs associated with the end of a product's life are included in the price of the product and, at the same time, motivates manufacturers to take into account the recyclability, reusability, repairability, and presence of hazardous substances when designing products. The table below (Table 70) shows that there is a steady increase in fees for ensuring compliance with take-back and waste recovery obligations through the EKO-KOM compliance system, but also that manufacturers who use recycled packaging are being given preferential treatment. Between 2021 and 2025, there was even an 18.63% reduction in the fee for transparent PET bottles made from recycled materials.

Table 70: Fees for ensuring the take-back and recycling of packaging (including eco-modulation)

Commodity	Fees per tonne from 7/2021 (CZK)	Fees per tonne from 1/2025 (CZK)	Percentage increase (%)
Composite packaging	11	25	1
Beverage cartons	7,720	7,879	2
Colored PET bottles (for beverages)	8,790	17,970 (9,433 from recycled materials)	104.5 (7.3)
Cans (aluminum)	3,760	4,017	6
Transparent PET bottles (for beverages)	4,070	11,850 (3,312 from recycled material)	191 (- 18.6)

Source: AOS

When the first phase of eco-modulation (see Table 70 for fee increases) was introduced in 2021, it was already clear that there would be further gradual changes in the coming years depending on increasing recycling rates, changes in the prices of secondary raw materials, and prices in waste management. The highest price increases between 2021 and 2025 were for composite packaging (113.7%), which is often non-recyclable or not worth recycling (soup bags, spray bottles with plastic caps).

There was also a sharp increase in the price of transparent PET bottles made from primary plastics (191.2%), mainly due to a decline in their purchase price and an increase in waste collection costs in general. In contrast, fees for transparent PET bottles fell by just under 19%.

Since the beginning of 2023, we can talk about the next phase of the eco-modulation process, specifically further differentiation of packaging fees. This mainly involved distinguishing aluminum packaging according to its sortability, i.e., the technical possibility of returning it for recycling. The next phase also included a further step in the eco-modulation differentiation of composite packaging from more easily recyclable, mono-material packaging. Furthermore, rates for the primary and recycled components of PET plastic beverage packaging were differentiated based on legislative amendments on single-use plastic products. In the coming years, further increases in fees for less recyclable commodities and a general shift towards more recyclable materials (transparent plastic, aluminum) can be expected. With the introduction of a deposit system for PET bottles and beverage cans, the efficiency of sorting these commodities is also expected to increase.

i) Emission fee

The emission fee is a tool that was part of the previous Waste Act (No. 185/2001 Coll.), and is now part of Act No. 542/2020 Coll., on end-of-life products, but its amount and method of payment have not changed. The emission fee is paid when registering a road vehicle of category M1 and N1 in the Czech Republic's vehicle register or when changing the owner or operator of the vehicle. This fee was intended to prevent the import of old vehicles into the Czech Republic from abroad and to speed up the scrapping of old vehicles that pollute the air the most. The funds collected are paid into the State Environmental Fund, which distributes them to projects that help protect the environment through subsidy programs (support for recycling materials from dismantled end-of-life vehicles, support for infrastructure and the purchase of alternative fuel vehicles, decarbonization in general).

The emission fee is a long-standing economic instrument of waste management that helps to achieve the objectives, measures, and principles of the previous Waste Management Plan of the Czech Republic. The effect of the emission fee was to motivate owners of older cars to switch to more modern vehicles that do not pollute the environment to such an extent, precisely because of the high fee. However, the average age of cars in the Czech Republic in 2022 was just under 16 years (the fifth highest in the EU) and is increasing every year, as is the case throughout Europe. Although the instrument has not reduced the age of the vehicle fleet in the Czech Republic, it can be considered functional, as its revenues are again being used for subsidy incentives in the area of decarbonization in the Czech Republic.

j) Fines under the Waste Act, the End-of-Life Products Act, the Packaging Act, the Municipalities Act, and the Offenses Act

The aforementioned laws strengthen the sanctioning powers of supervisory authorities with regard to their supervisory duties. Administrative authorities are also allowed to impose fixed penalties and corrective measures without imposing a financial penalty in the event of minor violations of legal obligations (e.g., administrative offenses).

The new Waste Act (No. 541/2020 Coll.) has increased some fines for offenses (or reduced the number of categories of offenses) that can be imposed on legal entities or natural persons engaged in business activities compared to the old one (No. 185/2001 Coll.). Fines may also be imposed on municipalities, for example for failing to designate a place for the separate collection of biological waste or for failing to meet the share of separately collected recyclable components of the total amount of municipal waste. In general, fines and their amounts are a good motivational tool for state administration to supervise entities operating in the waste management sector. They are also a tool that helps to achieve the objectives and principles of the previous POH ČR. However, the biggest problem is the enforcement of these fees and the detection of infringements, as state administration bodies often encounter insufficient human resources in their control activities.

k) Payments for municipal waste

An amendment to the Waste Act in 2021 transferred the issue of charging citizens for municipal waste solely to Act No. 565/1990 Coll., on local fees, or rather its amendment No. 252/2023 Coll. Municipalities may choose to levy a fee for the municipal waste management system or a fee for the disposal of municipal waste from immovable property. The fee for the municipal waste management system is linked to the permanent residence of persons or ownership of immovable property in which no natural person is registered and which is located in the municipality. The fee is a maximum of CZK 1,200 and is introduced by the municipality at a uniform rate for all taxpayers. The fee for municipal waste disposal from immovable property is based on the actual amount of waste produced by citizens or on the capacity of collection facilities ordered for the fee period. The municipality may set the amount for individual taxpayers based on the amount of waste they produce or the capacity of collection facilities (PAYT[37] system).

In general, the option for municipalities to choose the fee is a good step and an effective tool for achieving the objectives and principles of the previous POH ČR, especially in the case of various PAYT system variants. PAYT systems in particular can have a motivating effect on citizens, for example, to sort waste to a greater extent, as the fee actually reflects the amount of waste produced. In the Czech Republic, the use of PAYT payments in municipalities is currently around 20%. The introduction of PAYT systems and the general increase in municipal waste fees were initially accompanied by concerns that the need to pay for municipal waste would lead to an increase in the number of places polluted by waste concentrated outside designated areas (so-called illegal dumps). According to the information available for 2022, this phenomenon is not occurring to any significant extent, nor can its occurrence be directly linked to the increase in fees, as there may be other reasons for it. For example, during the COVID-19 pandemic, there was indeed an increase in the number of reports of such sites, but this can also be explained by other reasons, such as greater movement of citizens in nature and increased awareness among citizens who reported these sites; cleaning of neglected areas that citizens were able to access due to more free time and temporarily closed collection yards, etc. A concern in the case of expanding PAYT systems may be, for example, the theft of certain commodities from garbage cans or the artificial increase in the weight of the collected waste volume in a situation where citizens are financially motivated. The ideal scenario is therefore to base municipal waste charges on the size of the collection container or the frequency of waste collection.

l) Support from the State Environmental Fund of the Czech Republic

Through the State Environmental Fund of the Czech Republic, the Ministry of the Environment provides significant support for projects in the field of waste management. Various instruments (loans, subsidies) are used to support waste and circular economy management with the aim of advancing the waste management hierarchy.

Subsidy support from the State Environmental Fund is truly significant support in the field of waste management in the Czech Republic and can be considered a very effective tool contributing to the fulfillment of the objectives and principles of the previous POH ČR. The overall effect of subsidy programs (such as the Operational Program Environment) can be described as very positive, as a large number of projects focused on primary and secondary sorting, material or energy recovery of waste, waste prevention, the development of waste collection and treatment networks, the reclamation of old landfills and environmental burdens (including their inventory), and others that had a positive impact on the waste management hierarchy. Under the Operational Program Environment 2021-2027 in the area of waste management, almost 500 projects were supported in the first quarter of 2024.

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[37] From English Pay as you throw – pay for what you throw away

aimed primarily at waste prevention, the construction and modernization of collection yards and separate collection systems, and composters. This support exceeded CZK 2.4 billion (of which just under CZK 250 million was for completed projects). In the previous period of the Operational Program Environment (2014-2020), a total of 2,851 waste management projects were supported for a total of CZK 8.5 billion. A problem that is also typical for the subsidy area in general is the granting of different percentages of support to the same projects (public support) and the preferential treatment of certain types of projects, which has an impact on the competitive environment. Many projects are initiated by applicants motivated by investment subsidies.

m) Funding from the state budget

In terms of volume, the state budget is an important central source of environmental funding. It provides funds intended primarily for co-financing environmental protection projects supported by European Union funds, subsidies, repayable financial assistance (interest-free loans), investment incentives and guarantees for commercial loans, as well as transfers of funds to regional budgets and the State Environmental Fund.

Funding from the state budget is one of the key economic instruments for supporting waste management, enabling the objectives, measures, and principles set out in the previous POH ČR to be achieved. In the context of waste management, it is essential that the funds allocated to environmental protection in the state budget are constantly increased. This is because, in the field of the environment, for example, it is necessary to constantly respond to regulations, directives, and delegated acts issued at the European Union level, the implementation of which also entails necessary investments. The evaluation of the individual sub-instruments to which funds from the state budget are redistributed is explained separately in this chapter.

n) Expenditure from regional budgets

Based on the principles of subsidiarity, funds from regional and local budgets are another important source of financing for waste management. These budgets are used primarily to finance smaller-scale projects.

Within the framework of subsidiarity, some subsidy titles focused on less financially demanding projects are redirected to lower levels of self-government (regions, municipalities). This process appears to be effective, as it reduces the administrative burden on subsidy programs focused on more financially demanding projects. Subsidy programs are then administered by regions or municipalities, which have more detailed local knowledge and can better tailor the conditions of these programs to better correspond, for example, with regional waste management plans.

o) Support from EU programs and funds

The Czech Republic draws funds from European Union funds, which form the basis of European structural policy and help to promote balanced and sustainable development in all countries. These include, in particular, the Operational Program Environment 2021-2027 (and the previous one for 2014-2020), which supports activities in important investments for the development of the waste management sector, for the fulfillment of the objectives of the Waste Management Plan of the Czech Republic, and for the fulfillment of commitments to the European Union to strengthen waste management in accordance with the waste management hierarchy. For the so-called "coal regions" (Karlovy Vary, Moravia-Silesia, and Ústí nad Labem regions), there is the possibility of using the Just Transition Operational Program, which also supports waste management projects. Other options in this area include the Modernization and Innovation Funds.

Support from the Operational Program Environment, which is managed by the State Environmental Fund, has already been mentioned in a separate section of this chapter and is a key economic instrument in the field of waste management in the Czech Republic. The Operational Program Just Transition aims to rather on digitization, innovation, and support for small and medium-sized enterprises, so support under this program in the field of waste management is rather marginal, but possible. Another possible source of support from European Union programs is the Operational Program Technology and Applications for Competitiveness, which focuses on supporting projects in the areas of research, development, and innovation, digitization and digital infrastructure, business development, smart and sustainable energy, and the circular economy. One of the program's priorities is more efficient resource management, with a sub-priority of supporting the transition to a circular economy. The total allocation for this program is CZK 81.5 billion, and as of the first quarter of 2024, one call for proposals has been announced to support circular economy projects with a total allocation of CZK 1 billion. In the area of development and innovation of new waste management technologies, the Operational Program Enterprise and Innovation for Competitiveness can also be used by waste management actors. In general, the above-mentioned instruments (especially the OP Environment) are excellent tools that help to achieve the objectives, principles, and measures set out in the previous POH CR through the implementation of waste management projects. In addition to smaller projects focused on raising awareness in the field of waste management, these programs also implement projects that would not have been possible without them.

p) Taxation of primary raw materials, tax measures, and relief

Since 2021, Act No. 609/2020 Coll., amending certain acts in the field of taxation, has introduced a lower value added tax rate (to 15%, originally 21%) for activity "38.3 Processing of municipal waste for further use, secondary raw materials". The reduced VAT rate on waste processing was intended to promote greater waste utilization and recycling. In 2020, the value added tax was also reduced to 10% for services related to the repair of footwear and leather products, the repair and alteration of clothing and textile products, the repair of bicycles, and the rental of books (from the original 21%), but this is no longer the case. The tax reduction was intended to contribute to extending the life of products and preventing waste generation. In the past, consideration was also given to reducing taxes on repairs, renovations, and alterations of other products, or introducing additional tax incentives for products with a specific recycled content in order to stimulate demand for recycled materials.

Although tax instruments can be effective tools for helping to achieve the objectives and principles of the previous POH CR, the effect of reducing value added tax on selected types of services is difficult to assess. Only a short time has passed since its introduction until its termination for the effect to be reflected in the data. Furthermore, the period during which the reduced tax rate was in place was significantly affected by the COVID-19 pandemic, which may have distorted the data. In 2024, value added tax on the above services (and municipal waste treatment) returned to its original level of 21% as part of the recovery package.

q) Further support and subsidies

Working groups are being set up to identify more effective ways of supporting waste management. These groups generate knowledge, monitor current trends and seek solutions, such as the Centre for Environmental Research (CEVOOH). This center is made up of a consortium of eight research organizations and universities and focuses on conducting research in areas related to the Czech Republic's transition from a linear to a circular economic model. The project is divided into work packages that focus on different areas of waste management. The project is supported by the Ministry of the Environment's departmental program život "Environment pro život" (Environment for Life). The administrator of this program and the provider of support is the Technology Agency of the Czech Republic (TA ČR). The program also supports other projects in the public interest focused on new processes, environmental technologies, and eco-innovations (with high potential for rapid practical application and for supporting more time- and knowledge-intensive solutions based on long-term monitoring of social, natural, and climate changes). The main priorities include waste and circular economy. Support research projects in the field of waste management

In both the short and long term, it is an important waste management tool that significantly contributes to the fulfillment of the objectives, measures, and principles of the previous POH ČR. Given that the Environment for Life program has only been in operation since 2020 (until 2026), it is appropriate to evaluate its outputs over a longer period of time. However, the main measure of the program's success should be the applicability of research outputs in waste management practice.

Since 2019, the Ministry of the Environment has been issuing an annual call for proposals to support non-governmental non-profit organizations active in the field of environmental protection and sustainable development. These calls have already supported more than 70 projects focused primarily on promotion and education in the field of waste management and on minimizing waste production, preventing waste generation, and transitioning to waste management. These projects are successful and do a great service in terms of raising awareness about waste management, such as projects for sharing examples of good practice, raising awareness about composting, food and furniture banks, and others.

2.10.3 Administrative tools

a) Ensuring uniform performance of state administration in the field of environmental law

New legislation in the field of waste management has contributed significantly to the unification of public administration, mainly Act No. 541/2020 Coll., on waste, Act No. 542/2020 Coll., on end-of-life products, and, for example, Decree No. 273/2021 Coll., on details of waste management. The entire waste management sector will also be significantly affected by the amendment to the Packaging Act (No. 244/2022 Coll.).

The aforementioned administrative tools (and many others) are key instruments in the field of waste management and already have a significant impact on the development of waste management in the Czech Republic and on the fulfillment of the objectives, measures, and principles of waste management plans. Their impact will continue to be evaluated. In the future, these instruments will certainly be updated (amended) in response to developments in waste management.

b) Improving the expertise of public administration staff in the field of waste management

The professional training of public administration staff in the field of waste management is provided on an ongoing basis by the state administration. Several times a year, training cycles and professional competence exams for officials in the field of waste management are held. Staff of waste management authorities take an exam in technical environmental protection in accordance with the Civil Service Act.

Long-term continuous professional training of employees of the Ministry of the Environment and other public administration bodies in the field of waste management is an important administrative tool, for example in control activities. Individual approaches by administrative officials are eliminated by methodological communications, guidelines, and instructions, and by the continuous improvement of educational materials. Methodological consultations between higher and lower authorities take place on a regular basis.

c) Strengthening the powers of the Czech Environmental Inspectorate and other state administration control bodies

Ensuring optimal conditions for the effective performance of control activities with sufficient human resources and financial and technical support is also necessary for other state administration control bodies (such as the Czech Environmental Inspectorate (ČIŽP)). In general, the CEI operates at an excellent level. Regular training and close communication between the CEI management and the Ministry of the Environment and regional inspectorates support a uniform approach in all regions.

d) Green public procurement

Act No. 543/2020 Coll., amending certain acts in connection with the adoption of the Act on End-of-Life Products, implemented the principles of socially responsible procurement, environmentally responsible procurement, and innovation into the Public Procurement Act.

Green procurement is slowly gaining ground in practice. The Operational Program Environment, for example, has a positive impact, with green public procurement providing bonuses for the intensity of support. Pressure for carbon neutrality is also causing contracting authorities to focus more on the origin and sources of the items being procured. This tool can be assessed as a very positive and effective way to develop the circular economy and improve environmental protection.

e) Supporting desirable activities that lead to the prevention of waste generation, reduction of its quantity and hazardous properties, and preference for products made from recycled materials and environmentally friendly products.

This tool has been used to develop methodological guidelines that help to direct waste prevention and waste management in accordance with the requirements of the waste management hierarchy.

Prevention activities are also supported through subsidy programs such as the Operational Program Environment (OP ŽP). Previously specific objective 3.1. OPŽP 2014-2020, now measure 1.5./1-1.5.4 under OPŽP 2021-2027. Preventive activities were also supported through the Operational Program Enterprise and Innovation for Competitiveness and now the Operational Program Technology and Applications for Competitiveness. Preventive activities can also be supported through programs of the Technology Agency of the Czech Republic or the National Environmental Program. A wide range of tools to support desirable preventive activities exists and has been used.

f) Environmental education, training, and awareness

Environmental education (hereinafter also referred to as EVVO) is provided at a good level. It takes place at several levels and through various entities. There are programs, courses, and events organized directly by central organizations such as the Ministry of the Environment, the State Environmental Fund, and other institutions. Education is also provided through universities, schools, and accredited courses. Many activities are provided through non-profit organizations or private entities.

Environmental education has a major impact when it involves the youngest children and young people. Acquiring environmental protection habits in childhood offers the best chance of acquiring knowledge and adapting it in adulthood. Various voluntary activities by civic associations can also be observed. Activities that are not primarily educational but also have an educational effect are also important within EVVO. EVVO is also important for foreign citizens who study and work here.

g) Professional background for supporting the performance of state and public administration

The professional background for the performance of public administration has improved significantly. Several information systems have been created or modernized. A new, modernized waste management information system (ISOH2) has been launched, and the TIRAMISO application for waste production forecasting and the CEVOOH (Environmental Research Center) have been created, which provide significant support for public administration and the private sector. Other professional needs are primarily addressed through public procurement within the framework of programs announced by the Technology Agency of the Czech Republic or through public procurement based on the Public Procurement Act.

h) Support for research, experimental development, and innovation

Support for research, development, and innovation (hereinafter referred to as "RDI") leads in the long term to a reduction in the negative impacts of human activities on the environment, ensuring remediation and monitoring of the environment. Since 2011, the Technology Agency of the Czech Republic (TA CR) has played an important role in providing targeted support for applied research and development, including in the field of waste and circular economy. TA CR ensures the preparation and implementation of applied research, development and innovation programs, including programs for the needs of state administration, public tenders in research, development and innovation to support projects, and public procurement. Specific areas for RDI support in the field of the environment, including waste and circular economy, are listed in the Concept

R&D&I Concept of the Ministry of the Environment[38] and are further implemented under the Environment for Life program.

i) Waste Management Council

Based on recommendations from previous waste management plans, a Waste Management Council was established as an interdepartmental advisory body to the Minister of the Environment. This body coordinates waste management planning at the national level, discusses proposed measures to support the implementation of the Waste Management Plan of the Czech Republic, and submits proposals for waste management solutions. The Council is also expected to continue in the next period.

2.10.4 Information tools

a) Information concept of the Ministry of the Environment

Based on the current situation, the Information Concept of the Ministry of the Environment defines its own objectives in the area of quality and security management of public administration information systems (hereinafter referred to as "ISVS"). It also defines the general principles for the acquisition, creation, and operation of ISVS so that these objectives and principles are in line with the Information Concept of the Czech Republic and so that the information systems acquired, created, and operated by the Ministry of the Environment are gradually brought into line with them. Information systems are currently used to support public administration and to inform the public.

b) Communication strategy for waste management

Information on the environment and waste management is available on the ministry's website, the websites of departmental organizations, and through specialized information systems. As part of the department's communication strategy, media campaigns promoting proper municipal waste management are used to encourage active public participation in sorting and recycling and to promote a positive perception of municipal waste utilization. It also focuses on increasing the take-back of end-of-life products and on waste prevention in general. Comprehensive communication campaigns are being prepared by the regions in conjunction with realistic regional waste management solutions. The communication strategy is being prepared in accordance with the State Program for Environmental Education, Training, and Awareness and Environmental Consulting for 2016-2025. Regions, municipalities, cities, schools, non-profit organizations, educational institutions, and others are involved in this program.

c) Unified Environmental Information System (JISŽP)

The Unified Environmental Information System (JISŽP) is a set of specialized information tools for the environmental sector, but it is still only a theoretical concept. Unfortunately, the development and implementation of a unified information system has not yet been achieved, despite the fact that it is a requirement of Act No. 2/1969 Coll. on the establishment of ministries and other central government authorities.

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38 The updated Concept for Research, Development and Innovation of the Ministry of the Environment for 2016 to 2035 with a view to 2050 was approved by Resolution No. 82 of the Government of the Czech Republic on February 1, 2023.

Currently, there are several dozen separate information systems and databases operating within the Ministry of the Environment, which are not necessarily interconnected. The unification of information systems and databases and the digitization of processes within government agencies are key conditions for streamlining the activities of state administration in general, which can significantly reduce the administrative burden and free up already limited human resources.

d) Integrated system for fulfilling reporting obligations (ISPOP)

ISPOP is a unique system that serves as an excellent tool for collecting data on waste management. The Ministry of the Environment uses this system to collect information on the production and handling of individual types of waste according to catalog numbers, originators, waste handling facilities, and other data.

e) Hazardous Waste Transport Registration System (SEPNO)

The Hazardous Waste Transport Registration System (SEPNO), which was launched in 2018, is a separate module of the Integrated System for Fulfilling Reporting Obligations (ISPOP), which provides services for the receipt and processing of hazardous waste transport notification forms in electronic form and their further disclosure to the relevant state administration institutions. This system has contributed to streamlining and clarifying the hazardous waste transport agenda by digitizing processes. The introduction of the system has also reduced the administrative burden on obligated entities and enabled more efficient and faster control of hazardous waste management by public authorities, as it is possible to monitor the situation in real time.

f) Assessment of the hazardous properties of waste (HNVO)

The HNVO system, which is used to receive requests for the assessment of hazardous properties of waste and to make the assessment available to applicants and state administration bodies, is fully functional. The system also provides contact details for authorized persons, including a list of the properties they are authorized to assess under the Waste Act.

g) Waste Management Information System (ISOH)

The ISOH waste management information system is an important tool for handling waste management data. The data enables the monitoring of waste production and management. The system also serves as a conceptual solution for the licensing process for waste management facilities. Information is also collected on extended producer responsibility systems, authorized packaging companies, packaging waste, and end-of-life products. The development of a new, modern version of ISOH2 was also an important step.

h) Public consultation system within the EIA/SEA process

The EIA/SEA tool is very important for environmental protection. The system is used to keep records of assessed projects and concepts and to publish documents related to the environmental impact assessment process. The tool is also important for the public, as it allows them to find information about any submitted plans. The system can also serve as a kind of safeguard for affected parties in individual proceedings, as it allows them to discover proceedings that concern them and express their views.

i) Integrated Pollution Prevention and Control (IPPC) Information System

The integrated prevention information system serves to ensure all obligations relating to the disclosure of information and public access to information in accordance with the Integrated Prevention Act. The system allows the public to obtain the broadest possible overview of individual permitting processes and, where appropriate, to participate in the proceedings. The integrated prevention information system provides an overview of current proceedings and a database of all integrated permits issued. The system thus fulfills an important informational role and provides a safeguard for the public, enabling citizens to submit comments on permitted sources of pollution.

j) Other information systems of the Ministry of the Environment and other state administration bodies intended for informing the public

Environmental information is also published on social networks and websites of other public authorities, which usually obtain it from the Ministry of the Environment, or it may be part of their remit.

2.10.5 Voluntary instruments

a) Voluntary agreements in the field of waste and circular economy and other related areas

Voluntary agreements are a very good tool. Based on voluntary agreements, the influence of consumer, trader, or industry behavior can even precede legislative standards and tools and thus contribute to their creation.

A very good concrete example of a voluntary agreement was the "No More Plastic" initiative aimed at reducing the amount of single-use packaging and tableware. The main objective of this campaign was to prevent waste generation. Another example is "Responsible Shopping," which aimed to motivate the public and public and private entities to change their consumption habits and prevent waste generation.

b) Environmental management systems improving the quality of waste management entities

The basic voluntary tools used in the Czech Republic are environmental management systems that improve the quality of waste management entities. The most widespread environmental management system is the international standard ISO 14001 or the EMAS system, for which a national program has also been adopted. The Ministry of the Environment will therefore continue to support the implementation of the EMAS program. An excellent example is the requirement to implement EMAS or ISO 14001 in some subsidy programs.

c) Corporate social responsibility (CSR)

In the context of the European Green Deal, Fit for 55, and other European initiatives, there is growing pressure on companies not only in terms of environmental sustainability but also social responsibility. Thanks to the power of social media, companies are placing a strong emphasis on CSR activities, thereby improving their PR. This naturally has a positive impact on the environment, as many of these activities are genuinely beneficial. However, there is a certain risk that well-intentioned activities will not have a sustainable impact or will be nothing more than greenwashing. It is therefore important to only implement CSR activities that have a real and positive impact on society and the environment.

d) Ecolabelling

A number of positively perceived labels (ecology, recyclability, etc.) have emerged that influence the perceptions of consumers. The development of information campaigns is also increasing awareness and demand for environmentally friendly products. The danger here is greenwashing, where some products are labeled as eco-friendly when they are not. It is advisable to focus further on education in this area.

e) Life cycle assessment (LCA) and environmental product declarations (EPD)

An important tool is life cycle assessment (LCA) and the related calculation of the carbon footprint not only of products but also of entire production processes. An environmental product declaration is a tool for transparently declaring product properties to customers, which serves to present the actual environmental impact of a product. Although it is a set of measurable information about the environmental impact of products throughout their life cycle, it is only a voluntary tool. This tool is has recently become increasingly used, particularly in the field of construction products, in view of the growing use of building certification and carbon footprinting, as well as new regulations in the construction industry.

2.11 Assessment of specific areas of waste management

2.11.1 Waste disposed of outside designated sites

Legal regulation

The handling of illegally accumulated waste is regulated by the Waste Act. If the owner of the waste has accumulated it illegally, the law requires them to hand it over to a waste treatment facility or a waste dealer. In the case of waste that is illegally collected on land without the owner of the land also being the owner of the waste (generally referred to as "illegal dumping"), the owner must inform the relevant municipality with extended powers (hereinafter referred to as "ORP"). The ORP will then attempt to identify the owner of the waste. If the owner of the waste cannot be identified, the municipal authority will request the landowner to remedy the situation. If the landowner fails to do so, the authority may impose an obligation on the landowner to secure the site against further accumulation of waste, or it may secure the waste itself or transfer it to a facility designated for waste disposal.

Waste management may also be regulated by generally binding decrees issued by municipal authorities.

Illegal dumps – current situation

The primary objective is to prevent the delivery of further waste and to remove waste deposited outside designated sites as quickly as possible. This minimizes the impact on the environment and reduces disposal costs through the timely implementation of preventive measures (e.g., barriers to entry). Given that these illegal dumps often arise in remote locations, in the vast majority of cases it is not possible to identify the originator of such waste. The burden of removing this waste therefore often falls on municipalities, with the associated costs amounting to considerable sums. In 2022, for example, the cost of removing illegal dumps to municipalities was approximately CZK 10.2 per capita. Unit costs have ranged from CZK 10 to CZK 12 per capita over the last five years.

Most municipalities deal with littering (litter) through the following activities:

- Organization of clean-ups (3,348 municipalities)
- Awareness campaign (1,777 municipalities)
- Information on bins (820 municipalities),
- Fines for littering (320 municipalities)
- Other tools and measures (327 municipalities)

Citizens themselves can help remove waste deposited outside designated areas by submitting a report to the relevant municipality where the illegal dump is located, e.g. by email, text message, the municipality's website, data box (with a photo of the site attached) or by other means. Simply submitting a report does not automatically initiate administrative proceedings ex officio, so citizens can also request information when submitting a report, which obliges the relevant authority to inform the citizen about the status of the matter.

In specific cases and depending on the degree of threat to the environment or human health, reports are submitted to other relevant authorities (ČIŽP, Police of the Czech Republic, Fire and Rescue Service) depending on the size or location of the dump.

Various commercial applications used by local authorities themselves to communicate with citizens (MUNIPOLIS, ZmapujTo.cz, etc.) can also be used to report illegal waste dumps.

Municipal authorities with extended powers and municipalities resolve and remove around 5,000 illegal dumps each year based on reports.

The Ministry of the Environment has long been addressing the issue of illegally concentrated waste, i.e. waste deposited outside designated sites in unauthorised "black dumps". As part of the National Environmental Program (NPŽP), the Ministry of the Environment, through the State Environmental Fund of the Czech Republic (SFŽP), is announcing repeated calls for subsidies for municipalities to support the removal of " illegal dumps." These are projects where the source of the pollution is unknown, including ensuring proper waste management in accordance with Act No. 541/2020 Coll. on waste. A new NPŽP subsidy call No. 9/2024 to support the removal of illegal dumps for municipalities, with a total allocation of CZK 50 million, will be announced in mid-2024.

Causes and possible solutions for illegal dumps

One of the main reasons for the emergence of illegal dumps in the Czech Republic is human behavior. This problem is linked to insufficient public awareness of responsible waste management and the consequences of illegal waste disposal. In this context, the ineffective enforcement and punishment of illegal behavior also plays a role, creating the impression that waste can be disposed of outside official collection points without penalty. Within the Czech Republic, the large number of recreational properties, especially cottages and chalets, which are often not easily accessible for regular waste collection or whose owners have problems delivering waste to collection yards, also contributes to the creation of illegal dumps. Illegal dumps are also often made up of illegally dumped commercial waste or construction waste, where small businesses try to save money on legal disposal. These specific factors encourage illegal dumping in remote locations, which complicates control and monitoring measures.

A specific area within the issue of illegal waste dumps is the problem of temporary waste storage in the vicinity of collection points and containers within urban areas. Regular removal of these illegal dumps again represents an increase in costs for municipalities and thus contributes to the need to increase local fees for the municipal waste management system in municipalities.

The main **problem areas** can be considered to be:

- Lack of discipline among some citizens in the proper disposal of waste, often resulting from poor socio-economic conditions (related to unemployment in the region).
- Insufficient awareness and ineffective development of public education programs at the municipal level, including support in the form of funding for these programs.
- Insufficient funding for the removal of illegal dumps due to the very limited financial resources of municipalities.
- Inadequate preventive control activities by municipalities and municipalities with extended powers focused on waste producers (especially small businesses) in their territory.
- Insufficient cooperation between competent authorities (municipal and city authorities, city and municipal self-governments, the Czech Police, municipal police, and the Czech Environmental Inspection Agency).
- Insufficient prevention of illegal dumping through regular cleaning of public spaces, prevention of opportunities for the potential creation of illegal dumps, preventive control activities, and insufficient or non-existent environmental education and awareness.

- Insufficient penalties for setting up illegal dumps.
- The solution to the problem of illegal dumps does not lie solely in removing the dumps and subsequently restoring the site, but above all in thoroughly investigating and punishing those responsible and preventing the creation of illegal dumps.

Measures that could help resolve some of the above issues include:

- Establishing fast communication channels enabling more active and effective communication between municipalities and citizens, including the use of modern technologies (communication form on the municipality's website, the possibility for citizens to send SMS messages to the municipal office, communication via a portal, data boxes or other commercial applications designed for municipalities).
- Prioritizing preventive activities such as installing information boards, camera traps, and camera systems, and increasing municipal police surveillance in areas where waste is frequently disposed of outside designated areas.
- Effective creation of educational materials and awareness programs at the municipal level, including support, particularly in the form of funding for these programs.
- Obligation of waste producers to ensure further treatment of municipal, construction, and demolition waste at the point of generation.
- More effective promotion of the use of subsidy programs related to waste management (Operational Program Environment, National Program Environment).
- Involvement of the public in programs and events leading to the formation of positive attitudes toward maintaining a clean environment and proper waste management (initiatives such as Clean Up the World, Clean Up Czechia, Trash Hero, World Cleanup Day, etc.).
- Involvement of individuals and legal entities with their waste in municipal waste management systems.
- Regular placement of containers for bulky waste within municipalities and effective information for citizens about their location (social networks, applications for communication with citizens).
- Acceptance of construction and demolition waste from citizens up to a certain limit within the municipal system.
- Introduction of so-called waste amnesties, which offer citizens free collection of specific types of waste that would otherwise end up in illegal dumps (kitchen appliances, carpets, tires, etc.).
- Maintaining the cleanliness of public spaces.
- Use of community service or public service by municipalities to ensure the cleaning and maintenance of public spaces, including activities related to the removal of waste deposited outside designated areas.

2.11.2 Waste generated by extraordinary events

According to Act No. 239/2000 Coll., on the integrated rescue system, an extraordinary event is defined as the harmful effects of forces and phenomena caused by human activity, natural influences, and accidents that threaten life, health, property, or the environment and require rescue and liquidation work. If an emergency cannot be averted by normal means and requires the use of extraordinary powers associated with the declaration of a state of emergency, it is considered a crisis situation. The basic standards for crisis management are laid down in Act No. 239/2000 Coll., on the integrated rescue system and on amendments to certain acts, Act No. 240/2000 Coll., on crisis management and amending certain acts (the Crisis Act), and Act No. 241/2000 Coll., on economic measures for crisis situations and amending certain related acts.

The most common emergencies in the Czech Republic are natural disasters (fires, floods, tornadoes), which generate waste such as ordinary municipal waste, debris, and possibly contaminated debris. These materials may be contaminated with various hazardous substances, such as heavy metals, petroleum products, or other harmful chemicals, which may be released in these situations.

Floods are the most threatening natural disaster in the Czech environment. The scope of flood protection measures is determined by the degree of flood risk, which is expressed in three levels of flood activity (Act No. 254/2001 Coll., on water and on amendments to certain acts (hereinafter referred to as the "Water Act"). A flood begins with the declaration of the second or third degree of flood activity and ends with the revocation of the declared degree of flood activity. A situation where the second or third degree of flood activity has not been declared but the state or flow of water in the relevant profile reaches the reference level specified for one of these degrees of flood activity in accordance with the flood plan of the relevant territorial unit is also considered a flood. The decision on the existence of a flood in a specific area and at a specific time depends on the fulfillment of one of these conditions, with the authority to decide resting with the water management authority (according to the Water Act).

Waste generated as a result of flooding must be considered potentially hazardous and possibly infectious. For this reason, temporary landfills (dumps) in municipalities should not be located near permanent residences, sports facilities, or recreational areas (risks may include infectious aerosols, chemical contamination, and the spread of odorous substances).

Incineration is the most suitable method for the priority disposal of flood waste, but it is important to ensure that this is carried out in a controlled manner in waste disposal facilities such as hazardous waste incinerators or municipal waste incinerators. Uncontrolled burning of waste in landfills or open spaces is not acceptable.

For the handling of dead animals and animal remains, including food, it is necessary to use veterinary sanitation services and specialized companies or the army and firefighters. Sanitation companies carry out waste collection.

Another significant emergency is a pandemic situation. In this situation, the safety of waste handling workers must be ensured to the maximum extent possible. It is also important to ensure the smooth operation of waste handling, even at the cost of a temporary reduction in waste handling within the waste management hierarchy.

In a situation similar to the COVID-19 pandemic, an increase in the production of mixed municipal waste can be expected. Potentially infectious waste should be disposed of in an incinerator.

To ensure a high level of protection, infectious medical waste should be decontaminated. In 2020, the European Centre for Disease Prevention and Control (ECDC) identified the following decontamination methods (steam, heat, chemicals, microwave radiation, ultraviolet radiation, gamma radiation, autoclaving, and others). During pandemics, there is usually a sharp increase in hazardous waste that must be disposed of safely and properly. However, due to limited capacity, it may not be possible to process all such waste quickly and appropriately. It is therefore important for the future to ensure sufficient incinerator capacity to cope with emergency situations. Waste incinerators should become part of critical infrastructure. The Ministry of the Environment has already begun work to include selected hazardous and municipal waste incinerators in critical infrastructure.

Emergency management

During emergencies, it is mandatory to comply with the basic crisis management standards set out in the relevant legislation (e.g., Crisis Management Act No. 240/2000 Coll.) and contained in crisis and emergency plans.

Crisis measures are part of the crisis and emergency plans of the regions. Among other things, the plans also address the area of waste management. In particular, they specify locations for the possible collection of flood waste (landfills), agree on a model for the use of the necessary equipment, including an agreement with landfills to store flood waste according to its classification.

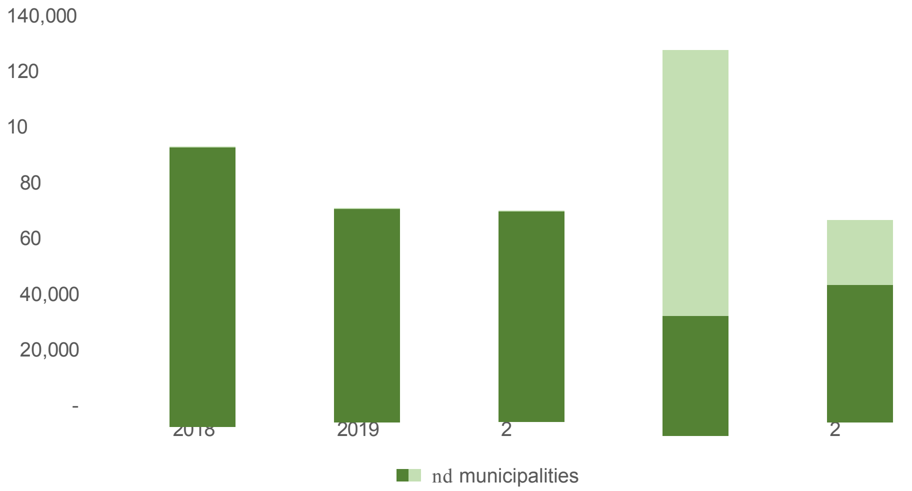
These plans are drawn up by the regional crisis management authorities. Detailed information from the regional plans is then elaborated for smaller areas administered by municipalities with extended powers. The plans also include financial reserves allocated within the region for dealing with emergency situations.

In addition, waste removal from emergencies can also be methodically managed by the Ministry of the Environment, which issues relevant methodological guidelines (e.g., Methodological Guidelines for Natural Disasters, ref. no. MZP/2021/720/3403 and ref. no. MZP/2024/740/6949). In 2021, this was the Ministry of the Environment's methodological guideline for managing waste from tornadoes. In 2013, the Ministry of the Environment issued a methodological guideline for municipalities on waste removal after floods and provided methodological recommendations for the Ministry of the Interior and mayors of municipalities on flood management. At the time of the preparation of the POH ČR, there was another guideline for the management of waste from the extensive floods in September 2024. Methodological guidelines relating to waste generated by extraordinary events are always issued by the Ministry of the Environment in response to the emergency situation in question.

Current status

- Waste from extraordinary events is recorded under code AN60, which also includes waste from old environmental burdens. When processing data, it is not possible to easily distinguish between these two different groups of origin. Figure 60 shows the development of production under AN60 in the Czech Republic in recent years. A distinction is made between municipalities and companies as waste producers.

Graph 60: Development of waste production from extraordinary events and waste from old environmental burdens in the Czech Republic between 2018 and 2022



Source: processed based on ISOH data

In recent years, businesses have played a dominant role in the production of waste from extraordinary events and old environmental burdens, while waste production by municipalities has been marginal. Recorded waste production by companies between 2018 and 2022 shows a downward trend, with waste classified in groups 17 and 19 predominating. Specifically, this concerns waste from group 17, identified under catalog numbers *17 05 03 Soil and stones containing dangerous substances and 17 05 04 Soil and stones not covered by 17 05 03.*

The graph (Graph 60) shows a significant increase in the amount of waste produced by municipalities during 2021. This increase can be explained by an extraordinary event that affected several municipalities.

on the border between Břeclav and Hodonín in the South Moravian Region in June 2021. It was a powerful tornado accompanied by suction vortices, which reached F4 on the Fujita scale. In the affected municipalities, approximately 1,200 to 1,600 buildings were damaged, including public, agricultural, and industrial buildings, as well as a large number of trees and vehicles. Infrastructure, including the railway corridor, was severely damaged. As a result of the tornado in the Břeclav and Hodonín regions, approximately 90,000 tons of mainly mixed construction and demolition waste were produced.

2.11.3 Contaminated sites in the Czech Republic

The vast majority of contaminated sites in the Czech Republic were created before 1990 (the oldest ones date back to the Austro-Hungarian Empire, followed by the First Republic, and then significantly during the communist regime), when environmental protection was not a priority for the state. The term "old environmental burden" (hereinafter referred to as "OEB") is used for such contaminated sites, which are sites where the contamination was caused by a source that no longer exists or is unknown (these were mainly state-owned enterprises and organizations). Old environmental burden is therefore one type of contaminated site. We consider a contaminated site to be a location with serious contamination of the rock environment, soil air, groundwater or surface water caused by the improper handling of hazardous substances (in particular, petroleum substances, pesticides, polychlorinated biphenyls, chlorinated and aromatic hydrocarbons, heavy metals, etc.).

There is no specific law in Czech legislation governing old environmental burdens, but the main law in this area is Act No. 254/2001 Coll., on water and on amendments to certain laws (the Water Act). Other laws dealing with the removal of environmental damage include Act No. 541/2020 Coll., on Waste, Act No. 17/1992 Coll., on the Environment, Act No. 334/1992 Coll., on the Protection of Agricultural Land, Act No. 258/2000 Coll., on the protection of public health, Act No. 114/1992 Coll., on the protection of nature and the landscape, Act No. 100/2001 Coll., on environmental impact assessment, and Act No. 201/2012 Coll., on air protection.

Another term related to contaminated sites is "ecological damage," which is defined by Act No. 167/2008 Coll. (as amended on February 1, 2022), on the prevention and remediation of ecological damage, which is based on Directive 2004/35/EC of the European Parliament and of the Council of April 21, 2004, on environmental liability with regard to the prevention and remedying of environmental damage. This Act defines ways to prevent or remedy environmental damage. According to this Act, environmental damage is an adverse change in a natural resource or a measurable deterioration in its functions, which may occur directly or indirectly and involves a change in protected species of wild animals or wild plants or natural habitats which has serious adverse effects on the achievement or maintenance of the favorable conservation status of such species or habitats. It also includes changes to groundwater or surface water, including natural medicinal resources and natural mineral water resources, which have a serious adverse effect on the ecological, chemical, or quantitative status of water or its ecological potential. Finally, there are changes to soil through pollution that pose a serious risk of adverse effects on human health as a result of the direct or indirect introduction of substances, preparations, organisms or microorganisms onto or into the earth's surface.

Contaminated sites can be of various types – they may include landfills, industrial and agricultural sites, small businesses, unsecured storage facilities for hazardous substances, former military bases, areas affected by mineral extraction, or abandoned and closed mining waste disposal sites posing serious risks.

There are a number of programmes for removing old environmental burdens, the most extensive of which was launched at the beginning of privatisation. In so-called environmental contracts, the state undertakes to reimburse individual acquirers up to a certain predetermined amount, known as a guarantee, for the costs of removing SEZ. Under these guarantees, 1991, and a total of CZK 821 million in 2023. The rights and obligations of the state in ensuring these remediation measures and reimbursing the associated costs are exercised by the Ministry of Finance. The Ministry of Finance is the contracting authority for public contracts for the implementation of measures to remove SEZ and covers the relevant expenses from a special account of funds from the sale of privatized assets and from the profits from the state's participation in commercial companies. It ensures the control of the use of these funds through its employees and external supervisors.

The role of expert guarantor of the process of removing old environmental burdens is performed by the Ministry of the Environment through its Department of Environmental Risks and Environmental Damage, which

- monitors and assesses the entire process of removing old environmental burdens from an environmental perspective,
- comments on proposals for the conclusion of new environmental agreements and on tender documentation for public contracts organized by the Ministry of Finance,
- assesses risk analyses,
- participates in inspection days and the assessment of stage and annual reports,
- It comments on adjustments to guarantees, methodological changes, possible increases in funding and, in the final phase, the termination of environmental contracts.

The Ministry of the Environment of the Czech Republic also supports the removal of environmental burdens methodically:

- Methodological guideline of the Ministry of the Environment Pollution indicators,
- Methodological guideline of the Ministry of the Environment Risk analysis of contaminated sites,
- Methodological guideline of the Ministry of the Environment for the investigation of contaminated sites,
- Methodological guideline of the Ministry of the Environment Sampling in remediation geology,
- Principles for preparing a feasibility study for measures to remedy the defective condition of contaminated sites,
- Methodological guideline of the Ministry of the Environment for addressing the issue of determining indicators of possible contamination by petroleum substances during remediation of contaminated sites,
- Methodological guideline of the Ministry of the Environment for conducting a basic assessment of environmental damage risk,
- Methodological guideline of the Ministry of the Environment for conducting a detailed assessment of environmental damage risk,
- Methodological guideline of the Ministry of the Environment for working with the SEKM system,
- Methodological handbook for the assessment of surveys and remediation,
- ISCO methodological handbook,
- Methodological handbook of the Ministry of the Environment – Application of geophysical methods in water resource protection,
- Methodological guide of the Ministry of the Environment – Basic principles of hydrogeology,
- Methodological guide of the Ministry of the Environment – Possibilities of geophysical methods,
- Methodological handbook of the Ministry of the Environment for the use of reductive technologies in situ in the remediation of contaminated sites,
- Directive No. 4/2017 of the Ministry of Finance and Ministry of the Environment of the Czech Republic on the preparation and implementation of contracts addressing environmental obligations arising from privatization.

Source: Ministry of the Environment

The Ministry of the Environment also maintains the Contaminated Sites Register (hereinafter referred to as "SEKM"), which is a key system for recording, monitoring, and assessing contaminated sites in the Czech Republic. The database contains detailed information on contaminated sites, including their location on a map.

Current status

In 2022, the Contaminated Sites Register recorded 10,174 contaminated sites and potentially contaminated sites. In the same year, reporting on the completion of remediation at 1,148 sites was completed. The latest inventory of environmental burdens was completed at the end of 2021 as part of the project

"National Inventory of Contaminated Sites – Phase II"[39]. The results of the mapping are presented in the text below.

In the Czech Republic, a total of 30,020 sites or indications were examined from two basic sources, the SEKM information system and Remote Sensing of the Earth,[40] of which 8,643 sites were assessed as contaminated or potentially contaminated. The remaining 21,377 sites or indications were excluded. A further 1,491 assessed sites (contaminated or potentially contaminated sites) were identified from other sources, meaning that as of December 2021, there were a total of 10,134 contaminated or potentially contaminated sites in the Czech Republic.

The highest environmental burdens are in the Central Bohemian (16%), Moravian-Silesian (9.5%) and Pilsen (9.5%) regions.

More than 70% of sites (a total of 7,102 out of 10,134 sites) are classified as unexplored or insufficiently explored. These sites require further investigation of soil contamination and, where necessary, risk analysis, which may subsequently lead to proposals for remedial measures. Most of the unexplored areas ( ) and areas with insufficient exploration ( ) are municipal waste landfills ( ) and contaminated sites (58.5 %). Other sites include oil handling facilities, industrial landfills, and others (e.g., hazardous substance handling, shooting ranges, etc.).

At the remaining 30% of sites (a total of 3,032 out of 10,134 sites), work related to the removal of old environmental burdens has either been completed, is ongoing, is being prepared, or was not necessary. Remedial measures are desirable or necessary at 496 sites. Most of these sites are located in the Moravian-Silesian Region, the former center of heavy industry in the Czech Republic (65), and in the Central Bohemian Region, in its industrial northern part (67).

In terms of location type in the Czech Republic, municipal waste landfills predominate, accounting for almost 46% of sites. The predominance of these sites is historically determined; before 1989, waste was simply deposited in uneven terrain and quarries. The share of municipal waste landfills in the total number of sites assessed in the regions is higher in the southern regions of the country, such as the South Bohemian Region, the Vysočina Region, and the South Moravian Region, where agricultural production predominates.

Over 17% are sites designated as contaminated areas in the SEKM system, i.e. sites where several activities have occurred simultaneously, leading to the creation of old environmental burdens. These sites are concentrated in regions with significant industrial production. These are mainly the Czech regions along the Elbe River, the capital city of Prague, and the Ostrava region.

More than 10% of the sites are places where petroleum substances were handled and where there were systematic leaks of substances into the rock environment. These three types of sites (solid municipal waste, contaminated sites, and petroleum substance handling) account for almost three-quarters of all contaminated and potentially contaminated sites in the Czech Republic. Other types of sites make up the remaining part of the assessed sites.

Remedial measures

With regard to remedial measures at 667 sites (approximately 6.5%), remedial measures are ongoing, about to commence, suspended, or unsuccessful. In total, no remedial measures are known for more than 72.5% of sites, and for the remaining approximately 21%, remedial measures are not necessary or have been successfully completed.

[39] Available at: https://www.cenia.cz/wp-content/uploads/2022/03/Zprava-o-inventarizaci-kontaminovanych-mist-na-uzemi-CR.pdf.

[40] Remote sensing. Analysis based on aerial and satellite imagery.

Urgent action (survey or implementation of corrective measures) is required at a total of 446 sites in the Czech Republic. These sites account for 4.40% of all sites assessed. Most of these sites are located in the Plzeň (83), Central Bohemian (50) and Liberec (45) regions. Remedial measures have already been completed in 31 sites, are ongoing in 101 sites, and have not yet been initiated in 95 sites. In the remaining sites, remedial measures have been suspended (27) or further investigative work will be necessary (192).

Financing

The corrective measures and surveys require funding, which needs to be secured for 8,024 sites. Funding for the remaining 2,110 sites is not necessary, as no remedial measures need to be taken or have already been successfully completed. Of the 8,024 sites mentioned above, funding has not been secured for approximately 84%, i.e. a total of 6,757 sites. On the other hand, at the remaining 1,267 sites, funding has been secured for at least some of the stages of the old environmental burden removal process (e.g., survey and risk analysis). Due to the large number of unexplored sites with environmental burdens, it is not possible to quantify the total remediation costs.

Table 71: Contaminated sites in the Czech Republic

Site characteristics	Number of sites
Total number of contaminated or potentially contaminated sites	10,134
- of which sites not requiring remedial action	2,110
- of which sites requiring investigation and/or remedial measures	8,024
- of which sites with secured funding	1,267
- of which sites with missing funding	6,757

Source: CENIA, 2021

According to Act No. 41, for environmental damage caused since August 2008, the operator who caused the environmental damage or its imminent threat is obliged to bear the costs of remedial measures. However, if the damage occurs as a result of compliance with a binding act of public administration, the costs incurred shall be reimbursed to the operator by the public administration body from the state budget. The same applies in cases where the operator has not violated legal regulations or it was not likely that the operational activity could cause environmental damage. The funds for reimbursement of costs are part of the financial security that the operator must provide.

The financing of contaminated site remediation is most often provided from the budget of the Ministry of Finance through environmental contracts, from the budgets of other ministries, from the budgets of municipalities and regions in whose territory the contaminated site is located, from state-owned enterprises, or from private sources. One of the most important sources of funding is also European funds – the Operational Program Environment42.

In the new programming period (2021-2027), a total of CZK 2.5 billion from European sources was allocated for the remediation of contaminated sites as of August 18, 2023. The allocation of funds takes into account the severity of the contamination (contaminants, components, priority, number of people at risk, complexity of the solution, etc.). EU funds will also support site surveys a n d the design of effective measures in 2021-2027. As of August 18, 2023, CZK 150 million had been allocated to this issue, but only 30 projects totaling CZK 61 million were ultimately approved.

[41] Act No. 167/2008 on the prevention and remediation of environmental damage and on amendments to certain acts.

[42] In the 2014–2020 programming period, a total of CZK 3.3 billion was approved for activities related to the inventory, analysis, and remediation of old environmental burdens. Since 2010, 10–15 contaminated sites have been remediated with the contribution of EU funds (NAVIGA, 2023).

2.12 SWOT analysis of waste management

Waste management plays a key role in sustainable development and environmental protection. In order to examine and evaluate its status and identify key factors, a comprehensive SWOT analysis was carried out, summarizing the strengths, weaknesses, opportunities, and threats of the current waste management system in the Czech Republic.

As part of a detailed analysis of individual waste streams, detailed SWOT analyses were prepared for each stream, on the basis of which principles and measures for the management of the given waste stream were proposed in the binding part of the POH ČR.

Table 72: SWOT analysis of waste management in the Czech Republic

Strengths (S – Strengths)
The strengths of waste management include: ➢ The existence of a high-quality and accessible collection network for municipal waste and end-of-life products. Residents are motivated to sort waste, and the work of municipalities, authorized packaging companies, and collective systems with citizens in waste management is effective. ➢ Waste is generally well utilized, with recycling and material recovery on the rise, contributing to sustainability.
Weaknesses (W – Weaknesses)
The weaknesses of waste management include: ➢ Insufficient waste prevention, high material intensity of the economy, increasing waste production. ➢ Lack of modern, efficient waste sorting and sorting facilities, lack of waste recycling capacity, low energy recovery from waste, and insufficient capacity for the safe incineration of hazardous waste are the main challenges currently facing waste management.
Opportunities (O – Opportunities)
Opportunities for waste management include: ➢ Changing behavior patterns and introducing waste prevention and circular economy approaches into everyday life. ➢ Continuous and intensive training, education and awareness-raising among the general public, waste producers and waste processors on waste prevention and proper waste management. ➢ Innovation and eco-design in the manufacture of high-quality products and the development of sustainable consumer behavior. ➢ Building a network of separate waste collection and waste treatment facilities. New, modern, and efficient waste treatment technologies. Research and development of new technologies, introduction of digitalization. ➢ Increasing the capacity of waste treatment facilities is key to achieving sustainable waste management in the Czech Republic.

