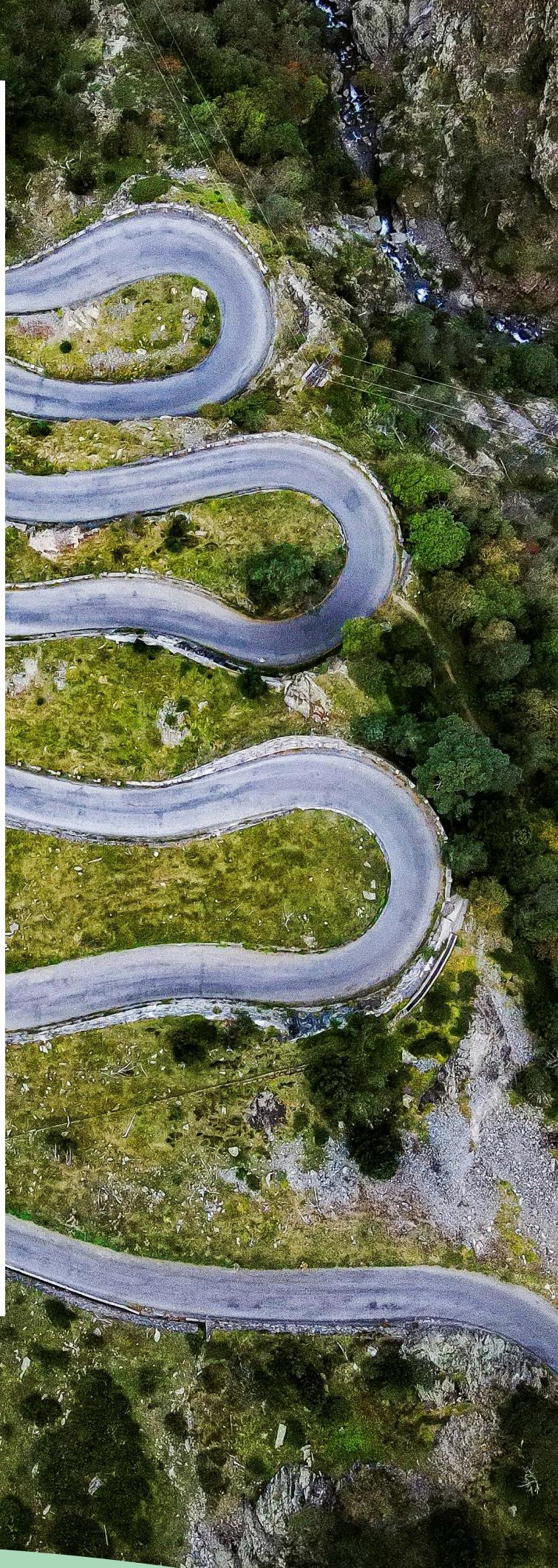


ABSTRACT

This report provides a comprehensive assessment of progress towards the European Green Deal (EGD), the European Union's transformative agenda for achieving climate neutrality by 2050. The analysis encompasses 154 quantifiable targets from 44 policy documents between 2019 and 2024 across key sectors such as climate, energy, circular economy, transport, agriculture and food, ecosystems and biodiversity, water, soil and air pollution.

The study shows that significant achievement has been delivered so far but progress needs to accelerate in many areas. As of mid-2024, 32 of the 154 targets are currently "on track" and 64 are identified as "acceleration needed" meaning that more progress is needed to meet the targets on time. Furthermore, 15 of the targets are found to be "not progressing" or "regressing", and for 43 of the targets no data is currently available. The timing of the binding policies, most of which have been recently agreed and are expected to deliver results in the coming years, is a significant factor influencing these assessments.

This report integrates all EGD actions and related policies, offering an assessment of the EU's green transition based on robust data and science. It identifies priority areas for intensified efforts to meet short-term implementation goals and contribute to the long-term ambition of a sustainable, fair, just, and climate-neutral Europe by 2050. This collective work serves as a benchmarking tool, providing scientifically grounded guidance for future EU policies and programmes.



Pyrénées
Photo by Sylvain Gilm on Unsplash



FOREWORD

Bernard Magenmann

Acting Director-General, Joint Research Centre

The European Green Deal marks one of the European Union's most transformative actions – a bold commitment to achieving climate neutrality while promoting sustainable economic growth, improving the health and wellbeing of its citizens, and protecting the natural environment.

I am pleased to present this comprehensive report on the status and progress towards the European Green Deal's goals and targets across all domains. It is the result of collective efforts and extensive collaboration among many scientists of the European Commission's Joint Research Centre (JRC). The report also integrates expertise from some of our external partner organisations and constitutes an important instrument of knowledge for future policymaking, providing a comprehensive overview of the EU's status (as of mid-2024) with respect to the ambitions of the European Green Deal. With a foundation in rigorous data analysis, this report provides clear evidence of how far we have come with respect to the main policy targets, where challenges persist, and where we need to accelerate the pace of transformation. It is both a reflection of the EU Green Deal achievements so far, and a guide for steering its further implementation in the years ahead.

Despite the unprecedented challenges posed by the COVID-19 pandemic and the energy crisis, the EU has demonstrated ambition and resilience in pursuing its climate and environmental objectives. The European Council's 2024-2029 "strategic agenda" has reaffirmed the commitment to making a success of the green and digital transitions, focusing on creating the markets, industries, and high-quality jobs of the future. The European Commission, under the leadership of President von der Leyen, has reaffirmed its commitment to the green transition, emphasising the need to stay the course on the goals set out in the European Green Deal.

The findings in this report remind us that progress is uneven. Disparities among Member States, energy security challenges, and socio-political shifts demand concerted action to bridge gaps and ensure that no one is left behind in this transition.

The challenges we face are substantial, but so are the opportunities. The European Green Deal is not only a climate strategy but a blueprint for fostering economic resilience, social cohesion, and global leadership. Achieving its objectives requires a collective effort by policymakers, businesses and citizens.

As the science for policy service of the European Commission, the JRC remains committed to supporting this transition by providing the tools and analysis needed to align ambition with results, and I am grateful to the many JRC scientists who have worked together to produce this report.

I hope that it will be a valuable resource for policymakers, stakeholders and citizens committed to working together to achieving the targets and ambitions of the European Green Deal and providing a foundation for the future Clean Industrial Deal.

Bernard Magenmann

*Acting Director-General of the Joint Research Centre (JRC),
the European Commission's in-house science and knowledge service*

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The authors are also grateful to the former JRC Director-General **Stephen Quest**, the Acting Director-General **Bernard Magenhan**, **Paul McAleavy**, **Milena Mathe** and **Margot Moslinger** for their unwavering support, guidance and invaluable suggestions and review throughout the development of this report.

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EXECUTIVE SUMMARY

The EU is striving to achieve climate neutrality by 2050 through a sustainable green transition. An unprecedented effort was started with the European Green Deal (EGD), a suite of new policies and amended legislation across seven thematic areas, aiming to drive progress towards a greener and more prosperous EU. By measuring progress against a range of agreed ambitions, this report provides a comprehensive, cross-cutting approach to understanding exactly where the EU stands in mid-2024. While implementation schedules for many of the EGD targets are still being put in place, the report monitors initial progress and identifies potential gaps, seeking to support the success of the green transition in the coming years.

As the European Commission's in-house research service, the Joint Research Centre (JRC) has conducted this analysis based on publicly available data, sound scientific knowledge and the most up-to-date trends. The report filters, distils and makes sense of the vast amount of information available both inside and outside the JRC, conveying it as clearly and transparently as possible.

This report presents a snapshot of the current status of EGD target implementation, providing an early assessment to benchmark progress towards the achievement of EGD goals. It does not evaluate the policies themselves and it is naturally framed by certain constraints. First, the number of targets per thematic area does not necessarily reflect their relative importance. Rather, the number of targets depends on various factors, such as the types of policy documents and the nature of the topics. The assessment of progress provides an overview of the current state of play but does not evaluate the relative impact of these targets in terms of environmental, social, or economic aspects, or policy timing. Second, the traffic light system used to assess the progress of targets incorporates, where possible, existing sectorial modelling exercises in the analysis, or assumes in certain cases a linear trajectory based on the most updated trends. This approach is in alignment with other reports such as Eurostat's Monitoring report on progress towards the Sustainable Development Goals (SDGs) in an EU context, the European Environment Agency (EEA) stocktake of the 8th Environment Action Programme, and the European Scientific Advisory Board on Climate Change's progress report of 2024. Third, a forward-looking approach would ideally involve complex scenario modelling, which is beyond the scope of this report. Nevertheless, the report establishes an important baseline against which to benchmark further progress.

The analysis encompasses 154 targets in total, from 44 key policy documents. Some are legally binding while others are non-binding. The inclusion of non-binding targets, such as those under the Biodiversity Strategy, supports comprehensive reporting across the EGD's full ambitions and is crucial for areas with limited legislation.

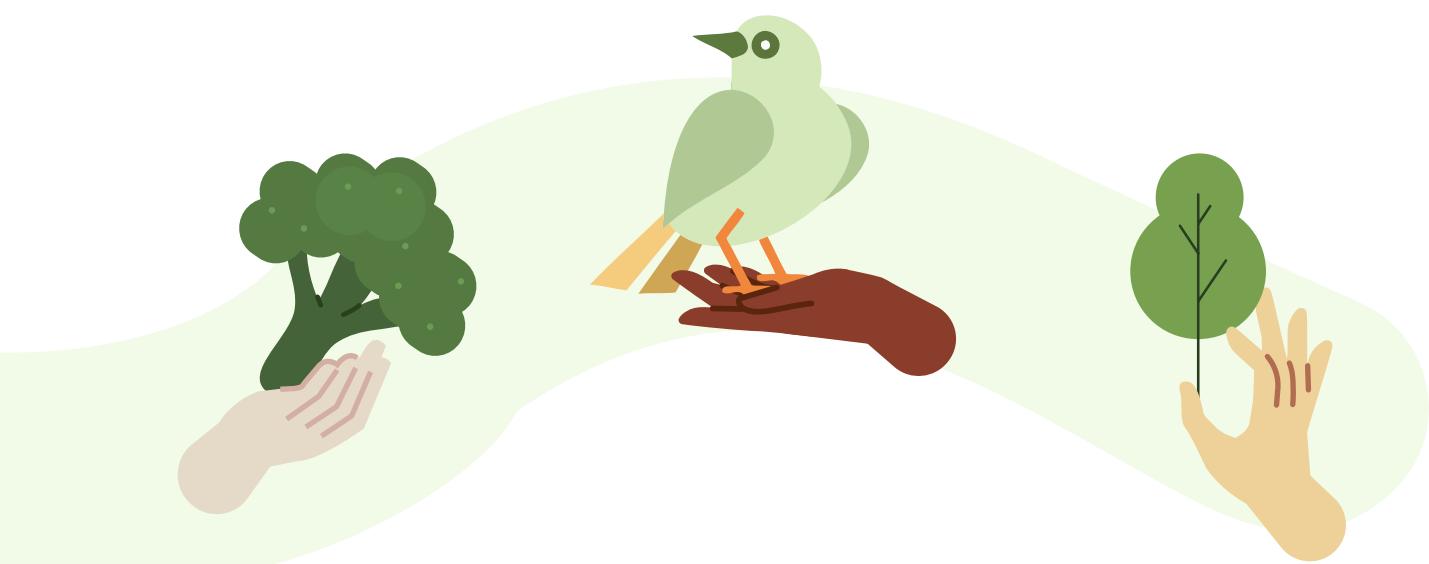


Progress has been made on 96 targets (62% of the total), of which 32 (21%) are on track to be met while for 64 targets (41%), the pace will need to be accelerated to meet the ambitions. For 15 targets (10%), the trend is either in reverse or stagnant, indicating the need to step up efforts to ensure their achievement. Data is not yet available for a further 43 targets (28%), but many of these are the products of recent policies whose effects will become clear in the coming years. These trends are confirmed when looking exclusively at the 87 identified legally binding targets (56% of the whole target set). A total of 42 are progressing to some extent. However, only 13 (15%) of these are progressing at the necessary speed to meet the EGD ambitions. Progress needs to accelerate on the other 29 (33%) to meet the final objectives. There are 12 targets (14%) for which the trend is either in reverse or stagnant. Data is not yet available for the remaining 33 targets (38%).

The report also identifies areas that may require additional effort to meet implementation of targets in the short term and contribute to climate neutrality in the long term. This report is unique in its scope, addressing all EGD actions and related policies in one integrated analysis. The work is split into thematic areas: climate ambition; clean, affordable and secure energy (including building and renovating in an energy- and resource-efficient way); industrial strategy for a clean and circular economy; sustainable and smart mobility; greening the Common Agricultural Policy and the ‘Farm to Fork’ Strategy; preserving and protecting biodiversity; and towards zero pollution for a toxic free environment.

For the purposes of this report, targets were drawn from policy documents covering the EGD time frame from December 2019 to mid-2024. The analysis focuses on quantifiable targets with thresholds to be achieved within a specific deadline. However, insights are also provided on broader objectives such as those in the Circular Economy Action Plan, the Sustainable and Smart Mobility Strategy, and the Sustainable Food System initiative. Commission services were extensively consulted, and 11 Directorates-General provided feedback (see acknowledgements).

The European Council, at its meeting in June 2024, reaffirmed the commitment of the European Union to ensuring the success of the green transition. Building on the “early assessment” of progress towards the targets proposed in this report, scientists at the JRC will continue to explore opportunities, address existing and emerging gaps, and consider the challenges facing the EU in achieving this transition. The JRC will also focus on identifying solutions, enabling conditions and best practices to support the successful implementation of the European Green Deal. This work aims to inform future EU policies and initiatives for a sustainable, fair, just and climate-neutral Europe.



INTRODUCTION

II Where does the European Union stand regarding its Green Deal ambitions in 2024? What progress is still needed?

Development Goals (SDGs) of the 2030 Agenda. The EGD and SDGs share common objectives that address major environmental sustainability concerns, whilst ensuring maximum social and economic sustainability.

It is widely recognised that the transition towards sustainability requires systemic solutions. All-encompassing approaches need to be evaluated from a broad perspective, integrating environmental and socio-economic considerations. This means simultaneously stimulating innovation, competitiveness, resilience and job creation, while ensuring that the underlying socio-economic systems respect our planetary boundaries. There is increasing evidence (such as the 8th Environment Action Programme and the International Panel on Climate Change (IPCC reports) indicating that EU and global production and consumption patterns are unsustainable [2], and that several planetary boundaries are being surpassed. This exacerbates the planetary crises of climate change, pollution and biodiversity loss [3], [4], [5].

Actions to foster green, just and inclusive transitions are essential for achieving EGD ambitions. Such actions require close cooperation between science, society and policymaking. Policies based on robust scientific evidence and citizen involvement can significantly contribute to the Green Deal's environmental, social and economic objectives. This report focuses on the contribution of science. Scientific evidence can provide an assessment of the current status and expected evolution of the EGD targets. It can identify the main barriers and limitations to implementation, and possible solutions that might accelerate progress towards sustainability.

As a contribution to this process, this report assesses the "distance to targets" to identify areas where urgent effort is needed to achieve the overarching EGD ambitions, stay within planetary boundaries, and advance towards the SDGs. The analysis is based on consolidated data and integrates the best available knowledge (within and outside the JRC), making sense of, filtering and distilling the vast amount of information available from many sources. This initial analysis quantifies progress towards goals and targets across seven EGD domains: 1) climate ambition, 2) clean, affordable, and secure energy, including building and renovating in an energy- and resource-efficient way, 3) industrial strategy and circular economy, 4) sustainable and smart mobility, 5) greening the Common Agricultural Policy and the Farm to Fork Strategy, 6) preserving and protecting biodiversity, and 7) zero-pollution

The European Green Deal (EGD) sets out Europe's strategy to achieve climate neutrality by 2050, including a 2030 target of reducing net greenhouse Gas (GHG) emissions by at least 55% compared to 1990. In February 2024, the European Commission (EC) recommended an additional intermediate target of 90% by 2040. The EGD outlines a detailed roadmap for achieving sustainable development in Europe [1]. The EGD ambitions are closely linked to the United Nations (UN) Sustainable

and toxic-free environment, addressing impacts and benefits within and beyond EU borders.

All EGD policy initiatives have been screened to extract the underlying quantifiable targets for each domain.

The results presented in this report focus on progress towards EGD goals and targets, to help understand where the European Union stands now with regard to these targets. The report highlights the achievements of recent years and identifies the areas where further efforts will be required by the EU and Member States in the coming years.

This assessment of status and trends towards EGD targets is necessary to identify implementation challenges, opportunities and barriers to reaching EGD goals. It will help to pinpoint enablers, synergies and trade-offs. The next steps will include the identification of gaps, as well as good practices and success stories emerging from policy design and implementation so far. The JRC will also consider other cross-cutting elements that are key for achieving EGD targets and fostering the green transition, including understanding and respecting planetary limits, digital technologies, Earth Observation, research and innovation, sustainable and green finance, and ensuring a just transition.

Overall, this work aims to provide an early assessment for benchmarking progress. Consequently, it can offer scientifically based guidance on future programmes, areas of intervention and policies.



METHODOLOGY

General Overview

Assessing progress towards implementing the European Green Deal (EGD) is complex. The EGD encompasses several policy initiatives across thematic areas, each with numerous targets.

Additionally, different policy documents may share common targets. As the EGD agenda is still being implemented, this integrated assessment report should not be considered an ex-post policy evaluation. Rather, it is a stocktaking exercise, relatively early with respect to some targets, aimed at assessing the current status with respect to these targets.

For this purpose, EGD policy initiatives were screened, and their underlying policy targets were extracted and organised by thematic areas into a database. The targets were further grouped by topic, constituting the base for various thematic fiches, which were then distributed among experts at the JRC. The experts validated the selection of targets to ensure an accurate, sound and robust selection. Furthermore, based on the most recent data available from in-house and acknowledged scientific research, they helped identify relevant indicators to assess the current status with respect to EGD ambitions. The resulting thematic fiches provided the knowledge foundation for this report. Additional information gathered from fiches (and related to policy socio-economic aspects, challenges to implementation and global implications) will be important in shaping the follow-up of this report.

Policy targets and current status

To understand the current status regarding EGD ambitions, a comprehensive analysis of EGD policies was conducted to derive overarching ambitions, targets, timelines, and benchmarks.

Starting from documents available on the [EGD website](#), the JRC analysed over 400 items (legal acts, communications, preparatory documents, staff working documents, factsheets, and reports). Considering only policy initiatives present in the [Legislative Train Schedule website](#) under the EGD priority, 127

EGD-related policy documents were identified, from which the targets were extracted¹. The assessment does not consider targets related to policies adopted before the EGD, as the status of their implementation falls outside the scope of this work and is covered by other reporting exercises, such as the *Environmental Implementation Review* for environmental policies.

In this report, the selection of targets has been refined according to three inclusion criteria: targets that define a specific value (numerical or semantic), that set a specific timeline, and whose objective is quantifiable. This process resulted in the identification of 154 targets extracted from 44 key policy documents.

Targets have been organised according to the seven thematic areas of the Green Deal (as reported in the Annex to the EGD Communication)². Their legislative nature is also considered: 87 targets (56%) are legally binding (from

The harmonisation of the distance-to-target assessment was crucial for **aggregating results coherently** across thematic areas. The assessment was classified into **four categories reflecting progress**:



"on track" (the pace of progress is sufficient to reach the target value);



"acceleration needed" (to reach the target value);



"not progressing" (the current trend runs counter to the desired direction or it is stagnant);



"cannot be assessed" due to lack of data.

¹ The analysis did not consider "blocked" and withdrawn initiatives. As mentioned in the Legislative Train Schedule website, "blocked" are the "proposals proceeding slowly or stalled". Last update: 30 June 2024.