Threats (T – Threats)
Threats to waste management include: ➢ Inappropriate disposal of waste in landfills. ➢ Inefficient and insufficiently effective waste sorting and re-sorting facilities. ➢ Inefficient transport of waste over long distances for processing. ➢ Illegal transport of waste. ➢ Risks associated with the presence of persistent organic pollutants in recycled materials, other risks associated with new types of waste, and the increasing presence of microplastics and hazardous substances in the environment. ➢ These threats must be addressed and eliminated within the framework of modern waste management.

In the coming period, the key task will be to maximize the strengths and opportunities of waste management in the Czech Republic. It is essential to eliminate weaknesses and effectively address threats to waste management in order to move towards fully effective waste management and a circular economy. The main objective is to keep the value of products, materials, and resources in the economic cycle for as long as possible and to use them as resources at the end of their life cycle. In the coming years, it will be necessary to deepen the transition from a linear economy to a circular economy that will be more in line with the principles of sustainability and efficient waste and material management.

2.13 Scenarios for the development of waste management in the Czech Republic

The basic support tool for compiling future waste production and management forecasts is the Ministry of the Environment's web application Tiramiso[43]. Tiramiso allows future production estimates to be made for all types of waste and selected waste streams for the Czech Republic, regions, and municipalities with extended powers. The tool implements the requirements of the methodology[44] and is freely available on the Ministry of the Environment website. The tool distinguishes between forecasts and projections (scenarios).

Forecast

A forecast, as defined in the methodology used to develop the Tiramiso application, represents the most likely scenario for future developments. It is based on historical data and does not include (except where necessary) expert opinions, i.e., changes in trends due to expected interventions in waste management. The forecast is not capable of responding to legislative and other interventions in the system that may occur in the future. Within the framework of scenario development, the forecast is referred to as the business-as-usual (BAU) scenario.

Historical production data are a key element in compiling forecasts. This approach therefore builds on long-term trends in the production of specific types of waste, category numbers, subgroups, groups, or streams. The Tiramiso tool also provides forecast reliability bands, or confidence intervals. As developments in most groups have been turbulent in recent years, there have often been significant changes and one-off jumps in production, so the confidence intervals are relatively wide. The forecast can therefore be interpreted as the mean (most likely) value based on currently available information and historical data.

[43] Available at https://tiramiso.mzp.cz/

[44] Šomplák, R., Smejkalová, V., Bouda, Z., Szásziová, L., Suzová, J., Popela, P., Rosecký, M., Kůdela, J., Eryganov, I., Šramková, K., Pavlas, M. *Certified methodology for long-term waste production forecasts in the Czech Republic, including a forecast review.* Technical report. Result V9, TIRSMZP719, 2021.

Projection – scenario

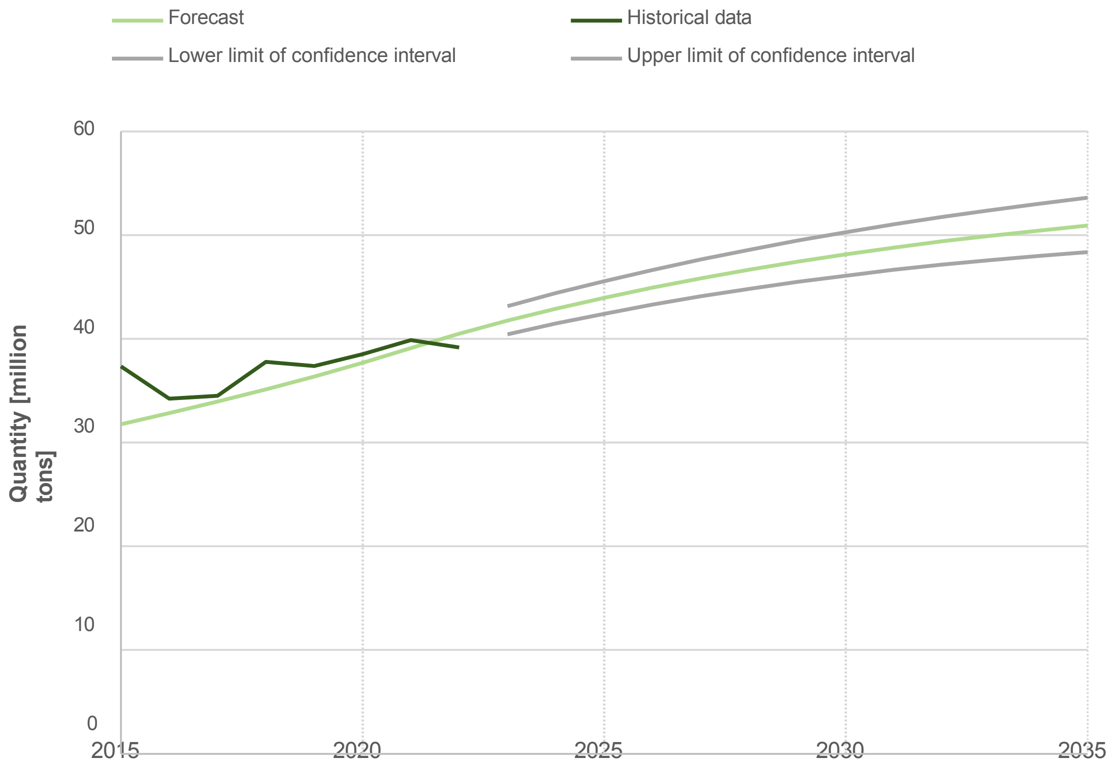
The projection is based on a defined scenario of future developments. The projection takes into account expertly set boundary conditions, but in such a way as to reflect historical developments as closely as possible. The projection should be as consistent as possible with the forecast of future developments. The projection can therefore be understood as an expert assessment of future developments using scenarios that reflect situations where the system is affected by external factors (legislative influences, technological progress, etc.).

2.13.1 Assumptions for scenario development

The forecast for total waste production, together with the above-mentioned confidence interval, is shown in the graph 61. According to the forecast, total waste production will increase until 2035. From the current production level of 39.2 million tons, an increase to 51 million tons is expected. As a result of the integration of scenarios for municipal waste (Trajectories 1 and 2), see the next chapter, it may be slightly lower (50 million tons).

Development of total waste production	**Based on historical data, future developments suggest that total waste production in the Czech Republic could rise to over 50 million tons by 2035.**

Graph 61: Forecast of total waste production until 2035



Source: 2022 production data – ISOH, Tiramiso forecast

Aspects affecting waste production are mentioned for individual flows in analytical documents. In summary, the following can be stated:

- Economic development, the condition of the economy and its segments, the level of construction activity, and the sectoral structure of industry.
- Demographic development and consumer preferences.
- The level of waste prevention at the municipal waste level (age structure of the population, education of the population, environmental awareness of the population) and industrial waste, including hazardous waste (preference for sustainable production, circular audits, social responsibility, etc.).
- Improved waste records, control activities, and compliance with legislation are also leading to a long-term increase in production.

2.13.2 Summary of expected future production of main streams

The projection (scenario) was used mainly for municipal waste, where a significant change in the production of certain sub-streams is expected as a necessary prerequisite for achieving municipal waste management targets. The projection was also used for waste group 19 (and partly for group 17), see below. The projection was compiled using long-term analytical work, data collection and processing at the level of the Ministry of the Environment, expert advisors and the academic sphere (e.g. in the TIRSMZP719 and CEVOOH projects). For most other flows, a forecast was used because the necessary expert background was not available and scenarios could not be developed, or because the forecast sufficiently described the expected future development.

Forecasts and projections were prepared in analytical documents for all flows. The most important ones are briefly summarized below. Chapter 2.13.3 presents the expected development of municipal waste production and management according to the scenarios developed, while Chapter 2.13.4 presents the expected development of secondary waste production (group 19).

Construction and demolition waste

The dominant stream in total waste production is waste from construction and demolition activities (group 17). Its production is growing and is expected to increase further for the following reasons:

1) Reconstruction and construction of infrastructure and linear structures. *Growth is expected in defined regions* – linked to the document Transport Infrastructure Development until 2050, published by the Ministry of Transport in 2020.
2) Repairs and construction of motorways and expressways.
3) Reconstruction and construction of production and storage facilities.
Growth forecast
4) Reconstruction of housing and residential construction.
Growth forecast
5) Reconstruction and construction of social and healthcare infrastructure.
Growth forecast
6) Demolition and removal of unnecessary or damaged buildings and infrastructure unsuitable for renovation.
7) Demolition and removal of old burdens.
8) Proper recording of small construction waste, which was often part of mixed municipal waste and bulky waste.
Growth forecast in defined regions
9) Proper handling of construction waste that is part of illegal waste management (illegal landfills).

It is not possible to quantify the impact of individual segments on the production of construction and demolition waste in detail. Expert assessment and growth projections for construction and demolition waste are based on trends and forecasts (business as usual).

Waste group 19

Based on municipal waste production and disposal scenarios, an increase is also expected in waste group 19 as output from waste treatment facilities. There will be an increase in the production of solid residues from energy recovery facilities, i.e. slag, category 19 01 12. By 2035, in line with municipal waste management targets, the capacity of waste-to-energy plants will increase significantly, and so will the production of waste category 19 01 12. Similarly, there will be an increase in the production of outputs from the treatment of recyclable waste such as paper, plastics, metals, and textiles (subgroup 19 12). The expected increase is related to the projected increase in the production of separately collected components, which are subsequently sorted on automated sorting lines. Another source of waste in subgroup 19 12 may be the sorting of bulky waste into individual components according to material. This development is discussed in more detail in Chapter 2.13.4.

Biological waste

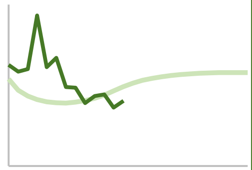
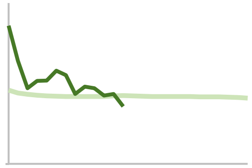
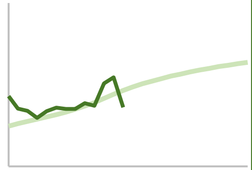
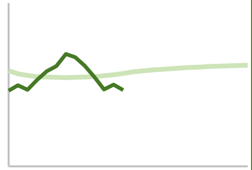
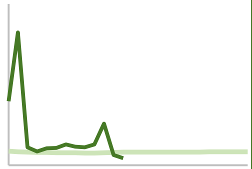
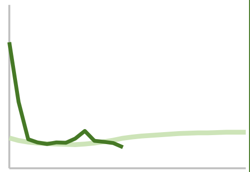
Depending on the scenarios for municipal waste, there will be changes in food waste. These will be mainly influenced by the share of food waste in mixed municipal waste, followed by waste from kitchens and catering facilities (cat. no. 20 01 08). Another significant share is bio-waste from gardens and parks (cat. no. 20 02 01) and kitchen waste (cat. no. 20 01 08), as well as the production of edible oils and fats (cat. no. 20 01 25).

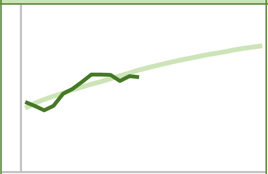
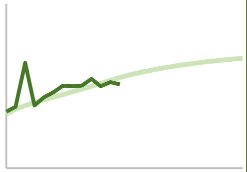
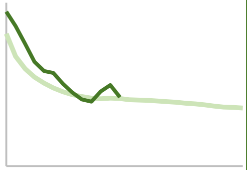
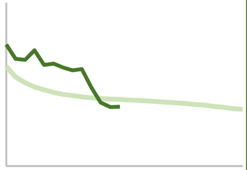
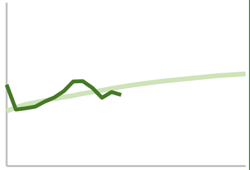
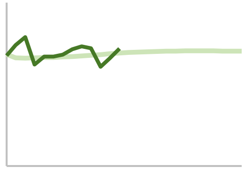
Waste from thermal processes

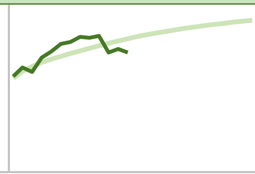
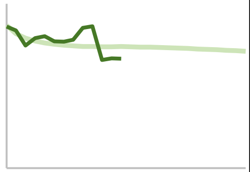
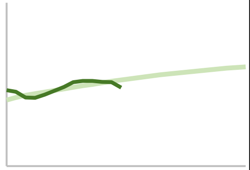
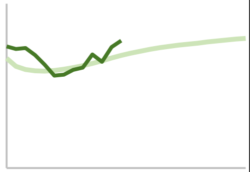
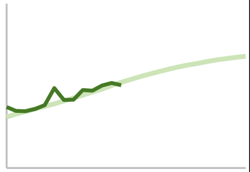
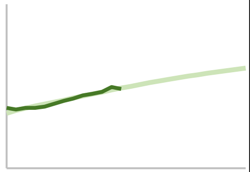
In the case of other waste streams with significant production, a decrease is expected in waste group 10 *Waste from thermal processes*, specifically in subgroup 10 01, where the decarbonization of energy and energy-intensive industrial production will lead to a decrease in coal combustion and thus a decrease in waste associated with its combustion. This decline has been ongoing for some time and it can be said that the forecast takes the expected decline into account. It is therefore not necessary to create a scenario.

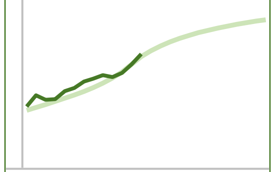
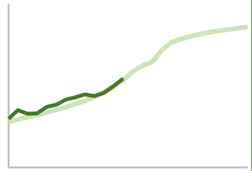
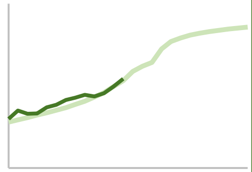
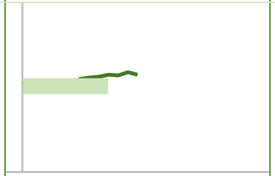
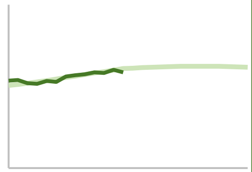
Table 73 below summarizes current production and expected production trends by waste group. Unless otherwise stated, these are waste production forecasts for 2030 and 2035.

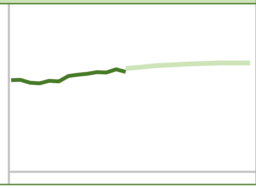
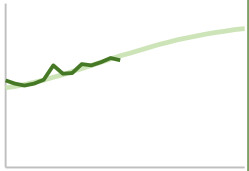
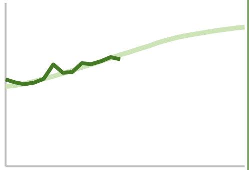
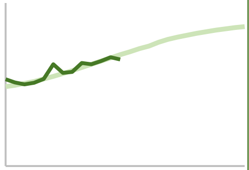
Table 73: Current production and expected development until 2035 by waste group

Group	Group name	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
0	Waste from geological exploration, mining, treatment and further processing of minerals and stone	6	85	8		Significant increase in 2013. Decline of approximately one third in subsequent years. The trend is based primarily on data from recent years. The development is expected to be rather constant or with slight growth, which reflects the possible start of new mining and the construction of major infrastructure projects.
02	Waste from agriculture, horticulture, fishing, forestry, hunting, and food production and processing	214.8	250	245		Significant decrease until 2012, followed by a rather constant or slightly decreasing trend. A further slight decrease is expected in the future.
0	Waste from wood processing and production of boards, furniture, cellulose, paper and cardboard	1	294	3		Slight growth since 2013, sharp increase in 2020 and 2021, mainly due to the bark beetle calamity in previous years. Significant decline in 2022. Forecast influenced by developments in recent years. Further increase expected.
0	Waste from the leather, fur and textile industries	69	91	92		Growth until 2016, followed by a decline to 2010 levels. Given the historical development, further developments are difficult to predict, but constant to slight growth is expected.
0	Waste from oil processing, natural gas purification and pyrolytic coal processing	6.6	12	12		A sharp increase in 2010, 2011, and 2020. Otherwise, a steady trend, which is expected to continue in the future.
0	Waste from inorganic chemical processes	12	2	22		Dramatic decline until 2012, followed by stagnation with slight fluctuations. Expected to remain constant or grow slightly.

Group	Group name	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
0	Waste from organic chemical processes	146	182	194.7		Stable growth between 2013 and 2017, followed by stagnation. Moderate growth or constant development is expected in the future, provided that production continues to stagnate in the coming years.
08	Waste from the manufacture, processing, distribution and use of coatings (paints, varnishes and enamels), adhesives, sealants and printing inks	51.0	63	6		Slightly increasing trend, stagnation in recent years. Slight growth or constant development expected if production continues to stagnate in the coming years.
09	Waste from the photographic industry	1	1	1		Long-term downward trend, increase between 2019 and 2021, decrease in 2022. Further decline in production expected.
1	Waste from thermal processes	1,088	1,130.2	1,042.7		Declining trend, significant decrease between 2018 and 2020, followed by stabilization of production. Further decline expected.
1	Waste from chemical surface treatment, metal surface treatment and other materials and non-ferrous hydrometallurgy	86.8	108.1	113.1		Long-term upward trend, but production has been declining since 2019. Further slight growth is expected in the future.
1	Waste from forming and physical and mechanical surface treatment of metals and plastics	718.8	704	7		Constant production with slight fluctuations. The same trend is expected in the coming years.

Group	Group name	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
13	Waste oils and waste liquid fuels (excluding edible oils and wastes listed in groups 05, 12 and 19)	149	180.1	186.8		A long-term slight upward trend, followed by a decline since 2020. A slight increase is expected to continue, or possibly come to a halt, with a constant or slightly declining trend similar to recent years.
14	Waste organic solvents, refrigerants and propellants (except for waste listed in groups 07 and 08)	3	3	3		Long-term slight downward trend, with a more pronounced decline in 2020 followed by stagnation. A further slight decrease is expected.
15	Waste packaging; absorbents, cleaning cloths, filter materials and protective clothing, not elsewhere specified	984.8	1	1		Long-term slight upward trend, with a decline since 2019. Due to historical developments, the forecast is difficult to predict. A slight increase is expected.
16	Waste not otherwise specified in this catalogue	775	759.9	790		Declining trend until 2015, then increasing. Production is expected to continue to grow.
1	Construction and demolition waste (including excavated soil from contaminated sites)	25	31,846.5	34,040.9		Long-term upward trend with a positive fluctuation in 2015. Further growth is expected in the future.
1	Healthcare waste and veterinary care and/or from related research (excluding kitchen waste and waste from catering facilities not directly related to healthcare)	48.2	56.9	60.9		A long-term upward trend without significant fluctuations, which is expected to continue.

Group	Group name	2022 [thousand tons]	2030 [thousand tonnes]	2035 [thousand tons]	Development	Note on expected development
19	Waste from waste treatment (recovery and disposal) facilities, from wastewater treatment plants for the treatment of such water outside the place of its generation, and from the production of water for human consumption and water for industrial purposes	3,530.5	Forecast: 4,318.9	Forecast: 4,574.0		Strong long-term growth trend, even more pronounced in recent years. Growth is expected to gradually slow down as potential is exhausted.
			Trajectory 1: 5,099	Trajectory 1: 5,398.4		Optimistic scenario. Higher energy recovery from waste is expected, along with the associated construction of waste-to-energy plants and facilities for sorting recyclable and usable components from mixed municipal waste and the subsequent production of solid alternative fuels. There will also be increased sorting of separated components. These changes will lead to a significant increase in the production of secondary waste.
			Trajectory 2: 5,145.8	Trajectory 2: 5,399.5		Realistic scenario. Same factors as In Trajectory 1, production will develop slightly differently, solely due to the smaller number of residents who sort waste intensively. However, the same production value is expected for both scenarios in 2035.
20	Municipal waste (household and similar commercial, industrial and office waste), including components from separate collection	5,854.4	Forecast: 6,850.0	Forecast: 7,142.3		A long-term slight upward trend without significant fluctuations, which is expected to continue according to the forecast. Approximately 75% of the population sorts municipal waste, but municipal waste prevention measures are not being fully implemented.
			Trajectory 1: 6,224.3	Trajectory 1: 6,165.2		Optimistic scenario. It is expected that 86% of the population will intensively sort municipal waste. Growth will slow down by 2030, and a slight decline in production should occur from 2031 onwards.

Group	Group name	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
			Trajectory 2: 6,369	Trajectory 2: 6,410.5		Realistic scenario. Less than 86% of the population is expected to sort municipal waste intensively. Growth in production is slowing down and will not be fully halted even by 2035.
	Total production	39,159.6	Forecast: 48,126.2	Forecast: 50,913.6		Total waste production continues to grow, by 23% by 2030 and by 30% by 2035.
			Trajectory 1: 47,500.6	Trajectory 1: 49,936.6		Total waste production continues to grow. with municipal waste expected to decline slightly from 2031 onwards, while secondary waste will increase significantly. Total production will increase by 24% by 2030 and by 30% by 2035.
			Trajectory 2: 47,645.3	Trajectory 2: 50,181.8		Total waste production continues to grow, For municipal waste, a realistic scenario is assumed, with municipal waste production continuing to grow slightly and secondary waste growing significantly. Total production will increase by 25% by 2030 and by 31% by 2035.

Note: Unless otherwise stated, the figures for 2030 and 2035 are production forecasts. Source: Prepared on the basis of ISOH and Tiramiso

2.13.3 Municipal waste

The historical development of municipal waste production and management and its sub-flows was summarized in Chapter 2.3.1. The development can be summarized as follows.

Current situation:

- The total amount of municipal waste produced has been growing in the long term, as has the specific production per capita.
- The long-term trend is expected to show growth in plastics, glass, wood, textiles, biodegradable waste from gardens and parks, and from kitchens and catering facilities.
- The sharp increase in the production of biodegradable municipal waste has slowed down.
- Most sub-streams, or municipal waste of other categories, have seen a decline in the last year (or several years), which may not be reflected in the trend.
- The production of bulky waste has been growing for a long time, while mixed municipal waste is slowly decreasing.
- As the forecast shows, the current trend in municipal waste production and the ratio between separately collected fractions and residual waste in subgroup 20 03, in the context of realistic treatment options, **cannot ensure that the binding targets set for municipal waste management will be met**.

Main challenges:

- Stop the growth of municipal waste production through preventive measures.
- Reduce the production of mixed municipal waste through more intensive sorting by citizens or mechanical sorting with the aim of reducing the content of recoverable components.
- Ensure conditions for a higher rate of utilization of bulky waste, in particular through sorting at source or further sorting, which will help to make better use of wood and metals, which constitute a significant part of bulky waste.

Proposed solution:

In response to the above challenges, **two scenarios for the production** of individual **municipal waste** streams have been developed that **have the potential to meet the targets**. The scenarios are based on an analysis of factors that may lead to changes in the production of waste streams. The changes will require high-quality economic and educational **measures**, see Chapter 3.5.1. They are based on the current legislative framework.

2.13.3.1 Factors influencing municipal waste production

Demographic development

- Municipal waste production depends on demographic trends. The forecast assumes a population increase to 10.7 million by 2035.

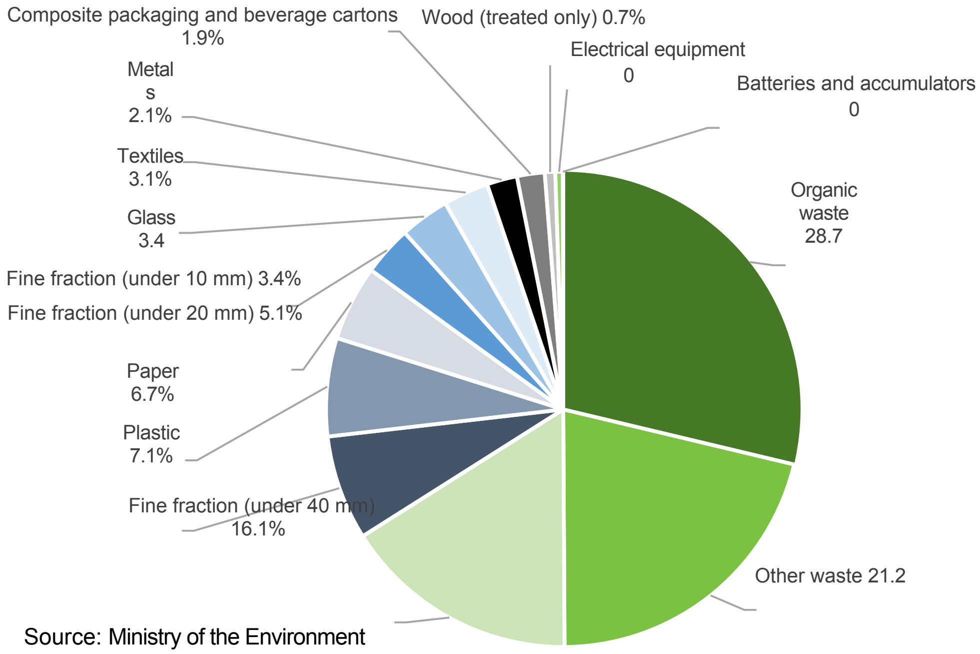
Waste prevention

- Municipal waste production has been growing in recent years (up to 2022), reflecting the rising standard of living in the Czech Republic. The link between production and economic development has been observed historically worldwide. At the same time, municipal waste production is increasing due to new streams entering waste management (especially bio-waste from garden and park maintenance) and improved record-keeping. The goal for the next period is to separate production from the economy, slow down the growth of municipal waste production, and ideally stop it altogether, for example by supporting the introduction of systems where citizens pay for municipal waste based on the actual amount or volume of municipal waste produced. The issue of waste prevention is is receiving a great deal of attention at EU level, with, for example, a regulation on eco-design and an amendment to the Waste Directive currently being prepared.

Aspects common to municipal waste

- The production of mixed municipal waste from municipalities was 2 million tons in 2022. Based on the Ministry of the Environment's analysis of mixed municipal waste (TIRSMZP19)[45], it is possible to estimate the average residual occurrence of recoverable components in mixed municipal waste. The average composition is presented on the Ministry of the Environment website23. Their content in mixed municipal waste also represents the theoretical potential for their future transfer to separate collection. A similar composition of mixed municipal waste is also reported by the authorized packaging company EKO-KOM46, which has been monitoring the composition of mixed municipal waste for a long time.

Graph 62: Average composition of municipal waste, values are given in % by weight



Source: Ministry of the Environment

- Materially recoverable components of municipal waste from citizens are collected through separate container and bag collection, collection yards and collection points, and other collection methods, including collection facilities with purchase and mobile collection. The current state of the collection network and its development are described in Chapter 2.4.2 Separate collection system in the Czech Republic.
- The amount of waste from separate collection (separation) has been growing for a long time, which was also reflected in a decrease in the production of mixed municipal waste in municipalities between 2008 and 2014. This trend has ended, and since 2015, the production of mixed municipal waste has basically stagnated. At the same time, the amount of separately collected (separated) municipal waste components continues to grow, as evidenced by higher production of individual commodities, but this increase is not entirely accompanied by a decrease in

[45] Gregor J. Kropáč J. Results of the average composition of mixed municipal waste in the Czech Republic, 2022 (Summary report of the Ministry of the Environment), Brno University of Technology, result of project TIRSMZP719, available at: https://www.mzp.cz/cz/prumerne_slozeni_sko

[46] EKO-KOM Results of the analysis of mixed municipal waste from municipalities in 2022, available at https://www.ekokom.cz/vysledky-rozboru-smesneho-komunalniho-odpadu-z-obci-v-roce-2022/

mixed municipal waste. Since 2019, the production of mixed municipal waste has begun to decline again, which can be attributed to the expansion of individual container collection (door to door).

- According to an authorized packaging company, 75% of the population currently sorts waste. However, according to the results of analyses, this sorting is not sufficient for all components. It cannot be said that everyone sorts sufficiently well and intensively. In the future, it will be necessary to increase the proportion of residents who actively sort waste. Tools in this regard include training, education, awareness-raising, and the development of the collection network. However, it cannot be assumed that all residents will participate. There will always be a certain percentage of residents who do not sort or sort insufficiently.
- Waste production outside the municipal system, i.e., in companies and public buildings, hotels, etc., also contributes to municipal waste production. Information on the composition of mixed municipal waste in this segment is insufficient. Measures should also target this sector. It is expected that the habits that citizens have or will have at home will also be transferred to activities outside the home (work, offices, schools), provided that they continue to be encouraged to do so and that the appropriate infrastructure is available.
- Changes are also expected in municipal waste production in companies as a result of improved and more accurate waste recording.

Specific aspects of paper

- A trend that will influence paper consumption in general is the process of digitization, which will affect households (replacing information leaflets and printed materials with applications and other promotional channels) as well as public administration and the corporate sector (digitization of agendas). This trend is counteracted by the development of e-commerce and delivery services, which use paper packaging for parcels. In line with the conclusions of the CEVOOH[47] project, the importance of paper as a material suitable for replacing plastic packaging, which is currently difficult to recycle, should also be mentioned. As paper is generally considered a sustainable and easily recyclable material, it can be expected that it will be used more in the future, in line with the principles of eco-modulation.
- There is also a noticeable trend towards the development of individual catering, the growing popularity of take-away, delivery services and box systems, where paper packaging and napkins account for a significant share.

Specific aspects of plastic

The factor that will influence the introduction of single-use plastic packaging onto the market is eco-modulation and future pressure to design sustainable and easily recyclable packaging. This issue was addressed, for example, by the CEVOOH[47] project. Specific conclusions:

Plastics:

- Excessive use of non-renewable resources and future efforts to minimize dependence on non-renewable resources.
- Plastic packaging is often multi-material (a combination of several types of plastic), whereas paper packaging is usually single-material, which can be expected to result in more efficient waste treatment into higher-quality secondary raw materials. Efforts to replace multi-material plastic packaging can be expected in the future.
- Selection of sustainable materials that are easily recyclable or biodegradable.
- A trend towards lighter packaging can be expected, with other types of materials with a lower carbon footprint (such as paper) taking over the carrier function.
- In the case of beverage packaging, aluminum cans are expected to grow in popularity.

[47] Pešta J., Kulhánek J., Herasymchuk I., Gregor J., Pavlas M., Weinzettel J. Summary comparison of eco-design options for packaging from a life cycle perspective. Summary research report 2023, Gregor J., Kropáč J., Pavlas M., Tichácek J., Shtukaturova A., Šyc M., Kulhánek J., Pešta J. Design of innovative packaging for higher recyclability. Summary research report. 2023. CEVOOH project outputs – Environmental Research Centre – Waste and Circular Economy and Environmental Safety. Work package 1.D, available at https://cevooh.cz/home/1-d-ekodesign-a-spotrebitelske-chovani/

Aspects specific to glass

- The production of glass from separate collection could be affected by eco-modulation, whereby packaging that is currently difficult to recycle could be replaced by glass packaging for certain products.

Aspects specific to metals

- The production of metals from separate collection (from municipal systems) accounts for only a small part of the total metal stream.

Aspects specific to wood

- Sorting bulky waste directly by citizens or by collection yard staff is essential for the production of wood from separate collection. In the future, the collection of discarded wooden furniture can be expected as part of the extended producer responsibility (EPR) system for the purpose of preparation for reuse and recycling. An example of good practice in this area is France, where such a system has been in place since 2013.
- Another tool that will lead to lower wood waste production in the future is green public procurement, which will stimulate demand for wood furniture designed according to circular and sustainable principles for easy disassembly, reuse, or recycling. If appropriate public procurement criteria are successfully introduced in the coming years, given the long life cycle of furniture, the effect of their introduction will only be felt at the end of the period covered by the forecast, i.e. after 2035.

Aspects specific to bio-waste from gardens and parks

- A change in residents' behavior, with an expected shift toward environmental awareness, will have a positive impact on the production of biowaste from gardens and parks. Citizens will reduce the burning of leaves, branches, and green waste. A higher demand for seasonal collections organized by municipalities is expected. At the same time, citizens must have access to a collection yard directly in the municipality or in the vicinity, which is conditional on the expansion of collection yards.
- The expected reduction in solid fuel boilers may lead to higher production of this waste.
- The development of door-to-door collection in individual buildings is expected. The approach to preventing the generation of biowaste, i.e., the use of home composting, is also important.
- The production of biodegradable waste from green space maintenance may tend to decline due to the preference for tall grass as a partial tool for drought prevention and biodiversity conservation. Many municipalities prefer mulching. At the same time, adaptation to climate change will require the expansion of green spaces and the planting of new greenery.

Specific aspects of bio-waste from kitchens and catering facilities

- An increase in the production of bio-waste from kitchens is expected as a result of the involvement of small businesses, restaurants, schools, canteens, hospitals, and retirement homes in the municipal system. It is also expected that the inappropriate handling of this waste by businesses (Horeca) will cease and that this bio-waste will be transferred for reuse. A decrease will occur as a result of waste prevention initiatives and the reduction of food waste as a result of new EU legislation. Education of the public and businesses and numerous campaigns on this topic are expected.
- The development of separate collection of kitchen waste with or without kitchen bio-waste of animal origin in family houses, apartment buildings, and housing estates in urban agglomerations is expected.
- It is also possible to partially redirect kitchen bio-waste, which currently ends up in home composters in family homes due to residents' preference for a more convenient method of disposal.

Specific aspects of the textile stream

- Textile production in the municipality will be significantly affected by legislation (the Waste Act) that will come into force on January 1, 2025, when the municipality will be required to ensure the separate collection of waste textiles. A similar development is expected to occur with production subject to similar legislative intervention, which has affected the production of bio-waste (cat. no. 20 02 01).
- It is expected that textile waste will partly emerge as a new stream and will also be sorted from mixed municipal waste.
- Prevention can have a significant impact on production. In larger cities across the Czech Republic, second-hand shops are gaining popularity, especially among the younger generation, and their number has grown in recent years. Swap shops, where unwanted clothing can be exchanged for other clothing or other items, are equally popular. It can be assumed that there is a higher level of awareness and education on sustainability issues in larger cities, and therefore greater demand for second-hand and swap shops. A shift away from "fast fashion" and interventions that contribute to the sustainability of the textile industry, such as support for local and sustainable fashion, are also expected.

2.13.3.2 Municipal waste production scenarios

Based on the above considerations, **two scenarios for municipal waste production**, or rather individual sub-streams, were created. The scenarios are labeled as **optimistic** and **realistic**. The scenarios assume a certain percentage of the population participating in waste sorting. According to available data**, 75% of the population currently sorts waste**.

MŽP OPTIMISTIC SCENARIO municipal waste production (TRAJECTORY 1)

- **In the optimistic production scenario (Trajectory 1 – T1)**, prevention activities are very effective, with **86% of the population** sorting municipal waste intensively. The amount of sorted components is growing, even though the occurrence of material-reusable components in municipal waste is decreasing as a result of prevention. Prevention affects all sub-streams, but the degree of prevention achieved varies for different sub-streams. Specific prevention measures are set out in the Waste Prevention Program. Sorting also applies to bulky waste directly at source – sorting by citizens or collection yard staff, which reduces the production of bulky waste.

Ministry of the Environment REALISTIC SCENARIO for municipal waste production (TRAJECTORY 2)

- **In the realistic production scenario (Trajectory 2 – T2),** prevention activities are less effective. Municipal waste is sorted intensively **by 81% of the population.** A lower percentage of the population is willing to sort, which is also reflected in the production of bulky waste (assuming that those who are not willing to sort basic materials such as paper, plastic, glass, and bio-waste will not be willing to sort bulky waste either).

		Optimistic scenario (trajectory 1)	Realistic scenario (trajectory 2)
 **Sorting by residents**	**75** **populationtodaysorted**	**86** **population in 2035 sort waste intensively**	**81** **of the population will be in 2035 sort intensively**

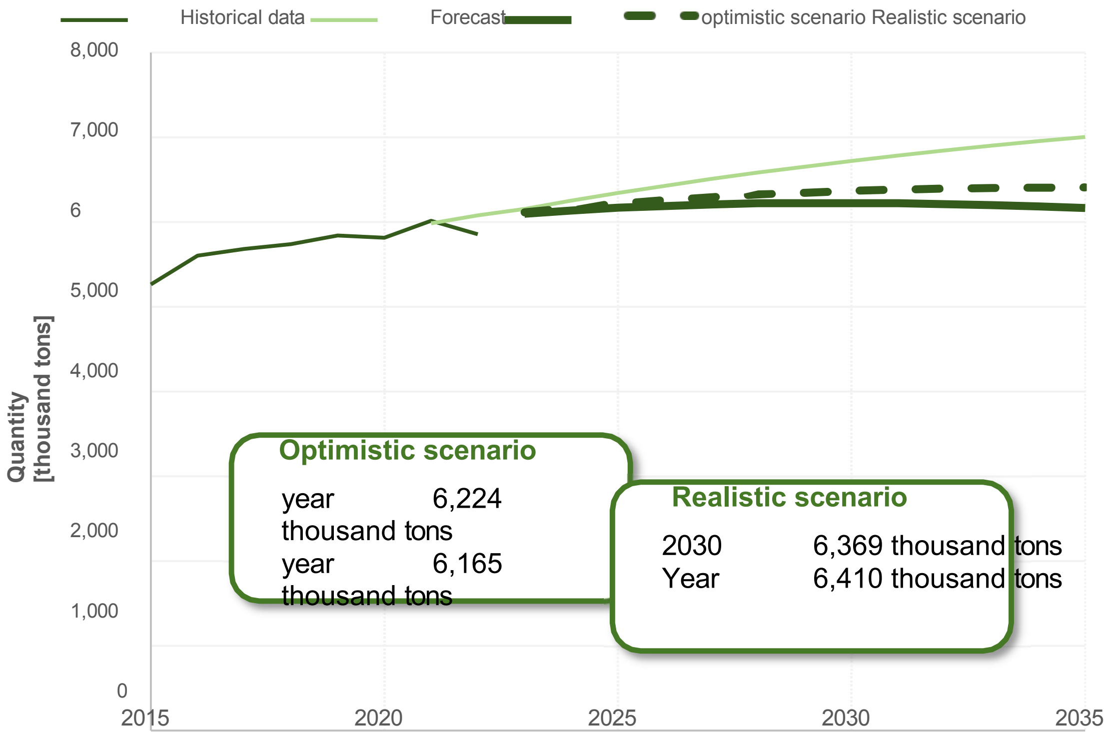
The results of the scenarios for the entire municipal waste stream are shown in Figure 63. In both trajectories, preventive measures are successful in halting the growth of municipal waste production.

In the optimistic scenario (Trajectory 1), municipal waste production is expected to be around 6.2 million tons in 2025.

In the realistic scenario (Trajectory 2), it is 6.4 million tons of municipal waste.

Furthermore, the two trajectories differ in the rate of sorting of bulky waste and mixed municipal waste.

Graph 63: Scenarios for municipal waste production



Source: Production data 2022 – ISOH, Tiramiso forecast, own projections

The development of production in line with the proposed trajectories will be influenced by the motivation of residents and waste producers to adopt the desired behavior. This behavior will be influenced by the quality and intensity of awareness and education campaigns, as well as technical and economic incentives. These will include tools such as limiting MSW collection and providing sufficient collection facilities for separate collection, as well as economic incentives such as payments based on the amount of MSW or the volume of MSW containers and the frequency of their collection.

From the perspective of municipalities, the economic benefits of separate collection will be a significant motivation for maximizing separate collection before disposing of mixed municipal waste or bulky waste. This economic advantage can be achieved through the participation of the EPR system in the municipality's costs for collection, transport, and subsequent treatment of end-of-life products falling under the individual EPR systems.

Scenarios T1 and T2 differ in the level of waste prevention and the level of municipal waste sorting, which is also reflected in the different production of individual municipal waste sub-streams. **Prevention**	**Both the optimistic and realistic scenarios anticipate significant municipal waste prevention.** **The long-term upward trend in municipal waste production will be halted.** **However, the impact on the production of all waste will be negligible.**

The following tables summarize the expected quantities of individual municipal waste sub-streams.

Table 74: ***Optimistic production scenario (trajectory 1) – overview of expected future production*** *by waste sub-streams (individual commodities)*

Waste stream	Quantity [t]				Quantity [kg/capita]	
	2021	2	2030	2035	2022	2035
All municipal waste	6,015,603	5,854,385	6,224,283	6,165,246	544	576
Biological waste						
From kitchens and canteens (20 01 08)	2	42,776	337	53	4	50
From gardens and parks (20 02 01)	878,977	845,876	1,204,012	1,298,190	81	121
Edible oil and fat (20 01 25)	10,709	12,437	16,438	17,619	1	2
Separately collected components						
Separated paper and cardboard (20 01 01+ nd 15 01 01)	467	466	550	581	44	54
Separated glass (20 01 02+ nd 15 01 07)	173,080	171,084	221,106	243,476	16	23
Separated plastic (20 01 39+ nd 15 01 02)	194,803	205,920	329,548	397,247	2	37
Separated metals (20 01 40 + 15 01 04)	434,215	441,751	441,198	478,588	42	45
Separated textiles (20 01 10+ nd 20 01 11)	34,004	35,855	85	115,582	3	11
Separated wood (20 01 38)	78,070	79,187	220	311,849	8	2
Mixed municipal waste (20 03 01)	2,755,893	2,674,934	2,008,871	1,539,322	25	14
Waste from markets (20 03 02)	7,007	5,997	6,853	6,637	1	1
Street cleaning (20 03 03)	92,434	101,325	114,786	121,334	10	11
Bulky waste (20 03 07)	712,494	634,822	578,957	441,167	60	41
Hazardous waste 20 (KO), N	8,346	38,402	9,627	10,267	4	1
Remaining waste in KO	140	98,594	99,421	66,680	9	6

Source: Prepared based on ISOH, own projections

Table 75: ***Realistic production scenario (trajectory 2) – overview of expected future production*** *by waste sub-streams (individual commodities)*

Waste stream	Quantity [t]				Quantity [kg/capita]	
	2	2	2030	2035	2022	2035
All municipal waste	6,015,603	5,854,385	6,369,031	6,410,455	544	599
Biological waste						
From kitchens and canteens (20 01 08)	28,428	42,776	312,793	494	4	46
From gardens and parks (20 02 01)	878,977	845,876	1,228,935	1,343,859	81	126
Edible oil and fat (20 01 25)	10,709	12,437	16,438	17,619	1	2
Separately collected components						
Separated paper and cardboard (20 01 01+ nd 15 01 01)	467	466,454	539,304	562	44	53
Separated glass (20 01 02+ nd 15 01 07)	173	171,084	218,221	238,464	16	22
Separated plastic (20 01 39+ nd 15 01 02)	194,803	205,920	305,708	355,870	2	33
Separated metals (20 01 40 + 15 01 04)	434,215	441,751	435,320	468,935	42	44
Separated textiles (20 01 10+ nd 20 01 11)	34,004	35,855	81	108,610	3	10
Separated wood (20 01 38)	78,070	79,187	207,673	289,860	8	27
Mixed municipal waste (20 03 01)	2,755,893	2,674,934	2,167,714	1,796,115	255	168
Market waste (20 03 02)	7,007	5,997	6,853	6,637	1	1
Street cleaning (20 03 03)	92,434	101,325	114,786	121,334	10	11
Bulky waste (20 03 07)	712,494	634,822	623,966	519,885	60	49
Hazardous waste 20 (KO), N	8,346	38,402	9,627	10,267	4	1
Remaining waste in KO	140	98,594	100,363	75,531	9	7

Source: Prepared based on ISOH, own projections

2.13.3.3 Expected future municipal waste management

Scenarios for the future development of municipal waste production are followed by scenarios for municipal waste management. For both the optimistic and realistic municipal waste production scenarios (Trajectories 1 and 2)**, three waste management scenarios (N1, N2, and N3)** have been developed**,** which will lead **to the achievement of municipal waste recycling targets and the diversion of municipal waste from landfills.**

Specifically, the targets are as follows:

- Increase the level of preparation for reuse and recycling of municipal waste to at least **55% in 2025, 60% in 2030, and 65% in 2035**.
- By **2035,** reduce the amount of municipal waste going to **landfills to 10%** (by weight) or less of the total amount of municipal waste produced.

Targets for municipal waste	**Level of preparation for reuse and recycling of municipal waste**		
	55 in 2025	**60** in 2030	**65** in 2035
	Landfilled maximum 10 of municipal waste produced in 2035		

The scenarios differ **in the level of municipal waste landfilling** in 2035, with **a maximum value of 10%** (scenario N1), lower in scenario N2, and the minimum realistic value (close to zero) achieved in scenario N3. In line with the decline in the landfill rate**, the share of energy recovery increases (**theoretically from **25% to 35%** with zero landfill).

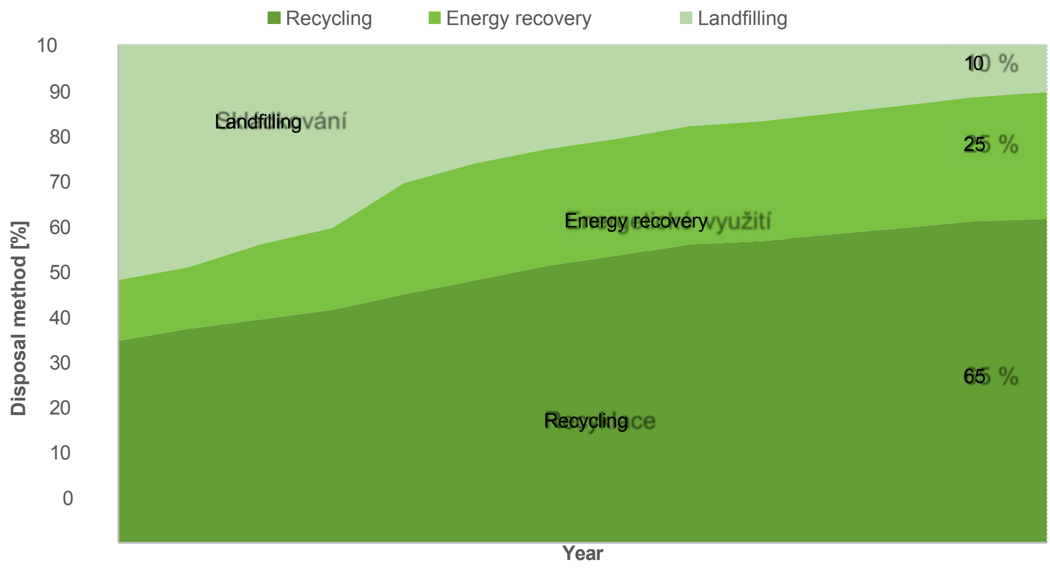
Scenarios Disposal of municipal waste	**Waste management scenarios for 2035**					
	Scenario N1		**Scenario N2**		**Scenario N3**	
	Recycling	**65**	**Recycling**	**65**	**Recycling**	**65**
	Energy reuse	**25%**	**Energy recovery**	**30%**	**Energy recovery**	**35**
	Landfilling	**10**	**Landfilling**	**5**	**Landfilling**	**0**

Unlike the production scenarios (T1, T2), **the management scenarios (N1, N2, N3)** are **closely linked to the implementation of processing technologies** (see Chapter 5.2 below). Without the necessary infrastructure, their achievement cannot be expected. Achieving a municipal waste recycling rate of 65% in 2035 is linked t o investments in technologies for the management o f biodegradable waste (biogas plants including sanitation, composting plants), sorting lines for plastics and paper, and technologies for the treatment and sorting of bulky waste.

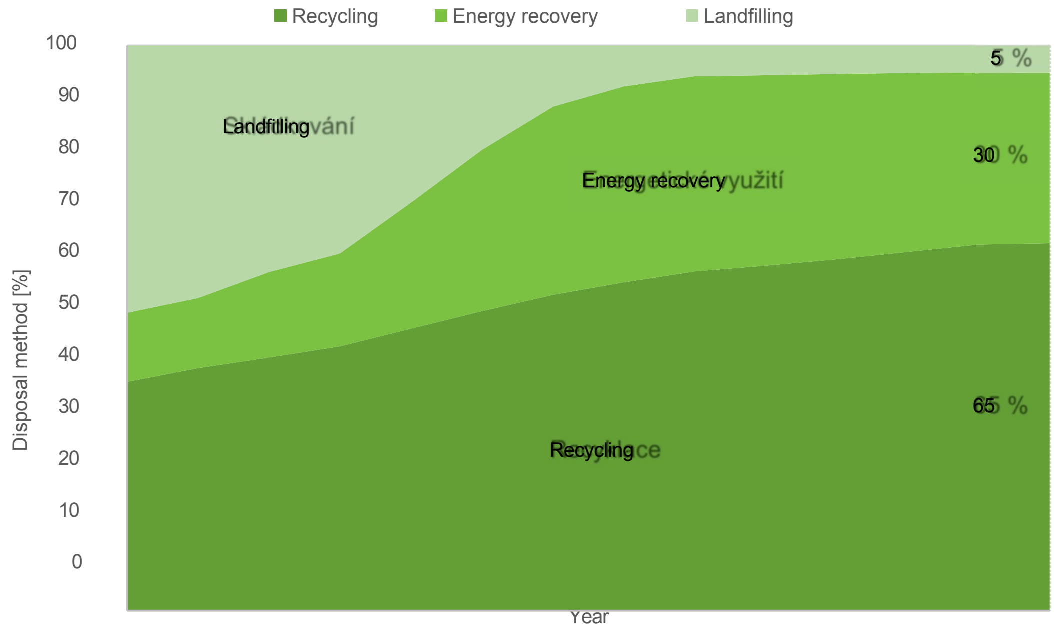
The results of the modeling in terms of the amount of municipal waste ending up in individual treatment methods according to the hierarchy are shown in Table 76 for the optimistic municipal waste production scenario (Trajectory 1) and Table 77 for the realistic municipal waste production scenario (Trajectory 2) at the end of this chapter.

The gradual development in waste management towards the set targets is evident from Figures 64 to 66. Given that the trend expressed in percentages is essentially the same for both the optimistic and realistic scenarios, a single graph is shown for both municipal waste production scenarios, i.e. for the optimistic (T1) and realistic (T2) scenarios. (T2).

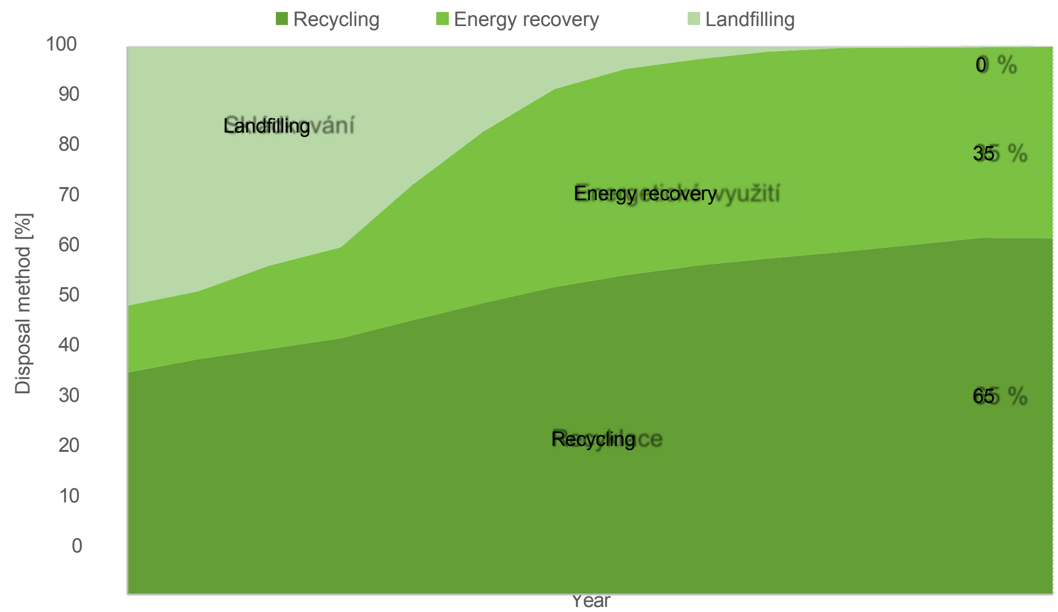
Graph 64: Municipal waste management model for waste ***management scenario N1*** *(graph common to both the optimistic and realistic municipal waste production scenarios – trajectories T1 and T2)*



Graph 65: Municipal waste management model for ***the N2 management scenario*** *(graph common to both the optimistic and realistic municipal waste production scenarios – trajectories T1 and T2)*



Graph 66: Municipal waste management model for ***the N3 management scenario*** *(graph common for both optimistic and realistic municipal waste production scenarios – trajectories 1 and 2)*



The following text describes in greater detail the material components and sub-streams that contribute to each treatment method. The commentary relates primarily to the target year 2035. The share of individual sub-streams in treatment in 2035 is shown in Figure 67 below.

RECYCLING

The following sub-streams contribute most to recycling:

- **Biowaste from gardens and parks** (20 02 01) **and biowaste from kitchens and catering facilities** (20 01 08) – this is the most significant stream, which will be predominantly used for material recovery.
- **Paper, plastic, glass, metals** – these are already established commodities of separate collection, whose importance will gradually increase.
- **Textiles** – textiles represent waste whose separate collection in the waste system will increase significantly in the coming years.
- **Bulky waste and separately collected wood** – this is another significant stream suitable for recycling.
- **Mixed municipal waste** – only a small proportion of the usable components obtained from mechanical sorting of mixed municipal waste and separation of metals from slag produced by municipal waste incineration plants contributes to the total production of recyclable materials.

ENERGY RECOVERY

The following sub-streams contribute primarily to energy recovery:

- **Bulky waste** – part of bulky waste after sorting (by staff at collection yards or by machine) may not be recoverable. This part is preferred for energy recovery.
- **Mixed municipal waste** – residual waste after maximum sorting of recoverable components will be the dominant stream that will be used for energy recovery. The disposal scenarios assume a share **of energy recovery of approximately 25 to 35%,** depending on the level of municipal waste landfilling. To achieve this, **an adequate network of energy recovery facilities and related logistics** must **be established.**

LANDFILL

Landfilling is correlated with the share of municipal waste used for energy recovery. The waste management scenarios were set based on the assumptions listed below.

Scenario N3 – zero landfill

- From a waste stream perspective, the process that contributes to the landfilling of mixed municipal waste is the mechanical sorting of mixed municipal waste using mechanical treatment technology. Achieving zero landfilling of mixed municipal waste means that no fraction that cannot be recovered is produced during the sorting of mixed municipal waste. However, current knowledge and practical experience show that this is unlikely to happen. The basic balance of mechanical sorting technologies assumes that, given the current composition of mixed municipal waste, approximately 20% by weight of the waste entering the system will still be destined for landfill.