² The seven EGD thematic areas are: 1) Climate ambition; 2) Clean, affordable and secure energy, including building and renovating in an energy and resource efficient way; 3) Circular economy; 4) Sustainable and smart mobility; 5) Greening the Common Agricultural Policy / Farm to Fork Strategy; 6) Preserving and protecting biodiversity; 7) Towards zero pollution ambition for a toxic-free environment.

directives and regulations), 20 stem from proposals for directives or regulations (still in the policy cycle process or with provisional agreements reached), and 47 targets are extracted from communications. Targets which are not strictly quantifiable have been reported in the Annexes, which also contain extended assessments of trends, indicators, data sources, related figures and future projections, where available. The analysis of the targets capitalised on JRC expertise across various domains, engaging many JRC scientists in a collaborative and trans-disciplinary exercise. The analysis also provides an important overview of data gaps, which is essential for informing future assessments. Additional overarching aspirational objectives are presented in thematic focuses, beyond the colour-coded assessment, to provide a more comprehensive picture in thematic areas 3 (Circular economy), 4 (Sustainable and smart mobility), and 5 (Greening the Common Agricultural Policy and the Farm to Fork Strategy). Specifically, the thematic focus in area 3 concerns the Circular Economy Action Plan overarching objectives, in alignment with other reporting exercises (e.g. the 8th Environment Action Programme by the EEA). The thematic focus in area 4 provides a snapshot of milestones set by the Sustainable and Smart Mobility Strategy, indicating the current status towards achieving the sector's decarbonisation. The thematic focus in area 5 provides an overview of relevant aspects contributing to a more sustainable EU food system capitalising on ongoing efforts by the JRC and EC services.

Implementation challenges

Several implementation challenges might hinder the achievement of EGD policies. This analysis encompasses a knowledge synthesis exercise to highlight the most prominent ones, as identified by several reporting mechanisms by the EC, as well as sectorial studies and reports by EU institutions and bodies. The EC reporting mechanisms reviewed and integrated into the assessment are:

- The *Environmental Implementation Review* (EIR) 2022 [6] for all thematic areas;
- The *EU 2023 assessment of the National Energy and Climate Plans* [7] for thematic areas 1 (climate ambition), 2 (energy), 4 (mobility), 5 (food system), 6 (biodiversity), 7 (pollution);
- The *Common Agricultural Policies Strategic Plans* [8] for thematic area 5;
- The *EC 2023 Recommendation on the National Support Programmes for Sustainable Urban Mobility Planning* [9] for thematic area 4;
- The European Scientific Advisory Board on Climate Change's *2024 Climate Neutrality Progress Report* [10] for thematic areas 1, 2, 4, 5, and 6.

Moreover, this report highlights implementation challenges at the sub-national level by considering sectorial scientific literature on the *EU Mission on 100 Climate-Neutral and Smart Cities by 2030* [11], the *EC Ninth Cohesion Report* [12], and the Committee of the Regions' (CoR) reports on the *Status of Regions and Cities 2023* [13] and *EGD implementation report 2023* [14] in several thematic areas. For thematic Area 3 (circular economy) these reports were also considered: the *European Court of Auditors Special Report 17/2023 on Circular Economy*, the *EEA Report 13/2023 on Accelerating the circular economy in Europe* and the *EEA's European Topic Centre on Circular Economy and Resource Use*, requested by the EC, focusing on the implementation of circular economy policies and highlighting good practices at the Member State level.

Framing the research

Some clarifications on the approach adopted to prepare this report are outlined as follows.

- The effects of certain policies that have recently come into force will only become evident in the coming years. Furthermore, in some cases, indicators for new targets still need to be agreed upon. **This analysis is limited to providing a snapshot of the present status of target implementation** (when data are available) and does not evaluate the policies themselves.

- **The number of targets per thematic area does not necessarily reflect their relative importance.**

The number of targets depends on various factors, such as the number and granularity of articles in the policy documents, the type of policy document, and the nature of the topic. Therefore, the distance to target assessments provided in the infographics represent only a numerical and statistical overview. They do not account for the relative influence of targets in terms of their socio-economic or environmental impacts. Addressing these limitations would require further research and advanced modelling, as well as systematic follow-up studies. While these aspects are beyond the scope of this report, they could be explored in future research efforts to enhance the assessment.

- Targets were extracted from various legal acts (regulations, directives, proposals for regulations and directives, and communications) issued after the European Commission's Communication on the European Green Deal (11 December 2019). For the purpose of this report, which focuses on assessing progress towards targets, **specific manufacturing or production requirements for certain products were excluded** (e.g. the 'Deforestation Free Product' Regulation and the Zero Emission Vehicles benchmark targets), as these do not have a defined time frame for achievement. Similarly, **requirements addressing specific groups of stakeholders (e.g. economic operators) were also excluded.**

- **Targets from communications were included in the analysis, despite their non-legally binding nature.** Their inclusion is important in order to have a comprehensive picture of the EGD ambitions across all thematic areas, especially in those with limited legislation with quantifiable targets (e.g. food system and biodiversity). Furthermore, targets from communications are often used as references in several monitoring systems currently in place or under development (e.g. the Zero Pollution Monitoring and Outlook and the Biodiversity Dashboard).

- Targets from communications that have not been adopted by a proposal (e.g. certain hydrogen-related targets from the 'REPowerEU') were also included in the assessment. Additionally, two targets common to different thematic areas (regarding the use of pesticides and organic farming, mentioned in both the 'Farm to Fork' and Biodiversity strategies) are acknowledged in their respective chapters and factsheets, but are counted only once in the overall statistics.

The assessment of the progress towards the targets is based on the data and knowledge available until July 2024, while the legislative process of policies and their respective targets has been updated as of December 2024.

METHODOLOGICAL FOCUS

A pragmatic approach to include the multitude of diverse targets and objectives under the EGD

The targets associated with the EGD and assessed in this analysis are heterogeneous and differ in nature (e.g. quantitative or non-quantitative, binding or non-binding, sector-specific or general), and may change depending on the evolution of policies.

Due to the intrinsic interlinkages among many targets across different policies, interventions might impact their achievement, by either creating synergies or diverging. Moreover, significant megatrends are affecting the EU, with the potential to disrupt, reduce or enhance the efficacy of policy interventions.

Ideally, a comprehensive approach would involve projecting the trajectories of the targets based on the expected impact of both implemented and planned policies, using an interlinked, forward-looking simulation extending to 2030 and beyond. However, this would require a complex modelling exercise that takes into account global policy and macroeconomic developments, the evolution of consumption and production patterns, and various climate and energy scenarios. This would generate a variety of potential pathways with a multitude of interlinkages and spillover effects, which are challenging to capture and quantify accurately. Modelling such scenarios is beyond the scope of this report due to the complexity of the targets and policy objectives, which require numerous assumptions.

Therefore, the approach used in this report for assessing progress – the traffic light system – assumes in certain cases a linear trajectory relative to the progress towards policy objectives. This approach is inspired by scientific literature and other distance to target exercises (e.g. the Eurostat's assessment of SDGs achievement, EEA's review of the 8th Environment Action Programme and the European Scientific Advisory Board on Climate Change 2024 report). Where possible, existing sectorial modelling exercises are incorporated in the analysis, mainly for climate, energy, biodiversity, air, water and marine policies.

Moreover, the JRC will continue to work on an integrated environmental assessment of the evolution of production and consumption patterns and their overall life cycle impacts. This will facilitate the evaluation of key environmental interlinkages, including how supply chains can either support or hinder the achievement of targets.





The European Green Deal

FACTS AND FIGURES

The European Green Deal (EGD) is the EU's ambitious strategic blueprint to tackle the global climate crisis. Its goal is to transform Europe into a climate-neutral continent by 2050, laying out a detailed roadmap to achieve sustainable development across the EU. With an unprecedented suite of new policies and amended legislations across seven thematic areas, the initiative provides a holistic integration of the United Nation's Sustainable Development Goals (SDGs). It aims to ensure that no one is left behind as Europe progresses towards the UN's 2030 Agenda for Sustainable Development. Both the EGD and SDGs frameworks share common objectives, reflecting a strong commitment to address climate change and environmental challenges while maintaining a balance with societal and economic needs in a just and inclusive manner.

In essence, the EGD aims to build a comprehensive and evolving policy framework that drives progress towards a green and prosperous EU. By setting clear targets and mobilising significant investments, the EU is taking concrete steps towards a more sustainable and environmentally friendly future. However, achieving the EGD's goals requires a significant shift in current economic, governance, lifestyle, and behavioural paradigms [2], [15]. While the legislative framework is in place to achieve at least a 55% net reduction in GHG emissions by 2030, the rapid implementation of policies and measures at the Member State level is crucial for realising this target. Significant changes in EU energy production and consumption, alongside a shift towards more sustainable and environmentally friendly practices across all sectors of the economy, are necessary.

The success of the Green Deal hinges on the effective implementation of its comprehensive policies and the commitment of all EU Member States to work towards the common goal of achieving climate neutrality by 2050. This collective effort is essential for ensuring the success of the green transition. Given the broad range of initiatives linked to the EGD, many of which are approved or under negotiation according to the [Legislative Train Schedule](#), it is essential to provide a comprehensive snapshot of where the EU stands with the set ambitions. This snapshot serves as a critical benchmark to track future progress against the EGD goals, identify areas requiring further attention, and ensure continued commitment from the EU Member States to the climate and sustainability objectives. With a similar approach – but a limited set of indicators – the [Statistics for the European Green Deal](#) dashboard by Eurostat was launched. In this context, the JRC is conducting a systematic analysis of policy targets under the EGD framework. A total of 154 targets across all key EGD domains have been identified, and their current implementation status is being assessed. The results are synthesised in the infographic on the following page.

Considering all the targets (see *Methodology*), the general picture indicates that:

- For 32 targets the EU is well on track to meet its ambitions
- For an additional 64 targets, a positive trend is detected but the pace needs to accelerate to meet the ambitions.
- 15 targets are not progressing and show a reversing or stagnating trend.
- For the remaining 43 targets, no data is available for their assessment yet.

This trend is confirmed when looking only at the binding targets, which constitute 56% of the overall number of targets. In this case, the EU is already on track to meet the ambitions in 13 targets (15% of binding targets). A positive trend is detected for an additional 29 targets (33%), although the pace should accelerate to meet the ambitions. For the remaining binding targets, 14% show no progress and 38% have insufficient data available to assess the trends. While there is a positive trend to acknowledge, it is important to note that, as of mid-2024, more than half of the assessed targets require an accelerated pace to achieve the policy ambitions. The recently agreed ambitious legislations, especially the 'Fit for 55 package', are expected to yield results in the coming years. Meanwhile, it is important to monitor areas where data indicates stagnating or reversing trends to address these issues effectively and enhance efforts. Furthermore, increased ambitions or targeted policy interventions might be needed in specific areas to ensure consistency with the overarching goal of reducing net GHG emissions by 55%. Implementation challenges and barriers might hinder progress, and further work is being conducted to identify and develop solutions that support effective policy implementation in the EU.

The EGD and the Sustainable Development Goals

The ambitions of the EGD are closely linked to the SDGs and support the achievement of most of the goals [16], [17]. Strong connections between the EGD priority and the 2030 Agenda [18] have emerged using the JRC SDG Mapper tool¹ to map all the EGD-related policy documents (retrieved via the [European Parliament's Legislative Train website](#), without considering initiatives which were not tabled, blocked, or withdrawn) to the SDGs. Specifically, Figure 1 shows the goals and targets mostly addressed by the EGD policies². The main SDG related is number 13 on Climate Action. Other relevant goals resulting from the textual analysis are SDG 7 on clean and affordable energy, SDG 12 on sustainable consumption and production, SDG 15 on sustainable use of terrestrial ecosystems, tackling biodiversity loss and environmental degradation, and SDG 9 on sustainable industries and innovation.

Moreover, the targets extracted from EGD policy documents were assessed to verify how they contribute to specific SDGs targets. The ongoing analysis reveals a strong correspondence between EGD policy targets and the SDGs, addressing 11 goals and 41 UN targets. A more detailed assessment of the relationship between the EGD policies and SDGs will be explored in further JRC work. This will highlight how achieving EGD policy targets contributes to integrating the 2030 Agenda into the EU and how interlinkages among targets may occur.

¹ The SDG Mapper tool is an open-source web-based application that utilizes text-mining techniques to detect relevant keywords and identify semantic links between the text and the UN 2030 Agenda. It helps users map any document with the SDGs on both goal and target levels [19]. The tool is available in the [KnowSDGs platform](#).

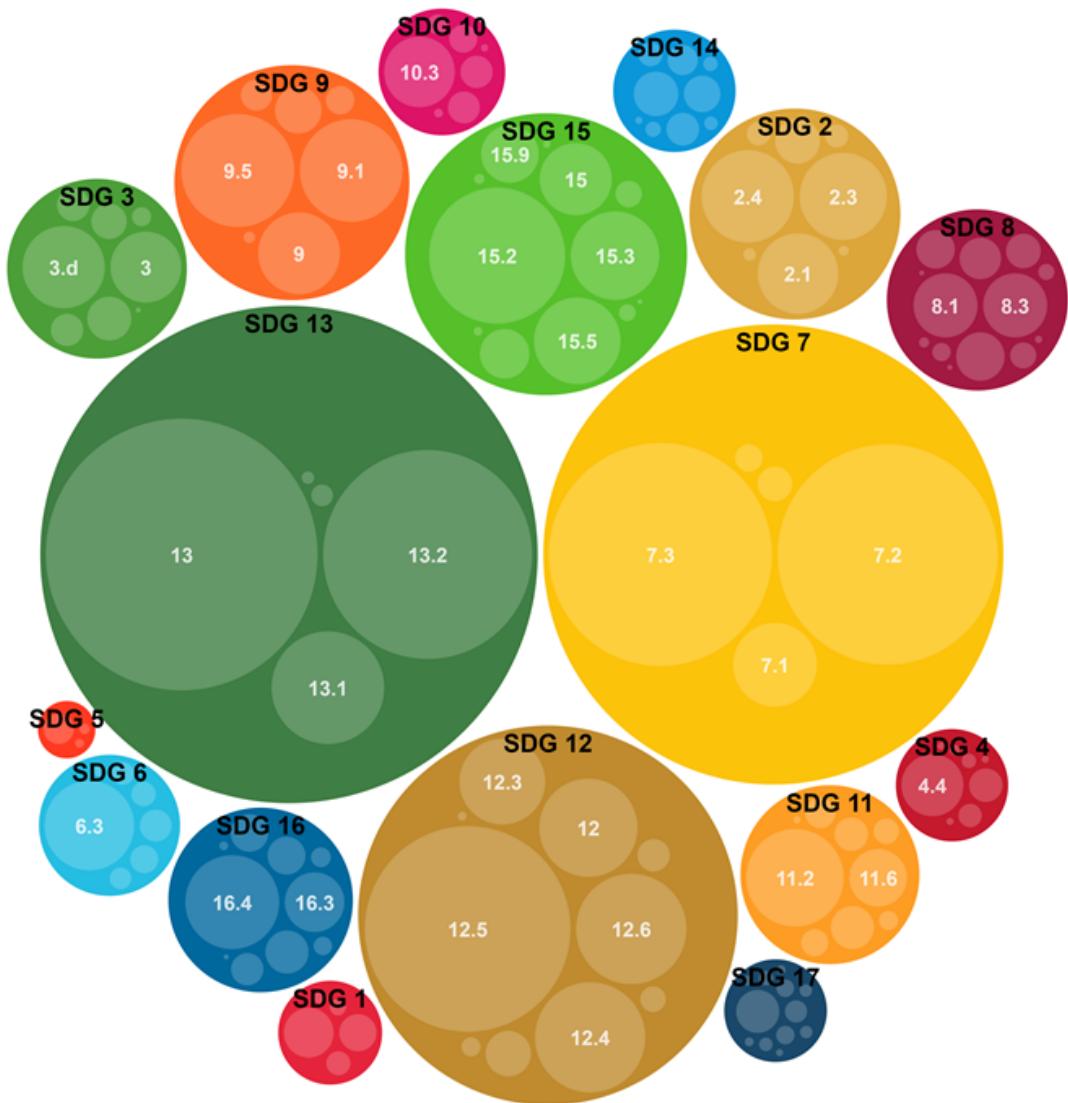
² The keywords can be target specific or more general at a goal level. For example, for the SDG13 the targets are very specific and most of the keywords detected in the policy documents refer to the main goal in general (i.e. "climate change" and "climate neutrality").

Figure 1. SDG goals and targets in the EGD policy documents, by number of keywords detected.

Note: the big bubbles represent the SDGs and the smaller bubbles inside refer to the sub-targets.

The size of the bubbles depends on the number of keywords detected for each SDG goal and target.

SDG 1: No poverty, SDG 2: Zero hunger, SDG 3: Good health and wellbeing, SDG 4: Quality education, SDG 5: Gender equality, SDG 6: Clean water and sanitation, SDG 7: Affordable and clean energy, SDG 8: Decent work and economic growth, SDG 9: Industry, innovation and infrastructure, SDG 10: Reduced inequalities, SDG 11: Sustainable cities and communities, SDG 12: Responsible consumption and production, SDG 13: Climate action, SDG 14: Life below water, SDG 15: Life on Land, SDG 16: Peace, justice and strong institutions, and SDG 17: Partnerships for the goals.



Source: JRC elaboration, utilising SDG Mapper for detecting SDGs and <https://flourish.studio> for the visualisation.

The European Green Deal Factsheet

The **European Green Deal** is the EU ambitious and strategic blueprint to tackle the global climate crisis by transforming the **EU into a climate-neutral continent** by 2050. With an unprecedented suite of new policies and amended legislations across **seven thematic areas**, the initiative is one of the six 2019-2024 European Commission's **headline priorities**. In essence, the EGD comprehensive and evolving policy framework is expected to drive progress towards a greener and more prosperous EU by setting **clear targets** and mobilising **significant investments**.

154

Quantifiable targets

extracted from policy documents
in all EU Green Deal thematic areas*

7

thematic areas considered
for the analysis as per
COM(2019) 640 - Annex



Number of targets per thematic area.

*The overall colour-code assessment considers two targets in common between thematic areas 5 (*Farm to Fork*) and 6 (*Biodiversity*), with a **total of 156 targets**.

Policy context

56%

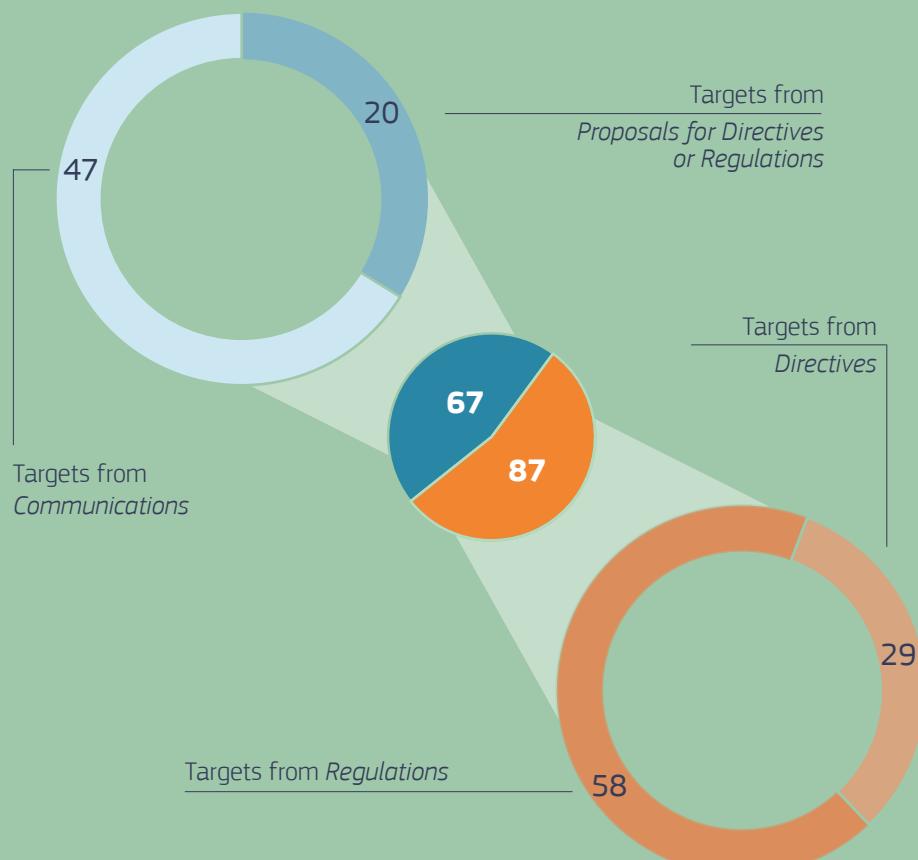
of all targets assessed
are **legally binding**

13%

of all targets assessed
come from **proposals for
directives or regulations**,
with **agreements achieved**
between co-legislators
in many cases

31%

of all targets assessed
come from **communications**



Number of targets per type of policy documents.