- This scenario therefore assumes that there will be no inert fine fractions or pieces of stone, etc. in mixed municipal waste. Fine particles will not be present due to a significant restriction (ban) on solid fuel boilers, or separate collection of ash will be permitted and carried out under waste category 20 03 01 01 *Separately collected ash from households.* At the same time, it is a condition that no pieces of construction and demolition waste appear in mixed municipal waste. Citizens will sort this waste thoroughly.

- No other waste streams will be landfilled alongside mixed municipal waste. This applies, for example, to street sweepings, which must be sorted thoroughly and recycled (e.g., to obtain inert materials for gritting during winter road maintenance).

Landfilling of municipal waste	**Achieving zero municipal waste landfilling by 2035 is difficult to achieve and unrealistic.**

Scenario N2 – minimum landfilling (5% of municipal waste is landfilled)

- Approximately 20% of mixed municipal waste that undergoes mechanical sorting and part of street sweepings are included in landfilling (sorting of inert waste after winter maintenance and energy recovery is still expected).

Scenario N1 – approaching **the maximum permitted** municipal waste **landfill** in 2035 (10%)

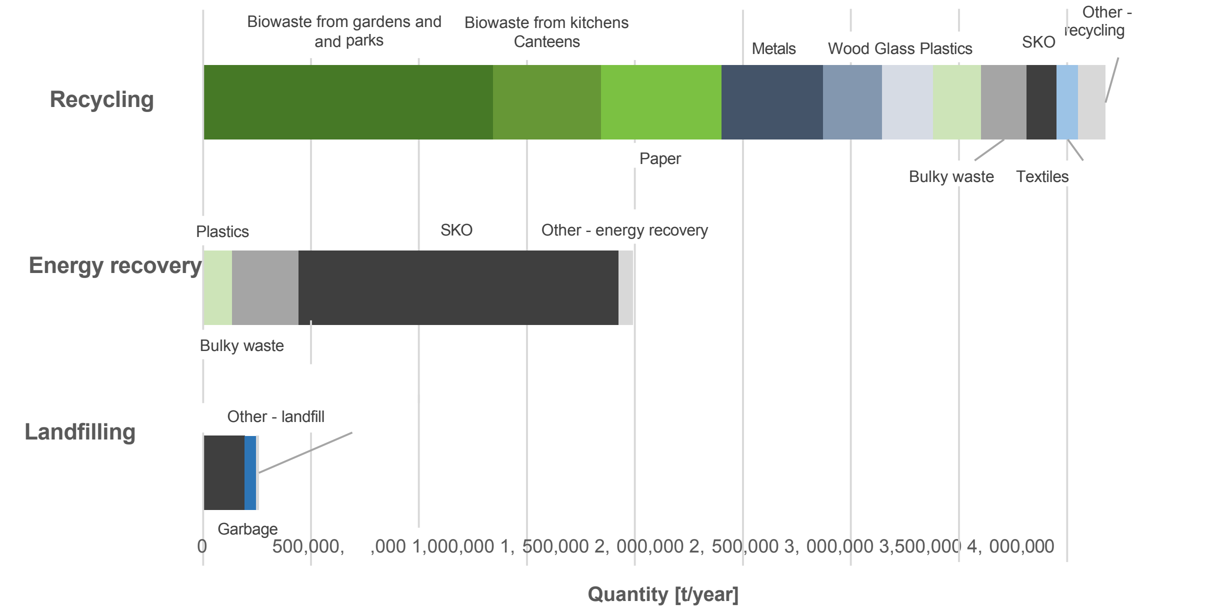
- In this scenario, more than 600,000 tons of municipal waste are landfilled annually. In addition to the above, direct landfilling of mixed municipal waste due to insufficient capacity of facilities for energy or other uses also contributes to landfilling. In this scenario, a capacity of approximately 1 million tons/year for waste-to-energy facilities and approximately 300,000 tons/year for sorting lines for mixed municipal waste would be sufficient. If the legal requirement that untreated mixed municipal waste cannot be landfilled is complied with, the same balance would be achieved with the operation of sorting lines with a capacity of 1.5 million tons/year (with 20% of outputs going to landfill).
- Separately collected components in this scenario are not landfilled. These are mostly recyclable wastes that will be banned from landfilling from 2030 because they can be recycled effectively given the current state of scientific and technical progress.

Landfilling of municipal waste	**The realistic share of landfilling that will be in line with legislation should be around 5%.**

Figure 67 shows the share of individual municipal waste sub-streams by treatment in 2035 for the optimistic municipal waste production scenario (Trajectory 1) and the N2 treatment scenario.

It can be assumed that the structure of the representation of individual sub-streams will be similar or almost identical for other management scenarios, or rather for the realistic production scenario (Trajectory 2).

Graph 67: Contributions of individual municipal waste sub-streams to key treatment methods in 2035 – ***treatment scenario N2 (landfilling of 5%*** *of municipal waste production)*



Note: Prepared for an optimistic municipal waste production scenario (Trajectory 1) and an N2 management scenario, assuming that 5% of municipal waste production is landfilled.

CONCLUSIONS OF THE DEVELOPMENT SCENARIO MODELLING

- The combination of the considered production and **technology development** scenarios, on which the management scenarios are based, has **the potential to achieve the set targets** for municipal waste management.
- Given that the production scenario anticipates a gradual increase in the production of material-recoverable components (paper, plastic, glass, metals, biowaste), it will be **more difficult to meet the target of 60% municipal waste recycling in 2030** than 65% in 2035. This means that **meeting the 2030 target requires the immediate implementation of all measures and the development of technologies** to ensure that the targets are met.
- This also implies that **achieving the target for the realistic** municipal waste **production scenario** (Trajectory 2) **is more difficult** than for the optimistic municipal waste production scenario (Trajectory 1).

 **Achieving recycling targets**	**Achieving the target of 60% municipal waste recycling by 2030 appears to be more difficult than achieving the target of 65% by 2035.** **This is due to the gradual increase in separately collected components intended for recycling at the expense of residual waste, which is currently mainly landfilled.** **Achieving the 2030 target requires the immediate implementation of all proposed measures and the development of the necessary technologies for waste collection, sorting, and recovery.**

Table 76: ***Municipal waste management scenarios – optimistic municipal waste production scenario (Trajectory 1)***

Trajectory 1 Scenario N1	**2**	**2**	**2**	**20**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Production (thousand tons)	5,854	6,099	6,136	6,168	6,190	6,208	6,221	6,223	6,224	6,221	6,213	6,199	6,184	6,165
Recycling (thousand tons)	2,371	2,618	2,749	2,883	3,086	3,270	3,454	3,589	3,734	3,773	3,845	3,918	3,993	4,007
Energy use (thousand tons)	716	757	926	1,013	1,384	1,459	1,463	1,460	1,473	1,491	1,510	1,527	1,542	1,570
Landfilling (thousand tons)	2,767	2,724	2,461	2,272	1,720	1,479	1,304	1,174	1,017	957	858	754	649	588
Trajectory 1 Scenario N2	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Production (thousand tons)	5,854	6,099	6,136	6,168	6,190	6,208	6,221	6,223	6,224	6,221	6,213	6,199	6,184	6,165
Recycling (thousand tons)	2,371	2,618	2,749	2,883	3,086	3,289	3,477	3,614	3,734	3,796	3,864	3,933	4,004	4,007
Energy use (thousand tons)	716	757	926	1,013	1,384	1,774	2,069	2,157	2,151	2,095	2,035	1,963	1,882	1,863
Landfilling (thousand tons)	2,767	2,724	2,461	2,272	1,720	1,145	675	452	339	330	314	303	298	295
Trajectory 1 Scenario N3	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Production (thousand tons)	5,854	6,099	6,136	6,168	6,190	6,208	6,221	6,223	6,224	6,221	6,213	6,199	6,184	6,165
Recycling (thousand tons)	2,371	2,618	2,749	2,883	3,096	3,300	3,489	3,626	3,736	3,812	3,883	3,954	4,027	4,007
Energy use (thousand tons)	716	757	93	1,024	1,527	1,944	2,247	2,342	2,344	2,353	2,311	2,230	2,150	2,158
Landfilling (thousand tons)	2,767	2,724	2,453	2,261	1,567	964	485	255	144	56	19	15	7	0

Table 77: ***Municipal waste management scenarios – realistic municipal waste production scenario (Trajectory 2)***

Trajectory 2 Scenario N1	**2**	**2**	**2**	**20**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Production (thousand tons)	5,854	6,116	6,170	6,219	6,259	6,296	6,327	6,348	6,369	6,385	6,397	6,404	6,409	6,410
Recycling (thousand tons)	2,371	2,611	2,746	2,882	3,105	3,305	3,504	3,641	3,841	3,917	3,989	4,054	4,116	4,178
Energy use (thousand tons)	716	756	917	1,003	1,297	1,360	1,650	1,646	1,507	1,530	1,555	1,577	1,598	1,632
Landfilling (thousand tons)	2,767	2,749	2,507	2,334	1,857	1,631	1,173	1,061	1,021	938	853	773	695	600
Trajectory 2 Scenario N2	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Production (thousand tons)	5,854	6,116	6,170	6,219	6,259	6,296	6,327	6,348	6,369	6,385	6,397	6,404	6,409	6,410
Recycling (thousand tons)	2,371	2,611	2,744	2,880	3,140	3,377	3,580	3,713	3,841	3,917	3,989	4,054	4,116	4,178
Energy use (thousand tons)	716	699	852	931	1,368	1,750	2,015	2,187	2,201	2,150	2,098	2,045	1,993	1,937
Landfilling (thousand tons)	2,767	2,806	2,574	2,408	1,751	1,169	732	448	327	318	310	305	300	295
Trajectory 2 Scenario N3	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Production (thousand tons)	5,854	6,116	6,170	6,219	6,259	6,296	6,327	6,348	6,369	6,385	6,397	6,404	6,409	6,410
Recycling (thousand tons)	2,371	2,611	2,739	2,875	3,137	3,367	3,563	3,703	3,823	3,902	3,977	4,048	4,121	4,177
Energy use (thousand tons)	716	756	925	1,014	1,527	1,923	2,224	2,455	2,399	2,415	2,380	2,334	2,274	2,230
Landfilling (thousand tons)	2,767	2,749	2,506	2,330	1,595	1,006	540	190	147	68	40	22	14	0

2.13.4 Waste from waste treatment and processing (secondary waste)

Waste from waste treatment facilities, i.e. waste generated during the treatment and processing of waste (e.g. waste from sewage treatment plants, waste from waste crushing or other mechanical or physical-chemical treatment of waste) is collectively referred to as secondary waste or secondary waste production. The stream consists of catalog numbers from group 16 *Waste not otherwise specified in this catalog and* 19 *Waste from waste treatment facilities (*abbreviated).

Significant changes in production are expected mainly in group 19, specifically in the production of waste after treatment or processing of municipal waste. For this reason, the following chapters focus mainly on municipal waste.

2.13.4.1 Factors influencing the production of waste in group 19

After processing municipal waste , secondary waste is produced, primarily as outputs from the energy recovery of municipal waste, outputs from the sorting of separately collected fractions, or, in the future, from the mechanical sorting of recyclable and recoverable fractions from mixed municipal waste. These three factors will have a significant impact on the production of secondary waste from municipal waste in the future.

Energy recovery from municipal waste

In the coming years, the capacity of waste-to-energy plants and the energy recovery of municipal waste, especially mixed municipal waste and fuels produced from mixed municipal waste, will increase. This will also lead to higher production of solid residues, so-called slag, with an average of 220 kg of slag produced per ton of waste processed in the Czech Republic in four waste-to-energy plants, i.e., approximately 160,000 tons of waste under category number 19 01 12 *Other ash and slag not listed under 19 01 11.* With the increase in the capacity of waste-to-energy plants, the production of slag will increase.

Sorting of recyclable and recoverable components

The forecast for municipal waste production anticipates an increase in the production of separately collected components such as paper, plastic, glass, metals, and textiles. In this context, the importance of their treatment and subsequent production of secondary waste will grow. In the context of scenario development, it is essential to consider the treatment of waste in group 19, in particular category 19 12 04 *Plastics and rubber,* 19 12 10 *Combustible waste,* 19 12 01 *Paper and cardboard,* 19 12 02 *Ferrous metals, and* 19 12 03 *Non-ferrous metals.*

Mechanical sorting of recyclable and recoverable components from municipal solid waste and subsequent production of solid alternative fuels (SAF).

Municipal waste management scenarios include not only waste-to-energy facilities but also the construction of facilities for mechanical sorting of mixed municipal waste, in particular with the subsequent production of solid alternative fuels. After sorting out recyclable components such as PET bottles, aluminum cans, polyethylene, some paper, and then after sorting out mineral fractions and, where applicable, parts of biodegradable fractions (for biostabilization), solid alternative fuels (SAF) will be produced from the remaining usable waste, which can then be used for energy in cement plants or heating plants.

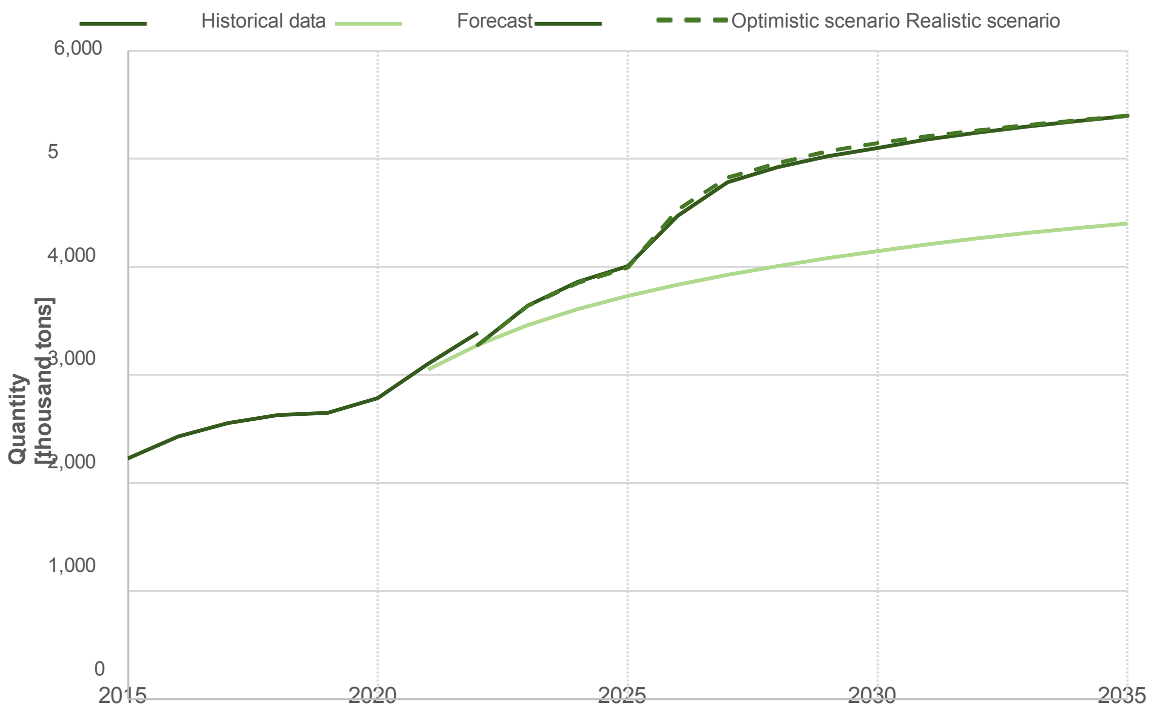
Due to the higher sorting of recyclable components from mixed municipal waste, higher production of waste category 19 12 10 *Combustible waste* is expected.

Scenarios for the production of secondary waste from municipal waste treatment

In accordance with the scenarios developed for municipal waste production (Chapter 2.13.3), two scenarios will also be considered for secondary waste, reflecting the above-described links between the production of separately collected fractions and the energy recovery of municipal waste for the production of secondary waste (group 19) – **secondary waste production scenarios are directly linked to municipal waste production scenarios.** Of the three municipal waste management scenarios developed (scenarios N1, N2, and N3)**, scenario N2** was selected as **the baseline for further analysis – municipal waste landfilling at 5 % in 2035, energy recovery a t 3 0 % , and recycling at 65%.**

Figure 68 shows the curves of secondary waste production (group 19) for both proposed municipal waste production scenarios (Trajectories 1 and 2). The difference between secondary waste production in the optimistic municipal waste production scenario (Trajectory 1) and the realistic municipal waste production scenario (Trajectory 2) is negligible. It can be seen that secondary waste production will increase significantly in both scenarios in the coming years.

Graph 68: Development of secondary waste production from municipal waste treatment according to the proposed scenarios



Source: ISOH production data, Tiramiso forecast, own projections

Table 78: Expected future production of secondary waste – Trajectory 1 and Trajectory 2 [thousand tonnes]

Production	Forecast (trend)		Projection (scenario)		Comment
2	2030	2035	2030	2035	
3,391	4,146	4,401	5,099	**5,398**	Optimistic production scenario (Trajectory 1), N2 loading scenario
			5,128	**5,399**	Realistic production scenario (Trajectory 2), N2 loading scenario

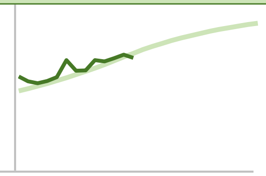
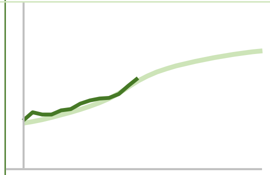
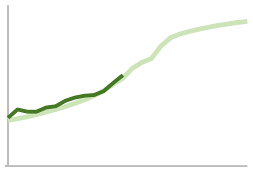
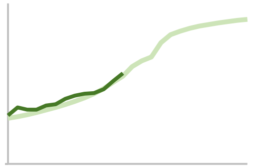
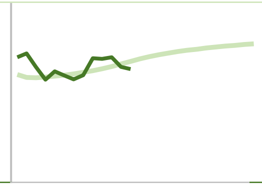
Source: 2022 ISOH production data, Tiramiso forecast, own projections

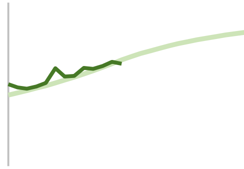
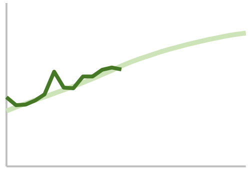
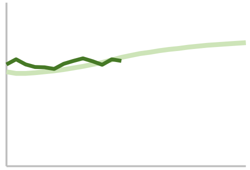
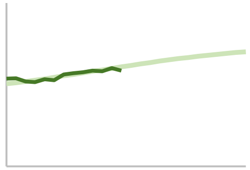
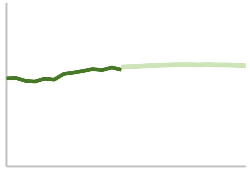
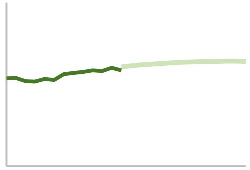
2.13.5 Expected development of all waste streams

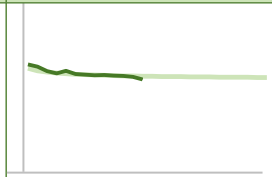
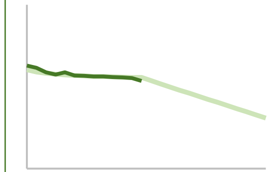
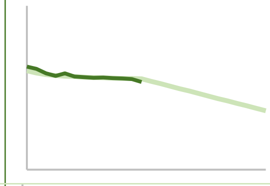
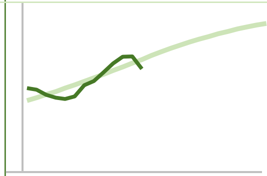
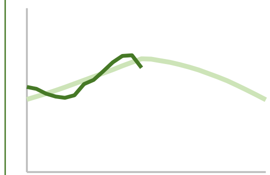
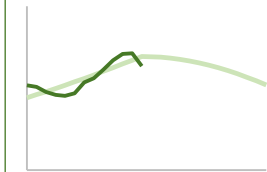
For clarity and simplicity, the following tables do not include municipal and secondary waste production scenarios where the impact of these scenarios on the waste streams is relatively small.

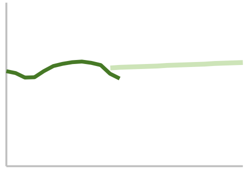
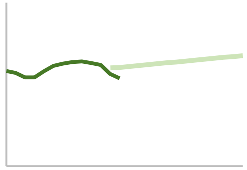
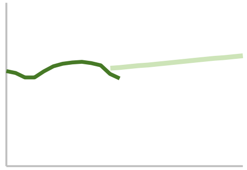
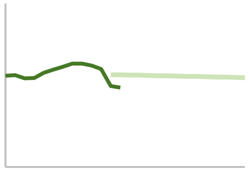
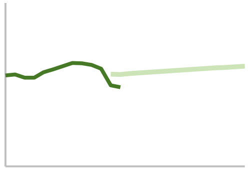
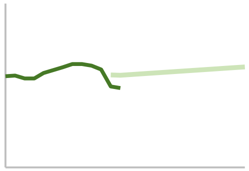
Table 79 below summarizes current production and expected production development by waste stream. Unless otherwise stated, the figures for 2030 and 2035 are production forecasts.

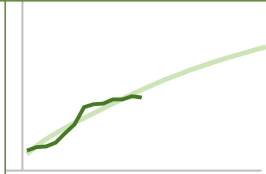
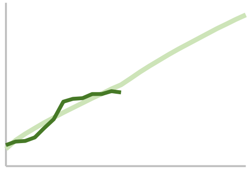
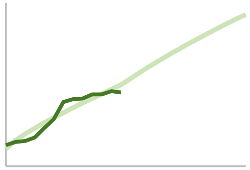
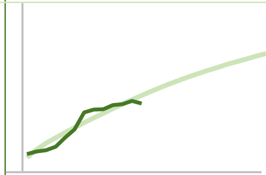
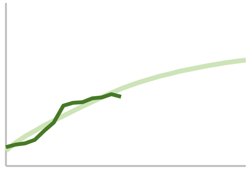
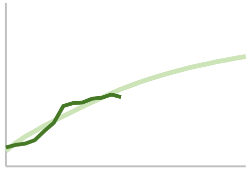
Table 79: Current production and expected development by 2035 by waste stream

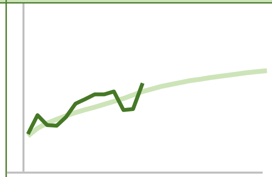
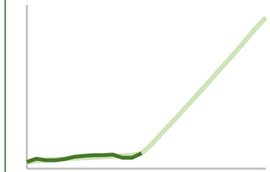
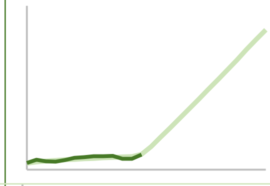
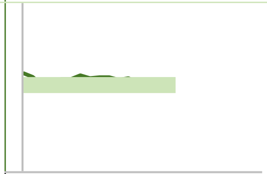
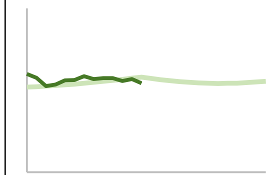
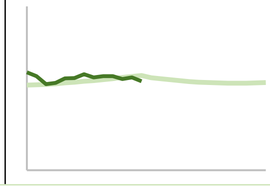
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Primary waste (primary production)	All groups	35,982	Forecast: 44,044	Forecast: 46,576		Long-term upward trend. The fluctuation in 2015 was mainly due to group 17; otherwise, production has followed the long-term trend, apart from isolated minor fluctuations. Further significant growth is expected in the future.
Secondary waste (secondary production)	16	3	Forecast: 4,083	Forecast: 4,338		Secondary waste has been growing steadily for a long time. A significant increase occurred in 2021 and 2022. This increase is also reflected in forecasts for future developments, but the growth rate is expected to decline from around 2025.
			Trajectory 1: 5	Trajectory 1: 5,398		Optimistic scenario. Higher energy recovery from waste is expected, along with the associated construction of waste-to-energy plants and facilities for mechanical sorting of recyclable and recoverable components from mixed municipal waste and the subsequent production of solid alternative fuels. There will also be increased sorting of material recoverable components. These changes will lead to a significant increase in the production of secondary waste.
			Trajectory 2: 5,146	Trajectory 2: 5,400		Realistic scenario. Same factors as in the optimistic scenario, but due to the smaller number of people who sort intensively, the development of production will be slightly different. However, in 2035, more or less the same production value is expected for both scenarios.
Hazardous waste	all groups	1,604	1,845	1,918		The production of hazardous waste fluctuates from year to year, mostly in waves. In 2021 and 2022, production declined, but a slight increase in the production of hazardous waste is expected in the future.

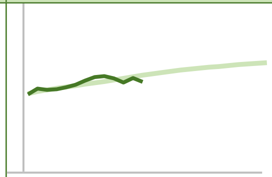
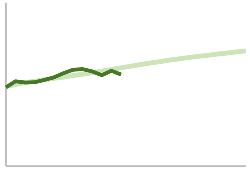
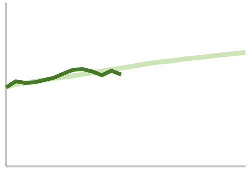
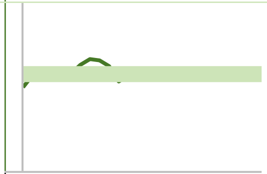
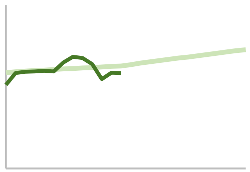
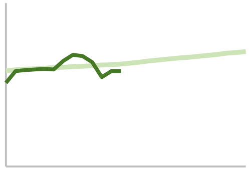
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Other waste	All groups	37,555	46,282	48,996		Except for occasional fluctuations to higher figures, the production of other waste has been growing in the long term and follows the trend. Further growth in the production of other waste is expected, with the growth rate slowing slightly around 2030.
Mineral waste	01, 02, 05, 06, 10, 17, 19, 20	23	29	32		In 2015, there was a significant deviation from the trend towards higher production; otherwise, production follows the trend. A significantly growing trend is expected to continue in the future, unless there are further unexpected fluctuations that would affect the long-term trend. Subgroup 17 05 has the main influence on production.
Production without mineral waste	all groups	16,061	18,293	18,858		Long-term trend is fairly constant, with slight fluctuations. Due to the expected significant increase in the production of all types of waste, a slight increase is also expected in this stream (excluding a significant increase in the production of mineral waste).
Municipal waste	2	5,854	Forecast: 6,850	Forecast: 7,142		A long-term slightly upward trend without significant fluctuations, which is expected to continue according to the forecast. Approximately 75% of the population sorts municipal waste, but municipal waste prevention measures are not being fully implemented and production is growing.
			Trajectory 1: 6	Trajectory 1: 6,165		Optimistic scenario. Approximately 86% of the population is expected to sort municipal waste intensively. Growth will slow down by 2030, and production should decline slightly from 2031 onwards.
			Trajectory 2: 6,369	Trajectory 2: 6,410		Realistic scenario. Approximately 81% of the population is expected to sort municipal waste intensively. Growth in production is slowing down, but it will not be possible to stop it completely. Production will increase slightly until 2035.

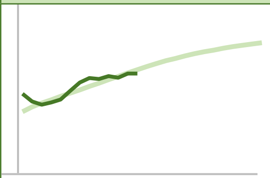
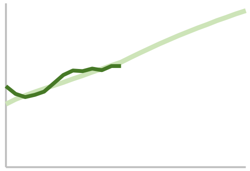
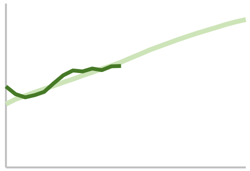
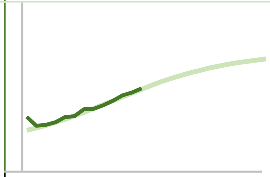
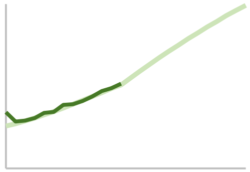
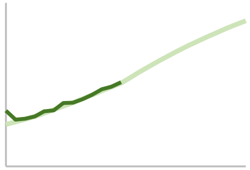
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Mixed municipal waste	2	2,675	Forecast: 2,748	Forecast: 2,733		Production has been declining slightly in the long term, following the trend with occasional fluctuations, such as in 2014 (upward) and in 2022, when there was another decline. According to the forecast, the slight decline is expected to continue, but the development according to the scenarios below is more likely.
			Trajectory 1: 2	Trajectory 1: 1,539		Optimistic scenario. Waste prevention will work very well and most of the material ly recoverable components will not enter the municipal waste stream, which will lead to a significant decrease in its production.
			Trajectory 2: 2,168	Trajectory 2: 1,796		Realistic scenario. Materially recoverable components will be diverted from mixed municipal waste, but not to the same extent as in the optimistic scenario. Here, too, the effect of waste prevention is taken into account and a significant decrease in MSW production is predicted.
Bulky waste	2	63	Forecast: 849	Forecast: 914		Production has been growing significantly since 2015. In 2021, there was stagnation, followed by a more significant decline in 2022. According to the forecast, production will continue to grow significantly in the coming years. However, the development is expected to follow the predictions in the scenarios below.
			Trajectory 1: 579	Trajectory 1: 44		Optimistic scenario. A significant decline in production is expected. Apart from the effect of municipal waste prevention, the sorting of approximately 70% of bulky waste by residents and at collection yards works very well.
			Trajectory 2: 62	Trajectory 2: 52		Realistic scenario. Here too, a significant decline in production is expected. In addition to the effect of municipal waste prevention, the sorting of approximately 60% of bulky waste at collection yards is working very well.

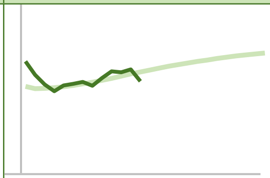
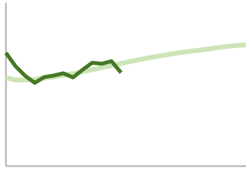
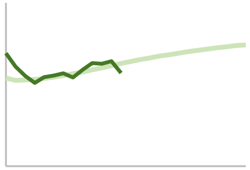
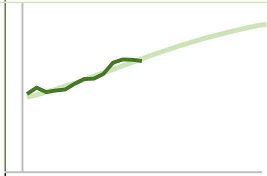
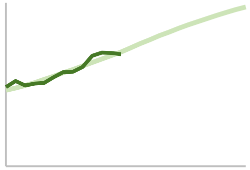
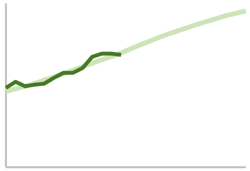
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Develo pment	Note on expected development
Biodegradable waste	02, 03, 04, 15, 16, 17,	4,	Forecast: 4,692	Forecast: 5,052		In 2022, there was a significant decline in production. However, the previous long-term growth in production is expected to continue in the future, unless there is a further decline in the coming years.
			Trajectory 1: 4,899	Trajectory 1: 5		Optimistic scenario. Partial decline in production of category no. 20 02 01, e.g. due to restrictions on grass mowing, significant increase in production of cat. no. 20 01 08 due to the expected development of separate collection of kitchen waste.
			Trajectory 2: 4,900	Trajectory 2: 5,388		Realistic scenario . Same factors as in the optimistic scenario, except that the decline in cat. no. 20 02 01 and the increase in cat. no. 20 01 08 will not be as significant.
Biologically degradable Municipal waste	2	2,442	Forecast: 3,167	Forecast: 3,542		Due to the bio-component share coefficients for some types of waste, growth stopped in 2017, followed by a gradual decline from 2018 and a more significant decline in production, especially in 2020. However, a slight decline in production is expected in the long term.
			Trajectory 1: 3,375	Trajectory 1: 3,873		Optimistic scenario. Partial decline in production of category no. 20 02 01, e.g. due to restrictions on grass cutting, significant increase in production of cat. no. 20 01 08 due to the expected development of separate collection of kitchen waste.
			Trajectory 2: 3,376	Trajectory 2: 3,877		Realistic scenario . Same factors as in the optimistic scenario , only decrease in cat. no. 20 02 01 and increase in cat. no. 20 01 08 will not be as significant.

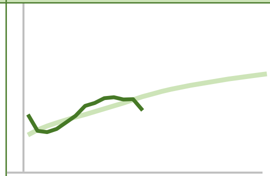
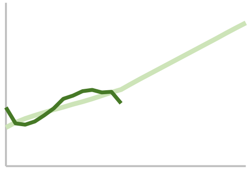
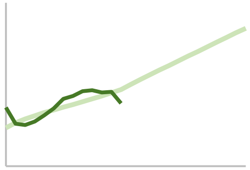
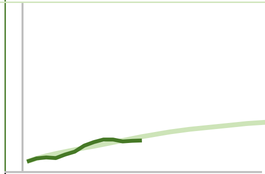
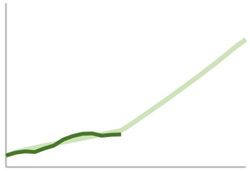
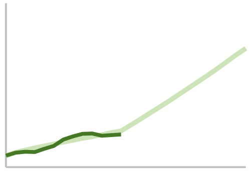
Waste flow	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Biological waste	2	9	Forecast: 1,350	Forecast: 1,520		Significant increase between 2013 and 2016, followed by moderate growth. Further significant growth in production is expected in the long term.
			Trajectory 1: 1	Trajectory 1: 1,852		Optimistic scenario. Partial decline in production of category no. 20 02 01, e.g. due to restrictions on grass mowing, significant increase in production of cat. no. 20 01 08 due to the expected development of separate collection of kitchen waste.
			Trajectory 2: 1,558	Trajectory 2: 1,856		Realistic scenario. Same factors as in the optimistic scenario, except for a decline in 20 02 01. and the increase in 20 01 08 will not be as significant.
Biodegradable waste from gardens and parks	2	8	Forecast: 1,291	Forecast: 1,458		This stream constitutes the largest component of biological waste, therefore it follows its trend. A significant increase between 2013 and 2016, followed by moderate growth. Further significant growth in production is expected in the long term.
			Trajectory 1: 1	Trajectory 1: 1,298		Optimistic scenario. Partial decline in production of category no. 20 02 01, e.g. due to restrictions on grass mowing. Furthermore, a transition to community composting of plant residues in municipalities is expected due to the possibility of counting this towards sorting targets. At the same time, a shift towards more environmentally conscious thinking among the population and greater prevention, e.g. through home composting, is also expected.
			Trajectory 2: 1,229	Trajectory 2: 1,344		Realistic scenario ( ). Same factors ( ) as in the optimistic scenario ( ), but the decline will not be as significant.

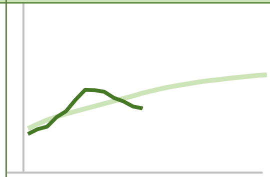
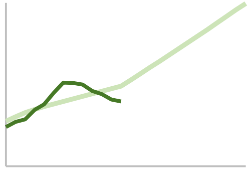
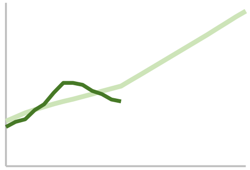
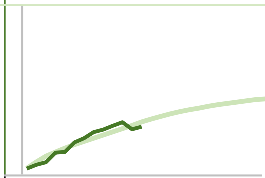
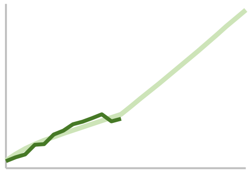
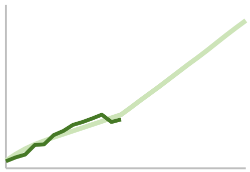
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Animal by-products and biological waste from kitchens and catering establishments	20	55	Forecast: 59	Forecast: 63		Long-term upward trend with slight fluctuations in production and a decline in 2020 and 2021 due to the COVID-19 pandemic. The upward trend is expected to continue in the future.
			Trajectory 1: 35	Trajectory 1: 55		Optimistic scenario. Separate collection of kitchen waste is expected to develop and inappropriate food waste management is expected to end. Significant growth in production is expected.
			Trajectory 2: 329	Trajectory 2: 512		Realistic scenario. Separate collection of kitchen waste is expected to develop and inappropriate food waste management is expected to end. A slowdown and lower growth can be expected as a result of initiatives to prevent or reduce food waste. Significant growth in production is expected.
Food waste	02, 16	1	Forecast: 1,230	Forecast: 1,261		Food waste production is fluctuating, growing between 2012 and 2016 and then slowly declining. A slight upward trend in production is expected in the future.
			Trajectory 1: 1	Trajectory 1: 1		Optimistic scenario. Depending on municipal waste production scenarios, there will also be a change in food waste production. Waste prevention will lead to a decrease in food waste in mixed municipal waste. A decrease in production is expected.
			Trajectory 2: 1,064	Trajectory 2: 1,070		Realistic scenario ( ). Same reasons ( ) and assumptions ( ) as in the optimistic scenario, but to a lesser extent. A decrease in production is expected in the future.

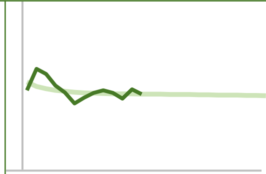
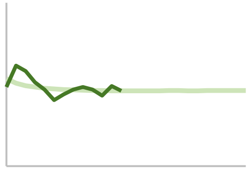
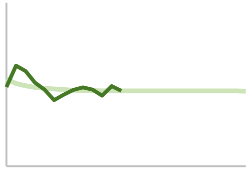
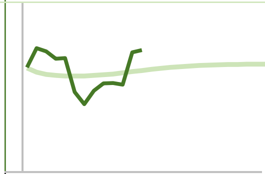
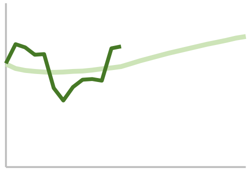
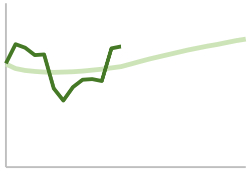
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected developments
All paper	03, 15, 20	1,118	Forecast: 1,306	Forecast: 1,354		Long-term stable growth with slight fluctuations, which is also expected in the future.
			Trajectory 1: 1	Trajectory 1: 1,408		Optimistic scenario. Replacement of printed materials with digital forms, leading to a decline in production. However, this is countered by the development of e-commerce and delivery services, where paper packaging is widely used and is expected to be used even more in the future. Production is expected to grow in the future.
			Trajectory 2: 1,328	Trajectory 2: 1,389		Realistic scenario ( ). Same reasons ( ) and assumptions ( ) as in the optimistic scenario, but to a lesser extent. Production is expected to grow in the future.
Separated paper	15	4	Forecast: 518	Forecast: 527		Long-term upward trend. Significant increase in 2016 and 2017, followed by a decline until 2020. The upward trend is expected to continue in the future.
			Trajectory 1: 5	Trajectory 1: 582		Optimistic scenario. Replacement of printed materials with digital forms, leading to a decline. However, this is countered by the development of e-commerce and delivery services, where paper packaging is widely used and is expected to be used even more in the future. Production is expected to grow in the future.
			Trajectory 2: 53	Trajectory 2: 563		Realistic scenario . Same reasons as in the optimistic scenario, only to a lesser extent. Production is expected to grow in the future.

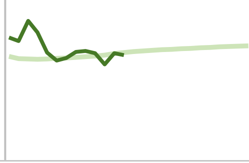
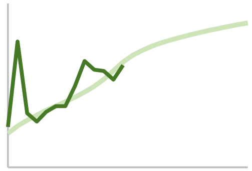
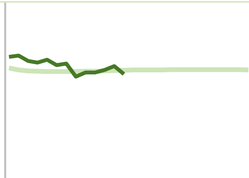
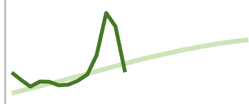
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
All plastics	02, 07, 12, 15, 16, 17	49	Forecast: 609	Forecast: 644		After a decline until 2012, growth will continue until 2017, when stagnation or slight growth will begin. More significant growth is expected in the future.
			Trajectory 1: 679	Trajectory 1: 76		Optimistic scenario. As with paper, the development of e-commerce and delivery services, where plastic packaging is often used, is leading to an increase in production. Furthermore, greater sorting of plastic waste and its transfer from mixed municipal waste to separate waste is expected. Significant growth in production is expected in the future.
			Trajectory 2: 65	Trajectory 2: 722		Realistic scenario ( ). Same reasons as in the optimistic scenario ( ), but to a lesser extent. Significant growth in production is expected in the future.
Separated plastic	15	2	Forecast: 259	Forecast: 277		A slight decline until 2012, followed by the start of stable growth, which is expected to continue.
			Trajectory 1: 3	Trajectory 1: 397		Optimistic scenario. As with paper, the development of e-commerce and delivery services, where plastic packaging is often used, is leading to an increase in production. Furthermore, greater sorting of plastic waste and its transfer from mixed municipal waste to separate waste is expected. Significant growth in production is expected in the future.
			Trajectory 2: 306	Trajectory 2: 356		Realistic scenario ( ). Same reasons as in the optimistic scenario ( ), but to a lesser extent. Significant growth in production is expected in the future.

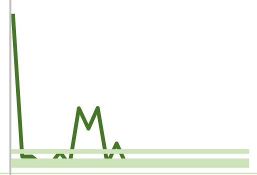
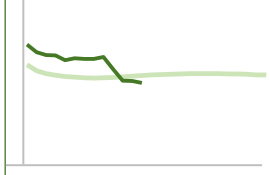
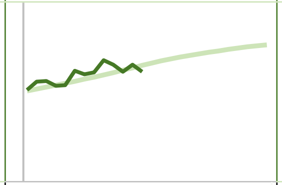
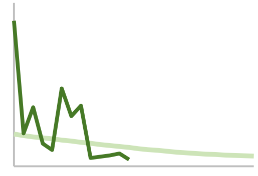
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
All glass	10, 15, 16, 17, 20	2	Forecast: 354	Forecast: 371		Significant decline until 2013, followed by slight growth with several fluctuations. The growth trend is expected to continue in the long term.
			Trajectory 1: 36	Trajectory 1: 38		Optimistic scenario. Glass is expected to be transferred from mixed municipal waste to separated waste thanks to prevention and greater sorting in households and businesses. The growth trend is expected to continue.
			Trajectory 2: 361	Trajectory 2: 382		Realistic scenario. Same reasons as in the optimistic scenario, but to a lesser extent. Production is expected to grow in the future.
Separated glass	15	1	Forecast: 211	Forecast: 227		Long-term stable growth, stagnation or slight decline since 2021. Growth is expected to continue in the future.
			Trajectory 1: 2	Trajectory 1: 24		Optimistic scenario. Glass is expected to be transferred from mixed municipal waste to separate waste thanks to prevention and greater sorting in households and businesses. Production is expected to grow in the future.
			Trajectory 2: 218	Trajectory 2: 238		Realistic scenario. Same reasons as in the optimistic scenario, but to a lesser extent. Production is expected to grow in the future.

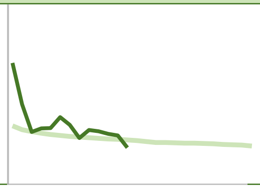
Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
All wood	02, 03, 15, 17, 20	2	Forecast: 397	Forecast: 425		A sharp decline until 2011, followed by significant growth, which turned into stagnation and then a slight decline in 2020. A sharp decline is expected in 2022. Wood production is expected to grow in the future.
			Trajectory 1: 50	Trajectory 1: 6		Optimistic scenario. Significant sorting of bulky waste will lead to a significant increase in wood production. A slowdown may occur due to efforts to market furniture designed according to circular and sustainable principles with a longer service life, but the effect is not expected until around 2035.
			Trajectory 2: 49	Trajectory 2: 591		Realistic scenario ( ). Same reasons as in the optimistic scenario ( ) , but to a lesser extent. Production is expected to grow in the future.
Separated wood	2	7	Forecast: 114	Forecast: 124		Long-term growth in production with slight fluctuations, and growth is also expected in the future.
			Trajectory 1: 2	Trajectory 1: 312		Optimistic scenario. Significant sorting of bulky waste will lead to a significant increase in production. A slowdown may occur due to efforts to market furniture designed according to circular and sustainable principles with a longer lifespan, but the effect is not expected until around 2035.
			Trajectory 2: 208	Trajectory 2: 290		Realistic scenario ( ). Same reasons as in the optimistic scenario ( ) , but to a lesser extent. Production is expected to grow in the future.

Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
All textile waste	04, 15, 20	5	Forecast: 86	Forecast: 90		Increase until 2016, then decline. Due to historical production, development is difficult to predict, but future growth is expected.
			Trajectory 1: 1	Trajectory 1: 15		Optimistic scenario. There is a significant increase in textile waste, mainly due to the obligation of municipalities to introduce separate collection of textile waste from 2025. The growth will also be driven by the sorting of bulky waste and the transfer of textile waste from mixed municipal waste.
			Trajectory 2: 1	Trajectory 2: 142		Realistic scenario . Same reasons as in the optimistic scenario, only to a lesser extent. Production is expected to grow in the future.
Separated textiles	20	3	Forecast: 52	Forecast: 56		Long-term stable growth with a decline only in 2021, probably due to the COVID-19 pandemic. Subsequently, growth is expected to continue in the future.
			Trajectory 1: 8	Trajectory 1: 11		Optimistic scenario. There is a significant increase in textile waste, mainly due to the obligation of municipalities to introduce separate collection of textile waste from 2025. The growth will also be driven by the sorting of bulky waste and the transfer of textile waste from mixed municipal waste.
			Trajectory 2: 8	Trajectory 2: 109		Realistic scenario ( ). Same reasons as in the optimistic scenario ( ) , but to a lesser extent. Production is expected to grow in the future.

Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Ferrous metals	02, 10, 12, 15, 16, 17	3	Forecast: 3,629	Forecast: 3,597		A sharp increase in 2011, followed by a significant decline until 2015, then fluctuating trends. A slight decline or stagnation is expected. Future developments will be determined by ferrous metal waste (steel scrap) from other sources (companies).
			Trajectory 1: 3,682	Trajectory 1: 3		Optimistic scenario. There will only be a slight increase in total iron waste due to greater sorting of metal waste in households and businesses and the sorting of bulky waste.
			Trajectory 2: 3,677	Trajectory 2: 3,674		Realistic scenario. Same reasons as in the optimistic scenario, but to a lesser extent.
Separated metals	15	4	Forecast: 388	Forecast: 391		Fluctuating production, with a sharp decline in 2015 and 2016, followed by growth and a sharp increase in 2021. A more constant development is expected in the future, but in any case, it is difficult to predict due to fluctuating production.
			Trajectory 1: 4	Trajectory 1: 47		Optimistic scenario. Expected increase due to greater sorting of metal waste in households and businesses and sorting of bulky waste. The growing popularity of aluminum packaging, e.g., in the food industry, may also contribute to growth.
			Trajectory 2: 43	Trajectory 2: 469		Realistic scenario ( ). Same reasons ( ) and assumptions ( ) as in the optimistic scenario, but to a lesser extent. Production is expected to grow in the future.

Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Non-ferrous metals	06, 10, 11, 12, 16, 17	22	248	25		Between 2012 and 2015, there was a significant decline, followed by stagnation in production. A slight increase in production is expected in the future.
Edible oil and fat	2	1	1	1		In 2011, there was a sharp increase, followed by a decline to previous levels and the start of growth. Production may be significantly higher given that some of the waste also ends up in sewers and proper waste management is implemented. An increase is expected due to the introduction and development of separate collection.
Sewage sludge	02, 03, 19	169	17	176		Long-term slight decline in production, which is likely to stabilize and stagnate in the future. The entire flow is mainly influenced by sludge 19 08 05 from municipal wastewater treatment, which has long-term constant production. Sludge from agriculture and the wood processing industry is declining.
Sludge from municipal wastewater treatment	1	1	1	16		Production has been constant for a long time, and this is expected to continue. There may be a minimal increase of a few percent due to the construction of wastewater treatment plants in smaller municipalities.
Asbestos waste	06, 10, 16, 17	3	5	5		Around 2017, there will be a very significant increase in production, peaking in 2022, followed by a sharp decline. The main flow is made up of group 17, so production trends will be determined by the number of demolitions of older buildings and structures whose construction materials contain asbestos.
Waste from health and veterinary care	1	4	5	6		Production has been growing steadily and follows the trend. The same development is expected in the future. Production consists mainly of subgroup 18 01 (waste from healthcare).

Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Waste oils	12, 13, 20	32	42	44		Production development is uneven. It grew rapidly from 2013 to 2016, then stagnated, and in 2020 there was a sharp decline. Long-term development is expected to be positive, but with the transition to electromobility, a gradual decline is expected.
PCB	13, 16, 17	0	0	0		Production is random. A sharp decline after 2010, a jump in 2017 and 2019, and a sharp decline in 2020. The forecast for the future shows very slight growth. However, it is more likely that the decline from 2020 and 2022 will continue and the future trend will change to a slight decline.
Industrial waste	03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13	2,513	2,793	2,756		The slightly declining trend was interrupted by a sharp drop in 2019 and 2020. Subsequently, the slight decline continued and is expected to continue. Groups 10 and 12 account for the largest share.
Construction and demolition waste	1	9	1	11		Production depends on construction and demolition work, so it's a bit up and down. But it's been growing over the long term. The planned selective demolition will have a tiny impact on production, mostly just moving waste into other waste categories. So production will grow as expected.
Mining waste	01	8	14	1		Production fluctuates significantly, mainly due to group 17 (mined waste rock and tailings), which accounts for the largest share and is linked to construction activities. Waste from processing has declined slightly, but is expected to stabilize at a constant level. Waste from mining is on a downward trend, but this may change abruptly with the opening of a new mining site. During the construction of infrastructure networks, such as the planned excavation of large tunnels, production will increase sharply.

Waste stream	Waste included in groups	2022 [thousand tons]	2030 [thousand tons]	2035 [thousand tons]	Development	Note on expected development
Agricultural waste	0	80	92	85		Long-term decline in production with slight fluctuations, sharp decline until 2012. Production is expected to continue declining in the future.

Source: Compiled on the basis of ISOH and Tiramiso

3 Binding part

The binding part takes into account the environmental policy of the Czech Republic, the Czech Republic's commitments to the EU, and the needs of the current waste and circular economy in the Czech Republic. The binding part represents the strategy for the development of waste and circular economy for the next period.

The binding part is based on the principle of compliance with the waste management hierarchy and support for higher levels of the waste management hierarchy.

In accordance with the Waste Act, the binding part presents an overview of the objectives of the Czech Republic's Waste Management Plan for priority waste streams, which are based on the vision of the Czech Republic's Waste Management Plan and priorities for the period 2025-2035 with a view to 2040.

The binding part of the Czech Republic's Waste Management Plan sets out targets and measures for waste prevention, as well as waste management targets and principles, measures to achieve them, including preferred waste treatment methods, and a set of indicators to assess the achievement of targets and monitor developments in waste management.

The binding part also deals with specific areas of waste management (cross-border transport of waste, reduction of the impact of certain selected plastic products, illegal waste disposal, and access to emergency response and contaminated sites).

The binding part of the Waste Management Plan of the Czech Republic is a binding document for the preparation of regional waste management plans and a basis for the preparation of spatial planning documentation.

3.1 Priorities and objectives of the Czech Republic's Waste Management Plan for 2025-2035

3.1.1 Vision of the Czech Republic's Waste Management Plan

"The Czech Republic prevents waste generation as much as possible and effectively recycles all the potential of the waste it produces."

3.1.2 Strategic objectives of the Czech Republic for the period 2025–2035

S1. Preventing waste generation and reducing specific waste production.

S2. Minimizing the adverse effects of waste generation and management on human health and the environment.

S3 Sustainable development of society and transition to a circular economy.

S4. Maximum use of waste as a substitute for primary resources.

3.1.3 Priorities of the Czech Republic's Waste Management Plan

Waste management should contribute significantly to the circular economy. In the coming years, the Czech Republic will focus on waste prevention, extending the life of products, minimizing waste, protecting critical raw materials, recycling and utilizing waste, and replacing primary raw materials with secondary ones. Part of natural resources will be replaced by materials from waste recycling, i.e., recyclates.

Basic principles of the approach to waste management

1. **Waste prevention**
2. **Waste as a resource**
3. **Polluter pays**
4. **Extended producer responsibility**
5. **Self-sufficiency**
6. **Proximity**
7. **Precautionary principle**
8. **Do Not Significantly Harm the Environment (DNSH)**

Waste prevention

P1 Preventing waste generation.

P2. Reuse and preparation for reuse. P3. Training,

education, and public awareness.

Production and impact on the environment and human health

P4. Eco-modulation.

P5 Reduction of hazardous properties of waste.

P6 Restricting the entry of materials containing persistent organic pollutants into recycling.

P7 Reducing the amount of food waste. P8.

Applying life cycle assessment (LCA).

P9. Reducing greenhouse gas emissions in the waste management sector.

Separate waste collection

P10. Intensifying and optimizing the separate collection of recyclable and recoverable municipal waste—paper, plastic, glass, metals, edible oils, biological waste, textiles, and wood—in municipalities.

P11. Separate collection of recyclable and recoverable waste from legal entities and natural persons engaged in business activities.

P12. Development of EPR systems, extension of producer responsibility to other commodities with clearly defined targets, transfer of costs from citizens to consumers. Extension of deposit systems to support the achievement of separate collection targets.

P13. Restricting exports of waste containing critical and strategic raw materials. P14.

Restricting imports of waste to processing facilities.

Waste management

P15. Promote and support high-quality recycling.

P16. Clarify the point at which waste ceases to be waste.

P17. Clarify upcycling and downcycling for selected waste streams.

P18. Support research, development, and innovation in waste management.

P19. Prohibit the landfilling of recyclable and recoverable waste in the Czech Republic. P20. Energy recovery from non-recyclable residual waste.

P21. Optimisation and streamlining of biological waste management, biodegradable municipal waste.

P22. Increasing the use of kitchen bio-waste from households and catering waste from restaurants.

P23. Support for capacity building for anaerobic digestion – biogas plants. P24. Support for capacity building for preparation for reuse.

P25. Support for environmentally friendly waste transport.

P26. Support the creation of sufficient processing capacity to meet the targets.

P27. Support for innovative technologies, e.g. in the bioeconomy, hydrogen production, and chemical recycling, especially for problematic types of plastics.

Use of waste in the economy

P28. Reuse and preparation for reuse of end-of-life products. P29. Replacement of primary raw materials with waste (secondary raw materials).

P30. Maximum utilization of suitable waste in the Czech economy, especially in connection with industrial segments in the regions (agriculture, energy, construction).

P31. Strengthening demand for recycled materials by promoting criteria for the use of recycled products in public procurement.

P32. Ensuring the long-term stability and sustainability of waste management in the Czech Republic.

P33. Address the optimal setting of municipal waste targets for municipalities, taking into account the size of municipalities and the production of mixed municipal waste.

Economic and financial instruments

P34. Promote the application of economic instruments to regulate the development of waste management (landfill fees, energy recovery/incineration fees, non-recycling fees, PAYT, possibly taking into account the municipality's waste management costs, etc.).

P35. Analyze the possibilities and consider introducing a tax on primary raw materials.

P36. Analyze options and consider introducing a reduced value added tax rate on products with recycled content.

P37. Promote rapid access to sources of financing, particularly for innovative technologies, and support the application of financial instruments such as incentives, loans, financial guarantees, and loans.

P38. Subsidy support for associations of municipalities at the regional level. Responsibility of regions for the distribution of subsidies within their territory.

P39. Involvement of regions in waste management and investment planning. Preparation of regional investment plans.

Enforceability

P40. Setting penalties for non-compliance with legal obligations and, in the event of failure to meet the targets set for the municipal level, considering the possibility of setting penalties based on the amount of municipal waste produced per capita.

3.1.4 Objectives of the POH CR

n overview of the strategic, main and sub-objectives for individual waste streams is available in the tables (Table 98 and Table 99) in the appendix. The objectives for individual streams, together with the principles and measures, are set out in the following chapters on individual waste streams.

3.2 General principles and measures for waste management

Principles:

Z1 Ensure information support for the fulfillment of the strategic objectives of the Czech

Republic's waste policy. Z2. Prevent waste generation in all activities.

Z3 When handling waste, it is mandatory to apply the waste management hierarchy, i.e. to handle waste in the following order:

1. waste prevention,
2. preparation for reuse and reuse,
3. recycling,
4. other use (e.g., energy recovery)
5. disposal (safe disposal).

Z4. When applying the waste management hierarchy, promote options that offer the best overall environmental outcome. Consider the entire life cycle of products and materials and focus on reducing the environmental impact of waste management.

Z5. When applying the waste management hierarchy, reflect the precautionary principle and prevent adverse effects of waste management on human health and the environment.

Z6. When applying the waste management hierarchy, take into account the principles of proximity, self-sufficiency, sustainability, including technical feasibility and economic sustainability.

Z7. Based on the polluter pays principle, develop extended producer responsibility.

Z8. When applying the waste management hierarchy, ensure the protection of raw material resources, the environment, and human health, taking into account economic and social impacts.

Z9. For specific waste streams, deviations from the established waste management hierarchy may be permitted if justified by the overall life cycle impacts of the waste and its treatment.

Z10. Promote waste management practices that use waste as a source of raw materials and contribute to the substitution of primary natural resources.

Z11. Promote waste management that leads to increased economic usability of waste. Z12. Promote direct

reuse, preparation for reuse, and recycling of waste.

Z13. Do not support the landfilling or incineration of recyclable waste.

Z14. Prohibit the landfilling of waste suitable for recycling or other recovery.

Z15. Tighten criteria for assessing waste as recyclable or recoverable, taking into account the state of scientific and technical progress.

Z16. Ensure the creation of sufficient capacity for waste treatment, recycling, and recovery facilities.

Z17. Individual methods of waste management within the Czech Republic must form a comprehensive whole that guarantees the lowest possible negative impact on the environment and a high level of protection for human health.

Measures:

O1. Support activities in the field of waste prevention.

O2. Consistently monitor compliance with the waste management hierarchy.

O3. Use tools that have a positive impact on reducing waste production and promote preferred waste management practices. O4. Introduce measures to eliminate "free riders" in waste management systems.

O5. Support reuse and repair centers, sharing services, etc. O6. Support low-waste innovative production technologies.

O7 Support the separate collection of recyclable and recoverable waste, especially municipal waste, and its subsequent recycling and recovery.

O8. Build and modernize the network of waste management facilities.

O9. Support high-quality waste sorting and re-sorting and new waste treatment technologies, including modern optical sorting lines.

O10 Support the development of sufficient waste recycling capacities.

O11. Support the construction of modern innovative technologies for waste recycling. O12. Support the modernization of existing waste management facilities.

O13. Support the development of infrastructure separate biological biological waste and construction of biogas plants for the production of biogas, biomethane and other products.

O14. Use non-recyclable components of municipal waste for energy.

O15. Support the expansion of capacity to increase the share of co-incinerated waste in suitable and designated facilities.

O16. Support capacity building for the safe energy recovery and incineration of waste from health and veterinary care (including hazardous waste) and other hazardous waste.

O17. Support the transport of waste by rail.

O18. Prevent the dilution or mixing of waste in order to meet the criteria for acceptance at landfills and backfilling.

O19. Ensure sufficient capacity for facilities for the management of waste from natural disasters and emergency situations.

O20. Support emerging techniques, as identified in particular in the reference documents on best available techniques (BREFs).

O21. Support the use of secondary raw materials from waste in production processes.

O22. Optimize production processes, innovation, new technologies, and the development of new materials to reduce material intensity.

O23. Focus on product development and eco-design.

O24. At the national level, define criteria that must be met for a specific substance or object to be considered a by-product rather than waste.

O25. Establish criteria at national level for when waste ceases to be waste.

O26. Support research, experimental development, and innovation in processing and recycling technologies.

O27. Support the introduction of certified environmental management systems.

O28. Promote consumer and industry interest in recycled products, promote product and service certification (environmental claims, eco-labelling).

O29. Focus on education, information support, environmental education and awareness. Conduct information campaigns for residents on the proper handling of municipal waste.

O30. Support responsible green public procurement to ensure demand for recycled products.

O31. As self-governing entities, regions will draw up regional investment action plans for waste management development, which will be followed by a subsidy policy tailored to the needs of the region concerned.

O32. Introduce subsidy support in the field of waste management for associations of municipalities at the regional level.

O33. Introduce penalties for municipalities in the area of meeting sorting targets linked to the specific production of municipal waste per capita.

O34. Create public support strategies for the construction of new facilities.

O35. Introduce a fee for energy recovery/incineration of waste if the capacity of waste-to-energy facilities and the amount of waste used for energy recovery exceed the levels set by the Waste Act.

3.3 Waste prevention program

3.3.1 Waste prevention objectives and measures

The objectives of the Czech Waste Prevention Program are based on Directive 2008/98/EC of the European Parliament and of the Council on waste, an analysis of existing measures, and waste streams. The objectives also take into account strategic documents of the EU and the Czech Republic.

Measures must be implemented to achieve the above objectives. The proposed measures for the Czech Republic's Waste Prevention Program are based primarily on the measures in Annexes IV and IVa of Directive 98/2008 on waste.

PPVO

Main objective:

a) To prevent waste generation as much as possible, reduce waste production and consumption of primary resources.

Sub-objectives:

a) Ensure comprehensive information support on waste prevention issues.

b) Promote sustainable production and consumption models (durability, reparability, and reusability of products) and increase the amount of reused and repaired products (especially products containing critical raw materials).

c) Create conditions for reducing raw material and energy resources in manufacturing industries and maximise the use of "secondary raw materials" and input-saving technologies.

d) Stabilize and subsequently reduce the production of waste from packaging and single-use plastic products and packaging.

e) Stabilize the production of hazardous waste, construction and demolition waste, and reduce the content of hazardous substances in materials and products without affecting harmonized legal requirements for these materials and products. Increase the share of reused construction products and materials.

f) Stabilize the production of end-of-life products and increase the promotion of waste prevention in the activities and operations of collective systems and take-back systems.

g) Strengthen the active role of research, experimental development, and innovation in supporting waste prevention.

h) Minimize the occurrence of waste (especially single-use plastics) in the environment and thus reduce the negative impact of waste management on the environment and human health.

i) Continuously increase the share of reused textile products and footwear, furniture, electrical equipment, tires, and other products (especially from households).

Measures:

a) Support the implementation of information campaigns and to raise public and business awareness of waste prevention.

b) Develop and promote a communication strategy to reduce waste generation, especially for residents. Update educational materials and incorporate them into education and training.

c) Support the provision of all information necessary for informed product choices (e.g., origin, environmental impact, repairability, availability of spare parts, service life, recyclability, etc.), including through the introduction of digital product passports.

d) Promote the reuse and repair of products through the development of a network of repair services, shared workshops, and other related projects.

e) Support online platforms for sharing things, libraries of things, and other related projects.

f) Support packaging-free sales and other business models, and the sharing of goods that aim to prevent waste generation.

g) Provide information on waste prevention techniques to facilitate the use of best available techniques in industry.

h) Use planning measures and economic instruments to promote resource efficiency.

i) Support research and development in the field of cleaner products and technologies associated with waste minimization and the dissemination and use of the results of this research.

j) Support business activities leading to waste prevention in production and distribution.

k) Include environmental and waste prevention criteria in public procurement.

l) Support municipalities in introducing systems whereby citizens pay for municipal waste based on the actual amount of waste produced, which encourage the sorting of recyclable waste at source and lead to a reduction in the generation of mixed municipal waste.

m) Introduce reduced/zero VAT on donations of unsold products.

n) Consider, where appropriate, the introduction of take-back systems and other measures to promote the effective collection of used products and materials, including support for voluntary take-back systems for selected products.

o) Provide financial and methodological support for the establishment and operation of reuse centers and furniture banks.

p) Introduce mandatory consumer payments for parts or elements of packaging that would otherwise be provided free of charge.

q) Reduce waste from single-use products and non-plastic packaging.

r) Support the use of pre-demolition audits and digital building passports when preparing for the demolition of buildings or parts thereof.

s) Support the use of alternative building materials (e.g., recycled concrete, wood materials, and others) and building elements that can be reused after removal from the building.

t) Analyze the possibilities of preparing standards for construction products and materials intended for reuse in construction.

u) Ensure that national standards comply with the eco-design requirements laid down in legislation and support small and medium-sized enterprises (SMEs) in applying eco-design requirements.

v) Use voluntary agreements in the field of waste prevention and single-use products or packaging.

w) Support credible eco-labels in cooperation with producers and distributors and ensure their active use.

x) Support and provide information on environmental management systems (EMAS and ISO 14001 standards).

y) Evaluate the effectiveness of existing extended producer responsibility schemes and consider extending them to other types of products and waste.

z) Identify products that are major sources of environmental pollution, including plastic waste in aquatic ecosystems, and take appropriate measures to minimize them and prevent and reduce environmental pollution.

aa) Organize training at the level of the relevant public authorities, focusing on the integration of waste prevention requirements, including environmentally responsible public procurement.

bb) Coordinate the relevant public authorities involved in waste management, including waste prevention.

Other activities in the field of waste prevention

a) Mandatory deposits on PET beverage bottles and aluminum beverage cans

In 2022, a draft European Commission Regulation was presented, which focuses on reducing the amount of packaging waste. The draft was and is being discussed in 2023-2024.

b) Introduction of separate collection of waste textiles from 2025

It can be assumed that the activities currently being implemented in the area of textile waste prevention (charity, swaps, bazaars) will continue in the future. In addition, from January 1, 2025, municipalities will be required to ensure the separate collection of textile waste from citizens.

c) Eco-design and digital product passport

In 2022, the European Commission proposed a new regulation on ecodesign. The regulation will enable the EC (in cooperation with an expert group on ecodesign) to formulate ecodesign requirements for products in the following areas:

- durability, reliability, reusability, upgradeability, and repairability of the product,
- possibility of maintenance and modernization of the product,
- presence of substances of concern,
- energy, water, and material efficiency,
- use of resources, materials and related efficiency,
- recycled content,
- possibility of refurbishment, possibility of recycling and reuse of materials,

- carbon and environmental footprint,
- contribution to climate change and water/air/soil pollution,
- expected waste production.

Performance requirements of a quantitative or qualitative nature will be defined in these areas.

Some products should be equipped with a so-called digital passport. The digital passport of products should contain:

information on the installation, use, maintenance, and repairability of the product, together with information on how to dispose of the product at the end of its life cycle.

information for waste treatment facilities – method of decomposition, reuse, recycling, disposal at the end of the life cycle.

The regulation also prohibits the destruction of unsold textile products (especially clothing) and footwear, and a ban on the destruction of other product groups (e.g., electronic equipment) is expected in the future, which will also have an impact on waste prevention for selected product groups.

d) Right to repair

The 2023 Directive proposals name product groups that will be subject to repair requirements. These include washing machines, dishwashers, dryers, refrigerators, vacuum cleaners, mobile phones, and electronic displays. The right to repair will also apply to situations where the warranty for the product has expired. Consumers will thus be able to request a free European Repair Information Form from any repair shop, which will include the price and expected repair time. Following the adoption of the directive, the Commission will create a single online platform that will include an overview of repairs and the possibility to search for repair shops by product type (European Council, 2023b).

e) Extension of restrictions on waste from single-use products to non-plastic products.

In the future, pressure to reduce waste from single-use products is expected to extend to non-plastic products, while pressure to reuse selected products will increase, including the setting of quantitative targets. A similar trend has been observed in the area of single-use packaging.

3.4 Food waste prevention program

3.4.1 Objectives and measures in the area of food waste prevention

PPVPO

Objectives

a) Prevent food waste and reduce its production in primary production, processing, distribution, and consumption.

b) By the end of 2030, reduce food waste generation in processing and manufacturing by 10% compared to 2020 levels.

c) By the end of 2030, reduce food waste per capita in retail and other food distribution channels, restaurants and catering services, and households by 30% compared to 2020 levels.

Measures:

a) Support the implementation of information campaigns to raise public and business awareness of food waste prevention.

b) Develop and promote a communication strategy to reduce food waste, especially among the general public. Update educational materials on food waste prevention and incorporate them into education and training.

c) Provide financial support for business activities aimed at preventing food waste in primary production, manufacturing, processing, and distribution.

d) Apply tax and other incentives for the donation of food products by producers and ensure infrastructure for the collection and storage of food.

e) Support regional and local authorities in preventing food waste.

f) Continue to support the activities of food banks so that food that is suitable for human consumption is donated to the greatest extent possible.

g) Assess the potential and consider allowing food donations from school canteens and other catering facilities.

h) Allow food unfit for human consumption to be used as animal feed or processed into non-food products.

i) Revise food labeling (minimum durability date or use-by date) in line with legislative changes at EU level.

j) Analyze and prepare a study specifying the types of food waste (especially with regard to edible and inedible parts) and household behavior in food handling.

k) Use voluntary agreements in the area of food waste prevention.

l) Coordinate relevant actors involved in food waste prevention and food waste management.

m) Support research and development of new technologies and practices for food waste prevention at all stages of the food chain. Identify gaps and propose appropriate solutions.

3.5 Objectives, principles, and measures for individual waste streams

3.5.1 Municipal waste

Objectives:

a) Increase the level of preparation for reuse and recycling of municipal waste to at least 55% in 2025, 60% in 2030, and 65% in 2035, of the total amount of municipal waste generated.

b) By 2035, reduce the amount of municipal waste landfilled to 10% (by weight) or less of the total amount of municipal waste generated.

Principles:

a) Support the development of preventive activities to prevent and reduce the generation of municipal waste.

b) Ensure that municipal waste is diverted from landfills.

c) Maintain, support, develop or, where appropriate, introduce separate collection of recyclable and recoverable components of municipal waste – separate collection of commodities (paper, plastic, glass, metals, beverage cartons, biological waste, textiles, wood, and others) with regard to the targets set for individual materials and with regard to the higher quality of the waste collected in this way.

d) Maintain and develop the availability and user-friendliness of separate collection (sorted collection) of recyclable and recoverable components of municipal waste in municipalities.

e) The system for the separate collection of municipal waste components shall be established by the municipality in its own competence by a generally binding municipal ordinance or by other means.

f) Encourage municipalities to determine the scope and method of separate collection of municipal waste components in the municipality, taking into account technical, environmental, economic, and regional possibilities and technological possibilities for further waste treatment, while complying with legislative requirements and meeting targets.

g) Expand separate collection of all biological waste in municipalities (including biological waste of animal origin).

h) Consistently adhere to the waste management hierarchy in the handling of municipal waste, in particular by preventing and reducing its quantity and, where possible, sending municipal waste for recycling as a priority, then for other uses, and only if the waste cannot be used, send it for disposal.

i) Deviations from the waste management hierarchy are only possible in exceptional circumstances, in serious justified cases, in accordance with applicable legislation, and provided that this does not endanger or harm the environment or human health, and after consultation with the Ministry of the Environment.

j) Prioritize environmentally beneficial, economically and socially acceptable technologies for municipal waste treatment.

k) Maintain and develop participation and cooperation with packaging producers and other product manufacturers in accordance with the "polluter pays" and "extended producer responsibility" principles to ensure the separate collection or take-back and recovery of the relevant components of municipal waste.

l) Support mechanical treatment of mixed municipal waste by mechanical sorting as a possible waste treatment technology prior to further material and energy recovery or disposal, while fully complying with the requirements for separate collection of recoverable components of municipal waste at source.

m) Support the sorting and treatment of bulky waste collected through municipal systems for the purpose of recycling and further use of all recoverable components.

n) Improve systems for the separate collection of recyclable and recoverable components of municipal waste in municipalities and from legal entities and natural persons engaged in business, and involve legal entities and natural persons engaged in business with municipal waste in municipal waste management systems.

o) Prevent the disposal of municipal waste components outside designated areas (creation of illegal dumps).

p) Support the application and use of recycled materials – outputs from municipal waste recycling facilities.

q) Consider and propose measures to make recycled materials a viable alternative to primary materials.

r) Wide application of green public procurement – giving preference to recycled products in so-called "green" tenders.

s) Use of economic instruments – give preference to economic instruments so that the municipal waste management sector can adapt to the new conditions.

Measures:

a) Actively support the development of reuse centers, repair services, workshops, and other activities aimed at preventing municipal waste generation.

b) Consistently monitor municipalities and other municipal waste producers to ensure that they have separate collection (sorted collection) of recyclable and recoverable municipal waste components, at least for paper, plastics, glass, metals, biological waste, and textiles.

c) Intensify and optimize the separate collection of recyclable and recoverable municipal waste in municipalities, primarily by densifying and optimizing the collection network and raising public awareness. Focus on the quality of sorted recoverable municipal waste.

d) Support municipalities in expanding the separate collection of municipal waste components to include other components beyond the legal requirements, such as wood and ash from domestic heating.

e) Continuously tighten the criteria for assessing waste as recyclable or recoverable, which will be banned from landfills from 2030, especially in the case of municipal waste, taking into account the state of scientific and technical progress.

f) Consistently monitor compliance with the hierarchy of waste management in municipal waste management.

g) Municipalities should continuously evaluate municipal municipal waste management systems and their capacity and propose measures to improve and streamline them.

h) Classify sorted waste containing packaging components obtained through separate collection (sorted collection) of recyclable components of municipal waste in municipalities as municipal waste, i.e. group 20 of the Waste Catalogue.

i) Improve the traceability of municipal waste flows by significantly eliminating the practice of waiving separate collection of waste at the source.

j) Integrate, communicate and require proper waste management for all residents and involve them in the prevention and collection of recyclable and recoverable components of municipal waste.

k) At the municipal level, inform citizens and other entities involved in the municipal municipal waste management system throughout the year about the methods and scope of separate collection of municipal waste, the use and disposal of municipal waste, and the management of other waste within the municipal system. on the possibilities of preventing and minimizing the generation of municipal waste, and publish the quantified results of municipal waste management at least once a year.

l) Keep legal entities and natural persons engaged in business activities involved in the municipal waste management system informed about the methods and scope of separate collection of municipal waste components and their management.

m) Inform legal entities and natural persons engaged in business activities about their obligation to separately collect recyclable and recoverable components of municipal waste.

n) Continuously evaluate the municipal waste management system at the municipal and regional levels.

o) Support innovation, digitization, and smart solutions in municipal waste management and other waste producers in the handling of municipal waste, e.g., dynamic weighing, smart collection systems.

p) Support innovative technologies and digitization in the collection, sorting, mechanical sorting, and final treatment of municipal waste.

q) Support the establishment of municipal waste management systems based on the "Pay as you throw" (PAYT) and related municipal waste charges in the form of a fee for the disposal of municipal waste from immovable property. Support municipalities in building infrastructure and technologies for the introduction, expansion, and operation of these systems.

r) Ensure targeted education of the general public on municipal waste prevention, environmental benefits, and cost savings associated with municipal waste management through appropriate information campaigns.

s) Focus specifically on education and continuous training on the proper management of municipal waste and its benefits, starting in kindergartens and primary schools and continuing in other facilities caring for school-age children.

t) Consistently monitor and punish inappropriate and illegal municipal waste management.

u) Support the construction of regional facilities and waste centers for municipal waste management and appropriate treatment in order to meet targets, reduce waste transport costs, and mitigate environmental impacts. Focus also on efficient transport to these centers.

v) Support the construction of infrastructure for the efficient transport of municipal waste to more distant treatment facilities, taking into account the environmental, safety, and economic impacts.

w) Support the construction of a stable, safe, and long-term network of key facilities for municipal waste management, especially for the most significant waste streams by weight (mixed municipal waste, bulky waste, sorted recyclable municipal waste).

x) Support the development of highly efficient technologies for the mechanical sorting of municipal waste to ensure its subsequent recycling and further use.

y) Consider introducing EPR systems for other products/wastes that meet the definition of municipal waste.

3.5.1.1 Mixed municipal waste

Objectives:

a) Reduce the production of mixed municipal waste per capita.

b) Mixed municipal waste (after sorting out recyclable and recoverable components, hazardous components, and biological waste) should be used primarily for energy recovery.

Principles:

a) Prevent waste generation to reduce mixed municipal waste production (education, awareness raising, home composting, prevention of food waste and textile waste).

b) Expand separate collection, including take-back, of other usable components of municipal waste.

c) Significantly reduce the landfilling of mixed municipal waste.

d) Create conditions for the direct use or use of treated residual mixed municipal waste in thermal and thermochemical technologies.

Measures:

a) Support the reduction of mixed municipal waste production through intensive separate collection of recyclable and recoverable components of municipal waste, both at the municipal level and among other waste producers.

b) Develop infrastructure for the separate collection of recoverable components of municipal waste and bring the collection network closer to citizens, including intensifying the separate collection of recoverable components of municipal waste (paper, plastic, glass, metal, beverage cartons, biological waste, textile waste, wood) and other waste such as small construction waste.

c) Gradually reduce the frequency of mixed municipal waste collection in connection with the development of infrastructure for the separate collection of recyclable municipal waste.

d) Support the development of SMART and PAYT systems and the application of the "pay as you throw" principle.

e) Support municipalities in introducing municipal waste charges based on the amount of mixed municipal waste disposed of, thereby increasing citizens' motivation to reduce the production of mixed municipal waste.

f) Support municipalities in introducing the separation of ash from domestic heating systems in order to reduce the amount of mixed municipal waste and the disposal of ash as technological waste in landfills.

g) Support the gradual reduction of the frequency of mixed municipal waste collection in connection with infrastructure development.

h) Enable small businesses as municipal waste producers to participate in municipal systems.

i) Monitor the handling of municipal waste at source, including thorough checks for the presence of recoverable components in mixed municipal waste from citizens and other waste producers.

j) Take corrective measures in municipalities that are unable to achieve the targets for the separate collection of recyclable components of municipal waste.

k) Consider adjusting the partial fee for landfilling recoverable municipal waste so that it significantly discourages the landfilling of waste types that will be banned from landfills from 2030, including mixed municipal waste.

l) Support the treatment of mixed municipal waste prior to its energy recovery or disposal in order to recover recyclable and recoverable components, thereby diverting them from landfill.

m) Allow the landfilling of untreated mixed municipal waste only if it has been stripped of all recoverable waste, including bio-waste, and meets the calorific value requirements and other legislative requirements.

n) Enable and support the mechanical sorting of recyclable and recoverable waste from mixed municipal waste in order to increase its recycling rate.

o) Support the development of adequate infrastructure necessary to ensure and increase the thermal utilization of non-recyclable residual waste from mixed municipal waste, without prior treatment or after treatment using specific technologies.

p) Continuously evaluate the mixed municipal waste management system at the regional level.

q) Support the association of municipalities into associations and the operation of their own collection companies.

r) Reduce the hazardous properties of mixed municipal waste through consistent sorting of hazardous waste and intensification of the collection of hazardous municipal waste by municipalities.

s) Monitor the composition of mixed municipal waste at the national level.

t) Educate citizens on the prevention of mixed municipal waste and the sorting of recyclable and recoverable components of municipal waste, emphasizing the benefits, usefulness of sorting, and reduction of residual mixed waste.

u) Inform residents about the proper handling of small construction and demolition waste and other types of waste that do not fall under municipal waste to ensure that they are diverted from mixed municipal waste.

3.5.2 Biodegradable waste

Objectives

a) Reduce the amount of biodegradable municipal waste sent to landfills (from 2021 onwards).

b) Increase the use of compost and digestate on agricultural land.

c) Increase the separation of biological waste, especially kitchen waste from households.

d) Increase the use of biological waste through composting and anaerobic digestion.

Principles:

a) Apply the principles of bioeconomy and make maximum use of biodegradable waste and products from its processing.

b) Divert biological waste from mixed municipal waste and landfills.

c) Increase the separation of biological waste as a usable component of municipal waste and meet municipal waste sorting targets.

d) Support, expand, and intensify the system of separate collection of biological waste (of plant and animal origin) in municipalities and among legal entities and individuals doing business throughout the Czech Republic.

e) Gradually expand the separate collection of biological waste of animal origin in municipalities in line with the available treatment facilities.

f) Build infrastructure, including municipal infrastructure and a network of facilities necessary to ensure the use of biodegradable waste.

g) Focus on the quality of outputs from facilities processing biodegradable waste, set quality requirements for outputs, and minimize the production of poor-quality outputs.

h) Prevent the concentration of harmful substances in organic products during the processing of biodegradable waste into organic products.

i) Use biodegradable waste as a source of organic matter and renewable energy.

j) Process waste from agricultural activities using aerobic composting, anaerobic digestion, and fermentation technologies.

Measures:

a) Optimize separate collection of bio-waste in municipalities.

b) Develop and intensify separate collection of biological waste in municipalities, increase the separation of plant and animal bio-waste.

c) Introduce economically sustainable, accessible, and convenient separate collection of kitchen bio-waste from households in municipalities for all residents.

d) Introduce joint collection of plant-based bio-waste from gardens and kitchen bio-waste from households, provided that composting plants with the necessary validated technologies for joint processing are available.

e) Develop and gradually expand the collection of kitchen waste from households and catering waste from catering establishments in connection with the development of a network of accessible biogas plants.

f) Subsidy support for the separate collection of kitchen waste from households in municipalities and its processing.

g) Support for infrastructure development, support for ensuring sufficient containers for the collection of biological waste, suitable collection techniques, and washing techniques for larger collection containers.

h) Fulfill the obligations of citizens and producers involved in the municipal system to properly separate biological waste and transfer it for use in accordance with the system established by the municipality.

i) Regularly evaluate the municipal system for separate collection of biological waste and the management of biological waste in relation to its management in the region at the municipal level, and adjust the system based on the results to achieve the highest possible sorting and subsequent recovery.

j) Support and expand domestic and community composting as a means of preventing waste generation.

k) Support the treatment of biodegradable waste using aerobic composting and anaerobic digestion technologies.

l) Process biowaste into high-quality organic fertilizers (compost, digestate, fugate) and energy (biogas, biomethane, and bioCNG).

m) Make maximum use of food waste from food unsuitable for consumption in biogas plants.

n) Build a network of bio-waste treatment facilities, develop and increase the number of biogas plants capable of treating kitchen waste and food waste.

o) Equip biogas plants with technologies that enable them to receive and process expired food in packaging.

p) Subsidy investment support for the construction of new biogas plants for the processing of biowaste, in particular kitchen biowaste from municipalities and catering waste from catering establishments.

q) Subsidy support for the modernization and equipping of agricultural biogas plants and the construction of upstream facilities for the appropriate treatment and sanitization of biowaste.

r) Modernize existing composting plants with a capacity of over 150 tons of biodegradable waste per year as a basic network of facilities for the processing of plant-based biowaste and also for the processing of sludge from wastewater treatment plants.

s) Support the even distribution of facilities for the processing of biodegradable waste throughout the Czech Republic.

t) Continuously evaluate the production of bio-waste and the network of facilities for its management, and appropriately locate new bio-waste treatment facilities in the regions.

u) Use compost as a substitute for mineral fertilizers in agriculture and improve soil quality by applying organic carbon from bio-waste.

v) Improve the quality of compost, ensure and guarantee its high quality, and promote its certification according to ISO standards.

w) Support demand from farmers for high-quality compost, digestate, and fugate as substitutes for mineral fertilizers.

x) Support the continuous sale of high-quality compost and consider introducing systemic operational support for compost application.

y) Consistently check the quantity and quality of individual inputs of biodegradable waste and other organic materials (digestate, fugate, compost, or fertilizer substrates, etc.) applied to agricultural land and soil.

z) Production of renewable energy sources – fuel from compost unsuitable for use in agriculture.

aa) Support the development of technologies for obtaining biomethane, bioCNG, and connection to the distribution network in biogas stations for the processing of biowaste.

bb) Support demand for renewable fuels produced from biowaste (dried biomass from compost of unsuitable quality, biomethane, bioCNG).

cc) Communicate with the Ministry of Agriculture to allow the application of compost from municipal community composting on municipal land.

dd) Communicate with the Ministry of Agriculture on the possibility of amending agricultural legislation to include organic fertilizers from biowaste (compost, digestate, fugate) in soil protection measures.

ee) Examine the possibilities for recognising and proving home composting and consider the risks of increasing municipal waste production. Communicate the outlook for the introduction of mandatory waste prevention targets.

ff) Intensive educational activities, awareness-raising and information campaigns to promote separate collection of biological waste and the creation of a "Communication Strategy" in municipalities. Regularly inform citizens and other participants in the municipal waste management system about the methods and scope of separate collection of biological waste, its treatment, and benefits.

gg) Introduction of bonuses within the framework of investment subsidies for the creation of a "Communication Strategy" to involve residents in the separate collection of bio-waste.

hh) Education and awareness-raising by the Ministry of Agriculture towards farmers on the benefits of fertilizers made from biowaste and building trust in the quality of compost, digestate, and fugate.

ii) Communication between investors and municipalities with the public and overcoming the NIMBY effect when planning the construction of waste biogas plants and composting plants.

jj) Education and awareness-raising by the State Veterinary Administration and the Ministry of Agriculture to meet the requirements for the hygienisation of biowaste (animal by-products).

3.5.2.1 By-products products of origin and biological waste from kitchens and catering facilities

Objectives:

a) To reduce the amount of biological waste from kitchens and catering facilities and animal by-products in mixed municipal waste originating from households, public catering facilities (restaurants, snack bars) and central kitchens (hospitals, schools, and other similar facilities).

b) Increase the separation and proper treatment of biological waste from kitchens and catering facilities and animal by-products, thereby reducing the negative effects of their treatment on human health and the environment.

c) Increase the use of biological waste from kitchens and catering facilities and animal by-products through anaerobic digestion.

3.5.3 Food waste

Objectives:

a) Prevent food waste and reduce its production in primary production, processing, distribution, and consumption.

b) By the end of 2030, reduce food waste generation in processing and manufacturing by 10% compared to 2020 levels.

c) By 2030, reduce per capita food waste generation in retail and other distribution channels, restaurants and catering services, and households by 30% compared to 2020 levels.

Principles:

a) Prevent food waste at all stages of the food chain.

b) Continue to build a motivational environment to encourage food donations from producers.

c) Support food donation and redistribution systems for human consumption.

d) Support activities to reduce food waste at all stages of the food chain, especially in households.

e) Educational activities, education, and awareness-raising on responsible and sustainable food management, especially in households.

f) Separate food waste and recycle it for material and energy recovery.

Measures:

a) Educate and raise awareness among consumers about food waste, prevent food waste and focus on changing traditional consumption patterns (produce-consume-dispose).

b) Raising awareness about food consumption dates and minimum shelf life.

c) Educating consumers and schoolchildren about food shelf life and proper storage.

d) Educating retail chains on logistics, food handling, and preventing food waste.

e) Developing an analysis of other options for preventing food waste at all stages of the food chain.

f) Ensuring supervision of the fulfillment of the obligation to donate food to food banks.

g) Developing food banks, strengthening their logistical capacities, and supporting their efficient operation and functioning.

h) Support (both technically and legislatively) the safe use of food as animal feed in compliance with Regulation (EC) No. 1069/2009 of the European Parliament and of the Council on animal by-products, if further redistribution of food for human consumption is not possible.

i) Transfer food waste from mixed municipal waste to separately collected biowaste.

j) Develop an analysis to determine the content of food waste that is not intended for human consumption and cannot be prevented at all stages of the food chain.

k) Update the Czech methodology for measuring food waste in line with any changes to the EU methodology for measuring food waste in relation to data on food waste that is not intended for human consumption and cannot be prevented.

l) Support technologies leading to the improvement and extension of food shelf life.

m) Focus on food production and optimal packaging sizes to take into account the different needs of households and thus reduce food waste.

n) Optimize legislative requirements for catering facilities and food use in order to reduce food waste.

o) Consistently monitor the handling of food waste from catering establishments and animal by-products.

p) If food waste is generated, use it for composting or anaerobic digestion.

q) Focus on the development, expansion, and intensification of separate food waste collection (kitchen waste from households and food waste from restaurants and canteens) and its connection to utilization in biogas plants.

r) Development of a network of biogas plants for bio-waste. Support the construction and modernization of biogas plant technologies so that they are capable of accepting food waste (kitchen waste and catering waste), including expired food waste, possibly even in packaging.

s) Retrofit biogas plants with technologies to ensure sanitation.

t) Create conditions for the development of other technologies for food waste processing.

u) Support research, experimental development, and innovation programs in the field of food production and food waste prevention.

3.5.4 Bulky waste

Principles:

a) Reduce the production of bulky waste by extending the life of products that would otherwise become bulky waste and promote their reuse.

b) Support the development of further preventive measures to prevent and reduce the generation of bulky waste.

c) Ensure that bulky waste is diverted from landfill.

d) Only landfill residual bulky waste that has been sorted to remove recyclable and recoverable components.

e) Support the treatment of bulky waste collected through municipal systems for the purpose of recycling and further use of all recyclable and usable components.

f) Prevent the disposal of bulky waste outside designated areas (creation of illegal dumps).

Measures:

a) Actively support the development of reuse centers and furniture banks, repair services, workshops, and other activities aimed at preventing the generation of bulky waste.

b) Inform residents and other entities producing bulky waste about ways to prevent its generation and reduce its quantity.

c) Integrate, communicate, and require proper waste management for all residents and involve them in the prevention and collection of bulky waste.

d) Introduce user-friendly, convenient systems in municipalities for the collection of bulky waste from residents to collection yards in order to minimize the creation of illegal dumps at collection points, etc.

e) Support, expand, and intensify the system for collecting bulky waste in municipalities and from legal entities and individuals doing business throughout the Czech Republic.

f) Reduce the generation of bulky waste by sorting individual reusable components directly at collection yards as part of municipal systems.

g) Support the construction and development of infrastructure for dismantling, crushing, and sorting bulky waste for recycling and reuse, within collection points and collection yards or within waste treatment facilities.

h) Support the development of technologies for mechanical sorting, treatment, and subsequent processing of bulky waste in regional waste centers. Support efficient transport to these centers.

i) Provide economic incentives for the sorting of bulky waste into recyclable and reusable components for recycling or energy recovery.

j) Within municipal systems, educate and motivate both residents and collection yard operators to handle bulky waste correctly.

k) Consistently monitor and penalize inappropriate and illegal handling of bulky waste.

l) Consider introducing EPR systems for furniture, mattresses, carpets, and other waste that meets the definition of bulky waste.

3.5.5 Construction and demolition waste

Objectives:

a) By 2030, increase the recycling rate of construction and demolition waste to 83% (excluding soil, stones, and tailings).

b) By 2035, increase the recycling rate of construction and demolition waste to 87% (excluding soil, stone, and tailings).

Principles:

a) Regulate the generation and management of construction and demolition waste with regard to the protection of human health and the environment.

b) Maximize the use of treated construction and demolition waste and recycled materials from construction and demolition waste.

Measures

a) Establish legislative conditions for selective demolition to enable the removal of hazardous materials from buildings and the safe handling of these materials, and to facilitate the reuse and high-quality recycling of construction materials and products.

b) Separately collect construction and demolition waste, at least wood, mineral components (concrete, bricks, tiles and ceramics, stones), metal, glass, plastics and gypsum during the removal, construction or maintenance of buildings, so that the highest possible level of reuse and recycling is ensured during further handling of these wastes.

c) Comply with European Union legislation on the "end-of-waste" status of selected construction and demolition waste, and if no relevant legislative document has been adopted at European Union level, draw up regulations for selected types of construction and demolition waste setting criteria for the end-of-waste status and the transition of recycled construction and demolition waste to a product.

d) Review standards for the quality of recycled materials from construction and demolition waste in cooperation with the Ministry of Industry and Trade.

e) Initiate and promote the use of recycled materials that meet the required construction standards as substitutes for natural resources in publicly funded construction activities, where technically and economically feasible.

f) Monitor compliance with legislation on the use of treated construction and demolition waste and recycled materials from such waste for backfilling, while maintaining a high level of protection for the environment and human health.

g) Prevent the use of untreated construction and demolition waste for backfilling, with the exception of excavated soil and tailings without hazardous properties.

h) Inspect facilities for the biodegradation of contaminated soil to ensure its safe reuse and provide information on soil that has undergone biodegradation treatment.

i) Analyze the possibilities for establishing conditions under which non-business individuals may transfer selected construction and demolition waste to a landfill without providing the relevant analyses.

j) Consistently check how non-business individuals ensure the handling of construction and demolition waste and its transfer to the appropriate waste treatment facility.

k) Support the collection of construction and demolition waste from citizens at municipal collection yards.

l) Support the reuse of construction materials and products while ensuring that technical and safety requirements for construction products and materials are met.

m) Consider options for extended producer responsibility and take-back schemes for selected construction products and materials (e.g., unused surplus from construction activities).

3.5.6 Mineral waste

Principles:

a) Reduce the landfilling of mineral waste and give preference to its material recovery and recycling.

Measures

a) Prevent the landfilling of excavated soil that could be used for landscaping and backfilling, even as technical security measures.

b) Support technologies and practices that enable the use of suitable mineral waste, in particular as a substitute for natural aggregates.

c) Support technologies and practices that enable the use of suitable mining waste, in particular as a substitute for natural aggregates.

d) Prevent the use of untreated construction and demolition waste for backfilling, with the exception of excavated soil and tailings without hazardous properties.

e) Check facilities for the biodegradation of contaminated soil to ensure its safe reuse and provide information on soil that has undergone biodegradation treatment.

f) Promote the reuse of construction materials and products while ensuring that technical and safety requirements for construction products and materials are met.

g) Support technologies and processes for obtaining critical raw materials from mining waste.

h) Focus on research into new technologies for obtaining critical raw materials.

3.5.7 Mining waste

Principles:

a) Recycle and reuse mining waste materials.

b) Reduce the landfilling of mining waste.

c) Focus on research into new technologies for obtaining critical raw materials.

Measures:

a) Selective sorting and use of soil at the extraction site.

b) Preventing the disposal of excavated soil that could be used for landscaping or backfilling in landfills, even as technical security measures.

c) Support for technologies and processes that enable the use of suitable mining waste, in particular as a substitute for natural aggregates.

d) Support for technologies and procedures for obtaining critical raw materials from mining waste.

3.5.8 Industrial waste

Principles:

a) Make maximum use of industrial waste as a substitute for primary raw materials.

b) Focus in industry on optimizing production processes and transitioning to circular solutions, low-waste and zero-waste technologies, and eliminating the hazardous properties of industrial waste.

Measures

a) Support optimization industrial production processes, modernization leading to low-waste, zero-waste technologies and reducing the hazardous properties of industrial waste.

b) Support the modernization of industry and innovative technologies, thereby reducing industrial waste production.

c) Support increasing energy efficiency, reducing energy consumption in industry, focus on decarbonising the energy sector and thereby reducing waste production from thermal processes.

d) Classify by-products from production as by-products and use them for recycling.

e) Support opportunity analyses (circular audits, scans) and the search for circular production solutions.

f) Support technologies for the use of waste as input in industrial production as a substitute for primary resources.

g) Support technologies for recycling and material recovery of industrial waste.

h) Support recycling technologies for industrial waste with an end-of-waste status and a defined output (product).

i) Legislative setting of the waste-non-waste transition for selected materials and flows.

j) Support the construction and modernization of technologies for the treatment of industrial waste, especially hazardous waste.

k) Support for the construction of facilities for the energy recovery or incineration of hazardous industrial waste.

l) Awareness raising and education of industry stakeholders in the field of waste management and implementation of circular economy principles.

m) Control of the handling of imported industrial waste.

3.5.9 Hazardous waste

Objectives

a) Reduce the specific production of hazardous waste.

b) Minimize the negative effects of hazardous waste management on human health and the environment.

c) Remove old burdens with the highest degree of urgency.

Principles:

a) Ensure a high level of protection for human health and the environment when handling hazardous waste.

b) Focus on identifying hazardous substances in waste.

c) Eliminate the hazardous properties of waste and prevent the generation of hazardous waste.

d) Ensure a stable network of sufficient capacity for the safe thermal disposal of hazardous waste.

e) Recycle hazardous waste, especially for energy, taking into account its properties.

Measures:

a) Focus on product design, reducing harmful substances already in production, minimizing the generation of hazardous waste during production and at the end of product life. Actively replace chemical compounds suspected of having negative effects on the environment and human health.

b) Modernize production technologies and comply with EU regulations for placing products on the market.

c) Classify hazardous waste correctly based on its actual properties.

d) Correctly identify and classify liquid hazardous waste and determine how to handle it.

e) Treat hazardous waste appropriately to eliminate its hazardous properties.

f) Use digitization to track the content of substances in products and waste.

g) Always provide all necessary information on the content of hazardous substances and substances of very high concern (SVHC) together with the waste.

h) Ensure sufficient information on hazardous substances in waste is available at the point of entry into treatment facilities, particularly prior to mechanical treatment and recycling, when there is a risk of hazardous substances being dispersed and the quality of the output being compromised.

i) Support research into new materials that do not contain hazardous substances.

j) Build key processing facilities and ensure sufficient capacity for the treatment of all hazardous waste.

k) Minimize the long-distance transport of hazardous waste and ensure the availability of final treatment in the region, unless it concerns specific types of waste.

l) Support the expansion of technologies for the decontamination of hazardous waste from health and veterinary care for safe disposal or recovery.

m) Support the construction and modernization of technologies for the treatment of hazardous waste, such as demulsification, neutralization, stabilization, and biodegradation.

n) Ensure sufficient capacity for the safe thermal disposal of hazardous waste, including waste from healthcare and veterinary care, corresponding to the actual production of hazardous combustible waste in the Czech Republic, while also having the capacity to safely dispose of larger quantities of hazardous waste arising suddenly in crisis situations.

o) Enable the energy recovery of selected waste from healthcare and veterinary care in municipal waste energy recovery facilities.

p) Support the construction of end-of-life facilities for the incineration or energy recovery of hazardous waste.

q) Classify facilities for the energy recovery or incineration of hazardous waste as critical infrastructure.

r) Recover energy from hazardous wood waste (e.g., railroad ties) in appropriate waste incineration facilities.

s) Minimize the landfilling of hazardous waste.

t) Ensure the even distribution of hazardous waste treatment facilities across the Czech Republic, allowing for reasonable transport distances to treatment sites.

u) Communication between investors and municipalities with the public to overcome the NIMBY effect when planning the construction of hazardous waste incinerators.

v) Divert hazardous waste from households away from mixed municipal waste and landfill.

w) Regular education and awareness-raising among the public on what constitutes hazardous household waste, how to separate it correctly and how to dispose of it within the municipal system.

x) Support the separate collection of municipal hazardous waste from households at collection yards.

y) Educate collection yard staff on the proper separate collection of hazardous municipal waste.

z) Focus on inspecting tradespeople and entrepreneurs in the municipality (e.g., car repair shops, small service providers, craftsmen) as a means of preventing abuse of the municipal system and collection yards.

aa) Educate healthcare workers and support the development of proper waste separation in healthcare and hospital facilities with the aim of reducing the proportion of hazardous waste from healthcare.

bb) Strengthen checks to ensure that waste that has lost its hazardous properties through treatment no longer exhibits these properties.

cc) Strengthen checks on obligated entities to ensure that they handle hazardous waste, especially waste with carcinogenic properties, correctly.

dd) Focus on illegal hazardous waste management and strengthen the fight against environmental crime in this area.

ee) Equip control authorities with modern technical equipment to monitor the presence of hazardous substances in waste.

ff) Promote thermochemical technologies based on scientific knowledge and follow the approaches recommended by the European Commission, e.g., for the treatment of selected wastes by chemical recycling methods.

gg) Support research into technologies for the thermochemical conversion of hazardous waste, analysis, identification of chemical composition, and classification of outputs. Expand expertise on the outputs of these technologies and demonstrate their safety for human health and the environment.

hh) Support research and development of new technologies for the treatment of hazardous waste.

3.5.10 End-of-life products

3.5.10.1 End-of-life vehicles

Objectives

a) Increase the recovery rate of critical raw materials contained in end-of-life vehicles.

b) Achieve high recovery rates in the treatment of end-of-life vehicles. Achieve the following rates of reuse, recycling, and recovery in the treatment of selected end-of-life vehicles, as shown in the table below.

Table 80: Targets for reuse, recycling, and recovery of end-of-life vehicles

End-of-life vehicle management	
Reuse and recovery	95
Reuse and recycling	85

Principles

a) Recycle the maximum number of end-of-life vehicles within the Czech Republic.

b) Prefer reuse of parts and recycling when processing end-of-life vehicles.

Measures

a) Support the collection and processing of selected end-of-life vehicles from funds collected on the basis of emission fees (additional emission classes, e.g., EURO 3).

b) Maintain, support, and further develop the existing network of facilities for the collection of selected end-of-life vehicles. Set standards for the processing and collection of end-of-life vehicles and standards for the reuse of parts from selected vehicles, strengthen monitoring of compliance with these standards, and enforce them consistently.

c) Set safety conditions for the processing of end-of-life electric vehicles (in particular the dismantling, loading, and storage of batteries from these vehicles).

d) Information campaigns and public awareness raising on the handling of end-of-life vehicles and increasing awareness of the network of facilities for the collection of end-of-life vehicles.

e) Support research, development, innovation, and implementation of procedures and technologies with a positive impact on increasing the level of material and energy recovery from waste generated during the processing of end-of-life vehicles, with a focus on the use of raw materials, in particular critical raw materials (non-ferrous metals).

3.5.10.2 Waste batteries

Objectives

a) Achieve a collection rate for waste portable batteries of at least 45% by the end of 2023, 63% by the end of 2027, and 73% by the end of 2030.

b) Achieve a collection rate for waste batteries from light-duty vehicles of 51% by the end of 2028 and 61% by the end of 2031.

c) Increase the recovery rate of critical raw materials contained in waste batteries.

d) Ensure the recycling and financing of "old burdens" from industrial batteries.

e) Increase the take-back rate of waste portable batteries. Achieve the minimum take-back rate for waste portable batteries as set out in the table below.

Table 81: Targets for the take-back of waste batteries

Portable batteries	By December 31, 2027	By December 31, 2030
Collection (%)	63	73

f) Achieve high recycling efficiency in waste battery recycling processes. Achieve minimum recycling efficiency in waste battery recycling processes according to the following table.

Table 82: Recycling efficiency targets for waste battery recycling processes

Battery group	**Recycling efficiency (% by weight)**	
	By December 31, 2025	By December 31, 2030
Lead batteries	75	80
Lithium batteries	65	70
Nickel-cadmium batteries	80	-
Other waste batteries	50	-

g) Achieve by August 18, 2031, in active materials of industrial batteries with a capacity greater than 2 kWh minimum shares of cobalt, lithium, and nickel from battery production or consumer waste and minimum share of lead present in the battery and obtained from waste recovery for each battery model per year and per manufacturing site, as shown in the table below.

Table 83: Targets for minimum shares of cobalt, lead, lithium, and nickel recovered from waste in industrial batteries

Material	**Minimum material content recycled from waste (%)**	
	From 18 August 2031	From 18 August 2036
Cobalt	1	2
Lead	85	85
Lithium	6	12
Nickel	6	15

h) Achieve recycling efficiency for selected batteries by material by the end of 2025 and subsequently by 2030 (see table below).

Table 84: Recycling efficiency targets for selected batteries by material

Battery group	**Recycling efficiency (% by weight)**	
	By December 31, 2025	By December 31, 2030
Lead batteries	75	80
Lithium batteries	65	70
Nickel-cadmium batteries	80	-
Other waste batteries	50	-

i) Achieve recycling of selected materials by 2027 and subsequently by 2031 (see table below).

Table 85: Target for recycling waste batteries

Material	Recycling (%)	
	By December 31, 2027	By December 31, 2031
Cobalt	90	95
Copper	90	95
Lead	90	95
Lithium	50	80
Nickel	90	95

Principles:

a) Apply the principle of extended producer responsibility.

b) Recycle the maximum amount of waste batteries within the Czech Republic.

c) Focus on recovering critical raw materials.

Measures:

a) Support the construction of waste battery recycling facilities in the Czech Republic.

b) Support the development of processing capacities for waste batteries.

c) Support research and development of recycling technologies that are environmentally friendly and cost-effective.

d) Support the safe handling of waste batteries containing lithium or its compounds.

e) Maintain, support, and further develop functional waste battery collection systems.

f) Deepening cooperation between manufacturers and collective systems with municipalities and strengthening the link between the collection network and municipal waste management systems.

g) Use Regulation No. 2023/1542 to introduce mandatory collective compliance or equal conditions for individual and collective compliance.

h) Set standards for the treatment of waste batteries and strengthen monitoring of compliance.

i) Strengthen control activities vis-à-vis producers and collective systems, including control of the effective use of funds collected under the waste battery take-back system.

j) Increase monitoring activities to reduce free-riding.

k) For products where possible, set up and effectively implement eco-modulation through manufacturers and collective systems.

l) Continue to educate the public on take-back schemes and intensify information campaigns and awareness-raising on the proper handling of waste batteries.

m) Educate end users on the collection of industrial batteries.

n) Create legislative conditions for the joint financing of old batteries.

3.5.10.3 Waste tires

Objectives:

a) Increase the level of waste tire collection. Achieve an annual waste tire collection rate of at least 80%.

b) Achieve high recovery rates for waste tires. Achieve a 100% recovery rate for waste tires each year.

c) Achieve an annual recycling and preparation for reuse rate of at least 30% for waste tires.

Principles:

a) Prefer the collection of tires in the Czech Republic.

b) Recycle the maximum amount of waste tires within the Czech Republic.

c) Prefer reuse in tire processing.

Measures:

a) Support the construction of waste tire recycling facilities in the Czech Republic.

b) Support processing capacities for waste tires.

c) Support the construction and establishment of logistics centers to optimize the transport of waste tires.

d) Maintain, support, and further develop functional waste tire collection systems.

e) Support cooperation between manufacturers and operators of collective waste tire systems and municipalities.

f) Increase the number of tire collection points.

g) Strengthen control activities vis-à-vis manufacturers and operators of collective systems, including control of the effective use of funds collected under the waste tire take-back system.

h) Analyze the extent of free-riding and possibilities for its elimination, especially in online sales.

i) Where possible, establish and effectively implement eco-modulation through manufacturers and collective systems for products.

j) Intensify information campaigns and awareness-raising to promote the proper handling of waste tires, with a view to minimizing the disposal of tires outside collection points and raising awareness of the network of collection points.

k) Support research and development of new technological processes and recycling technologies in the field of waste tires that are environmentally friendly and cost-effective (chemical recycling, devulcanization).

3.5.10.4 Waste electrical equipment

Objectives:

a) Achieve a collection rate of 65% for waste electrical and electronic equipment (from 2025 onwards).

b) Increase the recovery rate of critical raw materials contained in electrical equipment.

c) Ensure a high rate of preparation for reuse, recycling, and recovery of waste electrical and electronic equipment. Achieve the preparation for reuse, recycling, and recovery of waste electrical and electronic equipment listed in the table below (from 2025 onwards).

Table 86: Targets for individual groups of waste electrical equipment

Electrical equipment group	Use of waste electrical equipment	Recycling and preparation for reuse
1	85	80
2	80	70
3	-	80
4	85	80
5	75	55
6	75	55

Principles:

a) Apply the principle of extended producer responsibility.

b) Recycle the maximum amount of waste electrical equipment within the Czech Republic.

c) Ensure the effective functioning of collective systems for selected electrical equipment with a long service life or low economic value (e.g., solar panels).

d) Focus on the recovery of critical raw materials.

Measures

a) Support the construction and modernization of facilities for recycling waste electrical equipment in the Czech Republic.

b) Support processing capacities for waste electrical equipment.

c) Maintain, support, and further develop existing take-back systems for waste electrical equipment.

d) Enhance cooperation between producers and collective systems with municipalities and strengthen the link between the collection network and municipal waste management systems.

e) Continue to support the establishment of cooperation between collective systems and employers who create protected jobs (formerly known as sheltered workshops).

f) Establish an effective legislative framework for financing the take-back of solar panels.

g) Set standards for the processing of waste electrical equipment and strengthen monitoring of compliance.

h) Ensure greater oversight of collective systems over B2B waste electrical equipment.

i) Strengthen control activities vis-à-vis producers and collective systems, including control of the effective use of funds collected under the take-back system for waste electrical equipment.

j) Enforce the obligations of manufacturers/importers/sellers/operators of online marketplaces/e-shops and other entities at EU level (free-riding), i.e. limit the abuse of extended producer responsibility systems.

k) Ensure conditions for directing waste electrical equipment into the extended producer responsibility system and strengthen controls on other processors' equipment.

l) Where possible, establish and effectively implement eco-modulation through manufacturers and collective systems.

m) Continue to educate the public on take-back schemes.

n) Support research and development of new technological processes and recycling technologies with a focus on the use of waste electrical equipment.