Legend
Non-binding targets from Communications and Proposals
Binding targets from Directives and Regulations

Progress towards the targets

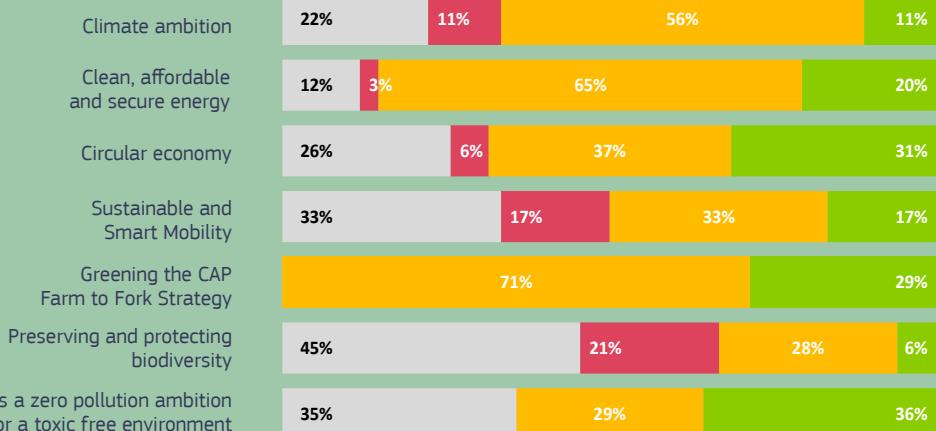
Progress assessment of targets per thematic area (right) and per type of document (below).
The overall colour-code assessment considers two targets in common between thematic areas 5 and 6, with a **total of 156 targets**.

Legend

- On track
- Acceleration needed
- Stagnant or reverse trend
- No data

Legend

- Targets from Dir. / Reg.
- Targets from Proposals
- Targets from Communications

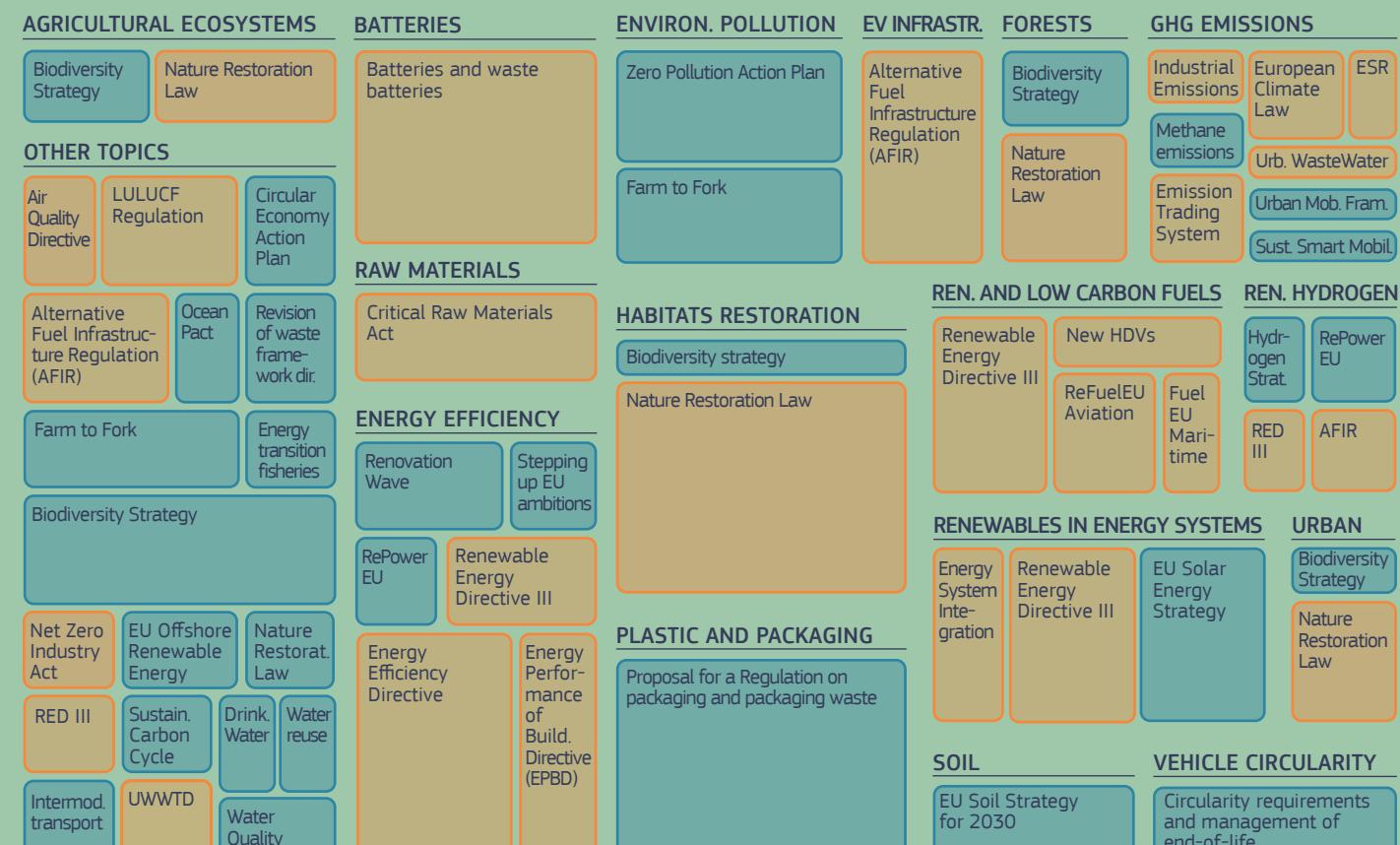


62%

of all targets are progressing towards the ambitions, with **21% well on track**

48%

of legally binding targets are progressing, with many pieces of legislation expected to **deliver results in the upcoming years**



Treemap of topics identified in the analysis within EGD policies and beyond thematic areas. Size of policy boxes is proportional to the number of targets for each topic. For layout reasons, only topics with more than three targets are displayed.

Legend

Non-binding targets from Communications and Proposals
Binding targets from Directives and Regulations

01

Climate
ambition



13 CLIMATE
ACTION



Iceberg in the Arctic

Photo by Annie Spratt on Unsplash

Climate ambition Factsheet

The EU has implemented a comprehensive set of climate change policies to address the need for GHG emission reduction, including its first-ever Climate Law to become climate-neutral by 2050.

In 2023, the EU adopted a set of proposals to make the EU's climate, energy, transport, and taxation policies fit for reducing net GHG emissions by at least 55% by 2030, compared to 1990 levels. The 'European Climate Law' and amended Regulation on LULUCF (Land Use, Land Use Change, and Forestry) also recognised the need to enhance the EU's carbon sink.



Policy context

9

Quantifiable targets

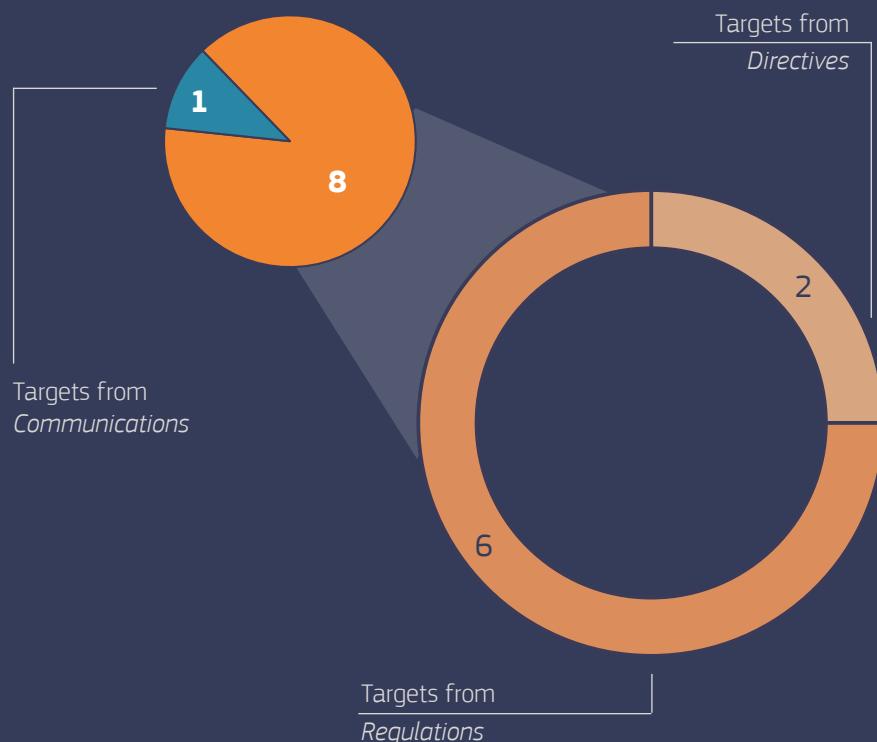
extracted from Policy Documents
in this Thematic Area

90%

of all targets assessed
in this Thematic Area are
legally binding

70%

of all targets assessed
in this Thematic Area regard
GHG Emission Reduction



GHG EMISSIONS

EU Strategy to reduce methane emissions
1 target

Emission Trading System
2 targets

European Climate Law
2 targets

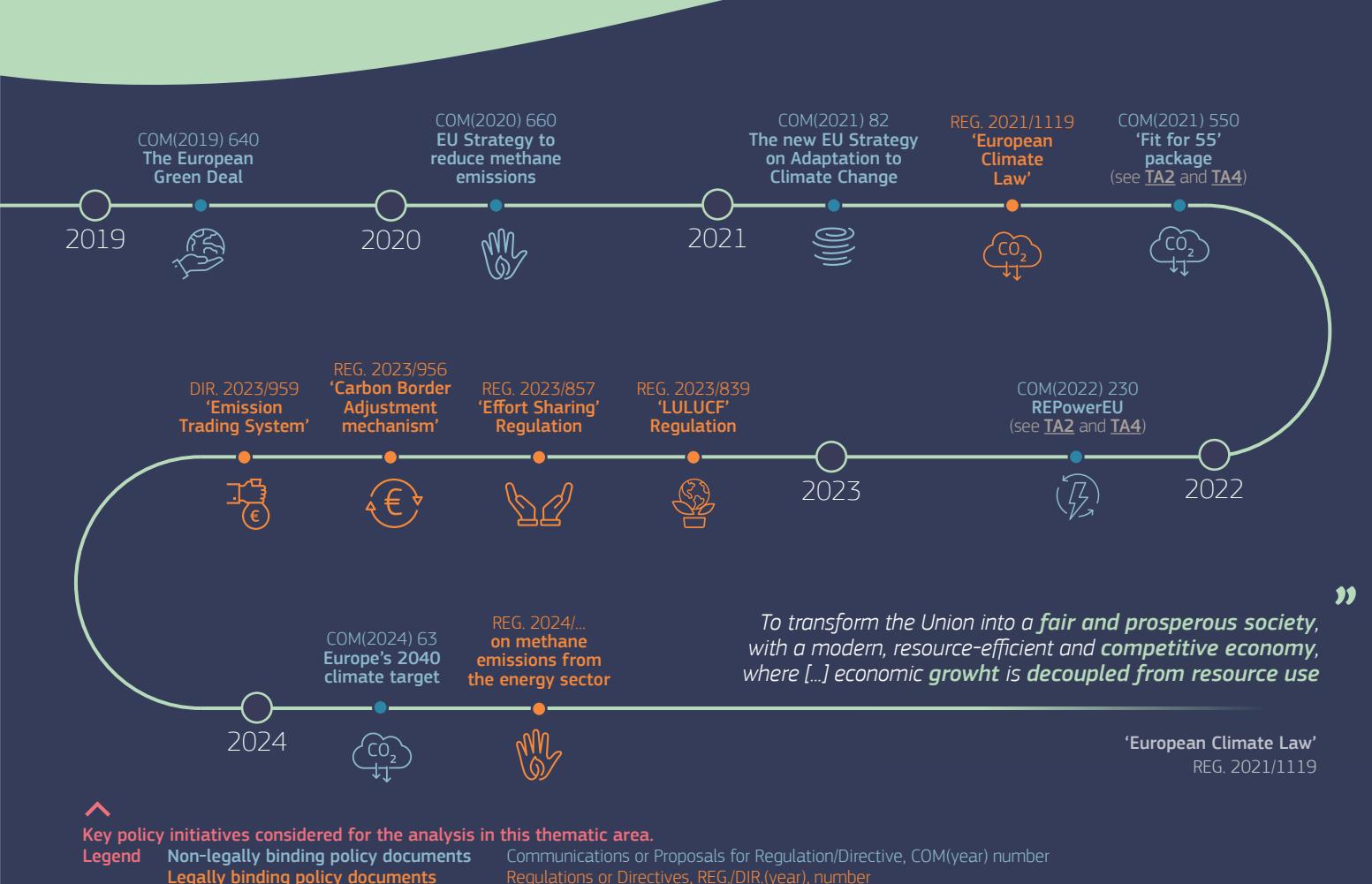
Effort Sharing Regulation
1 target

GHG REMOVALS

LULUCF Regulation
3 targets

Number of targets per policy document
and topic detected in the analysis

Legend
Non-binding targets from Communications and Proposals
Binding targets from Directives and Regulations



^

Key policy initiatives considered for the analysis in this thematic area.

Legend Non-legally binding policy documents
Legally binding policy documents

Communications or Proposals for Regulation/Directive, COM(year) number
Regulations or Directives, REG./DIR.(year), number

Progress towards the targets



Contribution to the 2030 Agenda



Targets of this thematic area contribute directly to achieving the 2030 Agenda target **13.2** to **"Integrate climate change measures into national policies, strategies and planning"**.

01. CLIMATE AMBITION

Policy context

The EU has implemented a comprehensive set of climate change policies to address the urgent need to reduce greenhouse gas (GHG) emissions and adapt to a changing climate, with the ambitious objective of becoming climate-neutral by 2050 [20]. In 2022 total emissions in the EU amounted to 3.375 gigatonnes of CO₂ equivalent (GtCO₂e), excluding Land Use, Land Use Change and Forestry (LULUCF) sinks. The sectorial contributions to total emissions (excluding LULUCF) are: energy supply (26%), transport (23%), other energy uses (14%), energy use in manufacturing industries (11%), agriculture (11%), industrial processes and product use (8%), waste management (3%), and international aviation (3%) [15, p. 65], [21], [22]. When comparing policy targets to Member State projections, some misalignments may arise due to individual national policies not fully considering the interconnectedness of sectors or the impact of EU-level policy frameworks. For instance, national energy plans might emphasise less cost-effective or slower-to-deploy energy sources, while transportation plans could overlook cross-border implications or EU-wide emissions reduction goals. This underscores the inherent challenge of coordinating national ambitions to achieve complex, overarching EU climate objectives.

The EU's legislative framework for emission reductions, embedded in the European Green Deal, builds on the United Nations Framework Convention on Climate Change (UNFCCC).

Most notably, the European Climate Law sets a legally binding target of at least 55% net reduction in GHG emissions by 2030 compared to 1990 levels. It also mandates achieving climate neutrality by 2050 and includes intermediate emission reduction targets for 2040 [23]. The Communication on the Union's climate target for 2040 initiates a political debate about the strategic choices for European citizens and governments regarding the future of EU climate policy. This debate is intended

to inform the next Commission as it prepares the legislative proposal to incorporate the 2040 target into the European Climate Law and develop an appropriate policy framework for the post-2030 period [23].

The European Climate Law also recognises the need to enhance the EU's carbon sink, particularly through the Land Use, Land Use Change and Forestry (LULUCF) regulation. The LULUCF regulation accounts for emissions and removals from various land use activities, including forest land, cropland, grassland, wetlands, settlements, and other land, as well as changes in carbon stock from harvested wood products. Targets for the LULUCF sector started to apply in 2021 with the LULUCF Regulation [19]. This regulation was revised in 2023 [20], under the Fit for 55 legislative framework. The revision maintained the commitments for the period 2021-2025, but introduced more ambitious goals for 2026-2030. It sets national budgets for Member States for 2026-2029 and specific targets for 2030. Additionally, it established an EU-wide commitment to increase the CO₂ equivalent (CO₂e) uptake in the Union by -42 MtCO₂e by 2030, compared to the average of 2016-2018. Other legislative acts, proposals and communications under the EGD contribute to enhancing the EU's carbon sink and interacting with the LULUCF sector. Examples include the new Forest Strategy, which emphasises the multifunctional role of EU forests, and the Biodiversity Strategy, which aims to plant 3 billion additional trees. The Common Agricultural Policy (CAP) promotes the implementation of climate-friendly farming practices and increases the area under organic agriculture. The Nature Restoration Law focuses on the restoration of ecosystems, including wetlands, to enhance biodiversity. The certification of carbon removals promotes the removal of CO₂ through practices such as carbon farming. Additionally, the revised Renewable Energy Directive specifies the types of biomass that can be incentivised and counted towards national renewable energy targets.

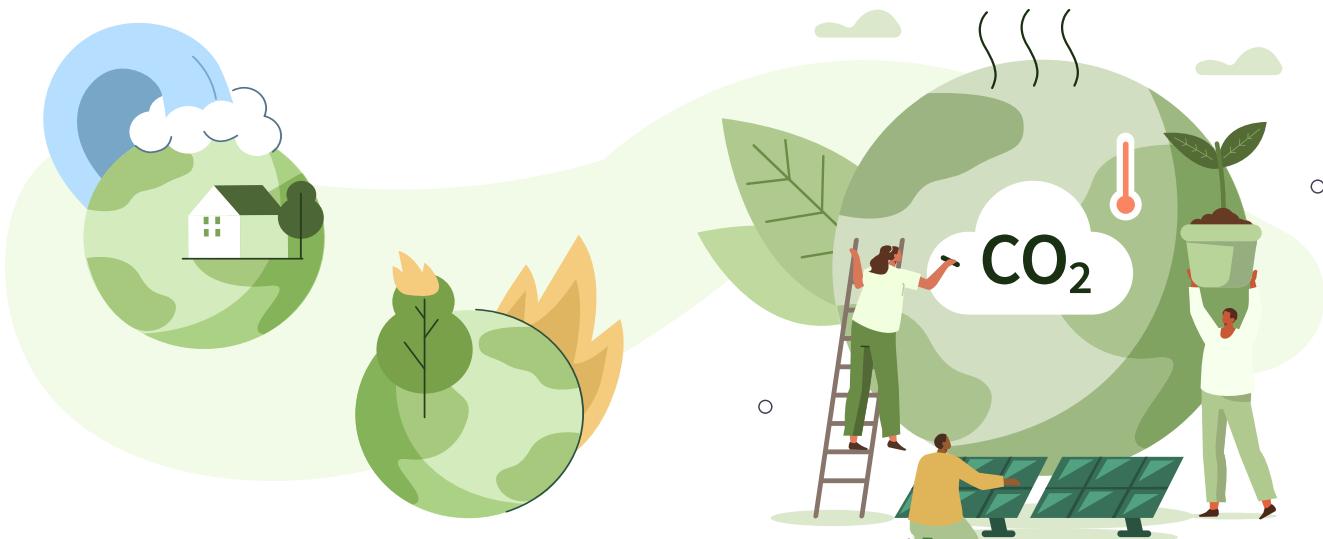
To deliver EU Climate law goals, the Fit for 55 package was presented in mid-July 2021 [21]. It is a set of legislative proposals and amendments to existing EU legislation (almost all of which have been adopted by co-legislators) to help the EU cut its net GHG emissions. The package introduces an increased ambition for the original Emissions Trading System (EU ETS) focusing mainly on stationary installations such as power generation and energy-intensive industries. The new target aims to reduce GHG emissions by –62% by 2030 compared to 2005 levels. Additionally, the EU ETS has been extended to include maritime transport, while aviation was already included since 2012, initially limited to intra-European Economic Area flights).