3.5.11 Packaging and packaging waste

Objectives:

a) Increase the overall recycling rate for packaging to 75% by 2025. Maintain this overall recycling rate at least for the following years.

b) Ensure that, from 2025 to 2028, 77% of the weight of single-use plastic beverage bottles placed on the market in a given calendar year is collected for recycling.

c) Ensure that 90% of single-use plastic beverage bottles placed on the market in a given calendar year are collected for recycling by 2029.

d) Ensure that PET beverage bottles contain at least 25% recycled content from 2025.

e) Ensure that plastic beverage bottles contain at least 30% recycled content from 2030.

f) Ensure that, by July 2024, beverage containers with caps and lids made of plastic are only placed on the market if the caps and lids remain attached to the container during the intended use of the products.

g) Achieve the recycling targets for individual materials set out in the following table from 2025.

Table 87: Recycling targets for packaging waste

Packaging waste (%)	from 1 January 2025 to December 31, 2029	from 1 January 2030 to December 31, 2034	from 1 January 2035
Paper and cardboard	75	85	8
Glass	75	75	75
Plastic	50	55	55
Iron	70	80	80
Aluminum	35	50	60
Wooden	25	30	30
For sale to consumers	50	50	50

h) Plastic packaging components shall contain the following minimum percentages of recycled material obtained from consumer plastic waste per packaging unit, by the end of 2029 or within three years of the entry into force of the implementing act of the Packaging and Packaging Waste Directive (paragraph 7)

   a. 30% for contact-sensitive packaging, excluding single-use beverage bottles, made from polyethylene terephthalate (PET) as the main component;

   b. 10% for contact-sensitive packaging made from plastic materials other than PET, with the exception of single-use plastic beverage bottles

   c. 30% for single-use plastic bottles;

   d. 35% for packaging other than that referred to in points (a), (b) and (c).

i) Achieve by the end of 2039 a minimum percentage of recycled content obtained from post-consumer plastic waste for all plastic parts of packaging placed on the market:

   a. 50% for plastic packaging sensitive to contact, excluding single-use plastic beverage bottles;

   b. 65% for single-use plastic beverage bottles;

   c. 65% for plastic packaging other than that referred to in points (a) and (b).

j) Ensure that, by the end of 2029, the proportion of empty space is no more than 50% of the product in group or transport packaging or e-commerce packaging.

k) Achieve, by the end of 2029, that at least 10% of products are delivered by economic operators placing large household appliances listed in point 1 of Annex II to Directive 2012/19/EU on the market of a Member State in transport packaging that is reusable within a reuse scheme.

l) Achieve that, by the end of 2039, at least 50% of products are delivered by economic operators placing large household appliances listed in point 1 of Annex II to Directive 2012/19/EU on the market for the first time in a Member State in transport packaging that is reusable within a reuse scheme.

m) By the end of 2029, ensure that at least 20% of cold or hot beverages sold in containers for takeaway at the point of sale are supplied in packaging that is reusable within a reuse system or in a manner that allows for refilling.

n) By the end of 2039, ensure that at least 80% of cold or hot beverages sold at the point of sale in a takeaway container are supplied in packaging that is reusable within a reuse system or in a manner that allows for refilling.

o) By the end of 2029, ensure that at least 10% of ready-made meals are supplied in packaging that is reusable within a reuse system or in a manner that allows for refilling.

p) By the end of 2039, ensure that at least 40% of ready-made meals are supplied in packaging that is reusable within a reuse system or in a manner that allows for refilling.

q) By the end of 2029, ensure that a certain proportion (see table below) of selected beverages are supplied in packaging that is reusable within a reuse system or in a manner that allows for refilling.

Table 88: Targets for reusable packaging by 2029

Beverage group	Share of beverages in a reuse system (
Beer, carbonated alcoholic beverages, fermented beverages (other than wine), aromatized wine products and fruit wines, and products based on spirits, wine or other fermented beverages mixed with beverages such as soda, cider or juice.	10
Wine, except sparkling wine	5
Non-alcoholic beverages in the form of water, water sweetened with sugar, water sweetened with other sweeteners, flavored water, lemonades, sparkling citrus lemonades, iced tea and similar beverages for immediate consumption, pure fruit or vegetable juices, juices or must and cocktails without milk and non-alcoholic beverages containing milk fat.	10

r) By the end of 2039, ensure that a certain proportion of selected beverages are supplied in packaging that is reusable within a reuse system or in a manner that allows for refilling (see table below).

Table 89: Targets for reusable packaging by 2039

Beverage group	Share of beverages in a reuse system (
Beer, carbonated alcoholic beverages, fermented beverages (other than wine), aromatized wine products and fruit wines, and products based on spirits, wine or other fermented beverages mixed with beverages such as soda, cider or juice.	25
Wine, except sparkling wine	15
Non-alcoholic beverages in the form of water, water sweetened with sugar, water sweetened with other sweeteners, flavored water, lemonades, sparkling citrus lemonades, iced tea, and similar beverages for immediate consumption, pure fruit or vegetable juices, juices or must and cocktails without milk and non-alcoholic beverages containing milk fat.	25

s) By the end of 2029, ensure that at least part of the selected transport or group packaging used is reusable within a reuse system (see table below).

t) By the end of 2039, ensure that at least part of the selected transport or group packaging used is reusable within a reuse system (see table below).

u) Reduce the amount of packaging waste generated per capita compared to the amount of such waste generated per capita in 2018 by at least

a. 5% by 2030;

b. 10% by 2035;

c. 15% by 2040.

v) Ensure separate collection for at least 90% by weight of newly placed single-use plastic beverage bottles of up to 3 liters and single-use metal beverage containers of up to 3 liters by the end of 2028.

w) By the end of 2025, ensure that at least 65% of the weight of all packaging waste generated is recycled, with minimum weight shares for selected specific materials contained in the packaging waste generated being

  a. 50% for plastics;
  b. 25% for wood;
  c. 70% for ferrous metals;
  d. 60% for aluminum;
  e. 75% for glass;
  f. 85% for paper and cardboard.

x) By the end of 2030, ensure that at least 70% of the weight of all packaging waste generated is recycled, with minimum weight shares of selected specific materials contained in packaging waste generated being

  a. 55% for plastics;
  b. 30% for wood;
  c. 80% for ferrous metals;
  d. 60% for aluminum;
  e. 75% for glass;
  f. 85% for paper and cardboard.

y) Achieve a minimum recycling rate of 70% by weight for beverage cartons.

z) Achieve a recycling rate for selected single-use packaging subject to a deposit system in accordance with the following table.

Table 90: Targets for take-back rates for single-use packaging subject to a deposit

Type of waste	**Minimum take-back rate (%)**	
	From 1 January 2025	From 1 January 2029
Single-use plastic packaging	77	90

Principles:

a) Comply with the waste management hierarchy.

b) Emphasis on preventing packaging waste (reusable packaging, economic instruments, etc.).

c) Prefer preparation for reuse and reuse.

d) Prefer separate collection of packaging waste by material at source.

Measures:

a) Reflection of the new regulation on packaging and packaging waste in Czech legislation at the time of its entry into force and preparation for this regulation.

b) Maintain and develop an integrated system for the separate collection of municipal waste, including its packaging component, and expand the range of commodities that can be sorted.

c) Strengthen educational activities, education, and awareness in the field of packaging waste management (educational advertising and campaigns).

d) Targeted education of residents (and other waste producers) to increase the sorting of packaging waste.

e) Educate residents on the prevention of single-use packaging and the use of packaging-free services.

f) Ensure the availability of a network for separate collection that is user-friendly and convenient for residents.

g) Support the introduction of reusable packaging.

h) Support the application of eco-modulation and eco-design, thereby preventing the creation of non-recyclable packaging.

i) Increase the sorting of packaging components from all waste streams using modern sorting lines.

j) Support innovative technologies for packaging waste management.

k) Support the construction of automated sorting lines.

l) Enable multi-commodity collection in connection with the availability of modern, high-performance automated sorting lines.

m) Support the construction of facilities for the treatment of minor packaging waste.

n) Support processing technologies for the treatment and recycling of packaging waste.

o) Support research into reusable and easily recyclable materials for packaging.

p) Monitor the application of eco-modulation principles in relation to improved sortability, recyclability, and recycled content in packaging.

q) Require optimized packaging size and weight without affecting the function and usability of packaging.

r) Support demand for recycled materials through legislation and economic instruments.

s) Obligation of authorized packaging companies to publish the method of achieving the recycling rate in terms of investment in the waste sector.

t) Obligation for authorized packaging companies to publish plans for the development of individual collection, treatment, and recycling systems so that the waste management sector can prepare and be in line with the intentions of the authorized packaging company.

u) Obligation of authorized packaging companies to publish their methodology for applying eco-modulation.

v) Continuously evaluate the management of packaging waste within the municipal waste management system, the capacity of the system, and propose measures for its improvement.

3.5.12 Single-use plastic products

Objectives

a) Reduce the placing on the market (consumption) of selected single-use plastic products compared to 2023.

b) Reduce the disposal of single-use plastic waste outside designated areas.

The targets apply to tobacco products, wet wipes, balloons, sanitary products, beverage cups, and food containers (within the meaning of Act No. 243/2022 Coll.).

Principles

a) Do not place selected single-use plastic products and products made from oxo-degradable plastics on the market.

b) Comply with the requirements for placing plastic products on the market (beverage bottles up to 3 liters only with non-detachable caps, or other requirements).

c) Focus on reducing the consumption of selected single-use products in the long term.

d) Promote extended producer responsibility.

e) Education and awareness raising in the area of selected disposable products and littering.

Measures:

a) Correctly label selected single-use plastic products on their packaging or on the products themselves.

b) Replace single-use plastic products with suitable substitutes that are more environmentally friendly.

c) Replace production and consumption patterns focused on single-use products with sustainable models – reusability, durability.

d) Support the development of technologies introducing new packaging solutions (reuse, refill).

e) Support the application of extended responsibility systems for selected single-use products.

f) Negotiate with collective systems on the possibility of covering multiple commodities of selected single-use products under one collective system.

g) Communicate with municipalities and encourage them to sign agreements with producers or collective systems.

h) Consider modifying the obligation of municipalities to enter into contracts to cover only the mandatory share of the population, regardless of the share of municipalities.

i) Support the expansion of the network of collection containers and litter bins in public places with a higher incidence of littering.

j) Increase cleaning of areas prone to littering.

k) Conduct and support public awareness campaigns on reducing single-use plastics and environmental pollution from waste, and integrate this issue into education and training.

l) Raise awareness and provide information on the availability of reusable alternatives, reuse systems, and methods for the proper disposal of waste from single-use plastic products and fishing gear that do not pose a threat to human health or harm the environment.

m) Support, through legislation, technical assistance, awareness campaigns, and subsidy programs, the replacement of single-use plastics, in particular packaging, tableware, and cutlery, with reusable products and packaging.

n) Provide information on the impact of inappropriate disposal of single-use plastic products on the sewage system.

o) Inform users of tobacco products about the harmful effects of discarding cigarette butts outside designated areas.

p) Inform users about the benefits of sustainable behavior in waste prevention.

q) Support initiatives aimed at eliminating litter.

r) Analyze the possibilities of measuring the consumption of selected single-use products and the waste generated from these products.

s) Support, through legislation, technical assistance, and awareness campaigns, the fulfillment of manufacturers' obligations to achieve the mandatory amount of recycled content in selected products.

3.5.13 Sewage sludge

Objectives

c) Use sludge from wastewater treatment plants as a material, with a particular focus on the use of phosphorus and nitrogen, apply high-quality sludge to soil, and use sludge for energy.

d) Reduce the amount of hazardous substances in sludge from wastewater treatment plants intended for application to agricultural land.

Principles

a) Prefer methods of wastewater treatment plant sludge management according to the content of hazardous substances in the sludge.

b) Preliminary caution in order to ensure a high level of environmental protection and human health.

c) Prioritize the use of sludge from wastewater treatment plants in the Czech Republic over sludge imported from abroad.

Measures

a) Continue to use high-quality and suitable sludge from WWTPs for application to agricultural land.

b) Support the development of technologies for the removal of heavy metals, pharmaceutical residues, hormones, chemicals, microplastics, and other contaminants from sewage sludge.

c) Monitor the specified microbiological and chemical parameters of treated sewage sludge from WWTPs intended for application to land.

d) Increase and prioritize composting of sewage sludge.

e) Optimization of operations and improvement of sludge composting technology from wastewater treatment plants.

f) In order to achieve higher quality sludge from WWTPs, industrial wastewater should not be accepted into municipal wastewater treatment technologies.

g) Support the development of industrial wastewater treatment plants, including leachate from landfills.

h) Support investment in WWTP sludge treatment technologies, in particular the prevention of residue formation while maintaining the potential of sludge as a source of nutrients (nitrogen, phosphorus, etc.) and organic matter, including the energy recovery of WWTP sludge.

i) Optimization of the anaerobic digestion process for better sanitation and higher energy utilization in sewage sludge.

j) Support the development of technologies for the recovery and use of biogas from sludge directly at WWTPs.

k) Increase biogas production at WWTPs and explore possibilities for its supply to the distribution network and its use as a substitute for fossil fuels.

l) Prevent inappropriate methods of sludge disposal from WWTPs in mobile facilities and landfills.

m) Enable the use of sludge from wastewater treatment plants in biogas plants, including agricultural biomass biogas plants.

n) Establish legislative rules for the preparation of cultivation and recultivation substrates containing sewage sludge for use in the upper soil layers during recultivation.

o) Support the development of technologies that enable the recovery of phosphorus as a critical raw material.

p) Focus on the development of technologies for the recovery of phosphorus, iron, aluminum, and other substances from residual products using thermal methods.

q) Support technologies for drying sewage sludge, especially before it enters thermal processes.

r) Support the development and increase of thermal pyrolytic treatment of sewage sludge.

s) Educate and raise awareness among the public with the aim of reducing the load of pharmaceuticals, heavy metals, chemicals, microplastics, etc. in wastewater and subsequently in sewage sludge.

t) Monitor developments and explore the possibility of extending extended producer responsibility to manufacturers of drugstore goods, chemical preparations, etc., as their residues end up in WWTPs and WWTP sludge.

u) Support research focused on monitoring the content and assessing the effects of contaminants in sewage sludge on human health and the environment.

v) Focus research on the content and removal of pharmaceutical residues, chemicals from personal hygiene products, microplastics, and persistent organic pollutants from WWTP sludge and the contribution of WWTP sludge to bacterial antibiotic resistance.

3.5.14 Waste oils

Objectives:

a) Increase the recycling and energy recovery of waste oils.

Principles:

a) Comply with the waste management hierarchy and prioritize the recycling of waste oils.

b) Prevent damage to the environment and human health when handling waste oils.

Measures:

a) Collect waste oils at the point of origin in an appropriate manner and prevent them from being mixed with other substances.

b) Ensure that waste oils are properly collected, stored, and not mixed with oils of different properties or with other wastes or substances, taking into account their subsequent use.

c) Waste oils should be regenerated or recycled as a priority, and oils unsuitable for this use should be used for energy in accordance with applicable legislation.

d) Support the construction of facilities for the regeneration and recycling of waste oils.

e) Set criteria for the production of liquid fuels from waste oils.

f) Build capacity for facilities to produce fuels from waste oils.

g) Educate and raise public awareness about the proper handling of waste oils and encourage people to dispose of them in the municipal waste system.

h) Control of waste oil collection and compliance with the waste oil management hierarchy.

3.5.15 Waste from health and veterinary care

Objectives:

a) Minimize the negative effects of healthcare and veterinary care waste management on human health and the environment.

b) Increase the incineration of waste from health and veterinary care.

Principles

a) Strengthen education and awareness in the field of healthcare and veterinary waste management (especially in the field of healthcare provided in the patient's own environment).

b) Prevent the generation of healthcare and veterinary waste (use of reusable devices after sterilization, measures against waste, etc.).

c) Eliminate the infectiousness and hazardousness of healthcare and veterinary waste primarily by decontaminating it directly at the source where it is generated.

d) Ensuring sufficient capacity for the safe management of healthcare and veterinary waste.

Measures:

a) Education and awareness-raising on the proper management of healthcare waste. Education of employees in facilities where healthcare and veterinary waste is generated.

b) Limiting the use of disposable equipment, promoting the reuse and sterilization of instruments.

c) Implement and comply with rules for the management of waste from healthcare and veterinary care, focusing on the safe collection, transport, disposal, and possible reuse of waste from healthcare, veterinary, and similar facilities.

d) Expand the decontamination of waste from healthcare and veterinary care directly at the source where it is generated.

e) Expand decontamination as a basic safety measure to reduce the production of hazardous waste and reduce the risk of infection through improper waste handling.

f) Support the purchase of decontamination equipment for healthcare facilities.

g) Manage waste from healthcare and veterinary care in accordance with the waste management hierarchy and available technologies, giving priority to the best available techniques.

h) Support investment plans to supplement the network of facilities and increase capacity for the safe energy recovery or incineration of healthcare waste (both non-hazardous and hazardous) and improve the Czech Republic's preparedness and resilience to potential pandemics.

i) Modernize existing capacities for the safe energy recovery or incineration of healthcare and veterinary waste.

j) Classify healthcare waste incineration facilities as critical infrastructure.

k) Support the construction and modernization of facilities for the energy recovery of healthcare and veterinary waste directly on hospital premises.

l) End the landfilling of waste from health and veterinary care, even after treatment.

m) Support research and development of new technologies for the management of waste from healthcare and veterinary care.

n) Monitor compliance with legally established procedures for the management of healthcare and veterinary waste by waste producers (collection, storage, etc.).

o) Unify and implement procedures for the proper management of healthcare and veterinary waste.

p) Monitoring the proper handling of healthcare and veterinary waste throughout the entire waste management chain.

q) Improving resilience and preparedness for potential pandemics through training, education, and awareness-raising among those affected.

3.5.16 Waste containing persistent organic pollutants

Objectives:

a) Raise awareness of persistent organic pollutants, the proper management of waste that is a source of persistent organic pollutants, and their effects on human health and the environment.

b) Reduce the entry of persistent organic pollutants from waste into recycling.

Principles:

a) Focus on the prevention of POPs in products.

b) Reduce the risk of negative impacts of POPs on human health and the environment.

c) Remove old POPs-containing waste.

Measures

a) Public education and awareness raising on the risks associated with the use of POPs, their occurrence in waste, the environment, households and everyday life.

b) Education and awareness-raising on POPs for public authorities involved in licensing processes and public procurement.

c) Consistently monitor compliance with POP regulations, the placing of POP-free products on the market, the presence of POPs in recycled materials, and the removal of POPs.

d) Recommend methods for determining the content of POPs in products and waste and warn of possible exposure.

e) Monitor POPs in environmental compartments, identify sources of potential releases and prevent their spread, and conduct biomonitoring of POPs in the population.

f) Improving POP monitoring in waste (e.g., sewage sludge, textile waste, plastic waste, fly ash).

g) Support research into POPs and possible POP substitutes.

h) Share information on POPs at national and international level.

i) Develop methodological guidelines on the possible occurrence of POPs in selected wastes and the proper management of POP-containing wastes.

j) Keep records of sites contaminated or potentially contaminated with POPs (e.g., new substances – PFAS) and update the SEKM database.

k) Support the remediation of sites contaminated with POPs.

l) Prioritize the severity of sites for remediation (with POPs) and increase subsidy support for the most at-risk areas.

m) Improve and develop methods for separating POP-containing waste.

n) Support research into new methods for detecting, monitoring, and removing POPs (existing and new).

o) Apply BAT/BEP technologies when disposing of waste containing POPs.

p) Develop new technologies and methods for decontamination, remediation of POPs, and safe disposal of POPs (e.g., fire extinguishing equipment containing fluorinated substances).

q) Support the development of facilities (new or expanded) for the management of POP-containing waste, for the safe disposal of POP-containing waste (hazardous waste incinerators) and seek new technologies for POP disposal.

r) Support the natural attenuation of POPs in the environment (e.g., degradation of pesticides in agricultural soil).

3.5.17 Waste containing polychlorinated biphenyls

Objectives:

a) Transfer all equipment and waste containing polychlorinated biphenyls to waste treatment facilities by the end of 2025 and decontaminate waste containing polychlorinated biphenyls by that date.

b) Eliminate waste containing polychlorinated biphenyls held by waste treatment facilities by the end of 2028.

Principles:

a) Focus on prevention and stop using PCBs.

b) Reduce the risk of negative impacts of PCBs on human health and the environment.

c) Remove old PCB-containing waste.

Measures:

a) Raise public awareness and knowledge about the negative effects of PCBs.

b) Keep records of equipment containing PCBs.

c) Keep records of sites contaminated or potentially contaminated with PCBs and update the SEKM database.

d) Recommend a method for determining PCB content in operating equipment.

e) Transfer lightly contaminated equipment and equipment containing PCBs with a filling volume of less than 5 liters to a facility for the disposal of this type of waste by the end of 2025.

f) Ensure that all equipment containing PCBs is transferred by the target year of 2025.

g) Monitor and check the gradual elimination of PCB-containing waste held by waste management facilities by the target year of 2028.

h) Monitor PCBs in environmental compartments and conduct biomonitoring of PCBs in the population.

i) Monitor PCB content in waste used for backfilling and reclamation.

j) Monitor PCB content in sludge from wastewater treatment plants intended for application to soil.

k) Continue the implementation of the National Inventory of Contaminated Sites project to map further contaminated sites. Monitor sites containing PCBs.

l) Prioritize the severity of contaminated sites for remediation and increase subsidy support for the most at-risk sites.

m) Apply BAT/BEP technologies when disposing of waste containing PCBs.

n) Support the use of in situ methods to reduce the potential risk of PCB spread.

o) Support research into new methods for monitoring and removing PCBs.

p) Seek alternatives to incineration for the disposal of PCB-containing waste.

q) Support the construction of new PCB waste disposal capacities or expand the capacities of existing facilities.

3.5.18 Waste containing asbestos

Objectives:

a) Minimize the potential negative effects of asbestos-containing waste management on human health and the environment.

Principles:

a) Monitor the occurrence of asbestos.

b) Ensure a high level of human health protection.

c) Manage the disposal of waste containing asbestos.

d) Safely remove waste containing asbestos.

Measures

a) Provide continuous training, education, and awareness-raising for both professionals and the general public.

b) Regularly update methodologies for the proper handling of waste containing asbestos, taking into account changes in this area.

c) Provide adequate training for employees and staff who come into contact with materials or waste containing asbestos in the course of their work.

d) Check that measures are in place to separate work areas where materials or waste containing asbestos are handled from the surrounding environment.

e) Minimize disruption of asbestos-containing materials during handling to prevent the release of asbestos fibers and asbestos dust.

f) Prepare a professional quantification of existing asbestos contamination throughout the Czech Republic in public buildings completed before 2005.

g) Comply with building inspections prior to demolition, prior to modifications to completed buildings, or prior to maintenance work in order to detect and determine the presence of asbestos.

h) Check that the rules for properly removing asbestos and putting it in a landfill are followed.

i) Establish a publicly accessible list of persons authorized to carry out building inspections for the detection of asbestos and persons for the professional handling of asbestos.

j) Consider introducing conditions for the removal of buildings or parts thereof containing asbestos by construction companies or tradespeople with the appropriate trade license.

k) Introduce a subsidy or other subsidy instrument to support the proper removal of asbestos from buildings.

l) Support science and research in the field of asbestos processing, assessment, and research into the health risks associated with exposure to respirable asbestos fibers.

m) Strict control of compliance with safe handling of waste containing asbestos and occupational health and safety when handling asbestos.

n) Further economic incentives for the removal of waste containing asbestos.

o) Evaluate the possibilities of creating a national plan or other long-term strategy at the national level for the complete removal of asbestos from buildings in the Czech Republic and the disposal of waste from them.

3.5.19 Materially recoverable waste

Objectives (wood):

a) Increase the efficiency of wood separation (separate collection rate) in municipalities.

b) By 2030, achieve a rate of preparation for reuse and recycling of wood waste of at least 40%.

c) By 2035, achieve a rate of preparation for reuse and recycling of wood waste of at least 50%.

Targets (ferrous and non-ferrous metals):

a) Process metal waste and end-of-life products into materials to replace primary raw materials.

b) Increase the recycling rate of metal waste.

Principles:

a) Maintain, support, and develop separate collection of recyclable and recoverable components of municipal waste – separate collection of specific materials (paper, plastic, glass, metals, wood, beverage cartons) with regard to the targets set for individual materials and with regard to the higher quality of waste collected in this way.

b) Maintain and develop the availability and user-friendliness of separate collection (sorted collection) of recyclable and recoverable components of municipal waste in municipalities.

c) The system of separate collection of municipal waste in the municipality shall be established by the municipality in accordance with legal requirements and taking into account the availability of waste treatment technology.

d) The scope and method of separate collection of municipal waste components in the municipality shall be determined by the municipality, taking into account technical, environmental, economic, and regional possibilities and technological possibilities for further waste treatment, while complying with legislative requirements and meeting targets.

e) Maintain and develop participation and cooperation with packaging producers and other product manufacturers in accordance with the "polluter pays" and "extended producer responsibility" principles to ensure the separate collection or take-back and recovery of the relevant municipal waste components.

f) Improve systems for the separate collection of recyclable and recoverable components of municipal waste from legal entities and natural persons engaged in business activities, and involve legal entities and natural persons engaged in business activities with municipal waste in municipal waste management systems.

g) Support the application and use of recycled materials, thereby contributing to the sale of outputs from municipal waste recycling facilities.

h) Consider and propose measures to make recyclates a viable alternative to primary materials.

i) Wide- nd application of green public procurement – giving preference to recycled products in so-called "green" tenders.

j) Use of economic instruments – prefer economic instruments to promote the recycling of sorted and appropriately treated waste.

Measures:

a) Intensify and optimize the separate collection of recyclable and recoverable municipal waste in municipalities, primarily by increasing and optimizing the density of the collection network, reducing the walking distance to collection containers, and raising public awareness of waste sorting.

b) Densify the collection network in areas with increased tourist traffic and areas with new residential development. Furthermore, in areas with a significantly higher number of residents than the registered population (cottage and recreational areas, tourist areas with high visitor turnover, etc.).

c) Enable the sorting of bulky waste into basic usable components according to material at the collection yard.

d) Focus on maximum sorting (transfer) of material components from mixed municipal waste.

e) Develop highly convenient separate collection for residents (users), in particular a clear sorting system, short delivery distances, and door-to-door systems.

f) Expand the network of waste bins in public spaces to enable sorting into usable components.

g) Expand the individual collection network in areas with a higher proportion of family housing.

h) Motivate residents to actively participate in waste sorting, in particular by setting up municipal waste management systems and pay-as-you-throw (PAYT) municipal waste charges and other incentives. Support municipalities in building infrastructure and technologies for the introduction and expansion of PAYT.

i) Educate and raise awareness among residents and increase their involvement in the municipal system, prevention and sorting of recyclable waste.

j) Focus on increasing the number of people who actively sort waste, increasing waste sorting and the quality of sorted components (paper, plastics, glass, metals, wood) from municipal waste.

k) Subsidy support for environmental education, training, and awareness in the area of consistent sorting of recyclable and usable waste.

l) Motivate legal entities and natural persons engaged in business to separate recyclable and recoverable waste (audits, scans, etc.).

m) Consistent monitoring of municipalities and other waste producers to ensure that they have separate collection (sorted collection) of recyclable and recoverable components (paper, plastics, glass, metals).

n) Municipalities should thoroughly check their citizens to ensure that they sort waste sufficiently and do not dispose of usable components in mixed municipal waste (e.g., random checks of the contents of trash cans).

o) **Wood:** Development and increase of separate collection of waste wood and its transfer for recycling. Separate collection of wood waste at municipal collection yards.

p) **Glass:** Development of separate collection of waste flat glass, construction glass, technical glass, and car glass, as well as packaging glass from hotels, restaurants, and other sources.

q) **Multi-commodity:** Development of multi-commodity collection in connection with the possibilities of modern, efficient, and high-performance sorting lines.

r) **Wood, metals, plastics, glass:** Development of sorting of bulky waste and increase in the sorting of wood, metals, plastics and, to some extent, glass.

s) Support innovation, digitization, and smart solutions in the collection, sorting, mechanical sorting, and final processing of recyclable and recoverable waste.

t) Develop systems for digitizing and recording waste weight and tracking waste origin.

u) Support the construction of highly efficient technologies for the mechanical sorting and post-sorting of municipal waste to ensure its subsequent recycling and further use. Maximize the use of sorted commodities.

v) Support the modernization and construction of waste recycling technologies and equipment and strengthen the competitiveness of production in the Czech Republic vis-à-vis the EU through subsidies.

w) Build automatic sorting lines for separately collected waste and ensure high quality of treated waste (secondary raw materials).

x) Build automatic sorting lines for the mechanical sorting of recyclable and recoverable components from mixed municipal waste.

y) **Metals:** Equip waste-to-energy plants with technologies for highly efficient sorting of ferrous and non-ferrous metals from slag.

z) **Glass:** Modernize and build new sorting lines for the efficient sorting of glass so that processed glass cullet is competitive on the EU market.

aa) **Plastics:** Streamline the plastic sorting and treatment system. Build modern, automated, high-capacity sorting lines and waste treatment facilities to achieve efficient sorting of even minor plastic material groups found in sorted waste and ensure better sales opportunities. Recycle plastics and use plastics unsuitable for recycling for energy recovery.

bb) **Plastics:** Develop plastic recycling technologies to produce high-quality recyclates suitable for reuse in the packaging and food industries.

cc) **Beverage cartons:** Consider introducing quantitative targets for the recycling of beverage cartons (composite beverage packaging).

dd) Consider introducing EPR systems for other products/wastes that meet the definition of municipal waste.

ee) Analyze any changes to the waste sorting system and eliminate the risk of a decline in the proportion of residents who actively sort waste.

ff) Increase the importance of financial resources from collective systems and authorized packaging companies for financing the intensification of the collection network for recyclable waste and the operation of processing facilities.

gg) Ensure a financially stable environment (covering market downturns) thanks to the financial resources of EPR systems.

hh) Ensure the sale of treated waste from sorting lines even in times of market problems with the sale of secondary raw materials through the basic role of EPR systems.

ii) **Metals, plastics:** Increase the amount of sorted and recycled aluminum and PET beverage packaging waste through deposit systems.

jj) Analyze the possibility of introducing additional deposit systems for various products (which constitute municipal waste in the waste phase).

kk) Targeted continuous education and awareness-raising among the public on proper waste sorting, its importance and benefits. Information campaigns to dispel concerns about the use of products containing recycled materials.

ll) Support for demand and consumption of products made from recycled materials (paper, plastic, glass, wood) in public procurement, through tax incentives, etc.

mm) **Metals, glass, plastics, paper:** If the results of sorting within the primary sorting system in municipalities are insufficient, it will be necessary to urgently ensure the development of technologies for the mechanical sorting of mixed municipal waste, especially from housing estates (metals, glass, some plastics and paper), or other suitable locations.

nn) Support for research and development of new technologies for recycling sorted waste, especially paper and plastic.

3.5.20 Textile waste

Objectives

a) By 2030, achieve a separation efficiency (separate collection rate) of textile waste in municipalities of at least 50%.

b) By 2035, achieve a separation efficiency (separate collection rate) of textile waste in municipalities of at least 55%.

c) By 2030, achieve a rate of preparation for reuse and recycling of textile waste of at least 35%.

d) By 2035, achieve a minimum of 45% preparation for reuse and recycling of textile waste.

Principles:

a) Strengthen sustainable access to textiles and the circularity of textile products.

b) Focus on the potential of textile and footwear waste, its sorting, preparation for reuse and recycling.

Measures

a) Introduce effective systems for the separate collection of textile and footwear waste in municipalities.

b) Introduce extended producer responsibility (EPR) systems for textile and footwear waste.

c) Raise awareness and promote eco-design, sustainability, and circularity of textile products.

d) Apply eco-modulation and set marketing fees that will encourage the increase of the service life, reparability, and recyclability of textile products.

e) Monitor compliance with the ban on the destruction of unsold textile products and footwear.

f) Develop systems for providing information on textile products (product passports, labels, green claims).

g) Support the development of infrastructure, increase the capacity of the collection network for textile and footwear waste, establish central collection points, and build modern, efficient optical sorting technologies and large-capacity sorting lines.

h) Support for the preparation of textile products and clothing for reuse.

i) Support for the development of modern technologies for recycling textile and footwear waste.

j) Restricting the export of textile and footwear waste for disposal.

k) Education and public awareness on fast fashion, ways to reduce and prevent textile and footwear waste, and options for reusing textile products.

l) Educating and raising public awareness about the proper disposal of textile and footwear waste.

m) Grant support for environmental education, training, and awareness-raising on the proper sorting of textile waste and its benefits.

n) Support for research and development of recycling technologies for textile and footwear waste.

3.6 Objectives, principles, and measures for specific areas of waste management

3.6.1 Limiting the disposal of waste outside designated sites and ensuring the management of waste whose owner is unknown or has ceased to exist

In order to achieve the objective of reducing the unauthorized disposal of waste outside designated sites, the following principles should be applied and measures taken.

Objectives:

a) Limit the disposal of waste outside designated areas.

b) Ensure proper handling of waste disposed of outside designated areas and waste whose owner is unknown or no longer exists.

Principles:

a) Focus on preventive activities.

b) Raise awareness of the importance of proper waste disposal in designated areas and environmental protection.

Measures

c) Create education and awareness programs at the municipal level, in particular by securing funding for these programs.

d) Involve the public in programs and events that promote a positive attitude toward keeping the environment clean and disposing of waste properly.

e) Involve manufacturers in the creation of programs and marketing campaigns for consumers of their products or services.

f) Increase preventive checks on persons authorized to conduct business (especially sole traders) by municipalities and municipalities with extended powers.

g) Inform citizens and businesses about the possibility of fines for activities related to the creation of illegal dumps.

h) Introduce and support the development of municipal communication channels (forms on municipal websites, SMS) through which residents can report illegally dumped waste in public spaces or temporary storage of waste in the vicinity of collection points and containers.

i) Conduct an inventory and chip municipal waste containers at the municipal level for the purpose of detailed inspection of collected containers and to prevent unauthorized disposal of waste from business activities in municipal waste containers.

j) Install camera systems or place photo traps in locations with frequent unauthorized waste disposal.

k) Involve businesses in the municipal system by directly contacting them.

l) Strengthen control over compliance with the obligation to ensure further treatment of municipal, construction, and demolition waste at the point of generation.

m) Focus municipal inspections on the unauthorized use of municipal waste management systems by legal entities and natural persons engaged in business activities.

n) Streamline the system of inspections and fines for littering in public spaces.

o) Increase the maximum fine for the offense of creating an illegal dump.

p) Use community service or public service programs run by municipalities to ensure the cleaning and maintenance of public spaces, including activities related to the removal of waste deposited outside designated areas.

q) Keep public spaces clean.

r) Secure places where illegal dumps are created and renewed.

s) Supplement the system of collection yards, containers, and waste collection for waste that most often appears in illegal dumps.

t) Ensure the collection of construction and demolition waste from citizens up to a certain limit within the municipal system.

u) Introduce systems for the regular collection of bulky waste and other household waste to increase citizens' motivation to dispose of such waste in designated places and effectively inform citizens about this (social networks, applications for communication with citizens).

v) Allocate funds in municipal budgets to finance the disposal of waste (waste collection) whose originator is unknown.

w) Promote the provision of support for co-financing the removal of illegal dumps from Ministry of the Environment sources.

3.6.2 Approach to dealing with emergencies and waste generated during them

During crisis situations, waste management is subject to crisis protocols. These protocols use standardized crisis management as set out in the relevant legislation. Other laws governing waste management under normal circumstances are then used as support and are limited to issues not covered by the crisis law.

Principles:

a) Ensure a high level of protection for human health, the environment, and property.

b) Safely manage waste generated as a result of an emergency.

Measures:

a) Operatively determine, through expert estimates, the quantity and composition of waste generated as a result of an emergency, and effectively manage the flow of this waste to disposal facilities or, where appropriate, to recovery facilities.

b) Inform residents (both individuals and legal entities) about the preventive measures necessary to prevent damage before and after an emergency situation and how to proceed during the cleanup.

c) Safely remove waste from areas affected by an emergency.

d) If circumstances permit, ensure adequate sorting of waste into basic components (metals, wood, plastics, hazardous waste, etc.) and disposal in accordance with the waste management hierarchy.

e) Always consider flood-contaminated waste as potentially hazardous and infectious.

f) Do not place temporary landfills in the municipality (interim storage sites) near permanent residences, sports facilities, and recreational areas.

g) The priority method for disposing of hazardous waste is controlled incineration in hazardous waste incinerators and municipal waste incinerators, or it may be temporarily stored in hazardous waste landfills. Open burning of waste in landfills or incineration of waste in open spaces is not permitted.

h) Include waste incinerators among critical infrastructure.

i) Dead animals and spoiled food of animal origin should be disposed of exclusively in sanitation facilities.

3.6.3 Remediation of contaminated sites

Waste policy has long sought to minimize the adverse effects of waste on human health and the environment. Within this framework, the removal and remediation of contaminated sites and environmental burdens is a particularly important aspect.

The following principles and measures will be observed when implementing activities relating to contaminated sites.

Principles:

a) Continue to identify new sites with environmental burdens and enter them into the relevant databases.

b) For unexplored sites, conduct further investigation of rock contamination, including risk analysis if necessary, and assess the need for remediation.

c) Continue remediation.

Measures:

a) Prefer remediation of sites that pose a threat to the environment or human health.

b) Prefer removal of contamination where the source does not exist or is unknown.

c) Prefer remediation of areas with a larger number of people at risk and according to the severity of contamination (e.g., harmfulness of contaminants, priority in SEKM[48], number of environmental components affected).

d) Support activities aimed at raising awareness among potential applicants about available funding options for remediation.

e) Strengthen the role of the Ministry of the Environment in the control and assessment of remediation work.

f) Monitor the condition of sites during and after remediation.

3.7 Establishment of a network of waste management facilities

In order to achieve the objective of establishing a comprehensive, adequate, and efficient network of waste management facilities at the national and regional levels in accordance with the principles of self-sufficiency, while respecting the waste management hierarchy, this network must include facilities of different capacities and significance.

The network of waste management facilities should also include modern and innovative technologies that are more environmentally friendly and, in addition to meeting waste management objectives, help to create high-quality

48 A system for registering contaminated sites.

environment for the population. One of the many objectives is therefore to support waste management facilities with environmental added value.

Regional waste management plans must also contribute to the long-term achievement of the objectives of the Waste Management Plan of the Czech Republic. From the point of view of waste management needs, it is therefore necessary to coordinate the regional waste management plans with the Waste Management Plan of the Czech Republic, but also to check the consistency of the regional plans with the regional plans.

The necessary capacity of the network of facilities is addressed in an economic analysis, a summary of which is included in the Czech Waste Management Plan and is attached as a separate document. **The economic analysis sets out a framework plan for investment in waste management facilities in the Czech Republic.**

In the long term, it is necessary to monitor the need for, economic competitiveness, and sustainability of waste management facilities in relation to the current and potential production of selected waste in the regions. Based on this information, it is then necessary to continuously update construction and investment plans for these facilities. Regional waste management plans help to direct public funding to selected waste management facilities.

The optimization, expansion, and modernization of the network of facilities in the coming years will again be made possible thanks to support from the Operational Program Environment (OPŽP), the Operational Program Technology and Applications for Competitiveness (OP TAK), the Operational Program for Entrepreneurship and Innovation (OP PIK), and possibly other projects still running under the National Recovery Plan as part of the implementation of European Union structural support for the Czech Republic and other support programs. The Operational Program Environment (OPE) for the 2021-2027 programming period was set up to meet the goals of the Czech Republic's Waste Management Plan.

For facilities of national importance, which may include, in particular, waste-to-energy plants or hazardous waste incineration plants whose hazardous components cannot be removed by other means, interregional cooperation must be taken into account. In particular, in the case of hazardous waste, transport logistics should be organized so that such waste is transported for disposal over the shortest possible distance for safety and environmental reasons. This criterion should also be taken into account when planning the construction of such facilities.

Individual regions will set their own primary needs and capacities for waste management facilities and their use within their territory in their waste management plans, in line with waste management and the current status of the Czech Republic's Waste Management Plan and the region's own targets. When analyzing facilities in their territory, regions can work with the Ministry of the Environment.

Objectives

a) To create and coordinate a comprehensive, adequate, and effective network of waste management facilities in the Czech Republic.

b) Build facilities of major importance for waste treatment.

Basic classification of waste management facilities in the Czech Republic and examples

- Facilities for preparation for reuse.
- Equipment for material recovery and recycling of other waste.
- Facilities for material recovery and recycling of hazardous waste.
- Facilities for material recovery and energy recovery from biodegradable waste and biodegradable municipal waste (e.g., facilities based on aerobic decomposition – composting plants or facilities based on anaerobic decomposition – biogas plants).

- Facilities for the recovery of sewage sludge (e.g., composting plants).
- Facilities for the treatment of waste prior to its recovery or disposal by biological processes (e.g., biodegradation), physical-chemical processes (e.g., neutralization), biological and physical-chemical processes (e.g., sludge treatment), mechanical treatment (e.g., sorting, dismantling, crushing), or mechanical-biological treatment.
- Waste collection facilities, facilities for the treatment and collection of end-of-life vehicles, facilities for the treatment and collection of end-of-life products.
- Waste-to-energy plants (e.g. municipal waste-to-energy plants – waste-to-energy plants).
- Equipment for separating metals from waste from municipal waste energy recovery facilities.
- Waste co-incineration facilities.
- Facilities for the disposal of other waste (e.g., landfills).
- Facilities for the disposal of hazardous waste (e.g., landfills, incinerators).
- Waste storage facilities.

Systems for separate collection and separate collection of waste

- Separate collection (sorted/separate collection) of recyclable and recoverable components in colour-coded collection containers (including containers within door-to-door systems), large-capacity containers or bag collection.
- Separate collection and concentration of biological waste, hazardous waste, recyclable and usable municipal waste (metals and others) and construction waste.
- Collection points for end-of-life products (waste electrical equipment, waste batteries, waste tires) and facilities for processing end-of-life vehicles.
- Collection of mixed municipal waste in bins and large-capacity containers and litter bins in public areas.
- Collection of other waste (littering, street sweepings, etc.).
- Waste collection facilities (collection points and collection points with purchase of metals and other waste).

Waste collection and transport systems

- A fleet of specially equipped vehicles for the collection of waste from all types of collection containers (including bag collection).
- Weighing systems for automatic detection of the weight of collected waste and modern systems for detecting waste volume.
- Container carriers with large-capacity containers.
- Logistics operations, transfer stations, waste volume reduction equipment for more efficient long-distance waste transport.
- Automated and robotic systems supporting collection logistics.

Principles for creating a network of waste management facilities:

a) Support the construction of waste management facilities in accordance with the waste management hierarchy.

b) Create conditions for the construction and modernization of a nationwide network of waste recycling facilities.

c) Create conditions for the construction and modernization of a nationwide network of hazardous waste treatment facilities.

d) Support innovative recycling technologies.

e) Support innovative thermochemical technologies, including chemical recycling.

f) Utilize existing waste management facilities that meet the required technical standards (as per letter g).

g) Design new waste treatment facilities in accordance with legislative and technical requirements and best available techniques.

h) Support from public funds for the construction and modernization of waste management facilities whose operation is economically and technically proven to be effective at the regional and national level, taking into account the adequacy of the existing network of facilities and in accordance with regional waste management plans and the Waste Management Plan of the Czech Republic.

i) As part of the evaluation process relating to public support, assess waste treatment facilities in terms of securing the supply of the relevant types of waste to be treated, including an assessment of evidence that there is sufficient waste in the area for the waste treatment technology or system and that the facility is adequate in terms of capacity.

j) As part of the evaluation process relating to public support, assess waste treatment facilities in terms of contractual arrangements for the sale of outputs from the facility.

k) When providing public support for the material use of biodegradable waste, emphasize compliance with the closed cycle and require proof of guaranteed sales for the use of compost on agricultural land or for recultivation.

l) Prefer and support from public sources the construction of waste treatment facilities whose output is a material that can be further used.

m) Recommend public funding for waste treatment facilities that are regionally significant in terms of capacity and will be an integral part of the waste management system.

n) A recommendation from the region will be required to demonstrate the need for a facility with the proposed capacity in the region and to support this facility from public sources. The region's recommendation will be based on compliance with the valid regional waste management plan and on evidence of a deficit of such facilities identified in the evaluation of the implementation of the regional waste management plan.

o) Gradually incorporate requirements for the creation of a network of waste management facilities into the set of spatial planning outputs as an important basis for decisions on further development (especially industrial zones).

p) Do not support the construction of new landfills.

q) Provide information on the criteria and conditions set at European Union level for when waste ceases to be waste in a facility and, if necessary, propose possible criteria at national level.

r) Support research projects focused on the development of new technologies for waste utilization, recycling, and processing, or the verification of technologies and waste management facilities not yet in operation in the Czech Republic.

Measures for the creation of a network of waste management facilities:

a) Continuously evaluate the network of waste management facilities at the regional level.

b) Evaluate the network of waste management facilities at the national level.

c) Based on the current status of the implementation of regional waste management plans, determine the waste management facilities needed in the regions.

d) Based on the current status of the implementation of the objectives of the Waste Management Plan of the Czech Republic, determine the waste management facilities recommended and preferred for support from public sources.

Waste collection

In order to achieve the objective of establishing a comprehensive and adequate network of waste collection facilities at the national level in accordance with the waste management hierarchy and in order to maximize the use of waste as a source of raw materials, modern systems for the separate collection and collection of municipal waste must be developed. The development of separate collection systems should aim to reduce greenhouse gas emissions from waste deposited in landfills, inter alia by giving preference to separate collection systems at higher levels of the waste management hierarchy. The aim should continue to be to maintain waste collection facilities (collection points and collection points with purchase of metals and other waste) w i t h restrictions on mobile facilities and metal waste, to tighten the licensing system and, in the event of a breach of the law, to revoke the operating licence for waste collection facilities.

Principles for waste collection:

a) For collection yard projects, separate collection of paper, plastics, glass, metals, wood, textiles, bio-waste, edible oil waste, bulky waste, hazardous components of municipal waste, and space for setting up a take-back point for end-of-life products as part of a service for manufacturers, in particular take-back points for electrical equipment. Collection yards with space for the collection of movable items from citizens as part of waste prevention will be given preference for support from public sources.

b) Support the separate collection (sorted collection) of recyclable and recoverable components of municipal waste, including packaging, through a sufficiently dense and accessible network of collection points in municipalities, at least for paper, plastics, glass, metals, and textiles, provided that existing separate collection systems are used, and a network of take-back systems for end-of-life products provided by obligated entities, i.e., manufacturers, importers, and distributors.

c) Support separate collection of biological waste, both of plant and animal origin.

d) Support separate collection of hazardous components of municipal waste and achieve environmentally safe waste management.

e) In waste collection facilities, allow the purchase of waste from citizens (provision of financial resources for waste) only in accordance with applicable legislation.

f) At take-back points for end-of-life products, continue to allow citizens to return these products free of charge in accordance with applicable legislation.

3.7.1 Slag waste from waste-to-energy plants

Slag from waste-to-energy plants has considerable potential as a construction material for selected building applications.

Objectives

a) Increase the material recovery rate of slag from the incineration of other waste, in particular municipal waste.

Principles

a) Use high-quality slag (waste category 19 01 12) from the incineration of other waste, especially municipal waste, in waste-to-energy plants for backfilling and construction in accordance with applicable legislation.

Measures:

a) Ensure proper waste management of slag from waste-to-energy plants, especially municipal waste.

b) Monitor the content of substances in slag waste.

c) Educate and raise awareness about the possibility of using slag as a building material, e.g., for layers in the construction of roads.

3.8 Principles for decision-making on cross-border transport, import, and export of waste

In order to achieve the objective of not endangering human health and the environment as a result of cross-border movements of waste and not jeopardizing the fulfillment of the Czech Republic's binding targets under European legislation, proceed in decision-making on matters of cross-border transport, import and export of waste in accordance with the principles set out in Regulation (EU) No 2024/1157 of the European Parliament and of the Council on the shipment of waste, as amended (hereinafter referred to as the "Waste Shipment Regulation"), and in accordance with the requirements of European regulations setting binding waste management targets for the Czech Republic.

Objective:

a) Not to endanger human health, the environment, or the fulfillment of the Czech Republic's obligations or binding targets under European legislation as a result of the transboundary movement of waste.

Principles

a) In enforcing the Waste Shipment Regulation, the Ministry cooperates with neighboring countries and, within the Czech Republic, with public authorities, particularly in the area of methodology and control of cross-border waste shipments.

b) When assessing plans for cross-border shipments of waste to the Czech Republic, the Ministry shall cooperate with the relevant regional authority. The Ministry may prohibit or restrict shipments of waste to the Czech Republic if the regional authority does not recommend such shipments.

c) Waste generated in the Czech Republic shall be used primarily in the Czech Republic, and if this is not possible, in other Member States of the European Union.

d) Cross-border shipment of waste from the Czech Republic for the purpose of disposal is permitted only if there is insufficient capacity in the Czech Republic to dispose of the waste in question in an efficient and environmentally sound manner.

e) Cross-border transport of waste to the Czech Republic for disposal is prohibited, with the exception of waste generated in neighboring countries as a result of natural disasters or emergencies.

f) Cross-border transport of waste to the Czech Republic for recovery, including treatment prior to recovery, is permitted only to facilities that are operated in accordance with applicable legal regulations, have sufficient capacity, and only if this does not jeopardize the fulfillment of the Czech Republic's obligations or binding targets under European legislation. All stages of waste management are assessed until the waste is transferred to the final facility for recovery or disposal.

g) In order to protect the network of facilities, the Ministry may prohibit or restrict the transport of waste to the Czech Republic for energy recovery, including all treatment of waste prior to energy recovery, if, as a result of cross-border transport, waste generated in the Czech Republic would have to be disposed of or waste generated in the Czech Republic would have to be treated in a manner that is not in accordance with waste management plans or the obligations laid down in the Waste Act.

h) The Ministry may prohibit or restrict the shipment of waste listed in Annex II to the Basel Convention to the Czech Republic in accordance with Article 4(1) of that Convention if, as a result of transboundary shipment, the fulfillment of the obligations or objectives of waste management set out in the Waste Act would be jeopardized.

i) The Ministry may, for the purpose of protecting the network of waste management facilities and infrastructure, prohibit or restrict the shipment of other types of waste to the Czech Republic if the transboundary shipment would jeopardize the fulfillment of obligations or binding targets set for the Czech Republic by European legislation.

j) The use of waste (in particular sludge from wastewater treatment plants) generated in the Czech Republic shall take precedence over the use of waste transported from abroad.

3.9 Set of indicators for evaluating the fulfillment of the POH CR objectives

The Czech Republic has set basic key indicators for monitoring the state of waste management and the implementation of the POH ČR. The indicators are based on recommendations from the UN, EC Eurostat, and EEA.

Indicators are basic indicators used to continuously assess the status and development of waste management in the Czech Republic. Quantitative and qualitative indicators enable the monitoring of the implementation of the Waste Management Plan of the Czech Republic. The Ministry regularly evaluates the set of waste management indicators and ensures that it is updated. The Ministry develops methodologies for evaluating the fulfillment of the Waste Management Plan's objectives and establishes a methodological approach for determining waste management indicators and other basic data on waste.

Data from the Ministry's basic information source, the Waste Management Information System (ISOH), containing data from entities subject to the Waste Act, the End-of-Life Products Act, and the Act on the Reduction of the Impact of Selected Plastic Products on the Environment, will be used to calculate waste management indicators. Information from other departmental databases may also be used.

The basic indicators of the indicator system enable a basic assessment of waste management at the national and regional levels. If necessary, other available data on waste flows are also used to assess waste management.

The POH ČR contains an overview of the basic key indicators used to evaluate waste management (Annex 2).

The Czech Republic has also adopted indicators for monitoring the effectiveness of preventive measures recommended by the European Environment Agency (EEA, 2023) for monitoring long-term trends in waste prevention. The main objective of the PPVO is to create conditions for lower consumption of primary resources and a gradual reduction in waste production. The main quantitative indicator is specific waste generation. However, waste generation is also influenced by external factors, in particular economic growth and other macroeconomic indicators. The effectiveness of preventive measures cannot therefore be monitored solely by changes in waste generation, but must also be considered in a macroeconomic context. The separation of economic growth from waste generation is precisely the purpose of the targets and measures.

Contextual indicators allow external factors to be taken into account when evaluating the success of waste prevention measures. These indicators can also be used to convert the values of other indicators (e.g., amount of waste per capita).

Data collection system

The waste recording system for waste producers and authorized persons and the waste management data collection system will continue to be used, enabling the monitoring of developments and the identification of trends in waste and circular economy management over longer periods of time.

Furthermore, the Ministry of the Environment will systematically collect comprehensive data on municipal waste prevention, municipal waste management, data on the setting up of municipal waste management systems, including economic data, and data on related technologies to which municipal waste is transferred for treatment.

When collecting data on waste management, emphasis will be placed on ensuring data quality and traceability. Data control and validation will be strengthened. The Waste Act, the End-of-Life Products Act, and the Act on the Reduction of the Impact of Selected Plastic Products on the Environment establish a system for record-keeping, reporting, and data collection in the field of waste management.

The central government authority responsible for waste management (Ministry of the Environment) and the central administrative authority for statistical services (Czech Statistical Office) will continue to collect and evaluate data on waste management in the coming period in accordance with the signed Memorandum of Cooperation on Waste Statistics.

3.10 Recommendations regarding the economic aspects of implementing the priorities, objectives, principles, and measures of the POH CR 2025-2035

The key recommendation in relation to the economic aspects of the Waste Management Plan of the Czech Republic for 2025-2035 is to comply with the principles and measures of the WMP and to comply with the principles and measures in the area of waste prevention (3.4), individual waste streams (see Chapter 3.5) and other specific areas of waste management. Another important recommendation is to base decisions in the field of waste management on the Economic Analysis (4.4), which was prepared on the basis of a large amount of data on waste management in the Czech Republic. This is the only way to achieve the strategic and partial objectives and priorities of the POH ČR.

The waste management plan offers economic tools that can significantly influence waste production and treatment methods, such as landfill fees, municipal waste treatment system payments, and subsidy tools aimed at constructing or modernizing waste treatment and disposal facilities. The economic impact of meeting the WMP objectives and principles depends largely on how these tools are designed to function – whether primarily as incentives (prevention and minimization of waste generation) or as fiscal measures (source of public budget funds).

In the case of landfill fees (see 4.4.2 below), the main decisions concern the amount of the fee, who should receive it, and what it can be used for. If this fee is intended to serve as an incentive, it should be set according to the cost of alternative (environmentally desirable) methods of waste management, such as material recovery or energy recovery. The tipping point for determining the amount of the fee is when the costs of landfilling are equal to the costs of alternative waste management methods, i.e. when the waste producer is indifferent between the different waste management methods. Setting the fee at a level that does not encourage substitution reduces the effectiveness of this economic instrument. Simply put, given the ban on landfilling from 2030, the fee for landfilling waste should be set at a sufficiently high level to motivate waste producers to use alternative methods of

. These methods should be at higher levels of the waste management hierarchy, and waste producers should have easier access to them.

Another factor that may contribute to the achievement of the Czech Republic's WMP objectives is the redistribution of these fees to waste management entities responsible for waste management strategy and which allocate funds to projects that can significantly contribute to the achievement of the objectives. Redistribution of the fee, in particular to the State Environmental Fund or to the regions, provided that the condition of purposefulness is met, can thus ensure that, for example, facilities with the preferred method of treatment (e.g., material or energy recovery of waste) are built in the necessary areas.

The effectiveness of payments for municipal waste management systems is also influenced by the decision as to what function these fees are to fulfil. If these payments are to fulfil an incentive function, their structure must respect the performance of municipal waste management systems (volume of production, frequency of collection, volume of collection containers, length of collection routes, etc.). Setting a flat fee for the operation of the municipal waste management system fulfills the fiscal function (filling municipal budgets), but it removes the incentive for households to adopt environmentally desirable waste management practices.

The effectiveness of subsidy instruments (from public, state, and European budgets) depends on whether the criteria for a circular economy are met, i.e., whether material and financial flows are closed. The construction of waste management facilities therefore makes sense if their operation can be financed from external sources (e.g., through the sale of suitably treated waste or secondary raw materials). The operation of these facilities is only sustainable if the income from sales covers the costs.

4 Guideline

4.1 Conditions and prerequisites for achieving the objectives set out in the POH ČR

Proper fulfillment of the set objectives depends on a number of factors. Some factors can be influenced to a greater or lesser extent by waste management actors, while others are completely beyond their control. If all conditions are met, it can be assumed that the objectives set by the POH CR 2025-2035 will be achieved. The most important conditions include:

- A stable legal and economic environment in areas affecting waste management, enabling long-term investment projects.
- Responsibility of the state and relevant entities for the objectives, principles, and measures set out in the POH ČR, including the Waste Prevention Program and the Food Waste Prevention Program.
- Raw material security, preference for the use of waste and secondary raw materials within the Czech Republic.
- Obtaining critical raw materials from waste and their use in the Czech Republic.
- Preparedness and resilience to deal with crises and emergencies (e.g., natural disasters).
- Waste Prevention Program and Food Waste Prevention Program, which motivate residents, municipalities, and companies to take greater responsibility for the environment and human health.
- Support for the development of technologies in the field of waste treatment, utilization, and recycling for the purpose of process automation with the aim of effectively increasing the quantity and quality of secondary raw materials and recycled materials for use in the Czech national economy.
- Ensuring and guaranteeing the origin and properties of recycled materials, including quality control, with regard to the requirements of high-quality recycling in terms of meeting waste management and circular economy objectives.
- Support for green and circular public procurement.

4.2 Tools for implementing, enforcing, and monitoring the fulfillment of the Czech Republic's waste management objectives

Below is an overview of tools that will help achieve waste management objectives. These tools are described in detail below.

Table 91: Instruments for enforcing and monitoring the fulfilment of the objectives of the POH CR

LEGAL INSTRUMENTS

- Legal order of the Czech Republic
- Laws, implementing regulations, amendments to laws, review and regulation
- Regional waste management plans
- Exercise of public administration control powers
- Legal framework for reporting companies' ESG activities

VOLUNTARY INSTRUMENTS

- Voluntary agreements on Waste management
- Voluntary improvement of the quality of waste management entities
- Corporate social responsibility
- Ecolabelling
- Environmental product declarations

ECONOMIC INSTRUMENTS

- Green and circular public procurement
- Landfill waste disposal fee
- Reduced municipal waste landfill fee for municipalities until 2029
- Fee for energy recovery and incineration of waste
- Extended producer responsibility systems
- Cross-border transport – financial guarantee
- Financial guarantee and insurance for the first phase of landfill operation under the Waste Act
- Financial reserve for reclamation and after-care following the closure of a landfill
- Deposit systems for selected packaging waste under the Packaging Act
- Eco-modulation
- Emission fee
- Penalties and fines
- Payments for municipal waste
- Support from the State Environmental Fund of the Czech Republic
- Funding from the state budget
- Local budget expenditures
- Support from EU programs and funds
- Tax measures and relief
- Other support and subsidies provided by other ministries
- Investment incentives and bank guarantees

ADMINISTRATIVE TOOLS

- Ensuring uniform performance of state administration
- Improving the expertise of public administration staff
- Strengthening the powers of relevant state administration control bodies
- Awarding green and circular public contracts
- Supporting desirable activities
- Environmental education, training, and awareness
- Professional support for the performance of state and public administration
- High-quality material equipment for supervisory authorities
- Support for research, experimental development and innovation

INFORMATION TOOLS

- Information concept of the Ministry of the Environment
- Communication strategy for waste management
- Methodological guidance in the field of waste management
- Uniform environmental information system
- Hazardous waste transport registration system
- Assessment of hazardous properties of waste
- Waste management agenda information system
- Public consultation system within the EIA/SEA process
- IPPC Information System
- Integrated Pollution Register

- Waste Management Council
- Other information systems of the Ministry of the Environment and other state administration bodies

4.2.1 Legal instruments

The legal system of the Czech Republic, in particular the set of legal regulations governing the environment, waste and circular economy, and relevant technical standards

The legal framework of the Czech Republic includes a set of legal regulations governing the environment, waste and circular economy, and technical standards. These legal regulations are listed in Annex 1. The most important ones include Act No. 541/2020 Coll. on waste, Act No. 542/2020 Coll. on end-of-life products, No. 477/2001 Coll. on packaging, as amended, and Act No. 243/2022 Coll. on the reduction of the impact of selected plastic products on the environment, which lay down the obligations established by EU legislation, in particular directives and regulations on waste and circular economy. There are also implementing regulations for the above-mentioned laws. Further legislative regulations are listed in the annex to this document.

Amendments to laws, regulatory review

Amendments to laws, adaptation and implementation of EU regulations, and regulatory review are important tools for promoting the achievement of the POH CR objectives. Amendments to laws include changes or additions to existing legislation.

Strategic documents of the Czech Republic

The circular economy is also regulated at the strategic level. The key document for other sectoral and regional policies in the field of the environment is the State Environmental Policy of the Czech Republic 2030 with a view to 2050. Other important documents include the Strategic Framework for the Czech Republic 2030, the Strategic Framework for the Circular Economy of the Czech Republic 2040, known as "Circular Czech Republic 2040," the Raw Materials Policy of the Czech Republic, the Secondary Raw Materials Policy of the Czech Republic, and the State Energy Policy of the Czech Republic. These documents are of key importance for other sectoral and regional policies in the field of the environment. A list of other strategic documents is provided in the relevant chapter of the POH ČR.

Regional waste management plans

At the regional level, waste management plans serve as strategic documents in the field of waste and circular economy. These documents (among other things) serve as a basis for the preparation of spatial planning documentation for regions and municipalities.

Exercise of public administration control powers

Control authorities have the power to sanction violations of laws relating to waste and circular economy, and the laws set out obligations that are subject to sanctions. However, it is important to further improve the conditions for control authorities and to strengthen the practical implementation of control powers and the enforcement of legal obligations by all relevant administrative authorities.

Legal framework for reporting on companies' ESG activities

Companies' activities have great potential to contribute to the transition to a circular economy. Large companies are required to report on environmental and social issues, including human rights and anti-corruption measures.

In 2020, the EC set criteria for sustainable business activities, known as the EU taxonomy. In the area of the transition to a circular economy, the activities of companies that reduce waste production waste and increase recycling rates49. The regulation aims to channel capital into sustainable activities by raising the visibility of sustainable activities.

The obligation to report non-financial activities was strengthened in 2023 with the entry into force of Directive 2022/2464, known as the CSRD (Corporate Sustainability Reporting Directive). This will significantly increase the number of companies required to report non-financial information in several waves. To ensure consistency in reporting and reduce the administrative burden, the EFRAG (European Financial Reporting Advisory Group) issued ESRS reporting standards in 2023, which were adopted by the EC in the same year in the form of Regulation 2023/2772. In the area of the circular economy, companies report, among other things, targets and indicators focused on resource use, waste generation, and waste management. The first reports prepared in accordance with the CSRD will be ready in 2025 for the 2024 financial year.

4.2.2 Economic instruments

Green and circular public procurement

From January 1, 2021, public contractors must comply with the principles of socially and environmentally responsible public procurement in accordance with the Public Procurement Act. In addition to the above, an environmentally responsible approach to public procurement is also part of the methodology of "green public procurement." This is a tool for achieving environmental policy objectives, which public authorities use to select suppliers of products, services, and works with a lower environmental impact throughout their life cycle. When awarding public contracts, for example, the impact on the environment, sustainable development, the life cycle of the supply, services, and other aspects must be taken into account.

Public procurement/purchasing is often the only way for services or products to reach public organizations and local governments. Green public procurement has great environmental potential and can serve as an accelerator for the circular economy. Increased demand for products using recycled materials instead of primary raw materials can significantly boost the production of recycling companies and contribute to the achievement of the Czech Republic's recycling targets. Last but not least, green procurement is a means of integrating sustainable management into municipal practice and can thus support economic growth in regions.

Another shift in public procurement is circular procurement, whereby public authorities purchase works, goods, or services that contribute to closing energy and material loops in supply chains. While green procurement focuses on environmentally friendly products, circular procurement takes into account an additional aspect, namely how a product will be handled at the end of its life or when I, as a consumer, no longer need it. By taking product life cycles into account, negative environmental impacts and waste generation can be significantly minimized throughout the entire life cycle. Circular procurement has the potential to increase reuse and recycling rates and bring about circular business models and methods, for example through product service systems and changes in material ownership. Public authorities can thus lead by example and stimulate circular activities.

Landfill charge

A fee is charged for the disposal of waste at a landfill site. The fee is payable by the person who loses ownership of the waste when it is handed over for disposal at a landfill site; the municipality, if it is the producer of the municipal waste being disposed of, or the landfill operator, if it has disposed of the waste at a landfill site operated by it.

[49]For a complete list of criteria, see Regulation (EU) 2020/852 of the European Parliament and of the Council, Article 13. Available at: https://eur-lex.europa.eu/legal-content/CS/TXT/HTML/?uri=CELEX:32020R0852

or designated the waste as technological material for the technical safety of the landfill when depositing it at the landfill.

The subject of the landfill fee is the disposal of waste at a landfill during the first phase of its operation. The basis for the landfill fee is the sum of the partial fee bases, which consist of the weight of recyclable and recoverable waste; hazardous waste, with the exception of asbestos and waste from remediation; selected technological waste; hazardous waste from the removal or remediation of environmental burdens, if the disposal of such waste in a landfill is paid for from public funds; and residual waste, i.e., waste not listed above and asbestos.

The rates are set to encourage a shift away from landfilling towards recovery methods in line with the waste hierarchy. For recoverable waste, which will be banned from landfills from 2030, the fee will be increased in subsequent years to encourage a gradual reduction in the landfilling of such waste. The fee for hazardous waste remains low, as high fees in the past led to significant efforts to circumvent payment or illegal disposal.

Exemption from the landfill fee is possible when waste is disposed of as part of crisis management measures under the Crisis Act. Furthermore, waste may be disposed of as technological material for technical landfill maintenance (hereinafter referred to as "TTS") up to 25% of the total weight of waste disposed of at the landfill during the fee period.

The landfill fee is calculated as the sum of partial fees. A partial fee is calculated as the product of the partial fee base and the rate. The landfill fee rate for individual partial fee bases is set out in the Waste Act. The landfill operator is responsible for paying the landfill fee. The State Environmental Fund of the Czech Republic is responsible for administering the landfill fee. The payment of the fee is administered by the customs office. The revenue from the landfill fee is allocated to the budget of the State Environmental Fund of the Czech Republic and the budget of the municipality in whose territory the landfill is located, with the percentage shares set out in the Waste Act.

Reduced fee for municipal waste disposal at landfills for municipalities, known as the "Discount"

The municipality will pay a fee of CZK 500 per tonne for the disposal of municipal waste only up to a certain amount of recyclable waste per resident in a given calendar year. If this amount is exceeded, the municipality will have to pay a fee for recyclable waste. From 2029, municipal waste that meets the conditions of usability under the law (with the exception of hazardous waste) and is produced by the municipality will be included in the partial basis for the municipal waste disposal fee, provided that the total weight of such waste deposited in any landfill does not exceed the amount specified in the Waste Act. The limit on the amount of waste deposited in landfills will be reduced annually on a degressive basis in order to support the intention to reduce the landfilling of recyclable municipal waste and to strengthen the waste management hierarchy.

Fee for energy recovery and incineration of waste

If necessary, a fee for energy recovery and waste incineration may be introduced. The capacity of waste-to-energy plants and the amount of waste recovered for energy and incinerated, including municipal waste, will be continuously assessed, and if the energy recovery rates exceed the levels set by the Waste Act, the Czech Republic will proceed with appropriate modulation of such a fee.

Extended Producer Responsibility (EPR) systems

Extended Producer Responsibility (EPR) is an effective concept for managing material flows in waste management that minimizes net economic (social) costs and helps implement desirable elements of environmental protection, in particular material circularity. The OECD defines an extended producer responsibility system as an approach to environmental policy in which the responsibility of the producer is extended to the stage of the product life cycle that follows its use by the consumer. There are two main features of this approach. The first is the transfer of responsibility (physically or economically, fully or partially) to the manufacturer (and away from municipalities). The second is the provision of incentives to manufacturers to incorporate environmental requirements into their products at the design stage. The EPR system is generally based on the polluter pays principle.

Natural persons or legal entities that place certain end-of-life products on the Czech market or into circulation are required to meet specific requirements for the take-back of these products, provide information about them, finance certain activities and awareness-raising, and ensure appropriate waste management and compliance with the specified percentage of waste recovery, recycling, and reuse.

EPR can be considered a tool for ensuring the effective achievement of policy objectives across a wide range of sectors. It is a proven tool that delivers good results (experience particularly in the field of packaging waste and electrical equipment).

The introduction of an extended producer responsibility system for individual commodities should always be in line with European Union requirements and following consultation with stakeholders in the sector concerned. The extended producer responsibility system should ensure effective financing and achievement of the targets set for the commodities concerned, while also acting as the system organizer. The extended producer responsibility system should contribute to ensuring a functioning market for the commodity concerned.

In the Czech Republic, EPR currently operates in the areas of packaging, waste electrical and electronic equipment, tires, batteries, end-of-life vehicles, tobacco products with filters, and filters placed on the market for use in combination with tobacco products. EPR should also be extended to wet wipes for personal hygiene or household cleaning and balloons.

EPR can also be extended to other product groups (e.g., furniture, selected plastic products, and others). These commodities are usually complex products made of different materials, which makes them difficult to recycle. In addition, they often have a low market value at the end of their life, which means high costs for companies to process them properly. If manufacturers commit to an EPR system, they are obliged to ensure the collection and recycling of products at the end of their life. The aim of introducing these systems is to improve waste management and move towards a circular economy.

The introduction of extended producer responsibility is appropriate if targets can be set in the area concerned. These targets should have a positive impact on the environment, for example by eliminating negative externalities, encouraging a shift to desirable levels of the waste hierarchy, increasing collection, recycling and the use of recycled materials, etc.

If the aim of introducing EPR is to generate financial resources for the collection, separation, and disposal of waste without added value in the form of measurable targets, streamlining material flows, etc., then the de facto task is to finance a certain proportion of municipal waste. EPR can be used for this purpose, but so can other instruments, which are likely to involve lower transaction costs and therefore greater efficiency.

Cross-border transport – financial guarantee

The Ministry uses the financial guarantee to finance the alternative use or disposal of waste, including the necessary preliminary procedures, waste storage and transport costs, if the notifier, consignee or other responsible person fails to meet all their obligations under the Waste Shipment Regulation.

Financial guarantee and insurance for the first phase of landfill operation under the Waste Act

Before commencing the first phase of landfill operation, the operator has a legal obligation to secure funds for this purpose. This includes taking out insurance to cover liability for damage to the environment, human health, and property caused by landfill operation during the first phase of operation or as a result of termination of operation during this phase. At the same time, the operator must deposit the relevant amount in a special escrow account or provide a bank guarantee in accordance with the Banking Act. The amount is determined on the basis of an expert opinion that estimates the costs of remedying potential damage. The guarantee must remain valid throughout the first phase of the landfill's operation, and the funds may only be drawn with the consent of the regional authority and only for predetermined purposes. Interest on the funds in the account becomes part of the funds designated for this purpose.

Financial reserve for recultivation and subsequent care after the end of landfill operation

During the first phase of landfill operation, the operator is required to create and maintain a financial reserve to ensure reclamation, subsequent care, and closure of landfills after the end of operation. This reserve is created by the operator as part of its costs and includes interest. This is a positive measure, the creation and use of which is regulated by law. The funds may be used for work related to the reclamation and subsequent care of the landfill, subject to the approval of the competent regional authority.

Deposit systems for returnable packaging under the Packaging Act

In the Czech Republic, the voluntary introduction of a deposit system for manufacturers is permitted. In the future, it will be possible to use deposits on products to a much greater extent. The introduction of such systems has the potential to contribute to high waste separation rates and the achievement of waste management targets. The introduction of a deposit system should be preceded by an impact analysis and discussions with stakeholders. The introduction of a deposit system is currently being discussed in the Czech Republic, which should increase the sorting rate of selected types of beverage packaging – PET bottles and beverage cans. This change is brought about by a draft amendment to the Packaging Act No. 477/2001 Coll., which is designed to ensure that all participants in the existing system find their role and to reflect and fulfill the government's program statement and the Circular Czech Republic 2040 strategy. The introduction of the deposit system is also expected to have a positive impact on municipal budgets. The deposit system will be based on an optimal technological solution.

Ecomodulation

Ecomodulation is a tool that focuses on extended producer responsibility (EPR) and is not limited to packaging, but also applies to other products such as electrical equipment, batteries, tires, and essentially any other product. This system allows fees to be set in such a way that manufacturers are encouraged to use solutions that minimize the negative impact on waste management while having a positive impact on the circular economy and the environment. Eco-modulation is linked to a recycling contribution that manufacturers pay for used materials, packaging, and environmental friendliness, primarily for their recyclability. It motivates producers and importers to design products and packaging, including their functions, minimum size, and appropriate mix of materials for recycling. The fees should take into account a range of criteria such as the durability of products, their reparability, reusability, content of hazardous substances, and the ease of sorting packaging. These fees should reflect the real costs of recycling different types of materials and strengthen the waste management hierarchy.

Emission fee

The fee is collected when registering road vehicles of categories M1 and N1 (hereinafter referred to as "selected vehicles") in the road vehicle register or when changing their owner or operator in the road vehicle register. The fee is not payable if the applicant (payer) has already been liable to pay the fee in the past and has not been exempted. The purpose of this fee is to prevent the import of older vehicles from abroad into the Czech Republic and to speed up the withdrawal of old vehicles that pollute the air the most. The fee is CZK 3,000 if the vehicle meets the EURO 2 emission limits, CZK 5,000 if it meets the EURO 1 emission limits, and CZK 10,000 if it does not meet the EURO 1 emission limits. The funds from this fee are used to support the recycling of materials from dismantled end-of-life vehicles. The support depends on the quantity of commodities (tyres, plastics, glass, textiles) that are handed over for processing. Alternatively, these funds can also be used to support infrastructure and the purchase of alternative fuel vehicles. The proceeds from this fee go into the State Environmental Fund budget.

Penalties and fines under the Waste Act, the End-of-Life Products Act, the Packaging Act, the Municipalities Act, and the Offenses Act

The laws must establish high sanctioning powers for supervisory authorities in the exercise of their supervisory powers. Serious damage to the environment must be severely punished in order to have a deterrent effect. However, the aim is also to effectively address situations where the supervisory activities of administrative authorities reveal breaches of legal obligations that are less serious and may not even have an immediate impact on the environment (such as administrative offenses or environmental violations). The current legislation allows for the imposition of fixed penalties or the adoption of corrective measures without imposing financial penalties. This is an effective tool for protecting the environment and indirectly contributes to the fulfillment of the waste management hierarchy. One of the penalties used is a penalty for municipalities for failing to meet the sorting targets set by the Waste Act. The possibility of introducing a graduated penalty for municipalities in the area of meeting sorting targets linked to the specific production of municipal waste will be considered.

Payments for municipal waste

From January 1, 2021, the regulation of fees charged to citizens is limited only to the Local Fees Act No. 565/1990 Coll., as amended. The municipality has the option of choosing either a fee for the municipal waste management system or a fee for the disposal of municipal waste from immovable property. The fee for the municipal waste management system is linked to the permanent residence of persons or to the ownership of immovable property in which no person is registered, and the municipality introduces it at a uniform rate for all taxpayers. The Local Fees Act also allows for exemptions and relief from this fee for certain groups of residents, taking into account their social situation and other factors. The fee for the disposal of municipal waste from immovable property is based on the actual amount of waste produced by citizens, or from the capacity of collection facilities ordered for the fee period, and the municipality may set the amount for individual taxpayers based on the amount (weight or volume) of waste they produce or the capacity of the collection facilities ordered (PAYT system=). The PAYT principle reinforces the waste management hierarchy. Both fees are assessed and enforced by the municipality, otherwise the fee is subject to the procedural regime of the Tax Code.

Support from the State Environmental Fund of the Czech Republic (waste management)

The State Environmental Fund (SFŽP) provides significant support in the area of waste management. Various financial instruments are used for this purpose, such as loans, subsidies, and others, which are focused on supporting waste and circular economy management and strengthening the implementation of the waste management hierarchy.

Funding from the state budget (primarily for waste collection and transport)

In terms of public resources, the state budget is the most important source of funding for environmental protection, and this also applies to the waste sector. The state budget is used primarily to co-finance environmental protection projects that are supported by EU funds. In addition, the state budget finances subsidies, repayable financial assistance (interest-free loans), investment incentives, and guarantees for commercial loans. Furthermore, funds are transferred to regional budgets and the State Environmental Fund. This financial instrument will continue to be actively used.

Expenditure from regional budgets (primarily for municipal waste collection and transport)

Environmental financing from regional budgets is an important public source of funding for waste management. Waste management has long been one of the most supported areas. Regional budgets mainly support smaller-scale measures. This financial instrument will continue to be actively used.

Support from EU programs and funds

The Czech Republic benefits from funds that form the basis of European structural policy and support the balanced and sustainable development of all member states. Specifically, this involves the Operational Program Environment (OPŽP 21+). The Operational Program supports investments that are key to the development of the waste management sector and compliance with the waste management hierarchy. In addition, it will be possible to use newly created funds, such as the Just Transition Fund for so-called "coal regions" or the Modernization Fund. The National Recovery Plan will be used to support investment and economic recovery after the COVID-19 pandemic.

It is expected that a follow-up program (OPŽP28+) will be established in the 2028-2035 programming period to support relevant areas of waste management.

Tax measures and relief (for selected activities, products, etc.)

The possibility of using this financial instrument will be considered, particularly with regard to EU legislation. Taxation of primary raw materials, etc., may also be considered and revised to support the use of secondary raw materials. The introduction of further tax incentives for products with a high recycled content will also be considered in order to stimulate demand for recycled materials.

Other support and subsidies provided by other ministries

It is possible to use funds earmarked for the development of waste management and the modernization of technologies in the form of subsidies, loans, business support programs, and others.

Investment incentives and bank guarantees

In the case of strategically important investments (e.g., waste treatment facility capacity, modern technologies), the state may consider using investment incentives and bank guarantees to stimulate and motivate investment.

4.2.3 Administrative tools

Ensuring uniform state administration in the field of environmental law (waste management)

Legislation in the field of waste management, laws, and related implementing regulations contribute to the harmonization of state administration in waste management.

Improving the expertise of public administration staff in waste management and related areas

Professional training for public administration staff in the field of waste management will continue to be part of the management system of the Ministry of the Environment. The aim is to harmonize the interpretation of the Waste Act and its implementing regulations at the level of regional authorities and authorized municipalities, as well as the Czech Environmental Inspectorate. Emphasis is placed on methodological guidance from the Ministry of the Environment and regional authorities.

Strengthening the powers of the Czech Environmental Inspectorate and other state administration control bodies

Ensuring optimal conditions for the effective performance of control activities through sufficient professional and human resources, financial and technical support.

Green public procurement

The possibility of including environmental requirements and criteria in public procurement should be exploited, and contracting authorities should be given greater incentives to do so. This should be facilitated by an amendment to the Public Procurement Act (No. 543/2020 Coll.), which imposes an obligation on contracting authorities to comply with the principles of socially responsible and environmentally responsible procurement and innovation. Documents such as Government Resolution No. 531 of July 24, 2017, on rules for applying a responsible approach to public procurement and purchases by state and local government, also serve to support green procurement. Part III of document No. 781/17 was approved to support compliance with the principles of responsible procurement and purchasing by state and local government. In 2020, the Public Procurement Act (No. 134/2016 Coll.) was amended to include the obligation for contracting authorities to comply with the principles of socially responsible procurement, environmentally responsible procurement and innovation when drawing up tender specifications, evaluating tenders and selecting suppliers. This approach should lead to a preference for products containing recycled materials and strengthen the waste management hierarchy. Public procurement can also contribute to increasing the use of products with recycled content, reparability, and extending the life of products by including these criteria in public contracts.

Supporting desirable activities leading to the prevention of waste generation, reduction of its quantity and hazardous properties, and prioritizing products made from recycled materials and environmentally friendly products

Tools will be adopted to implement the measures set out in the Waste Prevention Program and strengthen the waste management hierarchy. Some of these include methodological recommendations on extending the life of products, reducing waste production, prioritizing the reuse of products and recycled materials, and including appropriate criteria in the terms and conditions of public tenders announced by public authorities and other similar measures.

Environmental education, training, and awareness (hereinafter referred to as "EVVO")

This is a preventive systemic tool that promotes sustainable and environmentally responsible behavior by individuals. This tool includes standard education and training for children and young people, various awareness-raising events and campaigns for the public, the provision of environmental advice, as well as civic activism and participation in environmental protection and waste management. The EVVO program for 2016-2025 is currently underway, setting out appropriate content, methods, and forms of education and awareness.

Professional background for supporting the performance of state and public administration

Currently, the professional needs of state administration bodies and the Ministry of the Environment are addressed through targeted support for applied research in the Environment for Life and Environment for Life 2 programs and through public procurement within the programs of the Technology Agency of the Czech Republic. For the purposes of state and public administration, additional professional documents are being developed through public procurement in accordance with the Public Procurement Act and the internal regulations of the organizations. Professional support in the field of waste management is provided to the Ministry of the Environment by the state-funded organization Czech Environmental Information Agency (CENIA).

Support for research, experimental development and innovation

Support for research, development, and innovation (also known as "RDI") has long-term positive effects on reducing the negative impacts of human activities on the environment, ensuring remediation, and monitoring the state of the environment. Since 2011, the Technology Agency of the Czech Republic (TA CR) has played an important role in providing targeted support for applied research and development, including in the field of waste and circular economy. TA CR is responsible for the preparation and implementation of applied research, development and innovation programs, including programs for the needs of state administration and public tenders in research, development and innovation to support projects and public procurement. Specific areas supported by R&D&I in the field of the environment, including waste and circular economy, are listed in the MoE's R&D&I Concept([50]) and are further implemented under the Environment for Life program.

Increasing investment in research and development to 2.5% of GDP by 2025 and to 3% of GDP by 2030 is a long-term goal of the Innovation Strategy of the Czech Republic for 2019–2030. The strategy also includes several other objectives and measures aimed at supporting research, development, and innovation in the Czech Republic. Although the strategy does not specifically address the circular economy, part of the funds earmarked for research and development, as well as other planned support mechanisms, can be used for innovative projects in this area.

The Waste Management Council (hereinafter referred to as the "Council") as an advisory body to the Ministry of the Environment

The Waste Management Council was established by ministerial decree in 2004. The Council serves as an advisory body for the coordination of waste management planning at the national level. The members of the Council are appointed by the Minister of the Environment.

4.2.4 Voluntary instruments

Voluntary agreements on waste management

Where necessary, voluntary agreements may be concluded to achieve greater environmental protection beyond the scope of the legislation. It is expected that voluntary agreements and cooperation agreements will continue to be concluded with the aim of protecting and improving the environment in the Czech Republic and developing modern and efficient public administration. One example is the *"Enough Plastic"* initiative, which in the past focused on reducing the use of disposable packaging and tableware in order to prevent waste generation. Another example is *"Responsible Purchasing,"* which motivates private entities and the public to change their consumption habits and prevent waste generation.

Voluntary improvement of the quality of waste management entities

In the Czech Republic, the basic voluntary instruments for environmental protection are the National EMAS Program and the National Environmental Labeling Program. These instruments have been approved by government programs. The most widespread voluntary instruments in the Czech Republic are EMS environmental management certification according to the international standard ISO 14001 or the EMAS system. The Ministry of the Environment will continue to support the implementation of the EMAS program. The Czech Republic will continue to participate in international projects and activities aimed at promoting modern technologies, energy savings, and eco-innovation. The Ministry of the Environment will support the use of

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50 The updated Concept for Research, Development and Innovation of the Ministry of the Environment for 2016 to 2035 with a view to 2050 was approved by Czech Government Resolution No. 82 of February 1, 2023.

environmental labels, declarations and claims made by manufacturers about their products. The aim is to expand the use of voluntary instruments in business practice, increase advertising and marketing activities, and deepen cooperation with business associations and consulting firms.

The method of assessing the environmental impact of a product using the LCA (Life Cycle Assessment) method focuses on the entire life cycle of a product. This method assesses all the environmental impacts of a product throughout its life cycle, i.e. from the extraction of primary raw materials through production and use to reuse, recycling, recovery or final disposal. This method identifies all material, energy, and other inputs and outputs, thus enabling a comprehensive assessment of the impact on the environment and human health. Companies successfully use environmental certification to showcase their activities.

The Ministry of the Environment will support the use of "smart (SMART) solutions" in waste management where they can bring benefits for the environment and human health.

Corporate social responsibility (CSR)

Corporate social responsibility encompasses the voluntary commitment of organizations to take into account the needs of customers, suppliers, employees, and other stakeholders affected by their activities, whether directly or indirectly. CSR is an integral part of strategic management focused on achieving long-term performance. CSR is voluntary and includes activities that organizations carry out beyond their legal obligations and are focused on stakeholders, society, and the environment.

The National Action Plan for the Promotion of Corporate Social Responsibility in the Czech Republic for 2019-2023 was developed by the Ministry of Industry and Trade. However, a follow-up action plan has not yet been established.

Ecolabelling

The eco-label (Environmentally Friendly Product, Environmentally Friendly Service) is a special symbol used to label products or services. This certification is carried out by a third party based on the ČSN ISO 14 024 Environmental Labels and Declarations standard. The main objective is to enable consumers to easily identify products that are environmentally friendly throughout their entire life cycle. The certification allows manufacturing companies to present their environmentally friendly practices and products in a credible manner.

Environmental Product Declaration (hereinafter referred to as "EPD")

An EPD is a set of measurable information about the environmental impact of a product (or service) throughout its entire life cycle, such as energy and water consumption or waste generation. The product declaration helps consumers make purchasing decisions. The life cycle assessment (LCA) method according to ČSN ISO 14040-49 standards is used to create an EPD. The resulting report with information must be publicly available and all data contained therein must be verifiable. The methodology for creating EPDs is international, which ensures that individual declarations are transferable and comparable in different parts of Europe or the world. In the Czech Republic, this practice is governed by the Rules of the National Environmental Labeling Program.

Voluntary commitments

Voluntary commitments are a form of self-regulation that organizations and companies can use to support waste management goals. These commitments are often part of an organization's broader sustainability strategy. For example, corporate commitments to reduce plastics and packaging can contribute to reducing the amount of packaging used for products, switching to recyclable or compostable materials, or addressing single-use plastic issues.

The Czech Republic's 2030 Voluntary Commitment Platform for Sustainability goes even further and includes a wide range of sustainability goals. Companies can use this platform to share their commitments, monitor their progress, and exchange best practices. In this way, the platform helps to support companies' sustainability commitments, increases transparency, and strengthens public confidence in companies' sustainability efforts.

Environmental management systems

Environmental management systems such as EMAS (Eco-Management and Audit Scheme) or ISO 14001 help organizations establish, implement, improve, and monitor their environmental management systems. They provide organizations with a framework for managing their environmental issues with the aim of achieving continuous improvement in performance. This can include better management of waste production, energy and water consumption, and other aspects.

Voluntary agreements and the open method of coordination

Voluntary agreements and the open method of coordination are tools that can support companies in adopting commitments that go beyond the scope of current legislation, while at the same time providing them with certainty in the long-term legislative environment. These agreements and methods enable companies to take a proactive approach to environmental management and sustainability while remaining compliant with legal and regulatory frameworks.

A concrete example of such an agreement could be a company's commitment to go "beyond the best available techniques" (Beyond BAT). Such a commitment could involve adopting technologies and practices that go beyond current industry standards but could lead to significant improvements in sustainability and waste management.

4.2.5 Information tools

Information concept of the Ministry of the Environment (hereinafter referred to as "IK MŽP")

The Ministry of the Environment is the publisher and administrator of several information sources, such as the Waste Management Information System. In accordance with the Act on Public Administration Information Systems and the Digital Czech Republic 2018+ project, the Ministry of the Environment has published an Information Concept. In this concept, the Ministry of the Environment builds on the objectives set out in the ICT Development Strategy of the Ministry of the Environment for 2016-2020, the Information Concept of the Ministry of the Environment for 2017-2022, the State Environmental Policy of the Czech Republic 2030 with a view to 2050 (which follows on from the State Environmental Policy of the Czech Republic for 2012-2020) and the current objectives, principles and guidelines of the Information Concept of the Czech Republic for Building e-Government in the Czech Republic 2018+ (IKČR).

The aim of the Ministry of the Environment's Information Concept is to define or update its own objectives in the area of quality and security management of public administration information systems (ISVS) based on the current situation and to define general principles for the acquisition, creation, and operation of ISVS. These objectives and principles must be in line with the IKČR and must gradually be brought into line with the MoE's information systems. The main purpose of these information systems is to support public administration and inform the public.

Communication strategy for waste management

Information on the environment and waste management is available on the websites of the ministry, departmental organizations, and through specialized information systems. As part of the department's communication strategy, media promotion of proper municipal waste management will be used to encourage people to be more active in sorting and to increase recycling. Based on the strategy, the sorting of recyclable municipal waste, increasing the take-back of end-of-life products, and waste prevention will be promoted.

The regions will prepare comprehensive communication campaigns based on realistic regional waste management solutions. The communication strategy will be prepared in accordance with the State Program for Environmental Education, Training, and Awareness and Environmental Consulting for 2016-2025, which involves regions, municipalities, cities, schools, non-profit organizations, educational institutions, and others.

Methodological guidance in the field of waste management

Methodological tools primarily fulfill an educational role and are geared toward providing instructions, guidelines, information, and recommendations on how to proceed in specific cases or situations. The methodological guidelines issued by the Ministry of the Environment for specific areas are based on expert knowledge and good practices and are designed to provide guidance and instructions for solving specific problems. These documents contain practical information, detailed procedures, standards, or examples of good practice that assist in the implementation and management of waste management policies and programs. Such methodological guidelines are a reliable source of information for waste management stakeholders.

Unified Environmental Information System (hereinafter referred to as "JISŽP")

JISŽP is an information database of the Ministry of the Environment, which contains specialized information sources and is used to manage and administer the agenda of the Ministry of the Environment. Environmental data is collected, verified, processed, and published by the Ministry of the Environment and other organizations within the ministry. The information systems that are part of the JISŽP offer electronic information services for the performance of specialized tasks and also contain process-based public administration information systems and systems for collecting and presenting environmental data.

The current effort is to gradually integrate the Ministry of the Environment's database into a unified data platform. The Ministry of the Environment implements government policy in the area of e-Government, primarily ensuring the Ministry's reporting obligations within the Register of Rights and Obligations, including reporting its competence in areas where the Ministry has defined competence. This fulfills the condition for access to the reference data of the basic registers system and gradually connects the relevant information systems to its interface.

Integrated system for fulfilling reporting obligations (hereinafter referred to as "ISPOP")

ISPOP was introduced in 2011 on the basis of the Act on the Integrated Register of Environmental Pollution and on the Integrated System for Fulfilling Reporting Obligations in the Field of the Environment and on Amendments to Certain Acts (No. 25/2008 Coll.). This system is used to process, receive, and store selected reports (reporting obligations) in the field of the environment in the form of electronic forms in the relevant data standard and to forward them to public administration institutions. ISPOP applies to entities that have a legal obligation to report impacts on natural components, such as water, air, and soil pollution, waste production, and others. At the same time, ISPOP is connected to the Basic Registers Information System.

Hazardous Waste Transport Registration System (hereinafter referred to as "SEPNO")

SEPNO is an independent module of the Integrated Reporting System, which ensures the receipt and processing of Hazardous Waste Transport Notification Forms from obligated persons. This information system enables the relevant public administration institutions to monitor the flow of hazardous waste within the Czech Republic and streamlines the control of hazardous waste transport.

Assessment of hazardous properties of waste (hereinafter referred to as "HNVO")

This is a separate module that enables the electronic processing of applications for the assessment of waste properties. The system is used to issue electronic certificates of exclusion of hazardous properties of waste and notifications that waste has one or more hazardous properties.

Waste Management Information System (hereinafter referred to as "ISOH")

ISOH is a robust database system for the central management of the waste and recycling sector in the Czech Republic. The data it collects enables the monitoring of waste production and disposal methods. It also contains data on waste treatment facilities, waste traders, waste transporters, and intermediaries. ISOH also provides a platform for resolving issues related to the licensing of waste management facilities. The system collects information on extended producer responsibility schemes, authorized packaging companies, packaging waste, and end-of-life products.

Aggregated data on waste management from ISOH is presented to the general public in the Public Waste Management Information System (VISOH) module.

A separate part of the system, the End-of-Life Vehicles Module of the Waste Management Information System (MA ISOH), is used to monitor the flow of end-of-life vehicles and allows authorized persons with a license to collect and process end-of-life vehicles to store the issued confirmation of acceptance of the selected end-of-life vehicle in the central system, thereby fulfilling their legal obligations.

Public consultation system within the EIA/SEA process

Environmental impact assessment, i.e. the EIA (environmental impact assessment) and SEA (strategic environmental assessment) processes, are regulated by Act No. 100/2001 Coll., on environmental impact assessment, as amended. These processes are also commonly used in the field of waste management. The main purpose of impact assessment is to obtain comprehensive information on the expected impacts of proposed projects or concepts on the environment and public health. The information system is used to record assessed projects and concepts and to publish documents related to the environmental impact assessment process.

IPPC Information System

The Integrated Prevention Information System, administered by the Ministry of the Environment, is a nationwide public administration information system. Its main function is to ensure all obligations relating to the publication of information under the Integrated Prevention Act and to enable public access to such information. This system provides the public with information on individual permitting processes and enables them to actively participate in the management process. The IPPC includes a list of current proceedings and a database of all integrated permits issued.

Integrated Pollution Register (hereinafter referred to as "IRZ")

The IRZ serves to fulfill the Czech Republic's commitment to collect and disseminate information on the environment and to provide free public access to this information. The register monitors, records, and presents information on selected types of pollutants that are released into the environment or transferred outside the place of origin. Its task is to provide the public with clear and accessible information on environmental pollution. The IRZ is one of the main tools for monitoring and assessing environmental pollution in the Czech Republic. In addition to providing information to the public, it also serves as a basis for the formulation of state environmental policy, for planning and managing environmental protection, and for assessing compliance with international environmental commitments.

Other information systems of the Ministry of the Environment and other state administration bodies

In addition to monitoring the development of waste and circular economy management and the fulfillment of the objectives of the Czech Republic's Waste Management Plan, other available information sources of the Ministry of the Environment, as well as support and services provided by other ministries and state administration bodies, can also be used for this purpose.

4.3 Changes and new settings for waste management policy

The binding part of the Czech Waste Management Plan defines strategic objectives, priorities, general principles, and measures leading to the fulfillment of waste management objectives. In order to keep waste management on track to meet its objectives, it is necessary to comply with certain aspects of waste management policy, as outlined below.

1) Promote a policy to ensure the long-term stability and sustainability of waste management in the Czech Republic.
2) Timely adaptation and transposition of new EU legislation into Czech legislation.
3) Proceed with and implement the principles and guidelines set out in other strategic documents of the Czech Republic, such as Circular Czech Republic 2040, Update of the Raw Materials Policy of the Czech Republic, and others.
4) Appropriately adjust and supplement subsidy policy, including the delegation of subsidy policy to the regional level.
5) Involve regions in waste management and investment planning. Entrust regions with responsibility for drawing up regional investment plans.
6) Promote future supra-regional key investments in waste management.
7) Create suitable conditions for the storage, processing, recycling, and use of critical raw materials in the Czech Republic.
8) Support the creation of sufficient processing capacities and support innovative "green" technologies.
9) Replacing primary raw materials with secondary raw materials from waste.
10) Restricting the export of waste containing strategic and critical raw materials.
11) Increase preparedness and resilience to crises and emergencies and integrate waste incineration plants into critical infrastructure.
12) Motivate a shift in the waste management hierarchy to higher levels through waste management regulations, while maintaining economic, technological, and social sustainability for the Czech economy.
13) Use and expand mandatory and voluntary extended producer responsibility systems to reduce the negative impacts on waste generators and increase the responsibility of producers and consumers, while ensuring appropriate settings for the stability of EPR systems.
14) Set targets for products and waste covered by extended producer responsibility systems. Set targets for waste streams.
15) Significantly promote the application of economic instruments to regulate the development of waste management and financial instruments for the development of waste management and the circular economy. Promote rapid access to sources of financing, in particular for modern and innovative technologies, through appropriate financial instruments.
16) Analyze options for adjusting tax settings (possible introduction of a tax on primary raw materials, introduction of a reduced VAT rate for products with recycled content).
17) Improve the enforceability of legal obligations and optimally set penalties for non-compliance.
18) Strengthen digitization, information systems, and artificial intelligence for the collection, control, and processing of data on waste and material flows.

Chapter 4.2 presented tools for enforcing the objectives of the WMP CR 2025-2035. The principles and methods for working with these tools to achieve these objectives are presented below.

4.4 Economic analysis of the Czech Republic's Waste Management Plan – management summary

The economic analysis of the Waste Management Plan of the Czech Republic describes the impact of the WMP CR on the Czech economy, including the impact on the revenues and costs of municipalities and other waste producers, especially municipal waste producers. The document also sets out assumptions for the development of technologies and their capacities with an impact on investment needs in the waste management sector, so that the objectives of the Czech Republic's Waste Management Plan can be achieved in the long term by 2035.

Changes in waste management practices with the aim of diverting waste from landfills towards maximizing recycling and waste recovery are one of the main factors influencing the growth of waste management costs throughout the chain. Other significant factors include inflation, which significantly and permanently increases prices for all waste management methods and for commodities and products. The expected changes in waste management costs are described in more detail in the economic analysis below.

From an environmental perspective, it can be said that the POH ČR represents the main tool for maximizing the use of waste as a source of raw materials and energy thanks to the transformation of waste management towards more efficient waste use within the circular economy. A positive shift in the waste management hierarchy and a preference for waste treatment at the top of this hierarchy are key. An active approach by society as a whole, including a change in the attitude of waste producers towards waste, will be essential to achieving the objectives of the POH ČR.

An essential prerequisite for the successful development of waste management is the acceptance of changes in waste management, including the economic impacts, and support for the sale of products with recycled content, known as recyclates.

The implementation of the Czech Republic's Waste Management Plan should lead to **an increase in the number of jobs by up to several thousand**. The construction of modern waste management facilities is expected to create demand for hundreds of highly skilled workers, with further demand arising for construction work, designers, and other activities related to the construction of these facilities. Although the investment costs for these facilities may be reflected in product prices in the coming years, and thus in higher household costs, these costs should be offset by positive effects such as a better environment, less traffic, etc. Overall, the transition to waste management at higher levels of the waste management hierarchy should have a positive impact on citizens' costs. **In addition, the construction of modern facilities will strengthen the competitiveness of individual regions, but also of the Czech Republic as a whole, as it will have modern technologies requiring a highly skilled workforce.**

The measures and instruments proposed in the Czech Waste Management Plan are feasible and should bring the expected results.

The Waste Management Plan of the Czech Republic represents an opportunity for the development of waste management in the Czech Republic and has been assessed as technically and economically feasible, provided that all the assumptions made in the economic analysis are met.

4.4.1 Analysis of the current situation

According to the Statistical Yearbook of the Czech Republic for 2023 (ČSÚ), investment in waste management has been growing in the long term. Between 2020 and 2022, it rose from CZK 4.6 billion to CZK 5.2 billion. The total costs of waste management in the Czech Republic are also on the rise. Over the last three years recorded, from 2020 to 2022, as published in this yearbook by the Czech Statistical Office, total non-investment costs for waste management in the Czech Republic increased by CZK 15 billion, from CZK 45 billion in 2020 to CZK 60.7 billion in 2022.

Between 2020 and 2022, investments in waste management increased from CZK 4.6 billion to CZK 5.2 billion. Non-investment costs for waste management in the Czech Republic increased by CZK 15 billion from CZK 45 billion in 2020 to CZK 60.7 billion in 2022.

Significant cost growth has also been recorded in municipal waste management. From 2006 to 2022, the average annual costs of municipalities with municipal waste increased from CZK 698 per capita to CZK 1,319 per capita. In the last three years on record, from 2020 to 2022, this average annual cost represented a 24% increase, from CZK 1,064 per capita to CZK 1,319 per capita. Over the last ten years, the total costs incurred by municipalities have increased by almost 50%.

The costs of municipal waste management rose from CZK 698 per capita in 2006 to CZK 1,319 per capita in 2022.

The costs associated with the collection and transport of municipal waste represent a significant item of expenditure in the municipal waste management system. In the waste streams assessed, the costs associated with the collection and transport of municipal waste within the municipal system always represent the dominant part of the municipality's total costs associated with the commodity in question. The ratio of municipal costs associated with collection and transport accounts for roughly two-thirds of the costs of mixed municipal waste management, while for sorted plastic collection, collection and transport account for around three-quarters of the costs for this commodity. The costs incurred by municipalities for the collection and transport of commodities whose price is positive when handed over to a treatment facility account for almost 100% of the costs.

Based on the available data, it can be stated that the total costs associated with ensuring compliance with extended producer responsibility obligations increased by 45% between 2019 and 2022. The largest share of these costs is accounted for by the costs of ensuring the extended responsibility of producers of packaging and packaging waste. Their share has gradually increased from 69% to 76% of the total costs associated with ensuring the fulfillment of extended producer responsibility obligations. In terms of costs, the second most significant group is collective systems ensuring the take-back of electrical equipment.

The costs associated with ensuring compliance with extended producer responsibility obligations increased by 45% between 2019 and 2022. The largest share of these costs is represented by the costs of ensuring extended responsibility for packaging producers and packaging waste.

Within the Czech Republic, data on waste management costs are collected by the Czech Statistical Office. However, the data are presented without distinction or segmentation into individual types and groups of producers. This includes data on investments in environmental protection in the waste management category, as well as data on non-investment costs for environmental protection in the waste management category.

Detailed data collection on costs and revenues in the area of municipal waste, their regular evaluation and presentation is carried out only at the municipal level. For this reason, it is not possible to evaluate the costs associated with waste management in other segments such as industry, construction, and other sectors to the same extent as at the municipal level. Manufacturing companies have individual contracts with waste management companies, and this data is not publicly available.

As mentioned above, these costs are increasing in the context of municipal waste management. In the Czech Republic, the largest share of municipal waste costs is accounted for by mixed municipal waste. The second most significant group is the costs associated with the separate collection of recyclable waste (paper, plastic, glass, metal, beverage cartons). The third most significant item is the costs associated with the maintenance of green spaces and the management of biowaste.

The largest item of municipal costs is mixed municipal waste. In 2006, these costs averaged CZK 463 per capita, rising to CZK 652 per capita in 2022. Over the last three years, from 2020 to 2022, these average annual costs increased by 14%, from CZK 574 per capita to CZK 652 per capita.

The average annual costs incurred by municipalities for the separate collection of recyclable and recoverable components of municipal waste rose from CZK 98 per capita to CZK 307 per capita between 2006 and 2022. In the last three years, from 2020 to 2022, this growth was 21%, with average costs rising from CZK 253 per capita to CZK 307 per capita.

The questionnaire survey also collects data on municipal revenues related to municipal waste. According to the presented results, these average municipal revenues amounted to CZK 911 per capita in 2022, which represents a 24% increase compared to 2020. The largest share of municipal revenues in 2022 was covered by revenues from residents in the form of municipal waste payments, while the second largest source of municipal revenues was payments from the authorized packaging company system for the collection of packaging waste. These revenues represented an average of CZK 181 per capita in 2022.

In most cases, the total revenue of municipalities is lower than the total costs associated with municipal waste. Municipalities cover the difference between revenue and expenditure from their budgets. On average, municipalities had to spend 31% of their budget on waste management in 2022. In 2023, this share rose to 34%.

In the analysis of costs associated with input prices for waste treatment facilities, the highest prices are for hazardous waste treatment technologies, i.e., hazardous waste incinerators (up to CZK 25,000/t) and hazardous waste landfills (up to CZK 10,000/t). At the other end of the scale are metal recycling facilities (the customer pays up to CZK 20,000/t).

4.4.2 Modeling future developments

Six scenarios were **developed** to evaluate the impacts of individual waste production scenarios and municipal waste management methods. **Two waste production trajectories** were **developed based on individual waste streams, and three waste management scenarios were developed to meet legislative requirements for municipal waste in terms of recycling and landfilling**.

The economic analysis evaluates all six scenarios. The economic analysis also took into account significant factors affecting costs, such as population development in the Czech Republic, inflation, developments in landfill fees, etc.

In terms of municipal waste costs, **the total costs incurred by municipalities for municipal waste management will increase** in **all scenarios**. In 2035, the total costs incurred by municipalities for municipal waste are expected to exceed CZK 27 billion per year, which is essentially double the 2022 level. The average annual unit costs per citizen are expected to increase by approximately CZK 700 per capita between 2025 and 2035, i.e. an increase of almost 40% compared to the municipalities' estimated costs in 2025. Due to the fact that the prices used as the starting point for activities in waste management in the modeling of future developments are the prices for 2022, it is appropriate to present the difference in costs also for the period 2022 to 2035. This difference in the average of all scenarios represented an increase in annual costs of CZK 1,200 per capita.

In 2035, the total costs of municipalities with municipal waste are expected to exceed CZK 27 billion per year, which is essentially double the level in 2022.

As part of modeling the future development of municipal waste costs in municipal systems, the sensitivity of municipal cost growth to inflation was also tested. The test results show that, according to the initial assumption of the analysis, inflation will increase municipal costs by almost CZK 1,000 per capita between 2022 and 2035.

It can be assumed that, under the defined conditions of the analysis, municipal costs associated with the sub-stream of *"separately collected waste"* will increase by CZK 8 billion between 2025 and 2035, taking into account the development of their production and prices, including the impact of inflation.

The costs incurred by municipalities in connection with the sub-stream of *"hazardous waste"* are negligible compared to other sub-streams. In the long term, they can be expected to remain stable.

Based on the defined conditions of the analysis, it can be assumed that the costs associated with the sub-stream *"other waste"*[51] will peak in the period 2028 to 2030. After this period, there will be a decrease in costs due to a reduction in the total amount of this waste (the effect of increased separate collection). Costs associated with the sub-stream “other waste” are expected to increase only in the period 2025 to 2028, by approximately CZK 0.6 billion. In the following period and after 2030, costs are expected to decrease by CZK 1.5 billion by 2035. From 2025 to 2030, the share of costs associated with separately collected waste will increase by 8 percentage points, and between 2030 and 2035, this share will increase by a further 10 percentage points. Proportionally, the share of other waste sub-flows in the total costs of municipalities will decrease. The share of hazardous waste sub-flows will remain more or less unchanged over time.

According to the analysis and evaluation of individual waste production and management scenarios in relation to the assumed extent of co-financing of individual waste streams by current and planned EPR systems, it can be assumed that the cumulative net costs of all municipalities, after deducting revenues, will be just under CZK 17 billion in 2025, just under CZK 18 billion in 2030, and just under CZK 19 billion in 2035.

In terms of the impact on citizens, these will be costs that should also be passed on to citizens. Between 2025 and 2030, an increase of approximately CZK 140 per capita can be expected. In the following period, until 2035, the increase in costs per citizen should be more gradual, with an annual increase of less than CZK 100 per capita expected.

The total costs related to municipal waste for other producers will increase significantly until 2025, followed by a slower growth until 2035. According to the average value of the scenarios, the total increase between 2022 and 2035 is CZK 2.6 billion. Overall, the costs associated with separately collected waste sub-streams will increase by CZK 1.7 billion between 2025 and 2035, including inflation.

The costs of other producers associated with the hazardous waste sub-stream are negligible compared to other sub-streams. In the long term, they can be expected to stagnate.

The costs of other producers associated with the sub-stream of other waste will peak in the period 2025 to 2026. After this period, costs will decline due to a decrease in the amount of this waste (the effect of growth in separate collection). Costs associated with this sub-stream are expected to increase only between 2022 and 2026, by approximately CZK 1.3 billion. In the subsequent period, until 2035, costs are expected to decrease by approximately CZK 0.9 billion. From 2025 to 2035, the share of costs associated with

[51] The sub-stream “Other waste” is defined in a separate document, Economic Analysis of the Waste Management Plan of the Czech Republic.

with a sub-stream of separately collected waste by 20 percentage points. The share of the sub-stream of hazardous waste does not change over time.