A new separate Emissions Trading System (ETS2) [22], [23] has also been introduced to help Member States achieve their emission reduction targets under a reinforced Effort Sharing Regulation (ESR). The ETS2 covers CO₂ emissions from fuels used for combustion in buildings, road transport and other stationary activities excluded from the EU ETS (i.e. industries not covered by the EU ETS as well as thermal electricity and heat capacities below the EU ETS threshold). Activities in the agricultural sector are not included in ETS2. The ETS2 emissions reduction target by 2030 is set at 42% below the 2005 level. Moreover, maritime transport emissions are also brought into the existing ETS (100% coverage for intra-EU voyages and 50% for voyages starting or ending in the EU). The FuelEU Maritime initiative aims to increase the use of sustainable alternative fuels in European shipping and ports by addressing market barriers that hamper their adoption, along with uncertainty about which technical options are market-ready. This initiative is part of a broader package aimed at aligning the maritime sector with the EU's ambition of achieving climate neutrality by 2050. The FuelEU Maritime initiative was adopted in July 2023 and will come into effect on 1 January 2025.

The ESR covers about 60% of the EU emissions in sectors such as road and domestic maritime transport, buildings, agriculture, waste, and small industries. This regulation sets binding annual GHG emissions targets for Member States in sectors not covered by the ETS or the LULUCF regulation. As a part of the Fit for 55 package, ESR's GHG emissions reduction targets for 2030 have been amended from 29% to 40% compared to 2005 levels [24]. The country-specific targets for 2030 have also been amended in line with the increased ambition.

Targets for GHG emissions reductions are complemented by a comprehensive policy framework that addresses two closely interlinked aspects: the promotion of renewable energy [25] and energy efficiency [26], both through overall energy consumption reduction targets and energy efficiency standards in specific subsectors like buildings. There are a number of complementary policy instruments in the Fit for 55 package addressing climate objectives and its socio-economic consequences: Carbon Border Adjustment Mechanism (CBAM); Reduction of methane emissions in the energy sector; Renewable Energy; Energy Efficiency; Energy Performance of buildings; Sustainable Aviation Fuels; Sustainable maritime fuels; Alternative Fuels Infrastructure; CO₂ emission performance standards for cars and vans; Hydrogen and decarbonised gas market package; Energy taxation; Social Climate Fund.

Many of these targets, e.g. those related to energy, transport and mobility, are discussed in other related thematic chapters in this report. The assessment in this chapter only addresses EU climate mitigation targets.



THEMATIC FOCUS

Member States projections and EU Reference Scenario

The progress assessment in this chapter compares specific targets with the projected outcomes for the target year, such as a target of -62% reduction in EU ETS emissions by 2030 against a projected reduction of 55-59%). These projections are based on Member States' reporting to the EEA in 2023 under Article 18 of the Governance of the Energy Union Regulation (the EU-wide aggregate of these projections is published by the EEA, most recently in 2023). These projections include a with-existing-measures and a with-additional-measures version, reflecting Member States' views on the impact of their policies.

However, the same projections are not mutually coherent at the EU level. For instance, they do not accurately project the evolution of emissions regulated at the EU level, such as the ETS and the CO₂ standards for road vehicles. Coherent EU-wide projections are published by the Commission, notably in the EU Reference Scenario, which is updated periodically and used for the analysing the impact of new policy proposals. This scenario addresses individual policy instruments at the appropriate administrative level (EU-wide or Member State) while striving to maintain as much detail as possible for the policies put in place by the Member States. This constitutes the most appropriate analytical framework for assessing the existence of implementation gaps against future EU targets. However, the most recent Reference scenario ([Ref. 2020](#)) was developed before the Fit for 55 package and provided the baseline for its impact assessments. Therefore, it is not fit for the purpose of this assessment.



Photo by Dmitry Bukhantsov on Unsplash

Assessment of progress towards the targets

All thematic areas of the EGD directly contribute to the climate ambition. For this reason, only nine targets have been isolated for this area, setting clear trajectories for GHG reduction and contributions by sectors to reach

climate neutrality by 2050 at both the EU and Member State levels. Where available, historical trends, data sources and future projections are reported in Annex 1.

BINDING TARGETS

Targets	Assessment
<p><i>Reduce by at least 55% net GHG emissions compared to 1990 levels, by 2030</i> (<i>Intermediate 2040 Climate Target</i>) Achieve climate neutrality by 2050 <u>European Climate Law</u></p>	<p>The at least 55% economy-wide net reduction objective is enshrined in the Climate Law as an overall ambition at the EU level. Specific legislation covering different sectors translates this into sectoral ambition levels which cumulatively achieve the -55% target. This corresponds to greenhouse gas reductions of 62% in the existing ETS compared to 2005, a 40% reduction in ESR, (this is now complemented by 42% reduction target compared to 2005 in the newly established ETS2). With the aim of ensuring strong emissions reduction in other sectors, the overall contribution of the LULUCF sector to EU's economy-wide target of - 55% by 2030 is limited to a maximum of ~ 225 MtCO₂e/year. Achieving the LULUCF sector target of -310 MtCO₂e in 2030 will elevate the total EU GHG emission reduction to approximately 57% compared to 1990. The total net EU greenhouse gases emissions, including LULUCF, were reduced by 32.5% between 1990 and 2022 [21]. GHG emission reductions need to double in the current decade compared to the previous decades (see charts in the annexes).</p> <p>According to the Member States' own projections reported in 2023 under Article 18 of the Governance of the Energy Union Regulation, total EU emissions are expected to fall in 2030 by about 50% below the 1990 level when factoring in additional measures. This falls short of the at least 55% objective, but the Member States' projections do not accurately capture the evolution driven by EU-wide instruments such as the ETS.</p> <p>Reaching the -55 % objective further depends on delivery of ESR, which is not fully on track, as well as the related functioning of ETS2. In addition, the -55% objective assumes that the LULUCF sink is at least -225 MtCO₂e. The agreed LULUCF commitment of -310 MtCO₂e could even achieve -57%. However, the current development of the LULUCF sink is opposite to the targets, including natural disturbances that are expected to further increase with the ongoing climate change [27], [28]. If this negative development continues, the risk of not reaching the sink of -225 MtCO₂e cannot be ruled out.</p> <p>On the other hand, the implementation of the complete Fit for 55 legislative package is expected to reduce EU net greenhouse gas emissions by 57% by 2030, putting EU on track to exceed 2030 targets [29].</p> <p>On the way to climate neutrality by 2050, the Commission adopted a Communication [23] in February 2024 that launches the process of setting the 2040 climate target for the EU, in compliance with Art. 4.3 of the Climate Law. While 2040 targets are not yet set, it is clear that much of the transition to 2050 has to be realised by 2040. Based on the recommended emission reductions of 90-95 % by 2040 compared to 1990, of the European Scientific Advisory Board on Climate Change advised, the Commission has recommended a net 90% GHG reduction target for 2040.</p> <p>Both 2040 and 2050 targets require a much deeper transformation of the energy system, through large scale deployment of climate-neutral technologies that require high investment efforts with some technologies not yet deployed at market scale. While some of the current instruments will keep delivering reductions well beyond 2030 (notably the EU ETS but also CO₂ standards for vehicles, ReFuelEU Aviation, FuelEU Maritime and the Fluorinated gas (F-gas) Regulation), there will be a need to review, update and complete the legislative framework for the post-2030 period. This will include topics such as carbon capture, industrial carbon removals, and overall and sector specific emission reduction trajectories. In addition, larger emission reductions in difficult-to-abate sectors like agriculture will be needed, along with a larger role for carbon removals, including utilising land as a carbon sink.</p>

GHG Emissions

EU ETS. The contribution of the sectors covered by the existing EU Emission trading System (EU ETS) with respect to the EU Climate ambition should be of -62% compared to 2005 (increasing the linear emissions reduction factor from 2.2% per year up to 4.4%), by 2030

[Directive \(EU\) 2023/959](#)



The decreasing trajectory of the number of CO₂ emission allowances is expected to lead to -62% less CO₂ emission in 2030 compared to 2005 levels. EU ETS emissions fell by 47% between 2005 and 2022. The most important driver for the decrease in EU ETS emissions has been the power sector, due to a substantial increase in renewable electricity production (primarily wind and solar) at the expense of both coal and gas. The system covers the electricity sector, large industry, and since 2012, aviation (initially intra-European Economic Area, with an upcoming extension of scope). Since 1 January 2024, it has been expanded to include the maritime sector [30]. The 2023 greenhouse gas emission projections reported by the Member States to the EEA [15], [22] result in a reduction of ETS emissions of 55% to 59% (with existing measures – with additional measures projection) in the ETS sectors in 2030. While these projections are short of the 62% target, it is important to note that, the ETS being an EU-wide market-based (cap and trade) instrument, this objective is not directly addressed by Member States specific policies and cannot be consistently and comprehensively covered by the individual Member States GHG emission projections.

Given that the ETS instrument is established and operational, and that the necessary technologies are both available and affordable, it is anticipated that the target can be achieved.

ETS2. Contribution of the buildings and road transport sectors of 43% emission reductions by 2030 compared to 2005 and of the additional sectors, a combined cost-efficient contribution of 42% emission reductions by 2030 compared to 2005

[Directive \(EU\) 2023/959](#)



The ETS2 is a new EU-wide cap-and-trade economic instrument that covers the CO₂ emissions from the combustion of fuels in road transport, buildings, and other sectors (mainly smaller industries), excluding agriculture. Monitoring starts in 2025, with cap and trade applying from 2027. As such, it overlaps significantly with the ESR in terms of sectors covered, but important differences are that a) it is implemented at the EU level, rather than through Member State-specific policies, and b) it does not cover non-CO₂ emissions, many of which are from the hard-to-tackle agricultural sector.

Between 2005 and 2022, the emissions covered by the ETS 2 fell by 16% according to own estimates of the JRC. However, since the ETS2 instrument is newly implemented and official reporting by Member States is not yet available, the progress cannot currently be evaluated.

ESR. Increased national targets in line with an EU-wide reduction of 40% in the ESR sectors compared to 2005. Member States contribute to the overall EU reduction in 2030 with targets ranging from -10% to -50% below 2005 level (sectors: transport, buildings, agriculture and waste)

[Regulation \(EU\) 2023/857](#)



The current (2022) reduction is 17% relative to 2005, far from the 40% reduction target set for 2030. Between 2013 and 2020, Member States met or overachieved their ESR obligations- with the largest reductions in the buildings and small industry sectors. Emissions are expected to continue decreasing in the coming decade due to –among others- source control legislation, such as improved building standards, building renovations, CO₂ standards for road vehicles and EU policies on phasing down hydrofluorocarbons (HFC) and other fluorinated gases. Progress in the transport and building sectors faces different challenges. While transport emissions are regulated by EU-wide CO₂ emission standards for vehicles (which have a relatively fast turnover rate), renovating the building stock is a more challenging effort, primarily driven by Member States' policies. Therefore, Member States' projections for building emissions significantly lag behind the expected cost-effective rate of reduction [31].

Overall, EU emissions in the sectors covered by the ESR, according to 2023 Member States projections, are expected to fall by 27-32% (with existing and additional measures, respectively) by 2030 compared to 2005, i.e. 8 -13 percentage points below the 40% target for 2030, with only 6 Member States projected to (over-) achieve their targets [22].

Absolute emissions in the agriculture sector have stagnated since 2010, while agricultural aggregate output has increased, decreasing emission intensity of EU agricultural products by 13%.

Concerning emission reductions, current Member States' projections under the Governance Regulation foresee 2030 emissions with existing measures to be 373 MtCO₂e (or -3% compared to 2021) and 359 MtCO₂e (or -7 %) with additional measures. The 2030 'MIX (55 Euro/t CO₂e)' scenario, used to assess the Fit for 55 targets corresponds to a -7 % decline in the agricultural sector by 2030 compared to 2021, aligning with the Member States 'with additional measures' scenario. The current (2023-2027) CAP aims to contribute to climate mitigation, with Member State strategies outlined in their Strategic Plans. Estimates of the CAP 2023-2027 impact on emissions require detailed information on the implementation and effectiveness of farming practices from the CAP instruments, which are currently being evaluated.



GHG Emissions

Achieve an EU net greenhouse gas removal of 310 million tonnes CO₂ equivalent per year for the land use, land use change and forestry (LULUCF) sector, by 2030, and Member State-specific targets for 2030 summing up to -42 MtCO₂e increase in LULUCF sink between 2016-2018 and 2030.

[LULUCF Regulation](#)

No debit rule. For the period from 2021 to 2025, each Member State shall ensure that greenhouse gas emissions from the sector do not exceed greenhouse gas removals, calculated as the sum of total emissions and total removals on its territory in all the land accounting categories. The accounting benchmark for the EU is ca. -229 MtCO₂e/year for 2021-2025

[LULUCF Regulation](#)

MS specific targets. A budget for each Member State for the years 2026-2029, based on a linear trajectory between 2022 (as an average of 2021-2023) and 2030.

[LULUCF Regulation](#)

The revised LULUCF regulation sets a target of removing 310 MtCO₂e by 2030. The long-term EU forest sink is developing away from this target and jeopardising the fulfilment of the overall LULUCF sector target for 2030. Furthermore, natural disturbances are expected to increase with ongoing climate change, with potentially a further reduction of the carbon sink, making the situation even more difficult.

In 2020, the gap between the reported LULUCF emissions in 2016-2018 and the target of -310 MtCO₂e for 2030 was -42 MtCO₂e for the EU. 2024 shows that this gap has now widened: instead of -42 MtCO₂e, the EU needs to improve its LULUCF sink by -80 MtCO₂e between 2022 and 2030 to meet the targets. The LULUCF targets will be difficult to achieve unless substantial changes in forest management are implemented very soon.

Assessing the distance to the target is difficult. Comparing purely the GHG reporting from countries for 2021 and 2022, to the accounting benchmark of -229 MtCO₂e determined by the delegated act, it looks like the EU is slightly exceeding the accounting benchmark. However, the recalculations of the inventories have increased the net sink historical time series reported by the Member States, and those recalculations will be considered in the accounting. Given the sharp decline of the forest sink driven by increasing harvest levels and natural disturbances, it is likely that the EU will face an overall accounting debit (i.e. not reaching the target) than a credit in the LULUCF sector as a whole.

The reporting for years 2026-2029 will be done in GHG inventories during 2028-2031.

The reporting for years 2026-2029 will be done in GHG inventories during 2028-2031.



GHG Removal

NON-BINDING TARGETS (FROM COMMUNICATIONS)

Targets

Reduce methane emissions by 35 to 37% compared to 2005 levels, by 2030

[An EU Strategy to reduce methane emissions](#)

Assessment

Methane emissions were 497.15 MtCO₂e in 2005 and decreased to 394.37 MtCO₂e in 2022, making a reduction of about 20.67%. However, acceleration is needed to reach at least a 35% reduction by 2030.

The largest source of methane emissions in the EU is the agriculture sector, accounting for more than half of the total emissions, followed by the energy and waste sectors. Within agriculture, almost all methane emissions are from livestock: 80% of the total stems from enteric fermentation and 18% from manure management. Furthermore, the energy sector showed the highest decline in emissions, primarily due to the mitigation of fugitive emissions from fuels, including emissions from the extraction of solid fuels and those associated with oil and natural gas production and distribution.

Most methane emissions from the waste sector come from solid waste disposal.

GHG Emissions



Implementation challenges

Note: This section reports on the main challenges to implementing the Climate Ambition targets. It is based on extensive review of the *Environmental Implementation Reviews*, the *Communication (and accompanying documents) on the 'EU wide assessment of the draft updated National Energy and Climate Plans* [7] and sectorial literature. Due to the transversal nature of the EU Climate Ambitions, many related challenges are reported in other chapters. In particular, relevant challenges related to greening and securing the energy system (including energy efficiency in buildings) and the food system are addressed in thematic areas 2 and 5 respectively. This section will be expanded providing a focus on selected enablers to possibly overcome challenges and boost the achievement of the Climate Ambition targets in the follow-up of this report.

Achieving the EU's climate targets of reducing net GHG emissions by at least 55% by 2030 and attaining net-zero by 2050 involves overcoming significant challenges. A key feature of implementing is upgrading the EU's capital stock, which requires higher upfront investments. These investments are expected to be offset over time by associated fuel savings. The financial burdens of the Fit for 55 initiative are notable, particularly the substantial upfront investments needed in sectors like industry and agriculture. To address this, the ETS Innovation Fund and Modernisation Fund earmark ETS revenues for reinvestment in industry decarbonisation. Additionally, Member States can allocate ETS revenues for this purpose.

Low-income households, though supported by the EU Social Climate Fund, may need additional national support in the energy transition. Moreover, the large-scale deployment of technologies not yet market-ready, such as carbon capture and storage (CCS) and green hydrogen, presents significant technological and infrastructural challenges. The Innovation Fund, the EU fund for climate policy, aims to bring net-zero and innovative technologies to market and facilitate their deployment. Furthermore, the Industrial Carbon Management Strategy [32] adopted by the Commission on 6 February 2024, presents a comprehensive approach for the EU to scale up carbon management technologies.

Political and institutional barriers also complicate progress, with policy trade-offs between land and forest use, such as bioenergy versus carbon sequestration. Additionally, objectives within the Farm to Fork Strategy may increase competition for land, for example increasing organic farming and reducing pesticide and fertiliser use may require more crop areas for agricultural production. Behavioural resistance to changing traditional farming practices and adopting new technologies further hampers the transition, alongside socio-cultural inclinations towards maintaining the status quo.

Informational gaps and limited technological

capabilities for monitoring land use changes make effective policy implementation and adjustment challenging. The diversity in regional needs and conditions across the EU requires tailored approaches rather than a one-size-fits-all solution. Addressing these multifaceted barriers demands integrated strategies that enhance financial accessibility, advance technological readiness, ensure policy coherence, respect cultural contexts, and improve communication and data sharing.

The National Energy and Climate Plans (NECPs) and the Environmental Implementation Review (EIR)

The NECPs (COM (2023) 796 [7]) serve as the central strategic planning tool under the Regulation on the Governance of the Energy Union and Climate Action. They enable Member States to report on their progress towards the EU-wide climate and energy objectives. Furthermore, over 42% of the revised Recovery and Resilience Facility will contribute to the green transition and the REPowerEU Plan [7]. In December 2023, the Commission published its assessment of Member States' draft NECPs and issued recommendations to help them increase their ambitions. These recommendations aimed to assist Member States in improving their plans before the final NECPs were submitted by 30 June 2024. Overall, there is a good level of implementation of EU climate legislation according to the EIR 2022.