Costs incurred by regions in connection with the fulfilment of the POH ČR targets

In terms of the impact of costs incurred by activities aimed at achieving the WMP targets, these costs can be divided into four main groups.

- **Administrative costs**

These are costs related to waste management, control, data analysis, etc. Costs of this type will increase in line with growing targets and the need to ensure support.

- **Preparation of conceptual documents and strategies**

These costs include preparing analyses, consulting with experts, discussing and ensuring compliance with national targets, monitoring target achievement, and setting measures. Another segment is the developing cooperation with municipalities on optimizing waste collection. The preparation and updating of emergency plans for waste management in the event of natural disasters will also play an important role. These types of costs are also expected to increase in the future.

- **Subsidy funds**

Regions often provide (not only) municipalities with financial contributions for the introduction of effective waste collection systems, composting, anaerobic digestion of biological waste, or the construction of local facilities. In the future, we can expect regional support for waste collection and management for specific waste streams to grow. These costs are also expected to increase in the future.

- **Support for waste sorting and recycling**

These costs include financing and co-financing projects to increase the share of sorted waste, such as information campaigns, support for the development of collection networks and proper waste management, etc. These expenses are expected to increase significantly in the future.

It is not possible to predict how these costs will develop, but they can be expected to grow in line with the growth of the POH targets.

Estimated costs in the regions

In terms of predicting the costs associated with waste management in individual regions, only indicative estimates can be made, based on the expected and modeled development of waste production and the costs associated with ensuring municipal waste management in accordance with the objectives of the POH ČR.

As shown by analytical data on regional costs in 2022, the differences in costs for individual commodities vary greatly from region to region and are influenced by a wide range of factors, such as the number of inhabitants and their standard of living in individual regions, their consumption patterns, population density, geographical conditions, transport services in the area, methods of collection and transport of commodities, availability and equipment of waste management technologies, competition between waste management companies, methods of pricing for individual activities and methods of waste management in the field of waste management, and others. From this perspective, it is almost impossible to predict the development of these factors, including the development of waste management at the regional level for the period up to 2035. To provide an indicative overview, the estimated costs of municipalities with municipal waste in 2035 were calculated at the level of regions and NUTS 2 areas based on the average number of inhabitants living in the regions in 2024.

The following table (Table 92) shows that the highest costs by 2035 can be expected in the Capital City of Prague (up to CZK 3.6 billion) and the Central Bohemian Region (up to CZK 3.8 billion), South Moravian Region (up to CZK 3.2 billion) and Moravian-Silesian Region (CZK 3.1 billion). On the contrary, the lowest costs are estimated for 2035 are expected in the Karlovy Vary Region (CZK 0.8 billion). However, it should be noted that these are estimates based on the population of these regions and that the actual costs will be influenced by a number of other factors mentioned above.

Table 92: Breakdown of scenarios for the development of total municipal waste costs in individual regions (in CZK billion)

Region	**2030 (CZK billion)**		**2035 (CZK billion)**	
	min	**max**	**min**	**max**
Capital City of Prague	3	3	3	3
Central Bohemian Region	3	3	3	3
South Bohemian Region	1	1	1	1
Pilsen Region	1	1	1	1
Karlovy Vary Region	0.7	0	0	0
Ústí nad Labem Region	1	1	2	2
Liberec Region	1	1	1	1
Hradec Králové Region	1	1	1	1
Pardubice Region	1	1	1	1
Vysočina Region	1	1	1	1
South Moravian Region	2	2	3	3
Olomouc Region	1	1	1	1
Zlín Region	1.3	1.4	1	1
Moravian-Silesian Region	2	2	3	3

Source: CZSO (2024), own calculation

The following table (Table 93) shows that the highest costs by 2035 are estimated in the NUTS 2 regions of Southeast (up to CZK 4.5 billion), Northeast (up to CZK 4 billion), Central Bohemia (up to CZK 3.8 billion) and Prague (up to CZK 3.6 billion). Conversely, the lowest costs are estimated in the Northwest (CZK 2.9 billion), Central Moravia (CZK 3.1 billion), Moravia-Silesia (CZK 3.1 billion) and Southwest (CZK 3.3 billion) regions. Again, it is necessary to take into account that these are only estimates based on the population in the given areas and that a number of other factors mentioned above will affect the actual costs.

Table 93: Breakdown of scenarios for the development of total municipal waste costs in individual NUTS 2 regions (CZK billion)

NUTS 2 area	**2030 (CZK billion)**		**2035 (CZK billion)**	
	min	**max**	**min**	**max**
Prague	3.2	3.2	3.5	3
Central Bohemia	3.3	3.4	3	3
Southwest	2.9	3	3	3
Northwest	2.5	2	2	2
Northeast	3	3	3	4
Southeast	4	4	4	4
Central Moravia	2.8	2	3	3
Moravian-Silesian Region	2	2	3	3

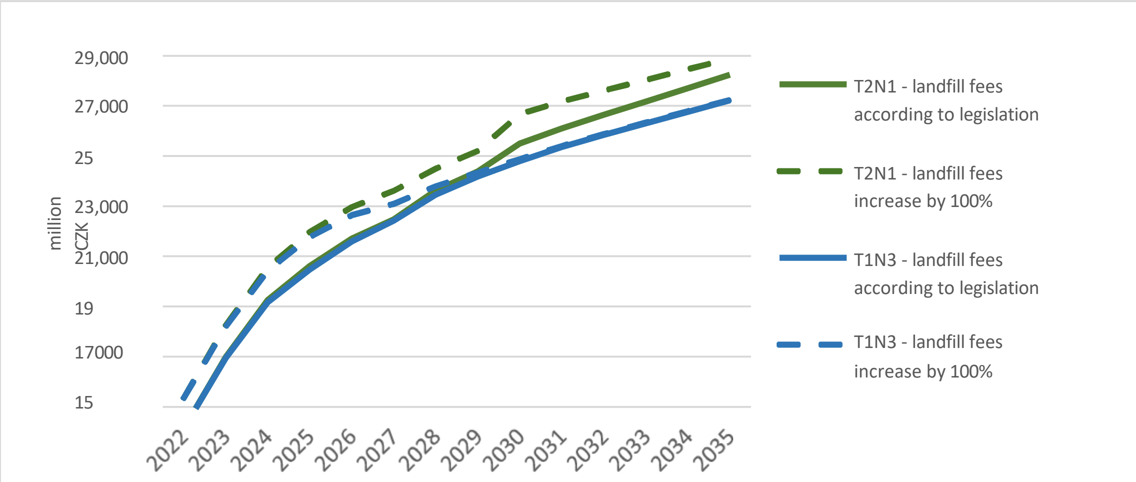
Source: CZSO (2024), own calculation

There is no comprehensive system for collecting data on waste management costs in the Czech Republic, apart from data collected by municipalities. For this reason, it is not possible to accurately estimate future waste management costs in other sectors such as industry, construction, and other sectors to the same extent as at the municipal level. Manufacturing companies have individual contracts with waste management companies, and this data is not publicly available.

Assumption of the impact of the change in landfill fees on the total costs of municipal waste management by municipalities and other waste producers

The Economic Analysis analyzed the impact of changes in landfill fees on the total costs of municipal waste management by municipalities and other waste producers for all scenarios (T2N1-T1N3). These calculations show **that a 100% increase in landfill fees for recyclable waste would result in an increase of up to 7% in the total costs of municipalities with municipal waste**, **with a gradual decrease** in the impact of landfill fees on the total costs of municipalities with municipal waste, mainly due to a decrease in the amount of waste sent to landfills (Chart 69).

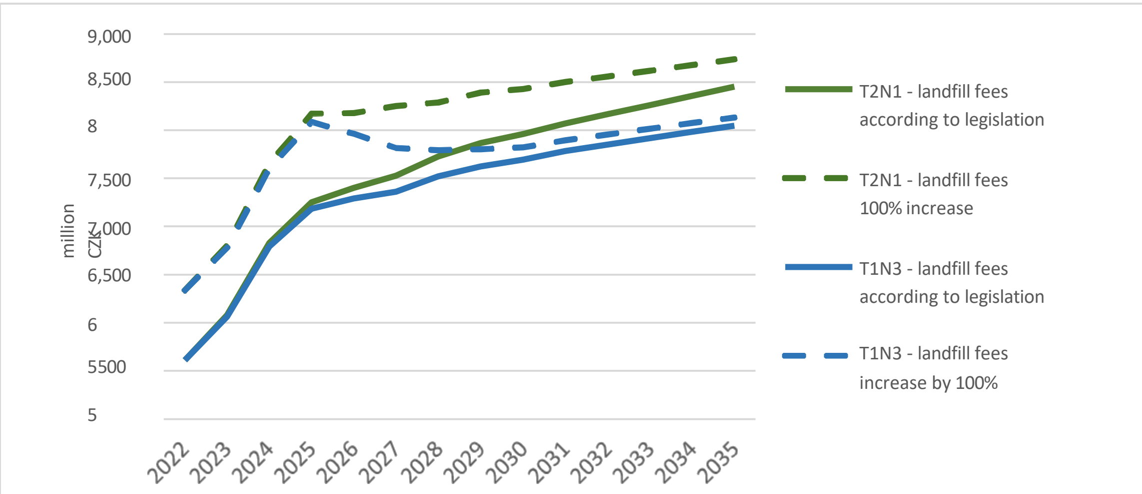
Graph 69: Development of total municipal waste costs according to individual scenarios – municipalities (CZK million)



Source: own processing

In the case of other waste producers, calculations show **that a 100% increase in fees for the landfilling of recoverable waste and residual waste would result in an increase of up to 13% in the total costs of other municipal waste producers.** As in the case of municipalities, the impact of landfill fees on the total costs of other municipal waste producers is expected to decrease, mainly due to a reduction in the amount of waste sent to landfill (Chart 70).

Chart 70: Development of total municipal waste costs according to individual scenarios – other producers (CZK million)



Source: own processing

4.4.3 Required investments

The following table presents the estimated investment needs for the development of waste management in the Czech Republic with a view to meeting the targets set out in the Czech Waste Management Plan.

The capacity requirements of individual technology groups were assessed for each waste stream. Differences between the required amount of waste processed in individual years and the current existing capacities were defined. **The highest investment expenditure per unit of waste processed per year is for investments in hazardous waste incinerators, medical waste incinerators, and waste-to-energy facilities.**

For the purposes of the POH ČR, investments in the development of a collection network for separately collected recyclable waste collected as part of municipal waste originating from municipalities were also calculated. These were investments in the expansion and development of the collection network linked to the growth in the sorted quantities of individual commodities, not for its replacement, as these costs are subsequently reflected in operating costs. In the area of container collection, the highest investment expenditure is for commodities for which intensive introduction of a door-to-door system is expected. These are primarily paper, plastic, and bio-waste. Investments in containers for the collection of these commodities account for almost 90% of the total estimated investment expenditure on the development of the collection network.

Total investment in the development of the collection network (container collection and collection yards) for the purpose of its expansion can be expected to amount to CZK 6.4 to 7.5 billion between 2025 and 2035.

The estimated capacity requirements for municipal waste were also calculated for technologies that will be used primarily for the management of individual municipal waste streams in six production and management scenarios. The estimated investment requirements for these capacities were then calculated for each period.

In all scenarios, the greatest need for new capacity by 2030 is in the area of waste-to-energy and transfer stations. The opposite is true for paper sorting capacity.

The highest investment expenditure until 2030 will be **in waste-to-energy** technologies. Significant investment costs can also be expected for the construction of technologies for **the mechanical sorting of mixed municipal waste**. After 2030, with a few exceptions, no significant new capacity is expected to be needed compared to the previous period. **Overall, between 2025 and 2035, key facilities for the primary treatment of municipal waste or outputs from its treatment will be needed with a capacity of 3.2-5.4 million tons of waste.** These capacities are divided between different groups of waste treatment or final disposal technologies.

As part of the reconstruction of existing capacities, it will be necessary to modernize the capacities of facilities with a total capacity of at least 0.9 million tons of waste.

Between 2025 and 2035, total estimated investment in technologies primarily for municipal waste management according to the established scenarios ranges from CZK 34 billion to CZK 64 billion.

If we add the estimated investment in the reconstruction and modernization of key technologies for municipal waste management, the estimated investment will range from CZK 50 to 81 billion.

Technologies for hazardous waste management are investment-intensive. The estimated total investment expenditure for the period 2025-2035 will be around CZK 12.5 billion. The largest expenditure is allocated to **the construction and reconstruction of hazardous waste incinerators.** The total investment in these technologies is estimated at **CZK** 9 **billion.**

The estimated total investment expenditure on technologies for hazardous waste management will be around CZK 12.5 billion in the period 2025-2035, of which CZK 9 billion will be spent on the construction and reconstruction of hazardous waste incinerators.

Technologies for **the treatment of construction and demolition waste** will require very high new capacity. However, the investment costs are relatively low per ton of new capacity. Approximately half of the value of the capacity and investment costs is accounted for by the reconstruction of existing capacity (approximately 65% of the total capacity required).

If the Czech Republic were **to require recycling capacity for 100% of sorted recyclable waste directly within the Czech Republic**, it would be necessary to secure new **paper** recycling technology capacity of just under 0.5 million tons per year. In terms of investment, this would amount to around **CZK 21 billion**. Furthermore, it will be necessary to expand the existing capacity for **plastic** recycling **by** a total of around 280,000 tons per year. The investment costs for the construction of this technology can be estimated at around **CZK** 4**.2 billion.** It will also be necessary to ensure an increase **in metal** recycling capacity **by** 1.4 million tons per year. Investment expenditure would amount to approximately **CZK** 9**.3 billion.** The new capacity required for metal processing is largely influenced by the current state and further development of the metallurgical industry in the Czech Republic. Investment expenditure for the processing of sorted **glass** is low compared to other technologies, amounting to around **CZK 100 million,** as it only involves investment in ensuring the production of high-quality raw materials for glassworks or in technologies for the manufacture of final products. **Textile waste** is a commodity whose production will grow significantly**.** The increase in the capacity of technologies for processing waste textiles that will not be directly transferred for reuse is expected to be around 60,000 tons per year in 2035. The estimated investment expenditure is around **CZK** 1 **billion.**

NIMBY effect

The issue of building new facilities or expanding the capacity of existing ones is almost always met with resistance from local residents. This phenomenon is referred to as the NIMBY syndrome ("Not In My Backyard").

This is often a situation where residents generally support a project but refuse to allow it to be implemented in their vicinity. This usually indicates that the solution is perceived by society as correct and necessary. However, it is necessary to uncover the real reason for the reluctance of residents/communities to allow the construction or expansion of waste management technologies.

Solving the NIMBY syndrome is complex because it combines psychological, social, and political aspects. The principles for eliminating the NIMBY syndrome can be grouped into three themes.

- **Open discussion and transparent communication about the intention**
  - Organize informational meetings with experts who will present the benefits and risks of the project. This category also includes education about current developments in the field and clarification and explanation of myths that may be a key factor in negative attitudes among residents.
  - Listen to the concerns of the public and involve residents of affected areas in the planning process, allowing them to propose measures to eliminate potential risks.
  - Take relevant public opinions into account in the project and gain public trust.

- Excursions for residents and representatives of residents to locations where such facilities operate, including discussions with local residents about the impact of the facilities on their lives, can also be positive.
- In the case of construction, organize meetings with residents at each stage of construction/project implementation and provide the opportunity to visit the site.

▪ **Seeking benefits for residents of the area of interest**

- This group of measures includes positive motivation tools such as offers of benefits to citizens of the area, for example, investment in infrastructure, better services, or financial compensation.
- Depending on the type of project and investment, this may often involve the creation of new jobs.
- Certain interest groups may also be interested in activities aimed at improving the local environment, including regular environmental monitoring.

The third group of topics for ensuring the acceptance of the exhibition/technology expansion is the possibility of agreeing on gradual development. This could involve implementing a pilot project—a smaller version of the project—so that locals can verify its safety and benefits.

The general conclusion for dealing with the NYMBI syndrome is patience, empathy, clear communication, and explanation of all the impacts of the project. It is key to build trust and seek mutually beneficial solutions. It is also important to mediate discussions between supporters and opponents of the project.

Summary of necessary investments - overview of the estimated need to build capacity for the treatment of selected waste and the associated investment in these facilities.

Estimated investments in technologies to ensure bio-waste management

Figure 29: Estimated investments in technologies to ensure bio-waste management

Input waste
Separate collection by municipalities and other sources - biodegradable waste from kitchens and catering facilities
Food and processing industry waste

Sanitization

		min	max	total
million tons	new capacity*	0	0	0.4
	capacity reconstruction**			
CZK billion	new capacity*	0	0	0.8 - 0.G
	capacity reconstruction**			

Input waste
Treated waste - sanitation
Food and processing industry waste

Biogas plant

		min	max	total
million tons	new capacity*	0	0	0.4
	capacity reconstruction**			
CZK billion	new capacity*	5.7	6	5.7
	capacity reconstruction**			

Input waste
Separate collection by municipalities and other producers - bio-waste from gardens and parks
Food and processing industry waste

Composting plant

		min	max	total
million tons	new capacity*	0	0	0.5
	capacity reconstruction**	0.2		
billion CZK	new capacity*	1	1	1.6
	capacity reconstruction**	0		

Estimated need for capacity expansion by 2035	Estimated investment required by 2035
million t	billion CZK
1.3	8.1 - 8.8

Legend
*new capacity due to production growth
**reconstruction and renewal of existing capacities

Source: own processing

Estimated investment in technology to ensure the treatment of waste from separate collection of recyclable waste (paper, plastic)

Figure 30: Estimated investment in technology to ensure the treatment of waste from separate collection of recyclable waste (paper, plastic)

Input waste

Separate collection - municipalities
Separate collection – other sources

Paper sorting line

		min	max	total
million tons	new capacity*	0	0.04	0.1
	capacity reconstruction**	0		
billion CZK	new capacity*	0	0	2.8 -
	capacity reconstruction**	2		

Plastic sorting line

		min	max	total
million tons	new capacity*	0	0	0.3
	capacity reconstruction**	0		
billion CZK	new capacity*	2	3	6.1
	capacity reconstruction**	3		

Estimated capacity construction needs by 2035	Estimated investment required by 2035
million tons	billion CZK
0.4 - 0.4	8.9 - 9.9

Legend
***new capacity due to production growth**
****reconstruction and renewal of existing capacities**

Source: own calculations

Estimated investments in technologies to ensure the management of primarily municipal waste outside separate collection

Figure 31: Estimated investments in technologies to ensure the treatment of primarily municipal waste outside separate collection

Input waste
Mixed municipal waste Bulky waste
Other waste primarily
of a municipal nature

Transfer stations

		min	max	total
million tons	new capacity*	0	1	0.6
	capacity reconstruction**			
CZK billion	new capacity*	1	3	1.6 - 3.2
	Capacity reconstruction**			

Input waste
Mixed municipal waste

Sorting line for mixed municipal waste

		min	max	total
million tons	new capacity*	0	0.9	0.2
	capacity reconstruction**			
CZK billion	new capacity*	2	8	2.1
	capacity reconstruction**			

Input waste
Bulky waste

Treatment and sorting of bulky waste

		min	max	total
million tons	new capacity*	0	0	0.4
	capacity reconstruction**			
CZK billion	new capacity*	1	1	1.1
	capacity reconstruction**			

Input waste
Municipal waste Industrial waste
Selected hazardous waste
Waste from treatment and processing technologies

Waste-to-energy (WtE)

		min	max	total
million tonnes	new capacity*	0.4	0.9	0.9
	Capacity reconstruction**	0		
billion CZK	new capacity*	14	34	23.8 -
	capacity reconstruction**	9		

Input waste
Waste from treatment and processing technologies

		min	max	total
million tons	new capacity*	0.43	0.91	0.4
	capacity reconstruction**			
CZK billion	new capacity*	3	8	3.9
	capacity reconstruction**			

Estimated need for capacity building by 2035	Estimated investment required by 2035
million tons	billion CZK
2.5	32.5 - 65.3

Source: own processing

Legend

***new capacity due to production growth**

****reconstruction and renewal of existing capacities**

Estimated investments in technologies for hazardous waste management

Figure 32: Estimated investments in technologies for hazardous waste management

Input waste

Hazardous waste primarily from: Industry

Healthcare and veterinary care

Municipal waste

Waste treatment and processing technologies

Treatment of hazardous waste

			Summary
million tons	New capacity*	0.1	0
	capacity reconstruction**	0	
CZK billion	new capacity*	1.5	3
	capacity reconstruction**	1	

Hazardous waste incinerator

			total
million tons	new capacity*	0	0
	capacity reconstruction**	0	
CZK billion	new capacity*	2.9	8
	capacity reconstruction**	6	

Stabilization and biodegradation

			total
million tons	new capacity*	0.0	0
	capacity reconstruction**	0.5	
billion CZK	new capacity*	0	0
	capacity reconstruction**	0	

Estimated capacity needs by 2035	Estimated investment needed by 2035
million tons	billion CZK
0	12

Legend
***new capacity thanks to production growth**
****reconstruction and renewal of existing capacities, including the addition of missing capacities**

Source: own calculations

Estimated investments in technologies for construction and demolition waste management

Figure 33: Estimated investments in technologies for construction and demolition waste management

Input waste

Construction and demolition waste

Processing of construction and demolition waste

			summary
million tonnes	New capacity*	1.9	5
	capacity reconstruction**	3	
CZK billion	new capacity*	0	1
	capacity reconstruction**	1	

Estimated capacity expansion needs by 2035	Estimated investment needed by 2035
million tons	billion CZK
5.6	1.7

Legend
***new capacity due to production growth**
****reconstruction and renewal of existing capacities, including the addition of missing capacities**

Source: own calculations

Estimated investments in technologies to ensure the recycling of the amount of material-recyclable waste produced in the Czech Republic

Figure 34: Estimated investments in technologies to ensure the recycling of the amount of recyclable waste produced in the Czech Republic

Input waste

Separate collection - municipalities
Separate collection - other producers
Outputs from the waste treatment and processing process Sorted industrial waste

Paper and cardboard

			summary
million tonnes	New capacity*	0.0	0
	shortfall in capacity**	0	
billion CZK	new capacity*	3	21
	Missing capacity**	18	

Plasti c

			total
million tonnes	New capacity*	0	0
	missing capacity**	0.1	
billion CZK	new capacity*	3	4
	missing capacity**	1	

Met al

			total
million tons	new capacity*	0	1
	shortfall in capacity**	1	
billion CZK	new capacity*	0	9
	missing capacity**	8	

Glass

			total
million tons	new capacity*	0	0
	shortfall in capacity**	0	
billion CZK	new capacity*	0	0
	missing capacity**	0	

Text

			total
million tons	new capacity*	0.1	0
	Missing capacity**	0	
billion CZK	new capacity*	1	1
	missing capacity**	0	

Estimated need for recycling capacity in the Czech Republic by 2035	Estimated investment needed for recycling in the Czech Republic by 2035
million tons	billion CZK
2	35

Legend
***new capacity due to production growth**
****capacity missing at current production**

Source: own processing

4.4.4 Distribution of investments in waste treatment facilities

To provide an indicative overview of the distribution of investments within the Czech Republic, a qualified assessment of the status and estimated needs of individual technologies in the East and West regions of the Czech Republic was carried out for suitable waste streams. The NUTS2 regions falling within the East and West regions are described in the following table (Table 94).

Table 94: Distribution of NUTS2 areas

East region	West region
CZ06 – Southeast	CZ01 – Prague
CZ07 – Central Moravia	CZ02 – Central Bohemia
CZ08 – Moravia-Silesia	CZ03 – Southwest
	CZ04 – Northwest
	CZ05 – Northeast

Source: own classification

For each waste stream linked to end-of-pipe technology, the principle for determining the estimated total capacity requirements in individual areas is described in the following table (Table 95). These considerations should be taken as very indicative, especially with regard to the free market and suitable conditions for the construction of individual technologies in specific regions/areas. An individual approach must always be taken to each investment project linked to the investor's plans and decisions, including the specific conditions for implementing the project in the given location. For these reasons, **it is not possible to determine exactly the distribution and location of capacities or investments within individual regions of the Czech Republic.**

Table 95: Principles of approach and determination of the estimated capacity requirements for waste management facilities in the Czech Republic in individual areas (East/West) for individual technology groups

Technology	Estimated capacity requirements in individual areas
Collection network (containers and collection yards)	Not possible – lack of data on detailed coverage (door to door) and the area covered in individual regions. Lack of detailed information on the need to develop a public collection network in individual regions. Too much detail taking into account approximately 6,500 separate municipalities.
Sorting lines – paper	Based on the production of separately collected paper in 2035.
Sorting lines – plastics	Based on the production of separately collected plastic in 2035.
Paper and cardboard	Not possible – linked to suitable locations and business plans.
Plastic	Not possible – linked to suitable locations and business plans.
Metal	Not possible – linked to suitable locations and business plans.
Glass	Not possible – linked to suitable locations and business plans.
Textiles	Not possible – linked to suitable locations and business plans.
Sanitization	Based on the increase in quantity by 2035 – almost identical to the production of biological waste from kitchens and canteens in 2035 thanks to minimal production in 2022.

Technology	Estimated capacity requirements in individual areas
Biogas plant	Based on the increase in the amount of biological waste by 2035, taking into account the deficits/surpluses in treatment capacity in 2022, when a surplus was identified in the Central Bohemian Region and a shortage in the Capital City of Prague. Prague (loading took place in the Central Bohemian Region). This has no impact on the distribution across regions.
Composting plant	Based on the increase in quantity by 2035, taking into account the deficits/surpluses in loading capacity in 2022, when a surplus was identified in the Central Bohemian Region and a shortage in the Capital City of Prague (loading took place in the Central Bohemian Region). This has no impact on the distribution across regions.
Transfer station	Based on MSW production in 2030.
Sorting line for mixed municipal waste	According to the share of planned capacity in each area in the total planned capacity for the Czech Republic.
Treatment and sorting of bulky waste	Based on bulky waste production in 2030 (end of technology growth) in individual regions, scenario T1.
Waste-to-energy (WTE)	According to the share of planned capacities in each area in the total planned capacity for the Czech Republic.
Production of solid fuels from waste	Not possible – linked to TAP customers.
Treatment of hazardous waste	Based on increase in quantity.
Hazardous waste incineration plant	Based on the sub-stream "Waste exclusively to incinerators". The amount is more or less proportional to the distribution of the population. Significant is waste from health and veterinary care in group 18 – its production in 2035.
Stabilization and biodegradation	NO production in 2035 in individual areas.
Processing of construction and demolition waste	Not possible – primarily mobile equipment linked to significant demolition/renovation/construction projects.

Source: own processing

There are known projects in the segment of future management primarily of mixed municipal waste.

The presented and known plans indicate that the East region will primarily focus on the treatment and mechanical sorting of mixed municipal waste with the aim of producing alternative fuels, linked to existing and planned projects for the transformation of energy to alternative fuels.

In contrast, according to known and presented projects, the western region will focus more on the use of mixed municipal waste in waste-to-energy facilities.

As mentioned above, however, each project is unique and its implementation depends on a number of factors. **Waste management is subject to market forces, and the state cannot centrally determine where projects should be implemented**. Individual entities active in the waste market bear the risks associated with securing their clients and waste.

Transport costs also have a significant impact on the overall cost of waste management. Naturally, this will lead to projects that take local waste production into account.

Another important aspect of project development is the suitability of the location. Building waste infrastructure on a greenfield site is very difficult and usually meets with resistance from citizens and civic initiatives. Typically, in the case of ZEVO or hazardous waste incinerators, it can be assumed that investments will be made in locations where infrastructure already exists and will be modified or expanded. The construction of new projects in completely new locations seems rather unrealistic. These are therefore investments where the geographical division into NUTS2 is unlikely to be respected.

The Czech Republic will have a market environment that should, in principle, optimize the overall costs of waste management.

4.5 Information on criteria for the location future waste treatment facilities

When preparing projects for the construction of a network of waste management facilities and planning the location of future waste treatment facilities, it is necessary to take into account a number of criteria, which are listed below:

a) **number of individual types of facilities that are active in the region** (classification according to the new Register of Facilities of the Waste Management Information System) within the Czech Republic and individual regions of the Czech Republic,

b) **capacity of individual types of facilities** within the Czech Republic and individual regions of the Czech Republic,

c) **deficit/surplus of capacity of facilities for the treatment of given waste in the region,**

d) **capacity of individual activities in the facility** according to Annex 2 of the Act within the Czech Republic,

e) **waste production** within the Czech Republic and individual regions of the Czech Republic,

f) **legislative restrictions from the perspective of spatial planning** (protected areas, geologically unsuitable areas,

g) **preference for waste treatment facilities at higher levels of the waste management hierarchy,**

h) **suitability of the facility's location in the region in terms of accessibility and travel distance,**

i) **use of BAT,**

j) **evaluation of possible technological options in the region.**

In general, the above criteria indicate that future waste management facilities should be located in regions with the highest capacity deficit for the management of the waste in question, or in the vicinity of such regions, depending on the nature and characteristics of the waste in question.

Facilities processing waste suitable for transport can serve larger catchment areas than, for example, facilities processing hazardous waste and other waste unsuitable for transport. The Czech Republic should establish a network of waste treatment facilities so that hazardous waste (and other waste unsuitable for transport) is transported over the shortest possible distances and other waste is transported over distances that do not cause unnecessary environmental pollution.

New facilities should be built in locations/regions where they are needed, and their construction must comply with applicable legislation, respect the waste management hierarchy, BAT principles, the Waste Management Plan of the Czech Republic (and the relevant region), and the suitability of the facility's location in the region (e.g., geographical suitability).

Where possible, preference should be given to facilities that treat waste at higher levels of waste treatment (e.g., facilities whose output is a reusable material product). It is also appropriate to continue using existing facilities if they meet technical requirements, or to modernize them.

If the nature of the waste allows it, emphasis should be placed on maintaining a closed cycle, and the disposal of outputs from the facility must also be addressed when planning the location of waste treatment facilities.

Obsolete facilities with unsuitable technologies will be gradually closed down.

As part of the preparation of the POH ČR, a detailed analysis of the existing waste management network (number of facilities and capacity in individual regions of the Czech Republic) was carried out, the adequacy of the existing network was assessed, and a proposal for optimising the network of facilities for the following areas was drawn up:

a) bio-waste management,
b) treatment of waste from separate collection of recyclable and recoverable waste (paper, plastic, glass, metals, textiles),
c) municipal waste management outside separate collection – mixed municipal waste, bulky waste,
d) hazardous waste management,
e) industrial waste management,
f) handling of waste from health and veterinary care,
g) handling of sludge from wastewater treatment plants,
h) handling of construction and demolition waste,
i) waste sorting, sorting and treatment technologies,
j) waste recycling,
k) energy recovery from waste.

Long-term outlook for 2035–2040

Planning investments for 2065 and beyond is very complicated, mainly due to significant legislative changes and requirements for changes in society's behavior and approach to waste management. The success of this transformation will directly affect the need for and modification of waste management technologies.

In general, it can be stated that, assuming the development of production and the methods of waste management described in the individual scenarios T1N1-T2N3, a significant portion of the financial resources will be invested in the modification, expansion, and reconstruction of existing facilities so that they are able to safely and efficiently manage the waste produced within the Czech Republic in the long term.

The plastic waste sorting, re-sorting, and treatment sector is set for a major transformation, with demands for the production of high-quality raw materials for reuse in products. In this technology segment, manual sorting lines are expected to be closed or transformed into transfer stations for the efficient transport of compressed sorted plastic waste to sophisticated automated lines for further sorting.

Further changes are needed in the recycling technology industry for the recovery of critical raw materials, in thermochemical waste treatment, and in the development of biogas plants for the anaerobic digestion of biowaste.

Significant changes can also be expected in the hazardous waste incineration sector due to the need to increase capacity by building new facilities and renovating existing ones. These technologies should meet the requirements for best available techniques for new waste incineration plants, as set out in the reference document on best available techniques for waste incineration - Best Available Techniques (BAT) Reference Document for Waste Incineration; EUR 29971 EN; doi:10.2760/761437 (from 2019), or from Commission Implementing Decision (EU) 2019/2010 establishing the best available techniques (BAT) conclusions for waste incineration.

Other new BATs and BREFs will affect waste management. The impact of BATs and BREFs on waste technologies is crucial not only from an environmental perspective, but also from a technical and economic point of view. They ensure that industrial processes meet the highest environmental standards while promoting innovation and competitiveness in waste management.

4.6 Sources of financing and enforcement of measures under the POH CR

Investments in waste and circular economy management in the Czech Republic can be financed through the appropriate use of economic instruments, including subsidy programs (European and national funds) and private investments.

These programs focus on financing the transition to circular economy principles and improving the application of the waste management hierarchy, waste prevention, improving the quality of sorting and the usability of sorted waste in accordance with the priorities and hierarchy of waste management, and creating and expanding capacities for recycling and waste recovery. Financial incentives give and will continue **to give preference to highly efficient and high-quality recycling and the production of products with recycled content (recyclates).** Subsidy support also focuses on financing **technologies that minimize waste generation, increase recycling and processing of secondary raw materials, innovative technologies, and new approaches to waste utilization.** Research and development and environmental education in the field of waste and circular economy are also supported.

The largest sources of funding for investments in technology are the European Structural and Investment Funds (ESIF) and the National Recovery Plan (NRP).

See the table for an overview of sources of financing for waste and circular economy management in the Czech Republic.

Table 96: Overview of funding sources for the development of waste and circular economy

Operational
Operational Program Environment 2021-2027 (OPŽP)
Operational Program Technology and Applications for Competitiveness (OPTAK)
Operational Program Fair Transformation 2021-2027 (OPFT)
Integrated Regional Operational Program (IROP)
Other programs
National Recovery Plan (NRP)
Modernization Fund
National Environment Program (NPŽP)
Environment for Life and Environment for Life 2 programs
MPO programs
EEA and Norway Funds
Ministry of Agriculture Programs
Programme to Support NGO Projects
EU Community Programs
Horizon Europe

LIFE
COSME
Innovation Fund
National and international cooperation programs
Interreg – European Territorial Cooperation Programs
Interreg Central Europe
Europe Interreg
Other sources of funding

Operational Program Environment 2021-2027 (OPŽP)

The Operational Program Environment (OPŽP) has long been the main subsidy program supporting the development of waste and circular economy in the Czech Republic. In the 2021-2027 programming period, Specific Objective (SC) 1.5 Support for the transition to a resource-efficient circular economy focuses on the circular economy.

SC 1.5 – Support for the transition to a resource-efficient circular economy

The entire area of waste and circular economy management is supported under the program and SC 1.5. The priority is to support activities leading to the development of waste and circular economy infrastructure, the fulfillment of the Czech Republic's Waste Management Plan objectives, commitments to the EU, and the improvement of the application of the waste management hierarchy.

The following activities are supported in the area **of waste prevention**:

- Purchase of composters to prevent municipal waste generation;
- Establishment of reuse centers for the reuse of products, including activities for the repair and extension of product life;
- Building food bank infrastructure;
- Support for the prevention of waste from disposable tableware or disposable packaging.
- The following activities are supported in the area of waste utilization:
- Construction and modernization of collection yards, separate waste collection and transport systems;
- Support for sorting and post-sorting systems (including treatment) for the separation of other waste;
- Construction of facilities for the treatment and processing of sewage sludge from wastewater treatment plants;
- Construction and modernization of facilities for material recovery from waste;
- Construction and modernization of facilities for energy recovery from waste;
- Construction and modernization of facilities for chemical recycling of waste;
- Construction and modernization of facilities for the collection and treatment of hazardous waste.

Operational Program Technology and Applications for Competitiveness 2021–2027 (OPTAK),

The circular economy area, with a primary focus on business entities, is supported by the Ministry of Industry and Trade under OP TAK.

SC 5.2 – Support for the transition to a resource-efficient circular economy

Supported activities:

- Acquisition of innovative technologies for the recovery, processing, and use of secondary raw materials from end-of-life products and materials and for the manufacture of products containing secondary raw materials;

- Support for innovative technologies for the recovery and processing of secondary raw materials (e.g., by-products, non-wastes, non-conforming products, and others);
- Investment in innovative technologies enabling new or higher use of secondary raw materials as substitutes for primary resources;
- Investment in innovative technologies to reduce material intensity of production and replace primary raw materials with secondary ones;
- Optimization of the eco-design of products to facilitate recycling and reuse;
- Projects and implementation of industrial symbiosis;
- Improving material recycling of waste and its reuse;
- Emphasis on closing material cycles, in particular by promoting material recycling;
- Introduction of eco-design of products (support for innovative production technologies using remanufacturing).

Operational Program Just Transition 2021-2027 (OPST)

The OPST program addresses the negative impacts of the transition away from coal in the most affected regions of the Czech Republic, namely the Karlovy Vary, Ústí nad Labem, and Moravia-Silesia regions. In the area of the circular economy, support is provided for innovative projects focused on sorting, post-sorting, treatment, material conversion, and chemical recycling of other and hazardous waste.

National Recovery Plan (NRP)

Component 2.7 Circular economy, recycling, and industrial water

Under Activity 2.7.1.1 Building recycling infrastructure, support is provided for increasing the capacity and efficiency of the biodegradable waste (BDW) management system as a whole, primarily through support for biodegradable waste treatment facilities and the application and incorporation of compost produced from bio-waste treatment facilities into agricultural land.

Modernization Fund

The Modernization Fund is an instrument financed from the proceeds of the sale of emission allowances, and its main objective is to modernize the energy sector. The Modernization Fund is divided into separate priority programs, under which funds are also allocated to support selected types of waste-to-energy facilities and the construction of biogas stations.

Program No. 2 Modernization of heat supply systems (HEAT)

The HEAT program supports projects for the reconstruction or replacement of heat sources in heat supply systems with a change in fuel base or energy type to waste-to-energy in combination with high-efficiency CHP.

Program No. 5 Renewable Gaseous and Liquid Fuels (GREENGAS)

The program supports projects for the construction of waste and municipal biogas stations and biogas treatment plants for biomethane.

Program No. 7 Community Energy (KOMUNERG)

The program supports projects for the construction of community biogas plants that process sorted biowaste, industrial biowaste, sewage sludge, or agricultural by-products within the community.

National Environmental Program (NPŽP)

The priority area **"Waste, legacy sites and environmental risks"** focuses on investments aimed at preventing waste generation, complying with the waste management hierarchy, and minimizing the impact of waste on human health and the environment.

The objective of this priority area is:

- Compliance with the waste management hierarchy.
- Preventing waste generation and reducing specific waste production.
- Maximizing the use of waste as a substitute for primary resources.
- Minimization of the adverse effects of waste generation and management on human health and the environment.
- Minimization of environmental risks (old landfills, old environmental burdens, chemical management, prevention of industrial accidents).
- Sustainable development of society and moving towards a "circular economy."

Environment for Life Program and the follow-up Environment for Life 2 Program

Ministry of the Environment program to support applied research and innovation in the field of the environment, climate protection, and sustainable development. The program supports research projects leading to the transition to a circular economy, the efficient use of natural resources, and sustainability.

Other sources of funding

The operation of waste management and any compensation for increased costs is further financed through the use of economic instruments listed in Chapter 4.2.2.

Program to support NGO projects

The program focuses on supporting education, training, and awareness-raising projects in the areas of waste prevention, waste minimization, waste utilization, and the transition to a circular economy.

Extended producer responsibility (EPR) systems

Another source of funding for waste management is the costs associated with the operation of extended producer responsibility systems, a concept described in more detail in Chapter 4.2.2.

Public procurement

The new public procurement methodology supports the circular economy in the Czech Republic. This is described in more detail in Chapter 4.2.2.

Private investment

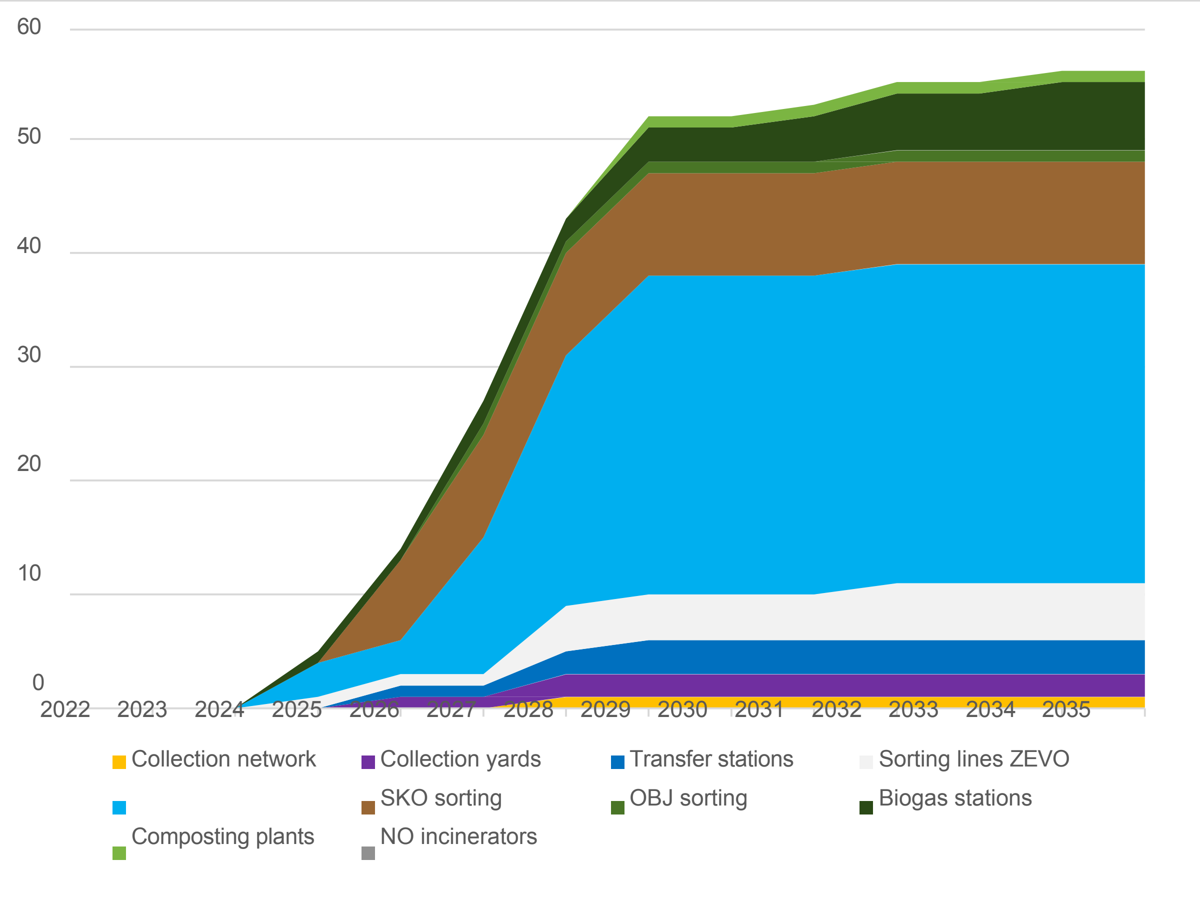
Private investment may be triggered by the need to expand the separate collection network or by the need to build or modernize other technologies. Incentives for private investment include stability of the environment, market potential, and the estimated capacity gap in the collection network and waste treatment facilities, as indicated in the conclusions of the economic analysis. Public-private partnership (PPP) projects may also be another financing option.

4.7 Proposal for the implementation of measures under the Czech Waste Management Plan

4.7.1 Implementation schedule

Proper municipal waste management will require investments of CZK 58 billion by 2035. The largest share of investments in municipal waste management facilities should take place between 2026 and 2029. Investments should primarily target facilities where **capacity shortages** are **most acute**, i.e., **waste-to-energy plants and mechanical sorting plants for mixed municipal waste.**

Graph 71: Cumulative investment needed in municipal waste treatment facilities (CZK billion)



In order to meet waste management targets, it will be necessary to invest in facility capacity. Estimated investment costs are shown in the table below.

Table 97: Estimated investment costs for meeting waste management targets

Technology	Minimum costs (thousand CZK/t annual capacity)	Maximum costs (thousand CZK/tonne of annual capacity)	Average cost (thousand CZK/tonne annual capacity)*
Hazardous waste incinerators	5	8	6
Hazardous waste incinerators from healthcare care	40	70	5
Waste-to-energy plants (ZEVO)	30	43	3
Plastic sorting lines	1	29	22.3

Technology	Minimum costs (thousand CZK/t annual capacity)	Maximum costs (thousand CZK/tonne of annual capacity)	Average cost (thousand CZK/t annual capacity)*
Biogas plants	13	18	15
Sorting lines for mixed municipal waste	4	14	9
Paper sorting lines	4	12	9
Demulsification and neutralization	10	11	10.8
Composting plants	3	4	3
Sanitation	2	3	2
Transfer station	2	4	2.7
Production of solid fuels from waste	2	3	2
Treatment and sorting of bulky waste	2	3	2
Biodegradation	0	1	0
Stabilization lines	0	0.7	0.5
Processing of construction and demolition waste	0	0	0
Glass recycling	1	3	1
Metal recycling	6	8	6
Textile recycling	10	20	15
Mechanical recycling of plastics	10	22	15
Paper recycling	40	60	45

Source: own processing

*Based on an analysis of investments, costs, and capacities of individual facilities, a weighted average was determined for each facility, from which the median value was derived. This is an expert estimate based on knowledge of the industry.

All newly built waste treatment facilities should meet the criteria of Best Available Techniques (BAT) and the Reference Document on Best Available Techniques (BREF).

BAT (Best Available Techniques) are standardized procedures and technologies that are considered the most effective in terms of environmental protection, while being technically and economically feasible. BREF (BAT Reference Documents) serve as reference materials that describe specific BATs for individual industries and processes. They have positive impacts:

1) Improved environmental performance

- The implementation of BAT ensures that waste treatment technologies minimize emissions of harmful substances (e.g., nitrogen oxides, heavy metals, greenhouse gases).
- They include the efficient use of raw materials and energy, thereby contributing to reducing the ecological footprint of waste processes.

2) Harmonization of technical and environmental standards

- BAT and BREF provide uniform standards applicable throughout the EU, thereby promoting transparency and predictability in waste management regulations.

- They contribute to the elimination of obsolete and inefficient technologies.

3) Enhancing economic efficiency

- The application of BAT can lead to reductions in energy, material, or emission costs through more efficient processes.
- Investments in equipment modernization often bring long-term economic benefits.

4) Ensuring compliance with legislation

- BAT and BREF are part of the Industrial Emissions Directive (IED, 2010/75/EU), which requires waste management facilities to meet emission limits based on BAT.
- An indirect impact is increased pressure to modernize facilities and operations that would otherwise fail to meet the requirements.

5) Support for innovation and research

- BAT and BREF promote the development of new technologies by setting standards that encourage the search for innovative solutions.
- They significantly influence the design and implementation of new waste technologies for recycling, waste-to-energy, or recycling of critical raw materials.

6) Minimizing health and environmental risks

- Thanks to clear rules on emission control, hazardous waste management, and wastewater treatment, BATs contribute to the protection of public health and the environment.
- They ensure better management of waste and by-products and minimize the risk of soil, water, and air contamination.

The impact of BAT and BREF on waste technologies is crucial not only from an environmental perspective, but also from a technical and economic point of view. They ensure that industrial processes meet the highest environmental standards while promoting innovation and competitiveness in waste management.

4.7.2 Responsibility for the implementation of the POH CR and measures

The Ministry of the Environment, municipalities, and waste producers continuously monitor the creation of conditions for waste prevention and management. They also monitor the fulfillment of the objectives, principles, and measures set out in the Czech Republic's Waste Management Plan.

Responsibility for the implementation of the POH CR

In the Czech Republic, there are clearly defined responsibilities, enforcement and support mechanisms for the fulfilment of the objectives of the POH ČR, and in particular for the fulfilment of the objectives for municipal waste. The responsible institutions are:

- **Government of the Czech Republic;**
- **Ministry of the Environment of the Czech Republic;**
- **Municipalities of the Czech Republic in cooperation with the regions of the Czech Republic;**
- **manufacturers and extended producer responsibility companies** (end-of-life products and packaging).

Since the Waste Act came into effect, individual municipalities in the Czech Republic have been responsible for meeting sorting targets. Failure to comply with this obligation may be sanctioned by the Czech supervisory authorities.

State administration

State administration at the waste management level is carried out by

- Ministry of the Environment,
- the Ministry of Industry and Trade,
- the Ministry of Agriculture,
- the Ministry of Health,
- the Central Institute for Supervising and Testing in Agriculture,
- regional hygiene stations,
- customs offices and the General Directorate of Customs,
- Police of the Czech Republic,
- regional authorities,
- municipal authority with extended powers,
- municipal authorities,
- district authorities,
- State Environmental Fund.

The duties and powers of all these bodies performing state administration in the field of waste management are laid down in Act No. 541/2020 Coll., on waste. If the implementation of the Waste Management Plan involves any of these bodies, they must act within the scope of their powers as laid down by law.

Ministry of the Environment

As part of its evaluation of the Waste Management Plan of the Czech Republic, the Ministry evaluates the waste management system in the Czech Republic, including municipal waste, mixed municipal waste, biological waste, packaging waste, hazardous and other waste, construction waste, end-of-life products, and other waste. It also evaluates the system of separate collection (sorted collection) of waste and the management of material recoverable components. The evaluation assesses the capacity of the waste management system and end-of-life products and proposes measures for its improvement. In addition to the overall evaluation of the fulfillment of the objectives and measures of the Waste Management Plan, the Ministry also evaluates the network of waste management facilities and waste management in general in the Czech Republic, as well as waste management tools and the fulfillment of the objectives and measures of the Waste Prevention Program.

The Ministry uses all available tools and resources to achieve the objectives and measures set out in the Waste Management Plan. Every two years, the Ministry prepares a report on the implementation of the Waste Management Plan, always for the previous two-year period, by December 31 of the given year. Based on this report, the Ministry proposes measures to support the implementation of the Waste Management Plan.

In accordance with Article 29 of the Waste Directive, the Czech Republic must draw up waste prevention programs with a view to decoupling economic growth from the environmental impact of waste generation and evaluate them at least every six years. In accordance with the Waste Act, the Waste Prevention Program will be evaluated together with the Czech Republic's Waste Management Plan.

Regions

Regions continuously evaluate the system of municipal waste management, mixed municipal waste, biological waste, packaging waste, hazardous and other waste, construction waste, and end-of-life products in their territory. They also evaluate the system of separate collection (sorted collection) of waste and the management of recyclable components.

The assessment evaluates the capacity of the waste and end-of-life product management system and, where necessary, proposes measures for its improvement. As part of the evaluation of the regional waste management plan, the network of waste management facilities in the region is evaluated. The regions also evaluate the fulfillment of the objectives and measures of the entire regional waste management plan, as well as the Waste Prevention Program, which is part of the regional waste management plan.

The regions use all available tools and means to ensure the implementation of the regional waste management plan. Every two years, the region prepares a report on the status of the implementation of the regional waste management plan, always for the previous two-year period, by November 15 of the given year. Based on this report, the region proposes further measures to support the implementation of the regional waste management plan.

Municipalities

Municipalities continuously evaluate the municipal waste management system, including packaging, mixed municipal waste management, and the system for separate collection of recyclable municipal waste (sorted collection), the system for handling biological waste, the system for handling construction waste and end-of-life products originating from municipal residents and participating entities. As part of the evaluation, they assess the capacity of the municipal waste and end-of-life product management system and propose measures for its improvement. Municipalities also evaluate the fulfillment of waste prevention targets and measures, while respecting higher-level waste management plans.

Waste Management Council

The Waste Management Council is an interministerial body of the Minister of the Environment that plans the coordination of waste management at the national level. The Council also coordinates the evaluation of the state of waste management with a focus on the implementation of measures that fall within the remit of other ministries. As an advisory body to the Minister, it discusses proposed measures to support the implementation of the Waste Management Plan of the Czech Republic and submits proposals for updates.

Private sector

The obligations of natural persons, natural persons engaged in business, and legal entities are laid down in the relevant provisions of Act No. 541/2020 Coll. on waste. These persons are required to comply with legal obligations, municipal regulations, and other legal instruments issued by the state, region, or municipality for the purpose of implementing the measures of the Waste Management Plan of the Czech Republic.