The draft updated NECPs are a step in the right direction regarding increased ambitions under the Effort Sharing Regulation. However, gaps in ambition remain. The draft NECPs are not yet sufficient to achieve the targeted reduction of net GHG emissions by at least 55% by 2030, as existing measures would only lead to a 51% reduction. Greater efforts and enabling measures from Member States are needed for the effort sharing sectors — domestic transport (excluding aviation), buildings, agriculture, small industry, and waste — to meet the EU's 2030 Effort Sharing Regulation targets of a 40% emissions reduction by 2030 compared to 2005 levels. The implementation of ETS2 will be key to reach the ESR

targets, but most Member States need to consider the new emission trading system in their plans and projection scenarios. This includes ambitions and actions in the land use sector and carbon removals. In the draft NECPs, most Member States have not outlined a concrete pathway to reach their national net removal targets or provided an overview of measures to support farmers, foresters, and other stakeholders in developing sustainable business models aligned with these targets.

Fossil fuel subsidies persist and, as stated in the Commission's EU wide assessment of the draft updated NECPs, a collective effort by Member States is needed to set a clear timeline for their phase out. Economically, transitioning to green technologies and energy systems involves upfront investments that require financial incentives, such as those provided by the EU ETS, as well as public and private funding mechanisms. However, increased investment in low-carbon technologies could potentially boost productivity and economic growth in the long term. Some Member States also highlighted a knowledge gap and lack of technical expertise and skills to implement and manage green technologies effectively. Technological immaturity and economic unviability as well as aging or inadequate infrastructure further hamper the large-scale adoption of those technologies.

The green transition challenges our long-established ways of operating and living, leading to cultural resistance to change. This resistance is further fuelled by public scepticism concerning the efficacy and benefits of policies fostering a green transition. Additionally, gaps persist in assessing investment needs via dedicated budgets, and achieving a wide uptake of nature-based solutions (see also Thematic Area 6). Finally, monitoring and reporting mechanisms are yet to be established in several Member States.

The role of cities and the 100 Smart and Climate-Neutral by 2030 City Mission

With the share of Europe's urban population projected to rise over 80% by 2050 [27] and given cities' major contribution to GHG emissions worldwide [28], addressing implementation challenges and ensuring smooth policy implementation at local level is crucial to achieve Climate Ambitions in the EU [29].

The most common challenges to the green transition, as identified by scholars [30] and local policymakers in a survey by the Committee of the Regions (CoR) on the Green Deal local

implementation [11], include inadequate financial resources, lack of skills and human resources within local governments, and the need to preserve local specificities through enhanced policy flexibility. Additionally, the absence of a horizontal climate policy mainstreaming across national government branches, and eventual misalignment in policy frameworks are significant barriers. Furthermore, the 9th Cohesion report by the EC [12] and the State of Regions and Cities report by the CoR [13] highlight additional challenges in implementing GHG emission reduction targets. These challenges include insufficient community engagement and low public awareness, inadequate infrastructure for upscaling cleaner technologies, regional disparities and urban-rural gaps, as well as misalignment between local and regional policies and national or EU-level strategies, preventing cohesive climate action.

The EC Mission for 100 Climate-Neutral and Smart Cities by 2030, as part of the EGD, addresses the important role of urban environments in meeting EGD commitments. It aims to empower cities to lead the transition to climate neutrality, displaying actionable pathways and innovative solutions that can be scaled and replicated across the EU and beyond [33]. This calls for collaborative efforts and innovative forms of governance [34]. According to the analysis of the survey of 362 EU cities that expressed interest in becoming Climate-Neutral and Smart Cities by 2030, local transition pathways to climate neutrality face several "risks", which have been organised into nine clusters by JRC scientists in an unprecedented source of knowledge on climate mitigation at city level [35]. These risks regard:

- (1) **Leadership, strategic planning, and political risks** (e.g. lack of long-term political will, inefficient planning and reporting particularly affecting highly interdisciplinary targets, misalignment between local and national policies, "educational poverty" and low levels of interest and commitment from the local population);
- (2) **Regulatory risks** (e.g. excessively unstable or unambitious regulatory regimes creating uncertain investment environments, limits to local governments' autonomy on fiscal and regulatory powers especially for public-private cooperation, misaligned incentives such as fossil-fuel subsidies);
- (3) **Organisational risks** (e.g. departmental silos unable to face the complexity of climate change, lack of horizontal supervision among city government departments, lack of feedback on policy implementation mostly due to improper data collection);
- (4) **Partnerships/stakeholder risks** (e.g. high number of stakeholders to be consulted and involved in the

green transition process, conflicting objectives, limited engagement/commitment of citizens and the “real” inclusiveness of them);

(5) **Social risks** (e.g. energy poverty, social inequality, social exclusion, and social polarisation further aggravated by rapid population growth in cities);

(6) **Environmental risks** (e.g. rising air and water quality, heat island effect and floods exacerbated by increasing extreme weather events);

(7) **Safety and security risks** (e.g. cyber-security due to the need to introduce sensors and Internet of Things in energy production, building, transport, lighting, waste, and city administration systems, energy security and grid stability, possible social opposition due to “unpopular” decisions and projects);

(8) **Operational risks** (e.g. resource availability, especially for skilled and trained staff, slow and lengthy procedures in public procurement and the obligation to choose the most affordable option which might work against green public procurement);

(9) **Financial risks** (e.g. incapacity to manage

unprecedented capital required for the transition to climate neutrality, lack of knowledge to raise external funding and find investment sources, financial uncertainties, and possible higher costs of sustainable construction materials and new technologies).

Strategies for managing climate risks in cities might include: decentralising responsibilities to ensure continuity in the transition process; enhancing cooperation across all government levels; emphasising innovative financial and business models to attract private capital and reduce bureaucracy; accelerating sustainable investments; and expanding stakeholder networks to include underrepresented groups, ensuring a fair transition. Additionally, pursuing climate mitigation solutions that also address adaptation, biodiversity preservation, and societal benefits is crucial. Investing in cybersecurity, transparent policies, and public education will help maintain stability and build consensus. Tailored solutions should be developed to fit local context specific needs and will be further explored in the follow-up of this report.

THEMATIC FOCUS

What other research shows about the EU Climate Ambitions

A comprehensive, cross-cutting, and interdisciplinary approach is essential to effectively assess the EGD ambitions and verify alignment with set targets. Three recent reports are particularly noteworthy for their consensus on the assessment of EGD climate ambition progress: the 2023 "Climate Action Progress Report" [15] by the EC, the 2023 "Monitoring report on progress towards the 8th EAP objectives" by the European Environment Agency (EEA) [2], and the 2024 report from the European Scientific Advisory Board on Climate Change (ESABCC), "Towards EU climate neutrality: progress, policy gaps, and opportunities" [10]. These reports highlight a scientific consensus on the actual state of play regarding the implementation of targets, and collectively confirm the achievement of crucial objectives, while also indicating that there is still distance to cover towards the EGD policy goals and acceleration is needed in many fields.

The Climate Action Progress Report confirms that EU net emissions decreased by 3% in 2022 compared to 2021, maintaining the 30-year downward trend since 1990. However, in line with this assessment, the report states that progress towards the EU climate targets is insufficient, and the pace of emission reduction should accelerate ‘considerably’ (p. 5) to meet the EU climate objective. This is also reflected in the Member States’ projections on CO₂ equivalent removals in the LULUCF sector, which show that the ‘size of the carbon sink is continuing to decrease’ (p. 32), despite a slight increase in 2022 based on approximated data. The ESABCC report also urgently recommends that Member States implement national measures to increase the pace of emissions reduction and reverse the declining EU carbon sink in time. The EEA report aligns with these assessments, confirming that it is very unlikely that the EU will achieve the LULUCF targets, and that while the GHG emission reduction target by 2030 is possible, it remains uncertain. A ‘considerable acceleration in emission reduction’ and more than ‘threefold increase in the past 10-year average annual rate of net GHG emissions reductions’ are needed. Therefore, a significant increase in effort across all socio-economic sectors, particularly in the building and transport sectors, is required. This also includes implementing additional measures within the CAP to align with the 2030 target.

Key messages

The economy-wide objective of at least 55% net emissions reductions compared to 1990 is enshrined in the Climate Law, but there is a risk of falling short of this target. Based on the analysis of the data and trends, the pace of EU GHG emission reduction should increase considerably in the current decade compared to the previous decades to achieve the 55% net reduction target.

Emissions reduction in the Effort Sharing Regulation (ESR) sectors, which include domestic transport (excluding aviation), buildings, agriculture, small industry, and waste, are ongoing but still far from reaching the 40% reduction target in 2030. The agriculture sector needs to further reduce its non-CO₂ GHG emissions to reach the ESR targets.

The revised LULUCF regulation sets a target of removing 310 MtCO₂e from the atmosphere in 2030, but the long-term EU forest sink is moving away from this target. Natural disturbances are expected to increase with ongoing climate change, putting a strain on areas designated for carbon removal.

Methane is the second most important greenhouse gas contributor to climate change, with a larger global warming potential than carbon dioxide. The EU has expanded on global efforts to encourage increasing methane abatement both as an element of climate action and energy security support. Acceleration is needed to reduce methane emissions in the energy, agriculture, and waste sectors, which account for almost all human-related methane emissions.

Implementation of EU climate legislation is underway in Member States, but many challenges persist. Member States need to develop concrete pathways to reach their national net removal targets in the LULUCF sector and to address the gaps in the Effort Sharing Regulation sectors. The new EU Emissions Trading System will provide further incentives to reach the Effort Sharing Regulation targets.

Fossil fuel subsidies remain a major obstacle to the EU climate ambitions and to the clean energy transition. As reported in the EU-wide assessment of the draft updated National Energy and Climate Plans [7], a collective effort by Member States is needed to set a clear timeline for their phase out.

Implementation at local level is key for climate ambitions. Possible challenges in implementing GHG emission reduction targets include insufficient community engagement and low public awareness, regional disparities and urban-rural gaps, social risks especially for most vulnerable citizens, and misalignment between local and regional policies and national or EU-level strategies, preventing cohesive climate action.

A photograph of a wind turbine at sunset. The sky is a warm orange and yellow. In the foreground, there's a dark, grassy hill. The wind turbine's tower and part of its blades are visible against the sunset. Large, white, semi-transparent numbers '02' are overlaid on the left side of the image.

02

Clean, affordable and
secure energy

7 AFFORDABLE AND CLEAN ENERGY



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



13 CLIMATE ACTION



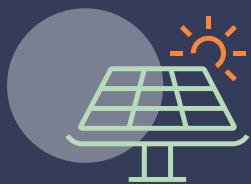
and

Wind turbines in Patras, Greece
Photo by Jason Blakely on Unsplash

Clean, affordable and secure energy

Factsheet

The European Green Deal emphasises three fundamental principles to facilitate the transition to clean energy, aimed at cutting down on GHG emissions and improving citizens' quality of life. These include guaranteeing a dependable and reasonably priced energy supply for the EU, creating a fully integrated, interconnected, and digitalised EU energy market, and giving priority to energy efficiency. This also involves enhancing the energy efficiency of buildings and cultivating a power sector driven by renewable energy.



Policy context

34

Quantifiable targets

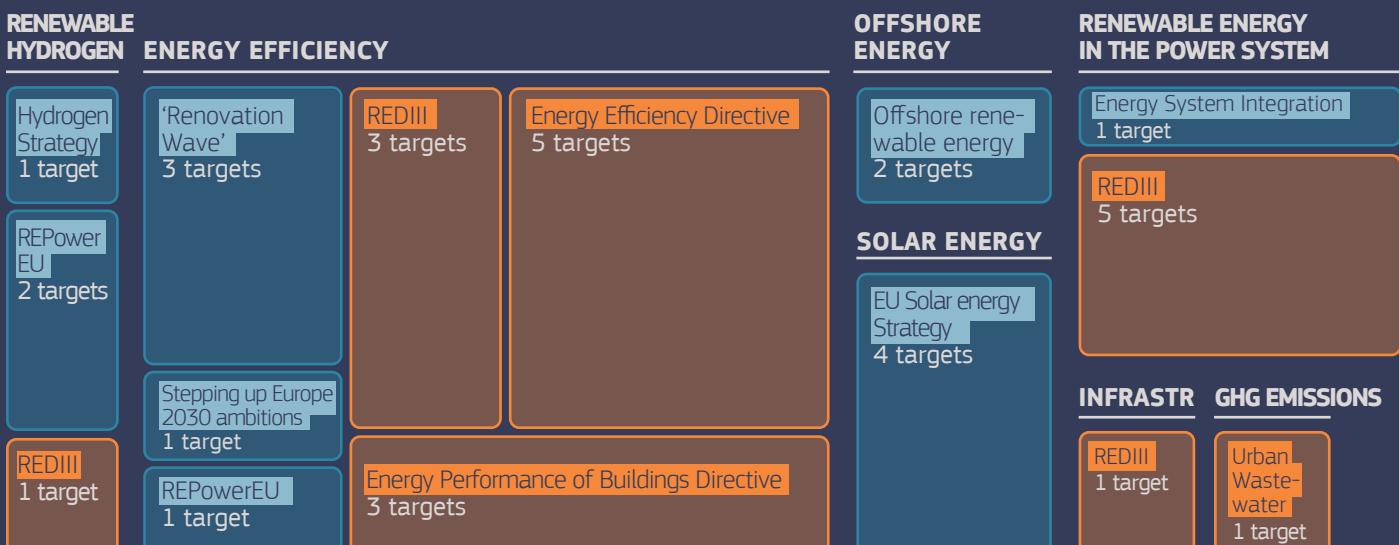
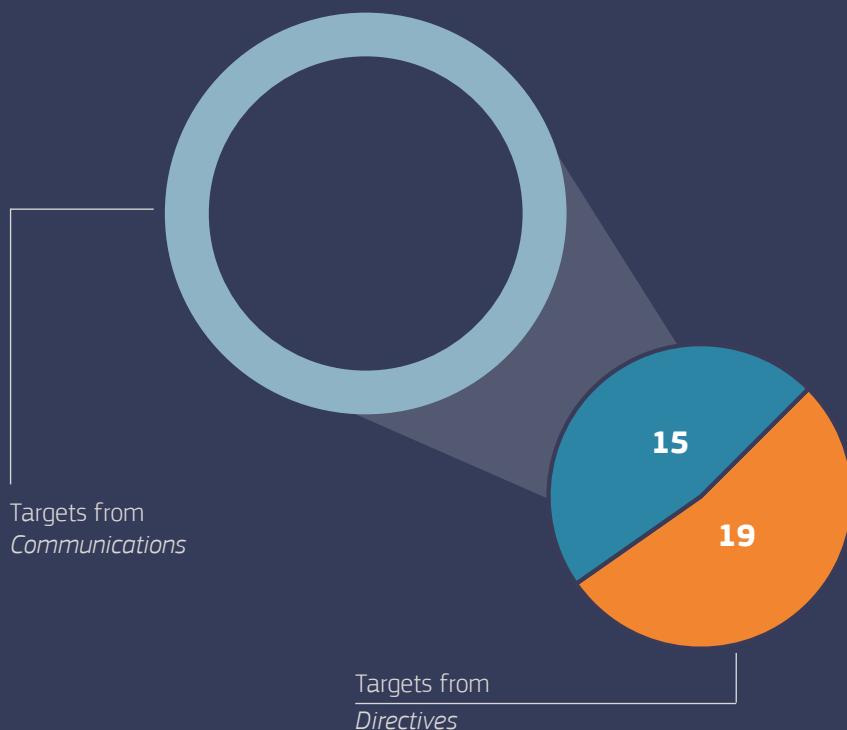
extracted from Policy Documents
in this Thematic Area

56%

of all targets assessed
in this Thematic Area are
legally binding

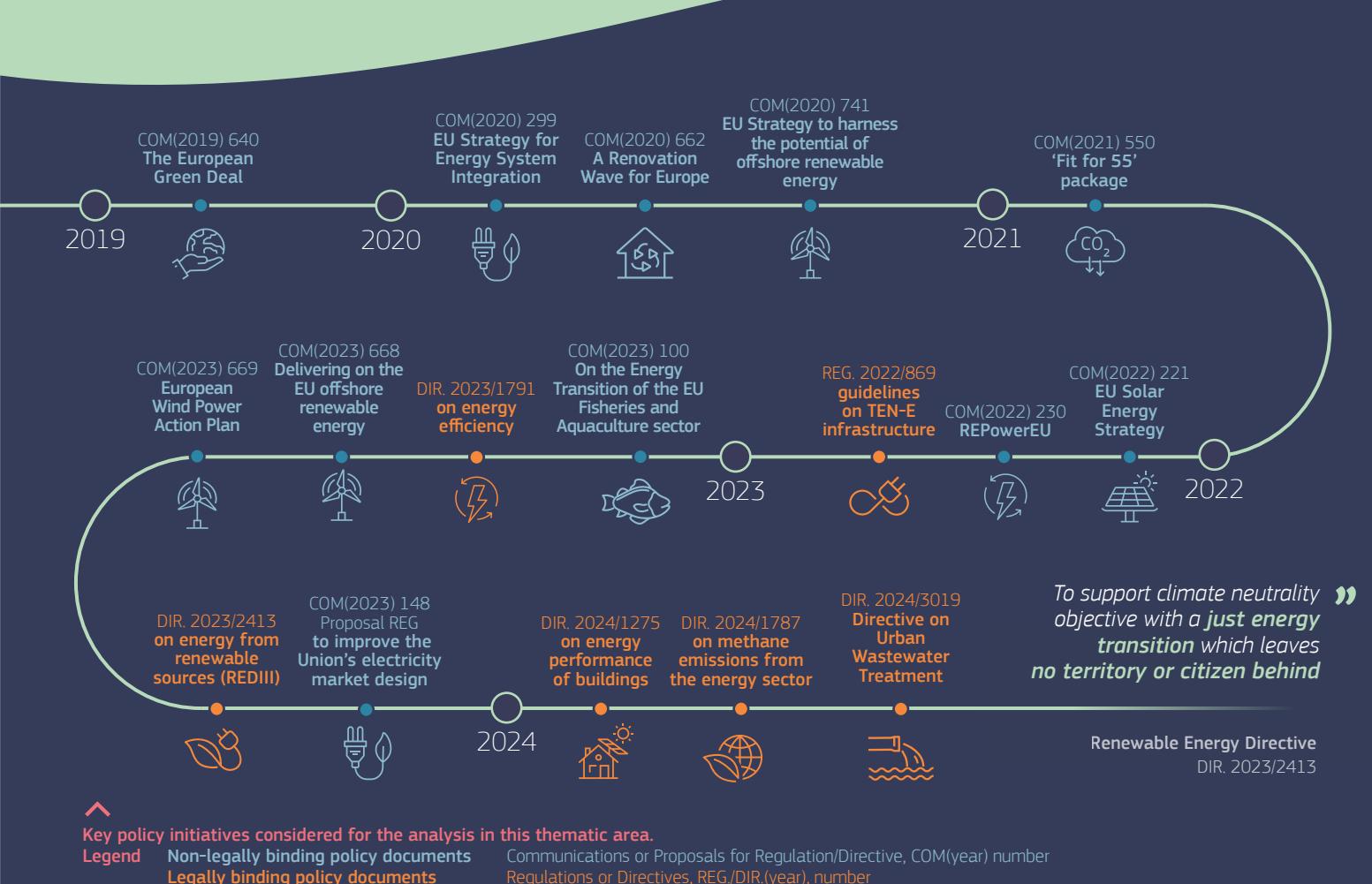
47%

of all targets assessed
in this Thematic Area regard
energy efficiency



Number of targets per policy document
and topic detected in the analysis

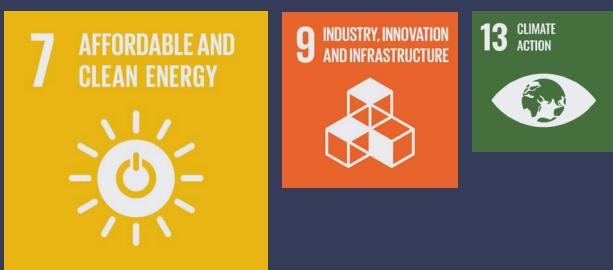
Legend
Non-binding targets from Communications and Proposals
Binding targets from Directives and Regulations



Progress towards the targets



Contribution to the 2030 Agenda



Targets of this thematic area contribute directly to 2030 Agenda targets **7.2**, **7.3**, and **7.a** on **renewable share**, **energy efficiency**, and **international cooperation** for clean energy respectively. They also support **sustainable infrastructure** deployment (**9.4** and **9.1**) and **climate change** measures integration (**13.2**).

02. CLEAN, AFFORDABLE AND SECURE ENERGY

Policy context

The European Union's medium- and long-term energy policy and decarbonisation initiatives are outlined in key strategic documents such as the Clean Planet for All (2018) [36] and the European Green Deal (2019) [37]. These documents outlined an ambitious legislative agenda for renewable energy, energy efficiency, and greenhouse gas (GHG) emissions reduction. The Fit for 55 package [38], adopted in 2021, translates these visions into actionable legislation that sets out the legal framework to reach the goal of reducing net emissions by at least 55% by 2030, aligning with the European Climate Law [20]. The proposals in energy establish common rules for the EU energy market, ensuring efficient and safe energy supply chains and setting targets for energy efficiency, renewable energy, and cross-border connections.

The EU's Renewable Energy Directive (RED) [39] and its subsequent revisions, establish common rules and targets for the share of renewable energy across all sectors of the EU economy. The revised directive introduces a strong policy framework for electrification in sectors such as transport and heating and cooling, along with new or increased sector-specific targets for renewables. It also converts into EU law some of the concepts outlined in the energy system integration and hydrogen strategies, aiming to create an energy-efficient, circular and renewable energy system. The directive promotes the use of renewable fuels, including hydrogen, in sectors like transport or industry where electrification may not always be a feasible option; setting new binding targets for renewable fuels of non-biological origin in these hard-to-electrify sectors. To address the critical bottleneck in the deployment of renewables, the directive streamlines permitting procedures for both renewable energy projects (including through shorter approval periods and the creation of 'Renewables acceleration areas') and the necessary infrastructure projects.

The 2021 EU Climate Law sets a clear target for climate neutrality at the latest by 2050, emphasising wind energy and solar photovoltaics in the future energy system. From being a pioneer in the offshore sector (the first offshore wind farm was installed in Denmark in 1991) the EU has developed into a global leader in offshore wind [40], exporting equipment and expertise worldwide. To support the EU's renewable energy targets, the Commission published in 2020 a strategy dedicated to offshore renewables [41] and the European Wind Power Action Plan, in 2023 [42]. The Commission also adopted the EU Solar Energy Strategy [43], which identifies remaining barriers and challenges in the solar energy sector and outlines initiatives to overcome them and accelerate the deployment of solar technologies.

The European Commission also adopted two proposals on key pillars of the EU's Green Deal Industrial Plan [44]: the Net Zero Industry Act (NZIA) [45] and Critical Raw Materials Act (CRMA) [46]. The NZIA aims to scale up the manufacturing of clean technologies in Member States, catalysing their investments. The CRMA sets out a renewed European approach to the use of raw materials and revitalising Europe's sustainable materials market, focusing on the extraction, processing, recycling, monitoring and diversification of critical ores, minerals and concentrates, while strengthening its international outreach.

To ensure the EU meets its climate and energy objectives for 2030, the Governance of the Energy Union and Climate Action Regulation [47] sets common guidelines for planning, reporting, and monitoring progress towards the agreed targets. Within this framework, Member states submit comprehensive national energy and climate plans (NECPs), evaluated by the European Commission. These plans encompass the five core dimensions of the Energy Union: decarbonisation (including reductions in greenhouse gas emissions

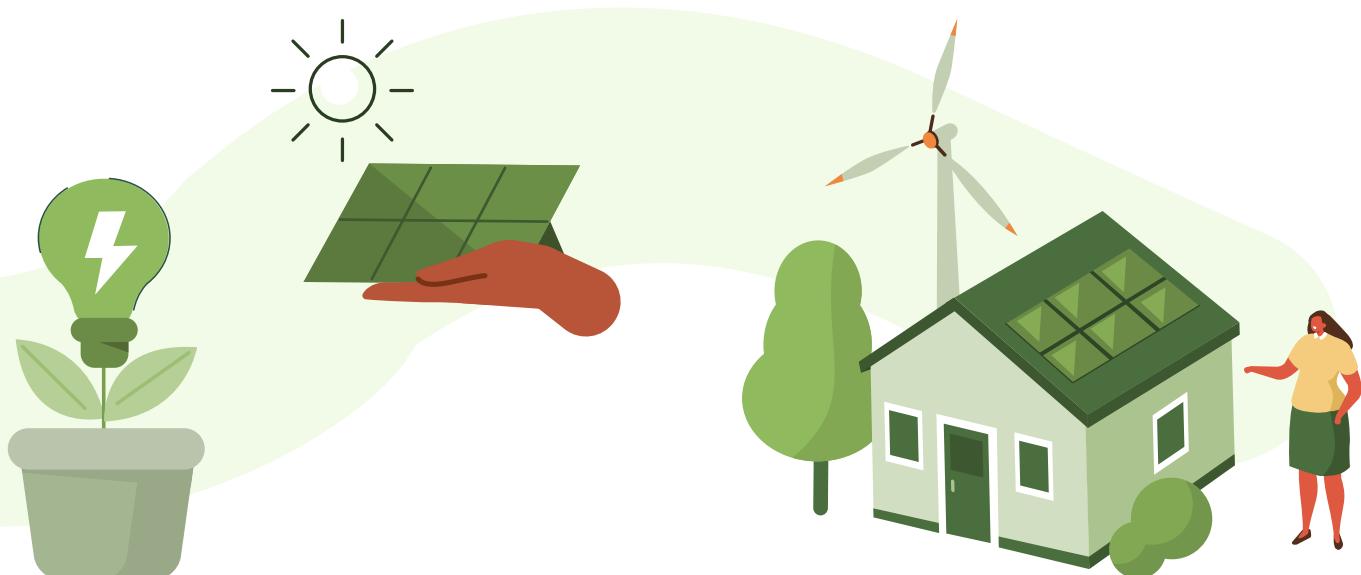
and the expansion of renewable energy sources), enhancing energy security, boosting energy efficiency, facilitating the internal energy market, and fostering research, innovation, and competitiveness. In order to reflect heightened ambitions in line with the Fit for 55 policy, 26 Member States revised and resubmitted their updated draft national energy and climate plans in 2023, which were then assessed by the Commission [29]. The final versions shall have been submitted by June 30, 2024.

In response to Russia's invasion of Ukraine and the energy price crisis, the European Commission adopted the REPowerEU Plan [49] to reduce the EU's dependency on Russian fossil fuels, address security of energy supply and accelerate the transition to clean energy with a massive speed-up and scale-up in renewable energy. It also introduced a market correction mechanism to counter excessively high gas prices after gas and electricity prices peaked in August 2022. The Commission continues to monitor energy prices for both citizens and industry, and has published a recommendation on energy poverty [50], as well as facilitated a joint declaration on enhanced consumer protection among key stakeholders in the energy sector [51]. The Council adopted a temporary emergency regulation in December 2022 for the fast-tracking of permitting procedures to accelerate the rollout of renewables and grids. The Commission proposed on November 2023 to prolong certain emergency measures on permitting, which are complementary to the permitting reforms that need to be transposed by EU countries by mid-2024 under the revised RED. These measures comprise the so-called gas solidarity measures [52], the Market Correction Mechanism [53] and the rules related to permit-granting for renewable energy projects [54].

Increased electrification makes grid planning a critical aspect. Flexible and resilient infrastructure capable of accommodating decentralised generation and managing intermittent power supply will be required. Improving Europe's cross-border electricity interconnections will allow the EU to boost its security of electricity supply and integrate more renewables into energy markets.

The European Commission's Hydrogen Strategy for a Climate-Neutral Europe Communication [55] outlines the policy context and actions for renewable and low-carbon hydrogen within the 2030 horizon. The cooperation with industry has been fostered by the European Commission through the establishment of the European Clean Hydrogen Alliance gathering industry, public authorities, academia to discuss key challenges, including regulatory barriers and facilitation of access to finance. To stimulate and support investment in sustainable hydrogen production, the Commission established the European Hydrogen Bank [56]. Its first EU-wide auction awarded nearly EUR 720 million to seven renewable hydrogen projects across Europe under the Innovation Fund. Water electrolyzers and fuel cell technologies also play a strategic role, as reflected in the Green Deal Industrial Plan and the NZIA.

Following the review and revision of the Gas Directive 2009/73/EC [57] and Gas Regulation (EC) No 715/2009 [58], the Hydrogen and gas markets decarbonisation package [59] was published in December 2021. Including the agreed proposals of a Regulation [60] and a Directive [61]; it enables the market to decarbonise gas consumption and puts forward policy measures required for supporting the creation of optimum and dedicated infrastructure, as well as efficient markets. One of the main aims is to establish a market for green



hydrogen, create the right environment for investment, and enable the development of dedicated infrastructure, including for trade with third countries. The market rules will be applied in two phases, before and after 2030, and cover access to hydrogen infrastructures, separation of hydrogen production and transport activities, and tariff setting.

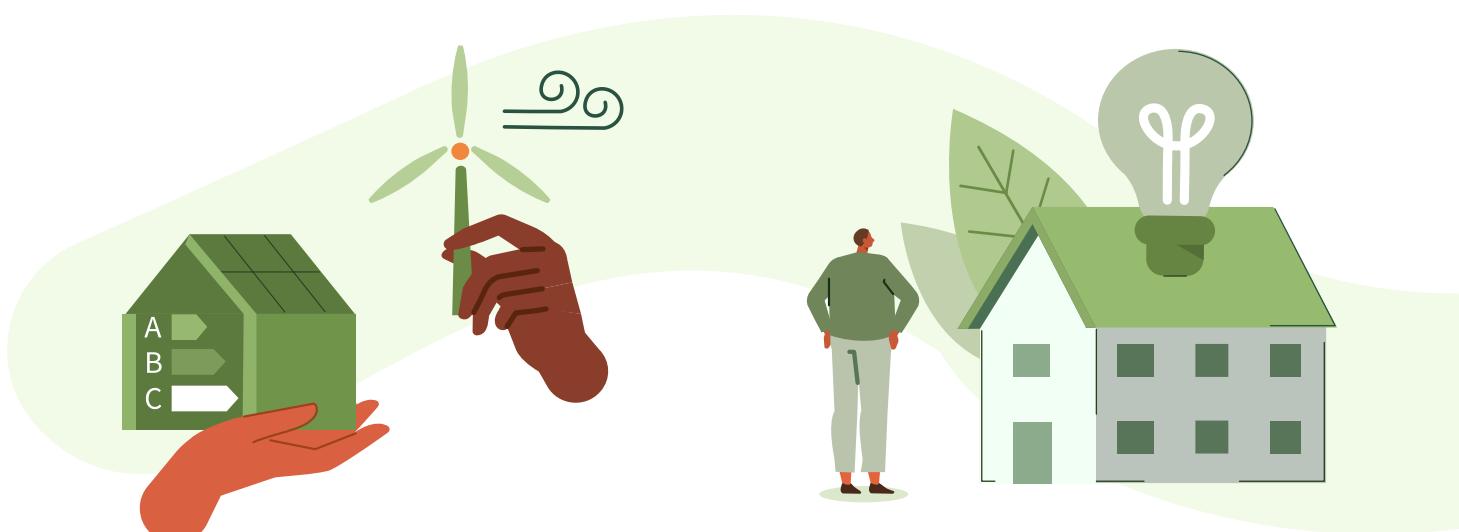
The Trans-European Networks for Energy (TEN-E) [62], effective since June 2022, introduced new rules for EU cross-border energy infrastructure. It promotes the integration of renewables and new clean energy technologies into the energy system. Furthermore, it strives to connect regions presently isolated from European energy markets, reinforce existing cross-border interconnections, and encourage collaboration with partner nations. The revised TEN-E Regulation includes a new chapter on offshore grids with provisions to support the scale-up of offshore grid development across the EU. The Grid Action Plan [63] outlines a series of measures to ensure that cross-border and local European electricity grids will operate more efficiently and will be deployed further and faster.

Additionally, the energy efficiency aspects of the EGD are consolidated in the Energy Efficiency Directive (EED) [64] and the Energy Performance of Buildings Directive (EPBD) [65] as part of the Fit for 55 package, and the Ecodesign Directive [66] and Smart Financing for Smart Buildings initiative [67]. The 'energy efficiency first' principle emphasises the consideration of cost-efficient energy efficiency measures on the energy demand side when shaping energy policy and making relevant investment decisions. This guiding principle is deeply embedded in several legislative acts of the EU (e.g. Governance of the Energy Union Regulation), most notably the EED, with the 2021 recast of the EED introducing the obligation for Member States to consider the 'energy efficiency first' principle in energy system decisions.

The principle of prioritising energy efficiency is also strongly embedded in the revised EPBD which aims to boost energy efficiency in buildings with the ultimate goal to decarbonise the whole EU building stock by 2050. The approved EPBD recast includes minimum energy performance standards for buildings, a definition of Zero-Emissions Building [68], strengthened provisions and harmonisation of Energy Performance Certificates, and enhanced requirements for national building renovation strategies [69]. Besides reducing costs, the energy efficiency of buildings yields several wider benefits, such as improved indoor conditions, reduced air pollution, enhanced health and safety, and reduced energy poverty. Reducing energy poverty through enhancing energy efficiency is particularly key in Europe. This has become a specific policy priority in the legislative package Clean Energy for All Europeans [70], [71] and has been strengthened with the Second and Third Recommendations on Energy Poverty [50].

Assessment of progress towards the targets

This section provides an overview on distance to 34 quantifiable targets identified as relevant for this thematic area. They are divided into legally binding targets (from regulations and directives) and non legally binding targets (from communications). Where available, historical trends, data sources and future projections are reported in Annex 2. Most of these targets are also assessed by the Commission on an annual or biannual basis as part of the State of the Energy Union Report [72]. The reporting and assessment use the latest available data; as a result, the consolidated data in certain areas relate to 2021, 2022 or 2023.



BINDING TARGETS

Targets

Assessment

Member States shall collectively ensure that the share of energy from renewable sources in the Union's gross final consumption of energy in 2030 is at least 42.5%.
[RED III \(Directive \(EU\) 2023/2413\)](#)



The amount of renewable fuels and renewable electricity supplied to the transport sector leads to a:
(i) *share of renewable energy within the final consumption of energy in the transport sector of at least 29 % by 2030; or*
(ii) *GHG intensity reduction of at least 14.5 % by 2030, compared to the baseline set out in Article 27(1), in accordance with an indicative trajectory set by the Member State.*
[RED III \(Directive \(EU\) 2023/2413\)](#)



By 2022, achieve 18% of the total increase in the share of energy from renewable sources between that Member State's binding 2020 national target, and its contribution to the 2030 target of the share of energy from renewable sources in gross final consumption of energy. Achieve 43% by 2025, 65% by 2027.
[RED III \(Directive \(EU\) 2023/2413\)](#)



Member States shall endeavour to increase the share of renewable sources in the amount of energy sources used for final energy and non-energy purposes in the industry sector by an indicative increase of at least 1.6 percentage points as an annual average calculated for the periods 2021 to 2025 and 2026 to 2030 [Indicative target]
[RED III \(Directive \(EU\) 2023/2413\)](#)



Member States shall set an indicative target for innovative renewable energy technology of at least 5% of newly installed renewable energy capacity by 2030.
[RED III \(Directive \(EU\) 2023/2413\)](#)



Each Member State shall increase the share of renewable energy in the heating and cooling sector by at least 0.8 percentage points as an annual average calculated for the period 2021 to 2025 and by at least 1.1 percentage points as an annual average calculated for the period 2026 to 2030, starting from the share of renewable energy in the sector in 2020.
[RED III \(Directive \(EU\) 2023/2413\)](#)



Member States shall ensure that the total final energy consumption of all public bodies combined is reduced by at least 1.9% each year, when compared to 2021.
[Directive \(EU\) 2023/1791](#)

In 2022, renewable energy represented 23.0 % of energy consumed in the EU, up from 21.9% in 2021. This EU-level target has not been translated into binding national contributions. The target is to be achieved jointly by all Member States, building on their coordinated and combined action. According to the EC assessment of the draft NECPs, the current drafts would lead to a share of 38.6-39.3% of renewables in the energy mix by 2030. Reaching the 2030 target of 42.5% (and even more so the aspirational target of 45%) will require a much faster growth in the coming years.

The share of energy from renewable sources used in transport in the EU reached 9.6 % in 2022, up from 9.1% in 2021. Acceleration is needed to reach the 2030 target. Following a sharp 13.5% drop in transport related GHG emissions between 2019 and 2020, due to the COVID-19 pandemic, according to European Environment Agency (EEA) data, they surged upwards (by 8.6%) between 2020 and 2021 from 720.2 to 782.1 Mt (million tonnes) and the EEA forecasts a further 2.7% increase for 2022, which would restore emission levels to above the 800-Mtonne threshold (803.2 Mt in 2022).

CO₂ emissions account for almost all transport related GHG emissions (98.9% in 2021) and far outstrip those of nitrous oxide (N₂O) (0.9% in CO₂ equivalent units) and methane (0.2% in CO₂ equivalent units).

Two Member States (Malta and Sweden) have already reached their 2030 target. 18 Member States have achieved the 2022 target of 18%. However, in 2021, 10 Member States experienced a decline in their share respect their 2020 value. This occurred as well for seven Member States in 2022; nevertheless, two of them have still met their 2022 targets despite the decrease. The EU jointly has reached the 2022 sub-target.



A 1.6 percentage point annual increase leads to a 26% share of renewables by 2030. The share of renewables in 2022 was 10.7%, an increase from 9.7% in 2020. In absolute values, this is an increase from 23.3 Mtoe in 2021 to 24.1 Mtoe in 2022. Acceleration is needed to reach the 2030 target.



Innovative technologies are defined as those that improve in at least one way comparable state-of-the-art renewable energy technologies or make exploitable a largely untapped renewable energy resource, involving a clear degree of risk, in technological, market or financial terms, which is higher than the risk generally associated with comparable non-innovative technologies or activities. According to the Association of European Renewable Energy Research Centers (EUREC) [73], the EU's industry is ready, in the right circumstances, to deploy innovative renewable energy technologies to a level likely to exceed 5%, including innovative technologies such as advanced photovoltaics, floating photovoltaics, concentrated solar power and solar thermal.

Renewable energy in the power system

Energy for heating and cooling makes up around half of the EU's total gross final energy consumption. The annual average increases would lead to a target of 32.48% share by 2030. In 2022, the share of energy from renewables in heating and cooling continued to rise, with the EU average standing at 24.8%, up 1.8 percentage points from 2021 (23.0%). However, the 2022 value is still below the expected annual average. In absolute terms, the gross final consumption of renewable energy for heating and cooling purposes in the EU has gradually increased over time, mostly due to the contribution of biomass and heat pumps. However, a major push is required to meet the 2030 target.

Sweden led the way when it came to renewables in heating and cooling, with a 69.3% share, followed by Estonia (65.4%). Both countries use mostly biomass and heat pumps. They are followed by Latvia (61.0%), which relies mostly on biomass.

14 Member States reported data on public buildings in their national energy and climate progress reports (NECPs). Missing data prevent drawing general conclusions or calculating aggregated data at the EU level. In terms of final energy, the short-term evolution indicates a general increase with some exceptions, such as the residential sector in Greece and Ireland. The first reporting deadline for EED is at the end of 2024.



Energy Efficiency

Member States shall collectively ensure a reduction of energy consumption of at least 11.7% in 2030 compared to the projections of the 2020 EU Reference Scenario so that the Union's final energy consumption amounts to no more than 763 Mtoe.

[Directive \(EU\) 2023/1791](#)



Member States shall make efforts to collectively contribute to the indicative Union primary energy consumption target amounting to no more than 992.5 Mtoe in 2030.