Annex No. 1 – Objectives of the Czech Republic's Waste Management Plan

4.7.2.1 Objectives arising from currently applicable legislation

Table 98: Targets of the POH CR resulting from current legislation (and EU legislation that was almost in force at the time of preparation)

Objective number	POH CR OBJECTIVE	Recommended assessment (numerical/descriptive)
Strategic objectives		
S1	Preventing waste generation and reducing specific waste production.	Description
S2	Minimizing the adverse effects of waste generation and management on human health and the environment.	Description
S3	Sustainable development of society and transition to a circular economy.	Description
S4	Maximum use of waste as a substitute for primary resources.	Description
Waste stream targets		
1. Municipal waste		
1.	Increase the level of preparation for reuse and recycling of municipal waste to at least **2025 – 55% / 2030 – 60% / 2035 – 65**%.	
1.2	By **2035,** reduce the amount of municipal waste going to landfills to **10%.** (by weight) or less of the total amount of municipal waste produced waste.	
2. Mixed municipal waste		
2.1	Reduce the production of mixed municipal waste per capita.	Description
2.2	Mixed municipal waste (after sorting recyclable and recoverable components, hazardous components and biological waste) should be used primarily for energy recovery.	
3. Biodegradable waste and biodegradable municipal waste		
3.	Reduce the amount of biodegradable municipal waste going to landfills (from 2021 onwards).	Description
3.2	Increase the use of compost and digestate on agricultural land.	
3.	Increase the separation of biological waste, especially kitchen waste from households.	
3.	Increase the use of biological waste through composting and anaerobic digestion.	
4. Food waste		
4.	Prevent the generation of food waste and reduce food waste production in primary production, processing, distribution, and consumption.	Description
4	By the end of **2030,** reduce food waste generation by **10%** in processing and production compared to the amount produced in 2020.	
4.3	By **2030,** reduce per capita food waste generation in the Union as a whole by 30% compared to 2018 levels. retail and other food distribution channels, in restaurants and catering services services, and in households by **30%** compared to the amount produced in 2020.	
5. Construction and demolition waste		
5.1	By **2030,** increase the recycling rate of construction and demolition waste to **83%** (excluding soil, stone, and slag).	
5.	By **2035,** increase the recycling rate of construction and demolition waste to **87%** (excluding soil, rock and slag)	

<table>
<tr><th>Target num ber</th><th>POH CR target</th><th>Recommended assessment (numerical/descriptive)</th></tr>
<tr><td colspan="3">6. Hazardous waste</td></tr>
<tr><td>6.</td><td>Reduce the specific production of hazardous waste.</td><td></td></tr>
<tr><td>6.</td><td>Minimize the negative effects of hazardous waste management on human health and the environment.</td><td>Description</td></tr>
<tr><td>6.3</td><td>Remove old burdens with the highest degree of urgency.</td><td>Description</td></tr>
<tr><td colspan="3">7. End-of-life products – waste products</td></tr>
<tr><td colspan="3">7.1 Packaging and packaging waste</td></tr>
<tr><td>7.1</td><td>Increase the overall recycling rate for packaging to 75% by 2025. Maintain this overall recycling rate at least for the following years.</td><td></td></tr>
<tr><td>7.</td><td>Increase the overall recovery rate for packaging waste to 80% by 2025.</td><td></td></tr>
<tr><td>7.1.</td><td>Achieve the recycling targets for individual materials in the table by 2025.
<table>
<tr><th>Waste
from packaging (%)</th><th>from January 1, 2025
until December 31, 2029</th><th>from 1 January 2030
until December 31, 2034</th><th>from 1 January 2035</th></tr>
<tr><td>Paper and cardboard</td><td>75</td><td>85</td><td>85</td></tr>
<tr><td>Glass</td><td>75</td><td>75</td><td>75</td></tr>
<tr><td>Plastic</td><td>50</td><td>55</td><td>55</td></tr>
<tr><td>Iron</td><td>70</td><td>80</td><td>80</td></tr>
<tr><td>Aluminum</td><td>35</td><td>50</td><td>60</td></tr>
<tr><td>Wooden</td><td>25</td><td>30</td><td>30</td></tr>
<tr><td>Intended for sale for consumer use</td><td>50</td><td>50</td><td>50</td></tr>
</table></td><td></td></tr>
<tr><td>7.1.4</td><td>Ensure that, from 2025 to 2028, 77% of the weight of single-use plastic beverage bottles placed on the market in a given calendar year is collected for recycling.</td><td></td></tr>
<tr><td>7.1.</td><td>Ensure that, from 2029, 90% of single-use plastic beverage bottles placed on the market in a given calendar year are collected.</td><td></td></tr>
<tr><td>7.1.6</td><td>Ensure that PET beverage bottles contain at least 25% recycled content by 2025.</td><td></td></tr>
<tr><td>7.1.7</td><td>Ensure that plastic beverage bottles contain at least 30% recycled content by 2030.</td><td></td></tr>
<tr><td>7.1.8</td><td>Ensure that, by July 2024, beverage containers with caps and lids made of plastic are only placed on the market if the caps and lids remain attached to the container during the intended use of the product.</td><td>Description</td></tr>
<tr><td colspan="3">7.2 Single-use plastic products</td></tr>
<tr><td>7.
7.2</td><td>Reduce the placing on the market (consumption) of selected single-use plastic products compared to 2023.
Reduce the disposal of single-use plastic waste outside designated areas.
The targets apply to: tobacco products, wet wipes, balloons, sanitary products, beverage cups, food containers (within the meaning of Act No. 243/2022 Coll.).</td><td>Description</td></tr>
<tr><td colspan="3">7.3 Waste electrical and electronic equipment</td></tr>
<tr><td>7.3</td><td>Achieve a 65% recovery rate for waste electrical and electronic equipment (from 2025</td><td></td></tr>
</table>

<table>
<tr><th>Target num ber</th><th>POH target</th><th>Recommended assessment (numerical/descriptive)</th></tr>
<tr><td></td><td>and beyond).</td><td></td></tr>
<tr><td>7.3</td><td>Ensure a high level of preparation for reuse, recycling, and recovery of waste electrical and electronic equipment. Achieve the preparation for reuse, recycling, and recovery of waste electrical and electronic equipment listed in the table (from 2025 onwards).
<table>
<tr><th>Electrical equipment group</th><th>Use of waste electrical equipment</th><th>Recycling and preparation for reuse</th></tr>
<tr><td>1</td><td>85</td><td>80</td></tr>
<tr><td>2</td><td>80</td><td>70</td></tr>
<tr><td>3</td><td>-</td><td>80</td></tr>
<tr><td>4</td><td>85</td><td>80</td></tr>
<tr><td>5</td><td>75</td><td>55</td></tr>
<tr><td>6</td><td>75</td><td>5</td></tr>
</table></td><td></td></tr>
<tr><td>7.3.3</td><td>Increase the rate of recovery of critical raw materials contained in electrical equipment.</td><td></td></tr>
<tr><td colspan="3">7.4 Waste batteries</td></tr>
<tr><td>7.</td><td>Increase the level of take-back of waste portable batteries. Achieve the minimum take-back rate for waste portable batteries as specified in the table.
<table>
<tr><th>Portable batteries</th><th>By December 31, 2027</th><th>By December 31, 2030</th></tr>
<tr><td>Collection (%)</td><td>63</td><td>7</td></tr>
</table></td><td></td></tr>
<tr><td>7.4</td><td>Achieve high recycling efficiency in waste battery recycling processes.
Achieve minimum recycling efficiency of waste battery group recycling processes according to the table.
<table>
<tr><th rowspan="2">Battery group</th><th colspan="2">Recycling efficiency (% by weight)</th></tr>
<tr><th>By December 31, 2025</th><th>By December 31, 2030</th></tr>
<tr><td>Lead batteries</td><td>75</td><td>80</td></tr>
<tr><td>Lithium batteries</td><td>65</td><td>70</td></tr>
<tr><td>Nickel-cadmium batteries</td><td>80</td><td>-</td></tr>
<tr><td>Other waste batteries</td><td>50</td><td>-</td></tr>
</table></td><td></td></tr>
<tr><td>7.4.3</td><td>By August 18, 2031, achieve in active materials of industrial batteries with a capacity greater than 2 kWh, the minimum shares of cobalt, lithium, and nickel from battery production or consumer waste and the minimum share of lead present in the battery and obtained from waste, for each battery model per year and per manufacturing plant, as set out in the table.
<table>
<tr><th rowspan="2">Material</th><th colspan="2">Minimum proportion of material used from waste (%)</th></tr>
<tr><th>From 18 August 2031</th><th>From 18 August 2036</th></tr>
<tr><td>Cobalt</td><td>1</td><td>2</td></tr>
<tr><td>Lead</td><td>85</td><td>85</td></tr>
<tr><td>Lithium</td><td>6</td><td>12</td></tr>
<tr><td>Nickel</td><td>6</td><td>15</td></tr>
</table></td><td></td></tr>
<tr><td>7.4.4</td><td>Achieve a collection target for waste portable batteries of at least 45% by the end of 2023, 63% by the end of 2027, and 73% by the end of 2030.</td><td></td></tr>
<tr><td>7.4.5</td><td>Achieve a collection target for waste batteries from light-duty vehicles of 51% by the end of 2028 and 61% by the end of 2031.</td><td></td></tr>
<tr><td>7.4.6</td><td>Achieve recycling efficiency for selected materials by the end of 2025 and</td><td></td></tr>
</table>

<table>
<tr><th>Target num ber</th><th>POH target</th><th>Recommended assessment (numerical/descriptive)</th></tr>
<tr><td></td><td>subsequently 2030 (see table).
<table>
<tr><td>Battery group</td><td colspan="2">Recycling efficiency (% by weight)</td></tr>
<tr><td></td><td>By December 31, 2025</td><td>By December 31, 2030</td></tr>
<tr><td>Lead batteries</td><td>75</td><td>80</td></tr>
<tr><td>Lithium batteries</td><td>65</td><td>70</td></tr>
<tr><td>Nickel-cadmium batteries</td><td>80</td><td>-</td></tr>
<tr><td>Other waste batteries</td><td>50</td><td>-</td></tr>
</table></td><td></td></tr>
<tr><td>7.4.7</td><td>Achieve material recovery of selected materials by 2027 and subsequently by 2031 (see table).
<table>
<tr><td>Material</td><td colspan="2">Material utilization target (%)</td></tr>
<tr><td></td><td>By 31 December 2027</td><td>By December 31, 2031</td></tr>
<tr><td>Cobalt</td><td>9</td><td>9</td></tr>
<tr><td>Copper</td><td>90</td><td>95</td></tr>
<tr><td>Lead</td><td>90</td><td>95</td></tr>
<tr><td>Lithium</td><td>50</td><td>80</td></tr>
<tr><td>Nickel</td><td>90</td><td>95</td></tr>
</table></td><td></td></tr>
<tr><td>7.4.8</td><td>Increase the recovery rate of critical raw materials contained in waste batteries.</td><td>Description</td></tr>
<tr><td>7.4.9</td><td>Ensure recycling and financing of "legacy burdens" from industrial batteries.</td><td>Description</td></tr>
<tr><td colspan="3">7.5 Waste tires</td></tr>
<tr><td>7.5</td><td>Increase the level of waste tire collection.
Achieve an annual collection rate of at least 80% for waste tires.</td><td></td></tr>
<tr><td>7.5</td><td>Achieve high recovery rates for waste tyres. Achieve a 100% recovery rate for waste tyres each year.</td><td></td></tr>
<tr><td>7.5.3</td><td>Achieve an annual recycling and preparation for reuse rate of at least 30% for waste tires.</td><td></td></tr>
<tr><td colspan="3">7.6 End-of-life vehicles</td></tr>
<tr><td>7.6</td><td>Achieve high recovery rates in the treatment of end-of-life vehicles. Achieve a rate of reuse, recycling and recovery in the treatment of selected end-of-life vehicles according to the table.
<table>
<tr><td colspan="2">Handling of end-of-life vehicles</td></tr>
<tr><td>Reuse and recycling</td><td>95</td></tr>
<tr><td>Reuse and recycling</td><td>85</td></tr>
</table></td><td></td></tr>
<tr><td>7.6</td><td>Increase the recovery rate of critical raw materials contained in end-of-life vehicles.</td><td></td></tr>
<tr><td colspan="3">7.7 Waste textiles</td></tr>
<tr><td>7.</td><td>By 2030, achieve a separation efficiency (separate collection rate) of textile waste in municipalities of at least 50%.
By 2035, achieve a separation efficiency (separate collection rate) of textile waste in municipalities of at least 55%.</td><td></td></tr>
<tr><td>7.7.2</td><td>By 2030, achieve a rate of preparation for reuse and recycling of textile waste of at least 35%.
By 2035, achieve a rate of preparation for reuse and recycling of textile waste of at least 45%.</td><td></td></tr>
</table>

Target num ber	TARGET OF THE CZECH REPUBLIC	Recommended assessment (numerical/descriptive)
7.8 Waste wood		
7.8	Increase the efficiency of wood separation (separate collection rate) in municipalities.	
7.8.2	By 2030, achieve a rate of preparation for reuse and recycling of wood waste of at least **40**%.	
7.8	By 2035, achieve a rate of preparation for reuse and recycling of wood waste of at least **50**%.	
8. Sewage sludge		
8.	Utilize sludge from wastewater treatment plants as a material, focusing primarily on the use of phosphorus and nitrogen, apply high-quality sludge to soil, and utilize sludge for energy.	
8.2	Reduce the amount of hazardous substances in sewage sludge intended for application to agricultural land.	Description
9. Waste oils		
9.	Increase the recycling and energy recovery of waste oils.	
10. Waste from health and veterinary care		
10	Minimize the negative effects of the management of waste from health and veterinary care on human health and the environment.	Description
10.	Increase the incineration of waste from health and veterinary care.	
11. Specific groups of hazardous waste		
11.1 Waste and equipment containing polychlorinated biphenyls		
11.1	All equipment and waste containing polychlorinated biphenyls must be transferred to a waste treatment facility by the end of 2025, and polychlorinated biphenyls must be decontaminated by that time. polychlorinated biphenyls by this date.	Description
11.1.2	Remove waste containing polychlorinated biphenyls held by waste disposal facilities by the end of 2028.	Description
11.2 Waste containing persistent organic pollutants		
11.2	Raise awareness of persistent organic pollutants, the proper waste management practices for POPs and their effects on human health and the environment.	Description
11.2	Limit the entry of persistent organic pollutants from waste into recycling.	Description
11.3 Waste containing asbestos		
11.3.1	Minimize the potential negative effects of waste management involving asbestos on human health and the environment.	Description
12. Animal by-products and biological waste from kitchens and catering facilities		
12.	Reduce the amount of biological waste from kitchens and catering facilities and animal by-products in mixed municipal waste originating from households, public catering facilities (restaurants, snack bars) and central kitchens (hospitals, schools, and other similar facilities).	Description
12	Increase the separation and proper management of biological waste from kitchens and catering facilities and animal by-products, thereby reducing the negative effects of their management on human health and the environment.	
12.3	Increase the use of biological waste from kitchens and catering facilities and by-products	

Target number	POH CR target	Recommended assessment (numerical/descriptive)
	of animal origin through anaerobic digestion.	
13. Ferrous and non-ferrous metal waste		
13.	Process metal waste and end-of-life products into materials for the purpose of replacing primary raw materials.	Description
13.2	Increase the recycling rate of metal waste.	
Targets for specific areas of waste management		
14. Principles for the creation of a network of waste management facilities		
14.	Create and coordinate a comprehensive, adequate, and efficient network of waste management facilities in the Czech Republic.	Description
14.	Build facilities of major importance for waste treatment.	Description
15. Principles for decision-making on cross-border shipments, import and export of waste		
15.	Not to endanger human health, the environment, or the fulfillment of the Czech Republic's obligations or binding targets arising from European legislation as a result of the transboundary movement of waste.	Description
16. Restrictions on the disposal of waste outside designated sites and ensuring the management of waste whose owner is unknown or has ceased to exist		
16	Limit the disposal of waste outside designated sites.	Description
16	Properly dispose of waste deposited outside designated areas and waste whose owner is unknown or no longer exists.	Description
17. Waste from emergency situations		
18.1	Proper and safe handling of waste from natural disasters and emergency situations.	Description
18. Waste slag from waste-to-energy plants		
19.	Increase the material recovery rate of slag waste from the incineration of other waste, in particular municipal waste.	

4.7.2.2 Targets resulting from pending legislation – expected to come into force

Table 99: Targets of the Czech Republic's Waste Management Plan resulting from pending legislation

Target number	Proposed wording of the target	Recommended assessment
Food waste		
1.	By the end of 2030, reduce food waste in processing and manufacturing by 10% compared to the amount produced in 2020.	
1.	By the end of 2035, reduce food waste by 15% in processing and production compared to the amount produced in 2020. Comparison with the amount produced in 2020.	
1.3	By the end of 2030, reduce per capita food waste generation in retail and other food distribution channels, restaurants and food services, and households by 30% compared to the amount generated in 2020	
1.4	By the end of 2035, reduce food waste per capita in retail and other food distribution channels, restaurants and food services, and households by 35% compared to the amount produced in 2020	
2. Packaging and packaging waste		
2.	Plastic packaging components shall contain the following minimum percentages of recycled material obtained from consumer plastic waste per packaging unit, by the end of 2029 or within three years of the entry into force of the implementing of the Packaging and Packaging Waste Directive (paragraph 7): a) 30% for contact-sensitive packaging, with the exception of single-use beverage bottles made of polyethylene terephthalate (PET) as the main component; b) 10% for contact-sensitive packaging made from plastic materials other than PET, with the exception of single-use plastic beverage bottles; c) 30% for single-use plastic bottles; 35% for packaging other than that referred to in points (a), (b) and (c).	
2.2	Achieve by the end of 2039 a minimum percentage of recycled content obtained from post-consumer plastic waste for all plastic parts of packaging placed on the market: a) 50% for plastic packaging sensitive to contact, with the exception of single-use plastic beverage bottles; b) 65% for single-use plastic beverage bottles; c) 65% for plastic packaging other than that referred to in points (a) and (b).	
2.3	Ensure that, by the end of 2029, the proportion of empty space in group or transport packaging or e-commerce packaging does not exceed 50% of the product.	
2.4	Achieve by the end of 2029 that at least 10% of products are delivered by economic operators placing large household appliances listed in point 1 of Annex II to Directive 2012/19/EU on the market of a Member State for the first time in transport packaging reusable within a reuse scheme.	
2.	Achieve by the end of 2039 that at least 50% of products are delivered by economic operators placing large household appliances listed in point 1 of Annex II to Directive 2012/19/EU on the market for the first time in a Member State in transport packaging reusable within a reuse scheme.	
2.	By the end of 2029, ensure that at least 20% of cold or hot beverages served in containers for takeaway at the point of sale are supplied in packaging that is reusable within a reuse system or in a manner allowing refilling.	
2.7	By the end of 2039, ensure that at least 80% of cold or hot beverages served in containers for takeaway at the point of sale are provided in packaging	

<table>
<tr><th>Target num ber</th><th>Proposed target wording</th><th>Recommended assessment</th></tr>
<tr><td></td><td>reusable within a reuse system or in a manner that allows for refilling.</td><td></td></tr>
<tr><td>2.8</td><td>By the end of 2029, ensure that at least 10% of ready meals are supplied in packaging reusable within a reuse system or in a manner that allows for refilling.</td><td></td></tr>
<tr><td>2.</td><td>By the end of 2039, ensure that at least 40% of ready-made meals are delivered in packaging reusable within a reuse system or in a manner that allows for refilling.</td><td></td></tr>
<tr><td>2.10</td><td>By the end of 2029, ensure that a certain proportion (see table) of selected beverages is supplied in packaging that is reusable within a reuse system or in a manner that allows for refilling.
<table>
<tr><td>Beverage group</td><td>Share of beverages in reuse system reuse system (%)</td></tr>
<tr><td>Beer, carbonated alcoholic beverages, fermented beverages (other than wine), aromatized wine products and fruit wines, and products based on spirits, wine or other fermented beverages mixed with beverages such as soda, cider or juice.</td><td>10</td></tr>
<tr><td>Wine, excluding sparkling wine</td><td>5</td></tr>
<tr><td>Non-alcoholic beverages in the form of water, water sweetened with sugar, water sweetened with other sweeteners, flavored water, lemonade, sparkling citrus lemonade, iced tea and similar beverages for immediate consumption, pure fruit or vegetable juices, juices or ciders and cocktails without milk and non-alcoholic beverages containing milk fat.</td><td>10</td></tr>
</table></td><td></td></tr>
<tr><td>2.11</td><td>By the end of 2039, ensure that a certain proportion (see table) of selected beverages is supplied in packaging that is reusable within a reuse system or in a manner that allows refilling (see table).
<table>
<tr><td>Beverage group</td><td>Share of beverages in the reuse system reuse system (%)</td></tr>
<tr><td>Beer, carbonated alcoholic beverages, fermented beverages (other than wine), aromatized wine products and fruit wines, and products based on spirits, wine or other fermented beverages mixed with beverages such as soda, cider or juice.</td><td>25</td></tr>
<tr><td>Wine, excluding sparkling wine</td><td>15</td></tr>
<tr><td>Non-alcoholic beverages in the form of water, water sweetened with sugar, water sweetened with other sweeteners, flavored water, lemonade, sparkling citrus</td><td>25</td></tr>
</table></td><td></td></tr>
</table>

Target number	Proposed wording of the target	Recommended rating
	lemonades, iced tea and similar beverages for immediate consumption, pure fruit or vegetable juices, juices or ciders and cocktails without milk and non-alcoholic beverages containing milk fat.	
2.12	By the end of 2029, ensure that at least part of the selected transport or group packaging used is reusable within a reuse system (see table).	
2.13	By the end of 2039, ensure that at least part of the selected transport or group packaging used is reusable within a reuse system (see table).	
2.14	Reduce the amount of packaging waste produced per capita compared to	

Table for target 2.12:

Transport or packaging material	Proposition usable in reuse system reuse system (%)
Pallets, plastic crates, collapsible plastic boxes, buckets, and barrels.	30
Transport packaging for the transport and delivery of items other than food, first placed on the market in electronic commerce.	10
Wrapping film and strapping tape for securing and protecting products on pallets during transport.	10
Group packaging in the form of boxes made of materials other than cardboard, which, in addition to sales packaging, are used to group a certain number of products into a storage unit.	10

Table for target 2.13:

Transport or packaging material	Proportion reusable in reuse system (%) reuse system (%)
Pallets, plastic crates, collapsible plastic boxes, buckets, and barrels.	90
Transport packaging for the transport and delivery of items other than food, first placed on the market in electronic commerce.	50
Wrapping film and strapping tape for securing and protecting products on pallets during transport.	30
Group packaging in the form of boxes made of materials other than cardboard, which, in addition to sales packaging, are used to group a certain number of products into a storage unit.	25

<table>
<tr><th>Target num ber</th><th>Proposed wording of the target</th><th>Recommended assessment</th></tr>
<tr><td></td><td>the amount of such waste generated per capita in 2018, as reported to the Commission in accordance with Decision 2005/270/EC, by at least:
a) 5% by 2030;
b) 10% by 2035;
c) 15% by 2040.</td><td></td></tr>
<tr><td>2.15</td><td>Ensure separate collection by the end of 2028 for at least 90% by weight of newly placed on the market single-use plastic beverage bottles of up to 3 liters and
single-use metal beverage containers of up to 3 liters.</td><td></td></tr>
<tr><td>2.16</td><td>By the end of 2025, ensure that at least 65% by weight of all packaging waste generated is recycled, with minimum weight shares for selected specific
materials contained in packaging waste produced shall be:
a) 50% for plastics;
b) 25% for wood;
c) 70% for ferrous metals;
d) 50% for aluminum;
e) 70% for glass;
f) 75% for paper and cardboard.</td><td></td></tr>
<tr><td>2.17</td><td>By the end of 2030, ensure that at least 70% of the weight of all packaging waste generated is recycled, with the minimum weight shares of selected specific materials contained in the packaging waste generated being:
a) 55% for plastics;
b) 30% for wood;
c) 80% for ferrous metals;
d) 60% for aluminum;
e) 75% for glass;
f) 85% for paper and cardboard.</td><td></td></tr>
<tr><td>2.18</td><td>Achieve a minimum recycling rate of 70% by weight for beverage cartons.</td><td></td></tr>
<tr><td>2.</td><td>Achieve a recycling rate for selected returnable single-use packaging as shown in the table.
<table>
<tr><td rowspan="2">Type of waste</td><td colspan="2">Minimum collection rate (%)</td></tr>
<tr><td>From 1 January 2025</td><td>From 1 January 2029</td></tr>
<tr><td>Single-use plastic packaging</td><td>7</td><td>90</td></tr>
</table></td><td></td></tr>
</table>

Annex No. 2 Overview basic key indicators for waste management and waste prevention

Waste management assessment

National indicators (name)	
PRODUCTION	
1	**Total waste production**
2.	**Total production of other waste**
3	**Total production of hazardous waste**
4	**Production of municipal waste**
5	Municipal waste production from municipalities
6	**Production of mixed municipal waste**
7	Production of mixed municipal waste from municipalities
8	Production of bulky waste
9	Production of bulky waste from municipalities
10	Production of biodegradable waste
11	**Production of biodegradable municipal waste**
12	Production of biodegradable municipal waste from municipalities
13	**Production of biological waste**
14	Production (separation) of biological waste in municipalities
15	**Production of construction and demolition waste**
16	Production of other construction and demolition waste
17	Production of textile waste
18	Production (separation) of textile waste from municipalities
19.	Production (separation) of wood waste from municipalities
20	Production of waste oils
21	Sludge production
22	Production of sludge 19 08 05 from sewage treatment plants
23	Production of food waste
24	Production of secondary waste
25	Primary waste production
26	Production of mineral waste
27	Production of waste excluding mineral waste
28	Production (separation) of paper, plastic, glass, and metal in municipalities
29	Efficiency of paper, plastic, glass and metal separation in municipalities
30	Efficiency of biological waste separation in municipalities
31	Effectiveness of textile waste separation in municipalities
32	Efficiency of wood separation in municipalities
LOADING	
29	**Waste utilization**
30	**Use of other waste**
31	**Utilization of hazardous waste**
32	**Material recovery of waste**
33	**Material utilization of other waste**
34	**Material recovery of hazardous waste**
35	**Waste recycling**

36	**Recycling of other waste**
37	**Recycling of hazardous waste**
38	**Energy recovery from waste**
39	**Energy recovery from other waste**
40	**Energy recovery from hazardous waste**
41	**Waste disposal**
42	**Disposal of other waste**
43	**Disposal of hazardous waste**
44	**Landfilling of waste**
45	**Landfilling of other waste**
46	**Landfilling of hazardous waste**
47	**Waste incineration**
48	**Incineration of other waste**
49	**Incineration of hazardous waste**
50	Total waste management
51.	Total treatment of other waste
52.	Total hazardous waste management
53	**Municipal waste recovery**
54	**Recycling of municipal waste**
55	**Energy recovery from municipal waste**
56	**Disposal of municipal waste**
57	**Landfilling of municipal waste**
58	**Incineration of municipal waste**
59	Total municipal waste management
60	**Energy recovery from mixed municipal waste**
61	Disposal of mixed municipal waste
62	**Landfilling of mixed municipal waste**
63	Incineration of mixed municipal waste
64	Total treatment of mixed municipal waste
65	Landfilling of biodegradable municipal waste
66	**Use of construction and demolition waste**
67	**Material recovery of construction and demolition waste**
68	**Recycling of construction and demolition waste**
69.	Energy recovery from construction and demolition waste
70	Overall management of construction and demolition waste
71	Material recovery of other construction and demolition waste
72	**Recycling of other construction and demolition waste**
73	Total management of other construction and demolition waste
74	**Recycling of waste oils**
75	**Energy recovery from waste oils**
76	Overall waste oil management
77	Use of sludge on agricultural land
78	Energy recovery from sludge
79	Recycling, composting of sludge
80	Overall sludge management
81.	Use of sludge 19 08 05 from wastewater treatment plants on agricultural land
82.	Total management of sludge 19 08 05 from wastewater treatment plants

Source: Methodology of the Ministry of the Environment Set of indicators

Regional indicators (name)	
PRODUCTION	
1	**Total waste production**
2	**Total production of other waste**
3.	**Total production of hazardous waste**
4	**Municipal waste production**
5	Municipal waste production from municipalities
6	**Production of mixed municipal waste**
7	Production of mixed municipal waste from municipalities
8	Production of bulky waste
9	Production of bulky waste from municipalities
10	Production of biodegradable waste
11.	**Production of biodegradable municipal waste**
12.	Production of biodegradable municipal waste from municipalities
13	**Production of biological waste**
14	Production (separation) of biological waste in municipalities
15	**Production of construction and demolition waste**
16	Production of other construction and demolition waste
17	Production of textile waste
18	Production (separation) of textile waste from municipalities
19	Production of waste oils
20	Production of sludge
21	Production of sludge 19 08 05 from sewage treatment plants
22	Production of secondary waste
23	Production of primary waste
24	Production of mineral waste
25	Production of waste excluding mineral waste
26.	Production (separation) of paper, plastic, glass, and metal in municipalities
27	Efficiency of paper, plastic, glass and metal separation in municipalities
DISPOSAL	
28	**Waste utilization**
29	**Use of other waste**
30	**Utilization of hazardous waste**
31	**Material recovery of waste**
32	**Material utilization of other waste**
33	**Material recovery of hazardous waste**
34	**Waste recycling**
35	**Recycling of other waste**
36	**Recycling of hazardous waste**
37	**Energy recovery from waste**
38	**Energy recovery from other waste**
39	**Energy recovery from hazardous waste**
40	**Waste disposal**
41	**Disposal of other waste**
42	**Disposal of hazardous waste**
43	**Landfilling of waste**
44	**Landfilling of other waste**
45	**Landfilling of hazardous waste**
46	**Waste incineration**
47.	**Incineration of other waste**

48.	**Incineration of hazardous waste**
49	Total waste management
50	Total management of other waste
51	Total hazardous waste management
52	**Municipal waste utilization**
53	**Recycling of municipal waste**
54	**Energy recovery from municipal waste**
55	**Disposal of municipal waste**
56	**Landfilling of municipal waste**
57	**Incineration of municipal waste**
58	Total municipal waste management
59	**Energy recovery from mixed municipal waste**
60	Disposal of mixed municipal waste
61	**Landfilling of mixed municipal waste**
62	Incineration of mixed municipal waste
63	Total management of mixed municipal waste
64	Landfilling of biodegradable municipal waste
65.	**Use of construction and demolition waste**
66	**Material recovery of construction and demolition waste**
67	**Recycling of construction and demolition waste**
68	Energy recovery from construction and demolition waste
69	Overall management of construction and demolition waste
70	Material recovery of other construction and demolition waste
71	**Recycling of other construction and demolition waste**
72	Total management of other construction and demolition waste
73	**Recycling of waste oils**
74	**Energy recovery from waste oils**
75	Overall waste oil management
76	Use of sludge on agricultural land
77	Energy recovery from sludge
78.	Recycling, sludge composting
79.	Total sludge management
80	Use of sludge 19 08 05 from wastewater treatment plants on agricultural land
81	Total sludge disposal 19 08 05 from wastewater treatment plants

Source: Methodology of the Ministry of the Environment Set of indicators

Assessment of waste prevention

Contextual indicators (name)
Population
Material consumption (DMC)
Waste intensity of production
Material intensity (DMC/GDP)
Turnover in repair sectors
Total GDP

Indicators of the system's readiness to support waste prevention (name)
The PPVO covers all types of measures under Directive 2008/98/EC, Article 9.
Quantified targets are set in the PPVO
Appropriate indicators are set in the PPVO
The PPVO uses a combination of tools – legal, economic, administrative, informational, and voluntary
The PPVO addresses all waste streams that are key to waste prevention.

Waste indicators (name)
Total waste production Production excluding mineral waste
Waste production intensity
Municipal waste production
Production of individual municipal waste components
Production of residual mixed municipal waste
Quantity of selected products reused
Food waste production – breakdown into individual stages of economic activity
Production of hazardous waste
Quantity of textiles, footwear and other selected reusable products taken back

Source: Ministry of the Environment

Annex 3 – Legal regulations and standards in the field of waste management in the Czech Republic and the EU

EU legislation and policies

International conventions

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel 1989), published under No. 6/2015 Coll.
- Stockholm Convention on Persistent Organic Pollutants (Stockholm, 2001), promulgated under No. 40/2006 Coll.
- Vienna Convention for the Protection of the Ozone Layer (Vienna, 1985), promulgated under No. 108/2003 Coll.
- European Agreement concerning the International Carriage of Dangerous Goods by Road – ADR (Geneva 1957), published under No. 64/1987 Coll., as amended,
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) (Geneva 2000), promulgated under No. 102/2011 Coll.
- Regulations concerning the International Carriage of Dangerous Goods by Rail (RID), which is Appendix C to the Convention concerning International Carriage by Rail (COTIF), promulgated under No. 8/1985 Coll., as amended
- Minamata Convention on Mercury (Kumamoto, 2013), promulgated under No. 53/2017 Coll.
- Convention on Long-Range Transboundary Air Pollution (Geneva, 1979), promulgated under No. 5/1985 Coll.

Regulation

- Regulation (EU) 2024/590 of the European Parliament and of the Council on substances that deplete the ozone layer and repealing Regulation (EC) No. 1005/2009
- Regulation (EC) No. 1013/2006 of the European Parliament and of the Council on shipments of waste (parts still in force)
- Regulation (EU) 2024/1157 of the European Parliament and of the Council of 11 April 2024 on shipments of waste, amending Regulation (EU) No 1257/2013 and (EU) 2020/1056 and repealing Regulation (EC) No 1013/2006
- Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring secure and sustainable supplies of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020
- Regulation (EC) No. 1069/2009 of the European Parliament and of the Council laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No. 1774/2002 (Animal by-products Regulation)
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labeling, and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC and amending Regulation (EC) No 1907/2006
- Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of December 18, 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals, establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93, Commission Regulation (EC) No. 1488/94, Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (REACH Regulation)
- Regulation (EC) No. 2150/2002 of the European Parliament and of the Council of November 25, 2002 on waste statistics
- Regulation (EU) 2017/852 of the European Parliament and of the Council on mercury and repealing Regulation (EC) No 1102/2008

- Regulation (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants
- Regulation (EU) 2023/1542 of the European Parliament and of the Council on batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020, and repealing Directive 2006/66/EC
- Regulation (EU) No 1257/2013 of the European Parliament and of the Council of November 20, 2013 on ship recycling and amending Regulation (EC) No 1013/2006 and Directive 2009/16/EC, as amended.
- Regulation (EU) No 2019/1009 of the European Parliament and of the Council of 5 June 2019 laying down rules on the placing on the market of EU fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009 and repealing Regulation (EC) No 2003/2003
- Regulation (EU) 2024/573 of the European Parliament and of the Council on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014
- Regulation of the European Parliament and of the Council establishing a framework for securing the supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020
- Commission Regulation (EC) No 1418/2007 of 29 November 2007 on the export for recovery of certain waste listed in Annex III or IIIA to Regulation (EC) No 1013/2006 of the European Parliament and of the Council2006, to certain countries to which the OECD Decision on the control of transboundary movements of wastes does not apply, as amended
- Commission Regulation (EC) No. 440/2008 of May 30, 2008, laying down test methods pursuant to Regulation (EC) No. 1907/2006 of the European Parliament and of the Council concerning the registration, evaluation, authorization, and restriction of chemicals
- Commission Regulation (EU) No. 1179/2012 establishing criteria determining when glass cullet ceases to be waste within the meaning of Directive 2008/98/EC of the European Parliament and of the Council
- Commission Regulation (EU) No. 1357/2014 of December 18, 2014, replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives.
- Commission Regulation (EU) No. 493/2012 of June 11, 2012, laying down implementing rules for the calculation of recycling efficiencies for waste battery and accumulator recycling processes under Directive 2006/66/EC of the European Parliament and of the Council
- Commission Regulation (EU) No. 715/2013 establishing criteria determining when copper scrap ceases to be waste within the meaning of Directive 2008/98/EC of the European Parliament and of the Council
- Council Regulation (EU) 2017/997 of 8 June 2017 amending Annex III to Directive 2008/98/EC of the European Parliament and of the Council as regards hazardous property HP 14
  "ecotoxic"
- Council Regulation (EU) No 333/2011 establishing criteria for determining when certain types of metal Commission Implementing Regulation (EU) 2019/290 of 19 February 2019 establishing the format for registration and reporting by producers of electrical and electronic equipment to the register
- Commission Decision 97/129/EC of 28 January 1997 establishing a system for the identification of packaging materials pursuant to Directive 94/62/EC of the European Parliament and of the Council on packaging and packaging waste scrap ceases to be waste within the meaning of Directive 2008/98/EC of the European Parliament and of the Council
- Proposal for a Regulation of the European Parliament and of the Council (EU) on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904 and repealing Directive 94/62/EC
- Proposal for a Regulation of the European Parliament and of the Council on the transport of waste and amending Regulations (EU) No 1257/2013 and (EU) 2020/1056
- Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC

- Proposal for a regulation on requirements for the circularity of vehicle design and end-of-life vehicle management (ELV), amending Regulations (EU) 2018/858 and 2019/1020 and repealing Directives 2000/53/EC and 2005/64/EC (July 2023)

Directive

- Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources
- Directive (EU) 2018/849 of the European Parliament and of the Council of 30 May 2018 amending Directive 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment
- Directive (EU) 2018/850 of the European Parliament and of the Council of May 30, 2018, amending Directive 1999/31/EC on the landfill of waste
- Directive (EU) 2018/851 of the European Parliament and of the Council of May 30, 2018, amending Directive 2008/98/EC on waste
- Directive (EU) 2018/852 of the European Parliament and of the Council of May 30, 2018, amending Directive 94/62/EC on packaging and packaging waste
- Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment
- Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles
- Directive 2005/64/EC of the European Parliament and of the Council of 26 October 2005 on type-approval of motor vehicles with regard to their reusability, recyclability and recoverability and amending Council Directive 70/156/EEC
- Directive 2006/21/EC of the European Parliament and of the Council on the management of waste from extractive industries and amending Directive 2004/35/EC
- Directive 2006/66/EC of the European Parliament and of the Council on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
- Directive 2009/125/EC of the European Parliament and of the Council establishing a framework for the setting of ecodesign requirements for energy-related products
- Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control)
- Directive 2011/65/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE)
- Directive 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards the reduction in the consumption of lightweight plastic carrier bags
- Directive 94/62/EC of the European Parliament and of the Council on packaging and packaging waste
- Council Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture
- Council Directive 87/217/EEC on the prevention and reduction of environmental pollution by asbestos
- Council Directive 91/271/EEC concerning urban waste water treatment
- Council Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)
- Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste

National legislation and policies

Law

- Act No. 565/1990 Coll., on local fees
- Act No. 100/2001 Coll., on environmental impact assessment and on amendments to certain related acts (Act on Environmental Impact Assessment)
- Act No. 102/2001 Coll., on general product safety and on amendments to certain acts (Act on General Product Safety), as amended
- Act No. 110/1997 Coll., on foodstuffs and tobacco products and on amendments to certain related acts
- Act No. 123/1998 Coll., on the right to information on the environment
- Act No. 106/1999 Coll., on free access to information
- Act No. 156/1998 Coll., on fertilizers, soil additives, plant protection products and substrates, and agrochemical testing of soils, as amended
- Act No. 157/2009 Coll., on the management of mining waste and on amendments to certain acts
- Act No. 17/1992 Coll., on the environment
- Act No. 201/2012 Coll., on air protection
- Act No. 22/1997 Coll., on technical requirements for products and on amendments to certain acts, as amended,
- Act No. 243/2022 Coll., on the reduction of the impact of selected plastic products
- Act No. 244/2022 Coll., amending certain acts in connection with the adoption of the Act on the reduction of the impact of selected plastic products on the environment
- Act No. 25/2008 Coll., on the integrated register of environmental pollution and the integrated system for fulfilling reporting obligations in the field of the environment and on amendments to certain acts
- Act No. 254/2001 Coll., on Water and on Amendments to Certain Acts (Water Act)
- Act No. 258/2000 Coll., on the protection of public health and on amendments to certain related acts
- Act No. 282/1991 Coll., on the Czech Environmental Inspectorate and its powers in forest protection
- Act No. 283/2021 Coll., Building Act
- Act No. 350/2011 Coll., on Chemical Substances and Chemical Mixtures and on Amendments to Certain Acts (Chemical Act)
- Act No. 44/1988 Coll., on the Protection and Use of Mineral Resources (Mining Act), as amended.
- Act No. 477/2001 Coll., on Packaging and on Amendments to Certain Acts (Packaging Act)
- Act No. 541/2020 Coll., on waste
- Act No. 542/2020 Coll., on end-of-life products
- Act No. 56/2001 Coll., on the conditions for the operation of vehicles on roads and on amendments to Act No. 168/1999 Coll., on liability insurance for damage caused by the operation of a vehicle and on amendments to certain related acts (Act on Liability Insurance for the Operation of a Vehicle), as amended by Act No. 307/1999 Coll.
- Act No. 634/1992 Coll., on consumer protection, as amended
- Act No. 73/2012 Coll., on substances that deplete the ozone layer and on fluorinated greenhouse gases, as amended
- Act No. 76/2002 Coll., on integrated pollution prevention and control, on the integrated pollution register and on amendments to certain acts (Act on Integrated Prevention)
- Act No. 90/2016 Coll., on the assessment of conformity of specified products when placed on the market, as amended
- Act of the Czech National Council No. 114/1992 Coll., on nature and landscape protection

- Act of the Czech National Council No. 282/1991 Coll., on the Czech Environmental Inspectorate and its powers in forest protection
- Act of the Czech National Council No. 388/1991 Coll., on the State Environmental Fund of the Czech Republic
- Draft amendment to Act No. 477/2001 Coll., on packaging and on amendments to certain acts (Act on Packaging)

Implementing regulations

- Decree No. 104/1988 Coll., on the rational use of exclusive deposits, on the licensing and reporting of mining activities and the reporting of activities carried out by mining methods, as amended
- Decree No. 16/2022 Coll., on details of the handling of certain end-of-life products.
- Decree No. 169/2023, on the conditions under which solid fuel from waste ceases to be waste
- Decree No. 273/2021 Coll., on details of waste management
- Decree No. 283/2023, on the determination of conditions under which reclaimed asphalt mixture and reclaimed penetrating macadam
- Decree No. 30/2021 Coll., on the implementation of certain provisions of the Packaging Act
- Decree No. 306/2012 Coll., on conditions for the prevention, occurrence and spread of infectious diseases and on hygiene requirements for the operation of healthcare facilities and social care institutions, as amended
- Decree No. 415/2012 Coll., on permissible levels of pollution and their determination and on the implementation of certain other provisions of the Air Protection Act
- Decree No. 428/2009 Coll., on the implementation of certain provisions of the Act on the management of mining waste
- Decree No. 429/2009 Coll., on the determination of the requirements for a plan for the management of mining waste, including the assessment of its properties and certain other details for the implementation of the Act on the Management of Mining Waste
- Decree No. 47/2023 Coll., on the implementation of certain provisions of the Act on the reduction of the impact of selected plastic products on the environment
- Decree No. 474/2000 Coll., on the establishment of requirements for fertilizers, as amended
- Decree No. 8/2021 Coll., on the Waste Catalogue and the assessment of waste properties (Waste Catalogue)
- Decree No. 345/2021 Coll., on details of the handling of end-of-life vehicles
- Decree of the Czech Mining Authority No. 99/1992 Coll., on the establishment, operation, security and disposal of facilities for the storage of waste in underground spaces
- Decree of the Ministry of Industry and Trade No. 116/2002 Coll., on the method of labeling returnable deposit packaging
- Decree No. 243/2023 Coll., on the implementation of certain provisions of the Act on substances that deplete the ozone layer and on fluorinated greenhouse gases
- Government Regulation No. 481/2012 Coll., on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Appendix No. 4 Economic Analysis of the POH CR 2025-2035

Economic analysis of the Waste Management Plan of the Czech Republic 2025-2035 – this is a separate document presenting the economic impacts of the WMP CR, which is an integral part of the WMP CR for the period 2025-2035.

Appendix No. 5 – List of abbreviations

List of abbreviations

Abbreviation	Meaning
Action Plan	EU Action Plan for the Circular Economy, developed by the EC in 2020
CENIA	Czech Environmental Information Agency
CVVM	Centers for Public Opinion Research
CSR	Corporate social responsibility
ČIŽP	Czech Environmental Inspectorate
CNB	Czech National Bank
ČOI	Czech Trade Inspection Authority
CR	Czech Republic
Czech Statistical Office	Czech Statistical Office
DSS 2024-2030	Transport Sector Strategy Phase 3 for the period 2024-2030
DSO	voluntary association of municipalities
DMC	domestic material consumption
DNSH	Do no significant harm
DPZ	Remote sensing
EIA	Environmental impact assessment
EC	European Commission
EPR	Extended producer responsibility
EU	European Union
EVVO	Environmental education, training and awareness
HNVO	Assessment of hazardous properties of waste
IKČR	Information Concept of the Czech Republic
IKT	information and communication technology
IPPC	Integrated Prevention Information System
ISPOP	Integrated system for fulfilling reporting obligations
ISOH	Waste Management Information System
JES	Uniform Environmental Opinion
JISŽP	Uniform Environmental Information System
KHS	Regional Public Health Authority
KÚ	Regional Authority
MD	Ministry of Transport
MMR	Ministry of Regional Development
MPO	Ministry of Industry and Trade

Abbreviation	Meaning
MZ	Ministry of Health
MZe	Ministry of Agriculture
MŽP	Ministry of the Environment
citizens	non-business individuals
ORP	Municipality with extended powers
PAYT	Pay As You Throw
PD ISOH	ISOH working database
POH ČR	Waste Management Plan of the Czech Republic
PPVO	Waste Prevention Program
Council	Waste Management Council
SEA	Strategic Environmental Assessment
SEKM	Contaminated Site Register System
SEPNO	Hazardous Waste Transport Registration System
SEZ	Old environmental burden
SFŽP	State Environmental Fund
SKO	Mixed municipal waste
SÚKL	State Institute for Drug Control
SZPI	State Agricultural and Food Inspection Authority
TA ČR	Technological Agency of the Czech Republic
ÚKZÚZ	Central Control and Testing Institute in Agriculture
ÚV ČR	Office of the Government of the Czech Republic
VaVaI	Support for research, development, and innovation
VISOH	Public information system for waste management

Appendix No. 6 – Sources

1. CENIA. (2021). *Comprehensive inventory – delivery of inventory work within the second stage of NIKM (Final report).* Available at: https://www.cenia.cz/wp-content/uploads/2022/03/Zprava-o-inventarizaci-kontaminovanych-mist-na-uzemi-CR.pdf.
2. CENIA. (2023). *Report on the Environment of the Czech Republic for 2022.* Available at: https://www.cenia.cz/wp-content/uploads/2023/12/Zprava_ZP_CR_2022.pdf.
3. CVVM. (2023). *Value orientations – June/July 2023.* Available at: https://cvvm.soc.cas.cz/media/com_form2content/documents/c2/a5694/f9/ov230906.pdf.
4. ČHMÚ (ed.). (2023). *National greenhouse gas inventory report of the Czech Republic.* Available at: https://chmi.cz/files/portal/docs/uoco/oez/nis/NIR/CZE_NIR-2023-2021_UNFCCC_allinone_ISBN.pdf.
5. ČNB. (2023a). *Monetary Policy Report.* Available at: https://www.cnb.cz/export/sites/cnb/cs/menova-politika/.galleries/zpravy_o_menove_politice/2023/podzim_2023/download/zomp_2023_podzim.p df.
6. CNB. (2023b). *GDP expenditure: Annual, 2015, current prices, B1GM Gross domestic product, volumes, seasonally adjusted.* Available at: https://www.cnb.cz/arad/#/cs/indicators.
7. Czech Statistical Office. (2022). *Fuel and energy consumption in households Energo – 2021.* Available at: https://www.czso.cz/csu/czso/rozdeleni-domacnosti-podle-paliv-a-energii-pouzivanych-na-vytapeni.
8. ČSÚ. (2022c). *Material flow accounts (selected indicators) – 2022.* Available at: https://www.czso.cz/csu/czso/ucty-materialovych-toku-vybrane-indikatory-ziq7a63mot.
9. Czech Statistical Office. (2023). *Demographic Handbook – 2021.* Available at: https://www.czso.cz/csu/czso/demograficka-prirucka-2021.
10. Czech Statistical Office. (2023b). *Population in municipalities – as of January 1, 2023.* Available at: https://www.czso.cz/csu/czso/pocet-obyvatel-v-obcich-k-112023.
11. CZSO. (2023c). *Territory, settlement structure.* Available at: https://vdb.czso.cz/vdbvo2/faces/cs/index.jsf?page=statistiky#katalog=30829.
12. Czech Statistical Office. (2023d). *Population development in the Czech Republic. Dostupné z: https://www.czso.cz/documents/10180/191186447/13006923.pdf/502e34ad-0540-4378-9cb1-fa19fbdbc4cb?version=1.6.*
13. CZSO. (2023e). *Development of the Czech economy – 3rd quarter of 2023.* Available at: https://www.czso.cz/csu/czso/vyvoj-ekonomiky-ceske-republiky-3-ctvrtleti-2023.
14. CZSO. (2023e). *Foreign Trade in Goods (ZOsZ).* Available at: https://apl.czso.cz/pll/stazo/STAZO_ZO.STAZO.
15. EK. (2022). *REPowerEU Plan.* Available at: https://eur-lex.europa.eu/legal-content/CS/TXT/HTML/?uri=CELEX:52022DC0230
16. EKO-KOM. (2020). *Implementation study for the EKO-KOM System Strategy "Strategy 21+".* Available at: https://www.ekokom.cz/uploads/Strategie21.pdf.

17. EKO-KOM. (2023). *The economics of waste management in 2022.* Available at: https://www.ekokom.cz/ekonomika-odpadoveho-hospodarstvi-v-roce-2022/.

18. EKO-KOM. (2023b). 75% of the population in the Czech Republic already sorts waste! Available at: https://www.ekokom.cz/wp-content/uploads/2023/05/TZ_vysledky_ekokom_2022.pdf.

19. EKO-KOM. (2023c). Results of the questionnaire on municipal waste management.

20. EUR-LEX. (2014). *Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups.* Available at: https://eur-lex.europa.eu/legal-content/CS/TXT/HTML/?uri=CELEX:32014L0095.

21. EUR-LEX. (2022a). *Assessing environmentally sustainable investments.* Available at: https://eur-lex.europa.eu/legal-content/EN/LSU/?uri=CELEX:32020R0852.

22. EUR-LEX. (2020). *Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088.* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32020R0852.

23. EUR-LEX. (2022b). *Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting.* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022L2464.

24. European Commission. (2014). *Improving corporate governance: Europe's largest companies will have to be more transparent about how they operate.* Available at: https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_14_124.

25. European Commission. (2023). *Corporate sustainability reporting.* Available at: https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en.

26. EUR-LEX. (2023). *Commission Delegated Regulation (EU) 2023/2772 of 31 July 2023 supplementing Directive 2013/34/EU of the European Parliament and of the Council as regards sustainability reporting standards.* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202302772.

27. EUR-LEX. (2023b). Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading. Available at: https://eur-lex.europa.eu/legal-content/CS/TXT/HTML/?uri=CELEX:02003L0087-20230605.

28. Eurostat. (2023). *Domestic material consumption.* Available at: https://ec.europa.eu/eurostat/databrowser/view/env_ac_mfain/default/table?lang=en&category=e nv.env_mrp.

29. Ministry of Finance. (2023). *55th Colloquium – Survey of macroeconomic forecasts for the Czech Republic (2023–2026).* Available at: https://mfcr.cz/cs/rozpoctova-politika/makroekonomika/setreni-prognoz-makroekonomickeho-vyvoje/2023/55-kolokvium--setreni-prognoz-makroekono-51468.

30. MPO. (2023). *Analysis of the Czech economy*. Available at: https://www.mpo.cz/assets/cz/rozcestnik/analyticke-materialy-a-statistiky/analyticke-materialy/2023/7/Analyza_vyvoje_ekonomiky_CR_cerven_2023.pdf.

31. MPO. (2023). *Start – OP TAK for your smart business*. Available at: https://www.optak.cz/ws/media-library/21d2f0ec4bcb4a438327d32ce885143e/brozura_optak.pdf.

32. Ministry *of the Environment*. (2020). *Recommendations of the Ministry of the Environment on the classification of personal protective equipment according to Decree No. 93/2016 Coll., on the Waste Catalogue and the handling of personal protective equipment in connection with the COVID-19 epidemic*. Available at: https://www.mzp.cz/C1257458002F0DC7/cz/news_20200402-MZP-zverejnilo-doporuceni-jak-nakladat-s-pouzitymi-ochrannymi-pomuckami-na-pracovistich/$FILE/Stanovisko_OOP.pdf.

33. Ministry of the Environment. (2020b). *How to handle waste during the coronavirus pandemic.* Available at: https://www.mzp.cz/C1257458002F0DC7/cz/news_20200923-co-s-pouzitymi-rouskami/$FILE/Covid_letak_MZP.pdf.

34. Ministry of the Environment. (2021). Methodological guideline – Removal of waste generated as a result of an extraordinary event – natural disasters (tornadoes). Available at: https://www.mzp.cz/C1257458002F0DC7/cz/metodicky_pokyn_tornado/$FILE/OODP-Metodicky_pokyn_MZP_Tornado_final-07072021.pdf.

35. Ministry of the Environment. (2021b). *Methodological communication – Waste classification.* Available at: https://www.mzp.cz/C1257458002F0DC7/cz/odpad_samotesty_metodika/$FILE/OODP-Sdeleni_MZP_Zarazeni_odpadu_samotesty-25022021.pdf.

36. Ministry of the Environment. (2022). *Just Transition Program 2021-2027. Dostupné z: https://dotaceeu.cz/getmedia/e7176906-f133-46f7-a508-869b3d40056b/Programovy-dokument-OPST-2021-2027.pdf.aspx?ext=.pdf.*

37. Ministry of the Environment. (2023). *Old environmental burdens, or contaminated sites.* Available at: https://www.mzp.cz/cz/stare_ekologicke_zateze.

38. Ministry of the Environment. (2023b). *Removal of old environmental burdens in the privatization process.* Available at: https://www.mzp.cz/cz/odstranovani_ekologickych_zatezi.

39. MoE. (2023c). *Methodology for dealing with old environmental burdens or contaminated sites.* Available at: https://www.mzp.cz/cz/metodiky_ekologicke_zateze.

40. MoE. (2023d). *Overview of contaminated sites.* Available at: https://www.sekm.cz/portal/.

41. Ministry of the Environment. (2023e). *Status of OPŽP calls for proposals as of August 18, 2023. Dostupné z: https://opzp.cz/files/documents/storage/2023/08/18/1692345485_20230818_stav_cerpani_vyzev_OPZP_2021_2027.pdf.*

42. Ministry of the Environment. (2023f). *Evaluation criteria for the severity of contamination.* Available at: https://opzp.cz/dokument/3360.

43. National Health Information Portal (2023). Prague: Ministry of Health of the Czech Republic and Institute of Health Information and Statistics of the Czech Republic, Available at: https://www.nzip.cz/clanek/477-zdravotnictvi-ceske-republiky-ve-srovnani-se-staty-oecd.

44. NAVIGA. (2023). *Thematic evaluation of the Partnership Agreement 2014-2020: summary. Final report for thematic objective 5 – Support for climate change adaptation, risk prevention and management.* Available at: https://www.dotaceeu.cz/cs/evropske-fondy-v-cr/narodni-organ-pro-koordinaci/evaluace/knihovna-evaluaci/vysledkova-tematicka-evaluace-dohody-o-partner-(1).

45. NPO. (2024). *Calls for proposals.* Available at: https://www.planobnovycr.cz/vyhlasene-vyzvy

46. SFŽP. (2023). *Operational Program Environment*. Available at: https://www.sfzp.cz/dotace-a-pujcky/operacni-program-zivotni-prostredi/.

47. SFŽP. (2023b). *Modernization Fund.* Available at: https://www.sfzp.cz/dotace-a-pujcky/modernizacni-fond/.

48. TAČR. (2024). *Environment for Life Program 2*. Available at: https://www.tacr.cz/program/program-prostredi-pro-zivot-2/. https://www.smocr.cz/cs/media/tiskove-zpravy/a/kazdy-obyvatel-cr-vytridil-loni-temer-67-kilogramu-odpadu

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