[Directive \(EU\) 2023/1791](#)



Member States are required to achieve cumulative end-use energy savings from 2021 to 2030, equivalent to new annual savings of at least 0.8% of final energy consumption in 2021-2023, at least 1.3% in 2024-2025, 1.5% in 2026-2027 and 1.9% in 2028-2030.

[Directive \(EU\) 2023/1791](#)



Each Member State shall ensure that at least 3% of the total floor area of heated and/or cooled buildings (of buildings which have a total useful floor area of over 250 m² and are not nearly-zero energy buildings) that are owned by public bodies is renovated each year to be transformed into at least nearly zero-energy buildings or zero-emission buildings in accordance with Article 9 of Directive 2010/31/EU.

[Directive \(EU\) 2023/1791](#)



Member States shall ensure that the average primary energy use of the entire residential building stock decreases by at least 16% compared to 2020 by 2030; and by at least 20-22% compared to 2020 by 2035

[EPBD \(Directive \(EU\) 2024/1275\)](#)



Member states will have to renovate 16% of worst-performing non-residential buildings by 2030 and, by 2033, the worst-performing 26% through minimum energy performance requirements.

[EPBD \(Directive \(EU\) 2024/1275\)](#)



The national measures will have to ensure that at least 55% of the decrease of the average primary energy use is achieved through the renovation of the worst-performing buildings.

[EPBD \(Directive \(EU\) 2024/1275\)](#)



Indicative target of at least a 49% share of energy from renewable sources in the building sector in the Union's final energy consumption in buildings in 2030.

[RED III \(Directive \(EU\) 2023/2413\)](#)



By 31 December 2025, each Member State shall agree to establish a framework for cooperation on joint projects with one or more other Member States for the production of renewable energy, subject to the following: by 31 December 2030, Member States shall endeavour to agree on establishing at least two joint projects; by 31 December 2033, Member States with an annual electricity consumption of more than 100 TWh shall endeavour to agree on establishing a third joint project.

[RED III \(Directive \(EU\) 2023/2413\)](#)



Final energy consumption reached 940 Mtoe in 2022, a 2.8% decrease compared with 2021. According to the EC assessment of the NECPs, the current Member States drafts pledges would lead to 5.8% energy efficiency improvements in 2030, compared to the target of 11.7%. Therefore, acceleration is needed to reach the 2030 target.

In 2022, primary energy consumption in the EU reached 1257 Mtoe, a 4.1% decrease compared with 2021, moving closer to the 2030 target.

Following the decline registered in 2020 due to the impact of the pandemic across sectors, EU primary energy consumption increased again in 2021. The year 2022 shows better results than in 2019, before the pandemic, when primary energy consumption was at 1354 Mtoe and 36.5% away from the target.

The 1257 Mtoe registered for primary energy consumption in 2022 was the second lowest level since 1990 (the first year for which data are available), and the lowest was in 2020 (1236 Mtoe).

According to the EC assessment of the NECPs, the current drafts would lead to a gap of 75 Mtoe from the 2030 target.

The directive requires EU countries to set indicative national energy efficiency targets based on final energy consumption contributions to meet the Union's target. This requirement is cumulative, meaning that Member States must sustain the annual savings achieved in one year over the following years, until the end of the obligation period in 2030.

Member States can spread the savings over the obligation period, as long as they achieve the required cumulative amount of savings at the end of the period. The progressive increase is equivalent to a flat rate of 1.49% over 2024-2030, which is almost a doubling of the current ambition level.

According to SWD(2023)646, several Member States did not reach their annual targets. Member States will have to step up their efforts to be able to meet the savings requirement in 2030.

EU residential consumption in 2022 was 242 Mtoe (reduced by -2.1% on average in EU Member States compared to 2020). Strong acceleration is needed to meet the 2030 target

Member States use different approaches to define their worst performing stock, such as energy class, age, energy consumption, as resulted by the analysis of the last long term building renovation strategies. In their NECPs, a total of 6 countries defined worst performance according the primary or final energy consumption in kWh/m², while no information was found in 12 other countries.

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No data available for buildings, only for the heating and cooling sector. From this data, the most reported fuels and technologies in 2021 per country are: biomass (21 countries), heat pumps (19), solar thermal systems (17), geothermal systems (12) and other decentralised renewable sources (8).

Joint projects allow for a cost-efficient deployment of renewable energy across Europe and contribute to market integration. Despite its potential, cooperation between Member States has been very limited, thus leading to suboptimal results in terms of efficiency in increasing renewable energy. There are a few projects under consideration and being planned, as well as some permitting and under construction. However, these are in localised areas across the EU and not homogeneously distributed between Member States.

A target of 15% electricity interconnection for 2030
[RED III \(Directive \(EU\) 2023/2413\)](#)

In 2021, 16 countries reported being on track to reach that target by 2030, or had already reached the target, but more interconnections are needed in some regions. Specifically, eight Member States have already met or are exceeding the EU target. Others commit in their draft NECPs to develop interconnections with neighbouring countries by investing in new transmission capacities and interconnectors, especially in regions that are historically dependent on a single supplier and now aim to improve diversification. Moreover, some Member States (e.g. EE, FI, IT and PT) plan to diversify their energy mix by carrying out joint hydrogen infrastructure projects [7]. Overall, Member States have made good efforts to increase cross-border capacity and the completion of various Projects of Common Interest should further improve the interconnectivity levels. Some Member States (CZ, IT, PT RO, SI, SE) are reporting delays in the completion of the projects in particular due to permitting issues. Still further efforts are required to meet the 2030 objectives, especially in terms of timely delivery of the planned cross-border projects [72].



Energy Infrastructure

Member States shall ensure that the contribution of renewable fuels of non-biological origin used for final energy and non-energy purposes shall be at least 42% of the hydrogen used for final energy and non-energy purposes in industry by 2030, and 60% by 2035.

[RED III \(Directive \(EU\) 2023/2413\)](#)

The use of renewable hydrogen in Europe was negligible up to 2023, including also in industrial processes.



Renewable Hydrogen

Reach energy neutrality in the wastewater treatment sector by 2045.

[Directive concerning urban wastewater](#)

There is a considerable potential for reducing fossil fuel-based energy use and GHG emissions in wastewater treatment and market incentives are increasingly attractive for investments in this direction. Member states should be required to ensure that the total annual energy used by all urban wastewater treatment plants on their territory treating a load of 10 000 population equivalent¹ and above does not exceed the production of energy from renewable sources.

¹ A number expressing the ratio of the sum of the pollution load in wastewater to the individual pollution load in household sewage produced by one person at the same time

Energy neutrality in wastewater

NON-BINDING TARGETS (FROM COMMUNICATIONS)

Targets

Assessment

By 2030, the share of renewable energy in the electricity mix should double to 55-60%, and projections show a share of around 84% by 2050. The remaining gap should be covered by other low-carbon options.

[An EU Strategy for Energy System Integration](#)



In 2022, 39% of electricity was generated by renewables (38% in 2021), and in May 2022 wind and solar surpassed fossil fuels for the first time in EU electricity generation. The EU is on track to meet the lower end of the target for 2030 if the current acceleration rate is maintained.

Renewable energy in the power system

Reduce buildings' final energy consumption by 14%
[A Renovation Wave for Europe](#)

The reference value for 2015 is 374.5 Mtoe. The final energy consumption (FEC) increased in 2021 to 391.2, value obtained from adding FEC from service and residential buildings (129.4 and 261.8 Mtoe). In 2022, the FEC decreased to 364.1 Mtoe, with 121.6 Mtoe coming from service buildings and 242.4 from residential buildings. Consumptions decreased by 2.8% in the 2015-2022 period.



At least double the annual energy renovation rate of residential and non-residential buildings by 2030 and to foster deep energy renovations

[A Renovation Wave for Europe](#)

The weighted annual energy renovation rate in the EU is about 1%, rate should double to 2% to achieve the target. For residential buildings, the annual weighted energy renovation rate was estimated close to 1% within the EU (0.4-1.2% depending on the Member State), for the 2012-2016 period. As of 2021, the annual rate of deep renovation is only 0.2% for residential buildings and 0.3% for non-residential buildings.

Data on renovation rates in the NECPR are highly incomplete, with only seven Member States reporting in this field in 2023.



Energy Efficiency

Double the current deployment rate of individual heat pumps, resulting in a cumulative 10 million units by 2027 and 30 million units by 2030.

[REPowerEU](#)

Reduce buildings' energy consumption for heating and cooling by 18% compared to 2015 levels by 2030

[A Renovation Wave for Europe](#)

The deployment rate was 2.2 million heat pumps in 2021 and 3 million in 2022. There are nearly 20 million heat pumps installed in the EU as of 2022. The current rate is enough to reach the 2030 target.



Reduce buildings' greenhouse gas emissions by 60%, by 2030 (compared to 2015), and reach climate neutrality by 2050

[A Renovation Wave for Europe](#)

The reference value for 2015 is 234 Mtoe. In 2021, FEC for space heating and cooling buildings was 247.2 Mtoe, obtained from adding FEC for space heating residential + FEC for air conditioning residential (only electricity) + FEC for space heating services + FEC for air conditioning = $170.72 + 1.01 + 64.9 + 10.6 = 247.2$ Mtoe (data from [75]). Consumptions increased by 5.6% (2015-2021), instead of reducing.

Data for 2022 has not been published yet, however an estimate can be provided based on the 2015-2021 average share of services FEC for space heating and air conditioning to total services FEC (56%).

2022 FEC for space heating and cooling buildings = FEC for space heating residential + FEC for air conditioning residential (only electricity) + FEC for space heating and air conditioning services = $159.4 + 1.1 + 68.0 = 228$ Mtoe. Consumptions expected to decrease by 1.3% (2015-2022).



In 2015 buildings direct GHG emissions were 541 MtCO₂e, therefore the target value for 2030 is 216 MtCO₂e.

European Climate Neutrality Observatory data shows past progress of 5 MtCO₂e between 2016 and 2021. To meet the target, the required annual change between 2021 and 2030 needs to be 7.5 times faster than the past rate of progress. Overall, buildings are responsible for about 40% of the EU's total energy consumption, and for 36% of its greenhouse gas emissions from energy (including indirect emissions). Buildings related emissions belonging to fossil fuelled district heating, electric heating and electricity use of heat pumps are covered by EU ETS, while the rest is covered by the ESR.



Energy Efficiency

Set up at least one renewables-based energy community in every municipality with a population higher than 10.000 by 2025

[EU Solar Energy Strategy](#)

For the 2010-2021 period, energy communities in the EU were still a niche in most national energy markets, with an estimated 9250 energy communities currently in operation across the EU and highly unbalanced distribution among Member States. More than half of these are located in Germany and almost 1000 are in the Netherlands. To date, however, a systematic and cross-country database on citizen-led initiatives and projects is lacking [74].



Bring online over 320 GW of solar photovoltaic by 2025 and almost 600 GW by 2030

[EU Solar Energy Strategy](#)

The EU solar generation capacity keeps increasing and reached, according to SolarPower Europe, an estimated 260 GW in 2023, 224 GWac (ac: alternating current) according to JRC estimates [75]. Compared to 177 GWac (ac: alternating current) in 2022. Based on the latest data, the 2025 target could be achieved.



Energy demand to be covered by solar heat and geothermal should at least triple (rate is currently at 1.5%)

[EU Solar Energy Strategy](#)

Share should be 4.5% by 2030. In 2021, the relative size of solar thermal in overall heat consumption was 0.687 TWh (0.1%), over the total of 651 TWh. According to EurObserv'ER, there was a 10% growth in 2022, while the required annual rate growth is 12% to reach the target.



Over this decade, the EU will need to install, on average, approximately 45 GW per year of PV to reach the share of 45% of energy coming from renewables set out in the REPowerEU Plan.

[EU Solar Energy Strategy](#)

The installations in 2023 are estimated at 56 GWp (about 47 GWac) growing from 41 GWp (about 34 GWac) in 2022. At this current rate, the target is met.



Solar Energy



Cumulative EU offshore goals of installed capacity: 60 GW by 2030 and 300 GW by 2050

[An EU offshore Renewable Energy Strategy](#)



In 2023, the cumulative installed capacity for wind offshore was on the order of 19 GW (it was 16.2 GW in 2022). Annual installation rate grew from 1.2 GW/year to around 3GW/year. A substantial increase is required in annual installations to reach 60 GW by 2030 (about twice the increase rate). Additionally, Member States have agreed to a new more ambitious non-binding target of reaching 111 GW by 2030 and 317 GW by 2050.

The strategy sets targets for an installed capacity of at least 1 GW of ocean energy by 2030 and 40 GW by 2050

[An EU offshore Renewable Energy Strategy](#)



In 2023, the EU Member States installed in the order of 700 kW of ocean energy (compared to 150 kW in 2022) and the cumulative ocean energy capacity in European sea basins is 43.8 MW. While there has been a positive increase in installations in the last year, the rate of annual installed capacity should still grow substantially to reach the 2030 target. Strong acceleration is needed.

Offshore Wind and Ocean Energy

REPowerEU sets a target of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of renewable hydrogen imports by 2030.

[REPowerEU](#)



Around 30% of EU primary steel production is expected to be decarbonised on the basis of renewable hydrogen.

[REPowerEU](#)



In the first phase, from 2020 up to 2024, the strategic objective is to install at least 6 GW of renewable hydrogen electrolyzers in the EU. In the second phase, from 2025 up to 2030, the strategic objective is to install at least 40 GW of renewable hydrogen electrolyzers.

[A Hydrogen Strategy for a climate-neutral Europe](#)

European production capacity is not yet officially monitored, but there are estimates of production of around 23kTH₂/year, which is very far away from the target of 10 MtH₂/year. Imports are currently non-existent.

The use of renewable hydrogen in Europe is negligible at the moment. This also includes industrial processes. Several initiatives at the European level such as Projects of Common Interest (PCIs), Important Projects of Common European Interest (IPCEIs), and the Hydrogen Bank, are expected to kick-start production of renewable hydrogen at scale. Several of the financed initiatives are targeting the production of green steel and currently Europe has the highest number of projects aimed at using renewable hydrogen for the production of steel.

Initiatives are ongoing and deployment of electrolyzers is increasing, but it is unlikely that the target of deploying 6 GW of hydrogen generation capacity will be reached by the end of 2024.



Renewable hydrogen

Implementation challenges

Note: This section reports on the main challenges to implementing the Clean and affordable energy targets at Member State and local (sub-national) levels. It grounds on an extensive review of the *Environmental Implementation Reviews* (EIR), the *Communication (and accompanying documents) on the EU wide assessment of the draft updated National Energy and Climate Plans (NECPs)* (COM(2023) 796) [7], and sectorial reporting. Due to the transversal nature of the topic, related challenges might also regard climate ambitions (Thematic Area 1). This section will be expanded providing a focus on selected enablers to possibly overcome challenges and boost the achievement of the Clean and Affordable energy targets in the follow-up of this report.

The EU needs to continue ensuring affordable, reliable, and accessible energy for households, while enhancing its industrial and economic competitiveness by supporting investments in clean technologies. Given all the challenges identified in the assessment of draft NECPs and the EIR, the Commission will place a stronger focus on research, innovation and competitiveness, including preparing a

skilled workforce [76].

The recently launched clean transition dialogues with industry will be a vital tool for implementing legislation and addressing bottlenecks, such as investment barriers and skills shortages. A thorough assessment of investment needs, currently lacking in the NECPs, must be backed by concrete measures to attract private finance. The bulk of investment necessary to reach the

Union's climate and energy targets should come from private sources. Extra focus on competitiveness and innovation in the NECPs, within a simplified regulatory environment, is needed for EU businesses to develop and expand clean technology production capacities and secure the supply of components and materials across the entire value chain, in line with the Net Zero Industrial Act and the Critical Raw Materials Act. Securing the Energy Union pillars also requires resilience to physical climate impacts. The final plans still need to analyse the relevant climate vulnerabilities and risks, include adaptation goals across the Energy Union dimensions and match these with solid policies and measures.

Decarbonising and strengthening the efficiency and resilience of the energy sector, while reducing dependency on external actors, remain top EU priorities, as evidenced by the adoption of the REPowerEU Plan, the Energy Union and Clean Energy for All Europeans packages. Increasing the share of renewable energy in final energy consumption is vital, as envisaged by the binding target of 42.5% in the REDIII (and the collective aim to achieve 45%). According to the draft NECPs assessment by the EC, current projections show that the EU could reach between 38.6% and 39.3% in 2030. While this is higher than the 32% target in RED II, it still falls short of current ambitions.

To align bioenergy policies with the principle of cascading use of biomass, RED III established that energy from biomass should be produced in a way that minimises distortions in the biomass raw material market and avoid adverse impacts on biodiversity, the environment and the climate. In particular, to prevent biodiversity loss, indirect land use change associated with the production of certain biofuels, bioliquids, and biomass fuels must be addressed. The EU should therefore promote these fuels in quantities that balance ambition with the need to prevent direct and indirect land use change.

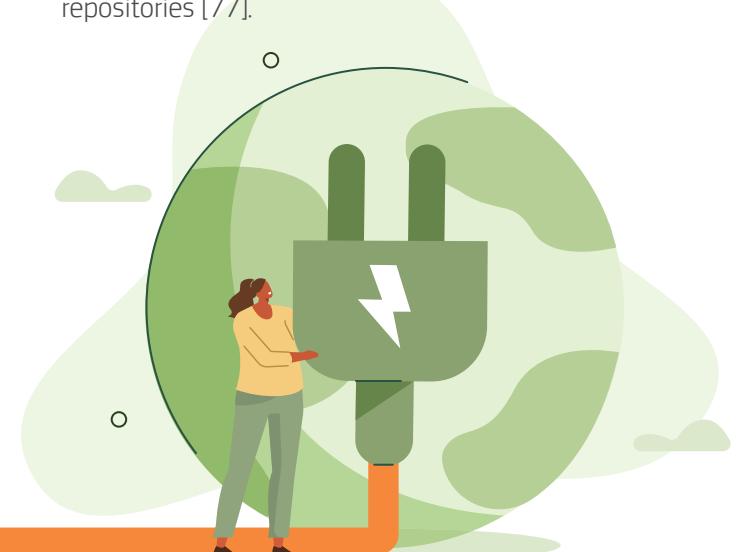
In the field of energy efficiency, the preliminary NECPs assessment unveils a substantial gap in achieving EU's 2030 energy efficiency targets for both primary and final energy consumption. Final NECPs will have to be more ambitious and indicate clear

trajectories to reduce energy consumption. Additional challenges have emerged in addressing energy poverty, highlighting the need for clear objectives and methods to define and assess vulnerable households.

The *Environmental Implementation Review 2022* reports on general progress in the transition to clean energy in Europe, but highlights several important challenges in adoption, access, funding, financing, governance, pricing, and competitiveness of the clean energy sector. Major economic challenges include high financial investment costs to expand energy system storage infrastructure, transmission and distribution networks and improving energy efficiency of the building stock. Member States are also dealing with inadequate or slow expansion of energy system infrastructure and shortage of skilled construction workers.

Energy-related targets are largely implemented in EU cities, where most people affected by energy poverty live. However, as also reported in the assessment of draft NECPs, very few Member States provide concrete evidence of involving Local and Regional Authorities (LRAs) in drafting. The State of Regions and Cities 2023 report confirms that LRAs in higher poverty areas struggle with skyrocketing energy prices and high inflation, which limit their ability to invest in sustainable energy solutions. Furthermore, many regions lag in digital infrastructure and green skills, hindering the ability of LRAs to implement energy policies.

According to the 9th Cohesion report [12], there is a need to better diversify funding resources at the sub-national level to support clean energy projects to avoid over-reliance on national budget or private investments. Policymakers in some LRAs have identified the need for dedicated funding mechanisms for clean energy production and efficient building projects, as well as more support for innovations and good practices repositories [77].



Key messages

In recent years, the EU has accelerated its clean energy transition, diversified supplies, and focused on energy savings. Several energy targets are currently assessed as needing more acceleration following the increased ambition and raised binding targets for 2030. Achieving the new 2030 EU overarching target of 42.5% share of energy from renewable sources will require a significant investment in renewable energy infrastructure, scaling up the production of renewable hydrogen, and reinforcing Europe's power grids to integrate more clean energy.

The Net-Zero Industry Act creates a regulatory framework that simplifies planning and permitting for renewables deployment while the EU Action Plan for Grids will expand and upgrade the EU power grids to accommodate the expected increase in electricity consumption and the growth in generation capacity of renewables.

Wind and solar, which first surpassed fossil fuels in EU electricity generation in May 2022, further consolidated the trend in 2023. The EU has become a global leader in offshore wind, exporting equipment and expertise around the world. Nevertheless, there is a need to accelerate investment in offshore wind, as well as ocean energies, to meet the 2030 targets. Solar is the fastest growing energy source in the EU.

Acceleration is needed to uptake renewable hydrogen in industry and transport by 2030, as well as to create an optimum and dedicated infrastructure for hydrogen, and an efficient hydrogen market.

The latest Energy Efficiency Directive revision established 'energy efficiency first' as a fundamental principle of EU energy policy, meaning that energy efficiency must be considered by EU countries in all relevant policy and major investment decisions taken in the energy and non-energy sectors.



Photo by Benjamin Jopen on Unsplash

OS

Circular economy



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



11 SUSTAINABLE CITIES
AND COMMUNITIES

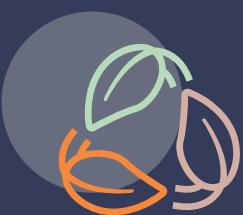


12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



Circular economy Factsheet

Reducing the environmental impacts caused by the extraction and consumption of raw materials requires transformed production and consumption systems to keep materials in their highest value use for as long as possible, optimised products, to minimise waste and to ensure high-quality recycled materials. The two main streams of policy actions under this area include the **EU Industrial Strategy** to increase EU's industry competitiveness globally and enhance open strategic autonomy; and the new **Circular Economy Action Plan** that establishes a coherent sustainable product policy framework aiming to keep **resource consumption within planetary boundaries** at EU level.



Policy context

35

Quantifiable targets

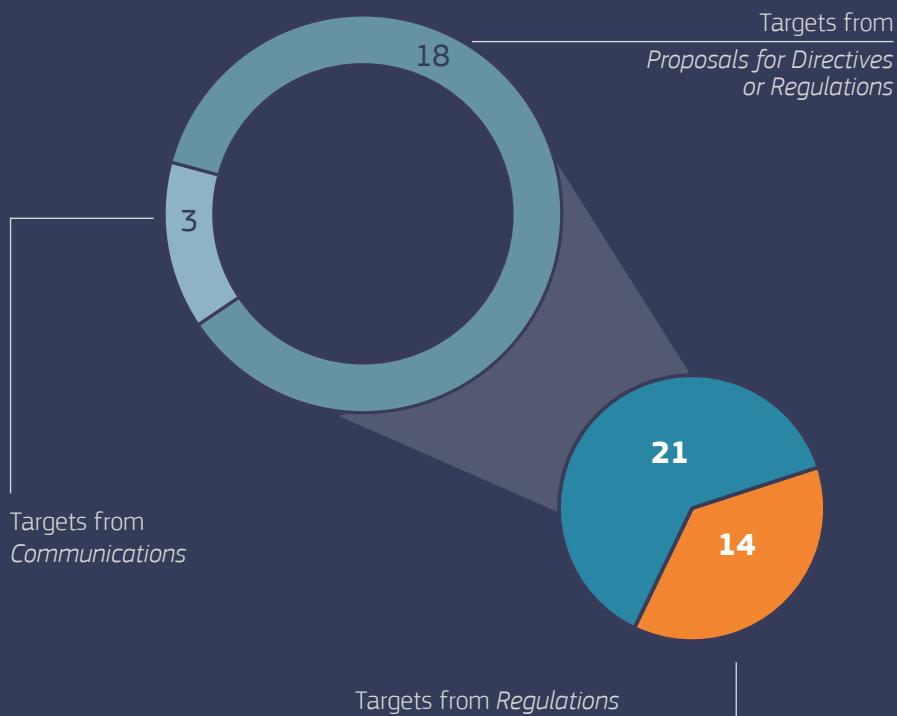
extracted from Policy Documents
in this Thematic Area

40%

of all targets assessed
in this Thematic Area are
legally binding

30%

of all targets assessed
in this Thematic Area regard
plastic and other packaging



CIRC. ECONOMY

Circular Economy Action Plan
2 targets

CARBON CYCLE

Sust. Carb. Cycle
1 target

FOOD WASTE

Targeted revision of the WFD
2 targets

PLASTIC AND PACKAGING

Packaging and Packaging waste
11 targets

VEHICLES

Circularity requirements for vehicle design and management of end-of-life vehicles
5 targets

BATTERIES AND WASTE BATTERIES

Batteries and waste batteries
9 targets

INDUSTRIAL STRATEGY

Net-zero industry
1 target

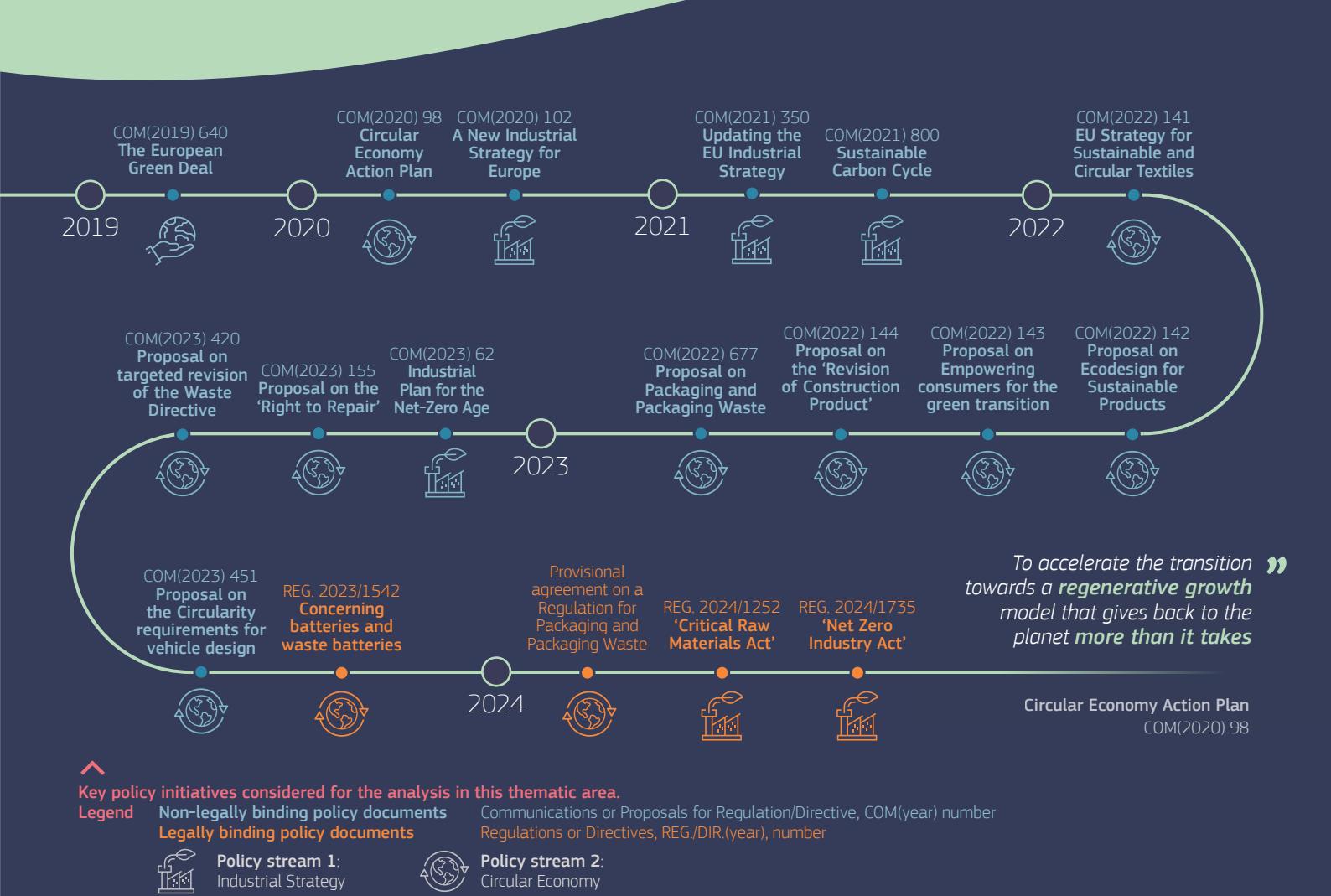
CRITICAL RAW MATERIALS

Critical Raw Materials Act
4 targets

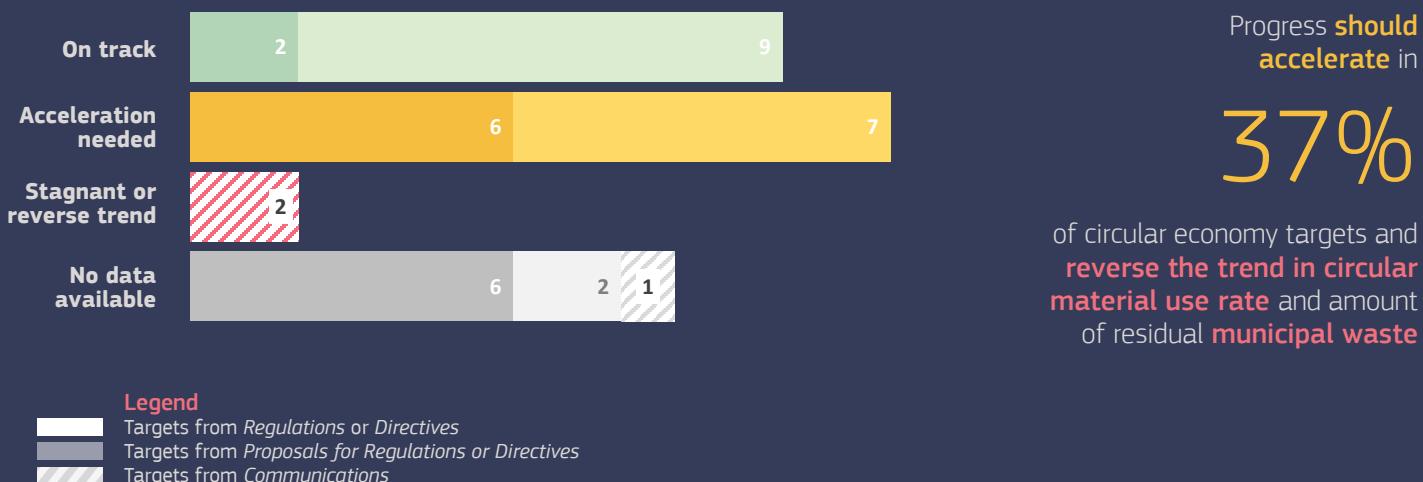
Number of targets per policy document
and topic detected in the analysis

Non-binding targets from Communications and Proposals for Directives/Regulations
Binding targets from Directives and Regulations

Legend



Progress towards the targets



Contribution to the 2030 Agenda



Targets of this thematic area contribute directly to 2030 Agenda targets **12.5** and **11.6** (waste generation), **12.2** (natural resources management), **9.4** (sustainable industries and infrastructures) and **12.3** (food waste).

03. CIRCULAR ECONOMY

Policy context

Resource extraction and processing globally have contributed to half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress [78]. Global consumption of materials (i.e. biomass, fossil fuels, metals and minerals) is expected to double by 2060 [78], while annual waste generation is estimated to increase by 70% by 2050 [79]. The amount of raw materials extracted to manufacture goods and services consumed in the EU reached 14.8 tonnes per capita in 2022, which is approximately 22% above the world average [80]. It is expected that products and infrastructures needed for the twin transition will consume huge quantities of valuable resources, including critical raw materials, in the next decades [81].

To tackle those challenges, the production and consumption systems should be transformed to keep materials in their highest value use for as long as possible, to optimise products and asset, to minimise waste, and to ensure waste is recycled to a high quality. A strong and competitive EU clean tech industry is needed to deliver the technologies and services required for the green transition. On the other hand, the COVID-19 pandemic and the Russian invasion of Ukraine have further illustrated the need to improve EU value chains resilience and decrease strategic dependencies. As part of this transformation, public and private consumers have a key role to play, as they can make use of their spending power to influence market decisions. As such, the two main streams of policy actions in this area include:

1. The EU Industrial Strategy [82], adopted in 2020 and updated in 2021 [83], aims to support the twin transition to a green and digital economy, increase the EU's industry competitiveness globally and enhance the EU's open strategic autonomy, while fully accounting for the new circumstances following the recent and ongoing crisis. This encompasses the newly presented Green Deal Industrial Plan [44], the Critical

Raw Materials Act [46] and the Battery Regulation [84].

2. A new Circular Economy Action Plan (CEAP) [85], adopted in 2020, sets out a policy agenda to establish a coherent sustainable product policy framework, to reduce waste and to increase circularity in resource-intensive sectors, such as electronics, plastics and buildings, while promoting resource consumption within planetary boundaries, both at EU and global level.

The EU Industrial Strategy

The EU Industrial Strategy, launched in March 2020, aims to support the twin transitions to a green and digital economy, boost the EU's global competitiveness, and enhance strategic autonomy. The COVID-19 pandemic highlighted the vulnerabilities of global value chains, emphasising the importance of a resilient EU Single Market. This prompted a targeted update to the EU Industrial Strategy in May 2021 to address new challenges. To increase Single Market resilience and strengthen the EU's open strategic autonomy, measures to include monitoring the Single Market across 14 industrial ecosystems and assessing strategic dependencies from foreign suppliers. To further accelerate the twin transition, action includes co-creating transition pathways and investing in low-carbon technologies through partnerships. Overall, the strategy seeks to ensure Europe's industrial resilience, competitiveness, and sustainability in the face of evolving global challenges.

The global market for key mass-manufactured clean energy technologies will be worth around EUR 600 billion by 2030, while clean energy-related manufacturing jobs could more than double in the same time frame [86]. The EU's ambition of becoming a leading player in net-zero industries will require the transformation of the EU industrial sector, while increasing its resilience and competitiveness, and ensuring that EU's strategic dependencies will not become bottlenecks in the future. Therefore, as part of the Green Deal Industrial Plan, the EC aims

to create a predictable and simplified regulatory environment, accelerate funding access, enhance skills and ensure fair trade. The Green Deal Industrial Plan includes initiatives, such as the Net-Zero Industry Act to support regulatory frameworks and financing, and to establish Net-Zero Industry Academies for up-skilling. The Plan also focuses on strategic areas where the EU has dependencies, such as critical raw materials and batteries [83].

Critical Raw Materials (CRMs) are materials with both a high risk of supply disruption and high economic importance for the EU [46]. CRMs are generally metals, or minerals – non-food and non-fuel raw materials – supplied at the extraction, processing or recycling stages. Currently, the EU depends heavily on third countries for CRMs. For example, China supplies 100% of EU's heavy rare earth elements and Turkey provides 99% of EU's supply of boron, both CRMs used in fuel cells, wind turbines, e-drive motors, among other technologies [81]. The Critical Raw Materials Act (CRMA) has taken root from the political momentum after the Russian invasion of Ukraine, since the Versailles declaration [87] underlined the strategic importance of CRMs in guaranteeing the EU's open strategic autonomy and sovereignty, as well as the importance of strategic partnerships and stockpiling, circularity and resource efficiency.

The CRMA leverages on the strengths and opportunities of the Single Market and the EU's external partnerships to diversify and enhance the resilience of EU critical raw material supply chains. The CRMA focuses on supply diversification and substitution and aims to improving EU's self-sufficiency and its capacity to monitor and mitigate disruption risks. At the same time, the CRMA promotes sustainable raw material production and enhances circularity through an ambitious benchmark on the recycling capacity. Increased efforts to mitigate adverse impacts within the EU and in third countries with respect to labour rights, human rights and environmental protection are foreseen. For a subset of critical raw materials, referred to as Strategic Raw Materials (defined in Article 3 and Annex I of the CRMA), a set of quantitative benchmarks has been proposed, notably concerning the EU's extracting, processing, recycling capacity and supply diversification from third countries to reinforce the EU industrial base.

Batteries are a key technology for the transition to a sustainable, secure and competitive EU economy by enabling electric mobility, facilitating renewable electricity storage and supporting the mobile digital transition. The global demand for batteries is expected to increase 14 times by 2030, with the EU potentially accounting for 17% of that demand.

EU's efforts to develop its own sustainable battery value chain were formalised in the 2018 Strategic Action Plan for Batteries and reinforced in the new CEAP [85]. This plan aimed to increase EU's industrial capacity in battery manufacturing by accelerating efforts to access raw materials (including secondary), and by developing large-scale cell manufacturing and battery assembly capabilities. These policy measures have led to significant investment in this value chain with the EU expected to reach production capacity of up to 379 GWh by 2025 for battery cells, representing around 70% of the expected EU demand for electric vehicle batteries in 2025 [88].

Building on the 2006 Battery Directive [89], the 2023 Batteries Regulation [84] under the new CEAP will ensure that batteries sold on the EU market are sustainable, circular, well-performing, safe throughout their life cycle and that materials used in batteries are responsibly sourced. This includes service life, possible second-life applications and high ambitions in terms of circularity (e.g. collection, removability, recycled content, recycling efficiency and recovery targets). The legislation also introduces green public procurement criteria and information platform(s) for consumers under due diligence requirements. This innovative legislation provides a life cycle approach, covering many aspects of battery performance including criteria on carbon footprint, consumer safety, and substances of concern.

Furthermore, in July 2023, the EC proposed new circularity requirements for vehicle design, production and management of end-of-life vehicles, targeting in particular plastics and rare earth elements in e-drive motors. This proposal is expected to produce substantial environmental benefits, while increasing the recovery of critical raw materials through an improved system for vehicles collection and treatment.

A new Circular Economy Action Plan

Since the 1990s, several EU initiatives and legislation have been introduced to address the sustainability of products, either on mandatory (i.e. Ecodesign Directive for energy-related products) or voluntary basis (e.g. EU Ecolabel). **The recently adopted Ecodesign for Sustainable Products Regulation [90] is a significant breakthrough as it establishes a process to apply design and data requirements to a vast range of product groups placed on the EU market,** significantly improving the circularity (e.g. durability, reusability, recyclability, recycled content), energy performance and other environmental aspects of products. To ensure non-toxic loops (e.g. in the production of some types of plastics and packaging materials), the EC has adopted a recommendation establishing a European assessment framework

for “safe and sustainable by design” chemicals and materials [91], which sets the ground for developing innovative chemicals and materials that are safer and more sustainable, contributing to steer the sector not only towards circularity, but also towards the minimisation of the use of substances of concern and the impacts on the environment and human health (see also thematic area 7).

Empowering consumers is key to ensuring a well-functioning circular economy, where consumers are informed about products' durability and reparability, protected from greenwashing, and can easily repair their products. As such, in 2024, the EC adopted a Directive on empowering consumers for the green transition [92], which amends the Unfair Commercial Practices Directive [93] and the Consumer Rights Directive [94] to ban commercial practices related to generic environmental claims (among others), in addition to setting obligations for companies to provide consumers with information on products' durability and reparability. To further protect consumers from misleading green claims, the EC has proposed in 2023, the Green Claims Directive, which sets the criteria for manufacturers to make a voluntary environmental claim that is reliable, comparable and verifiable across the EU and protect consumers from greenwashing [95]. On 2 February 2024, the European Parliament (EP) and the Council reached a political agreement on the Right to Repair Directive [96], which will provide EU consumers with easier and cheaper options to repair products (e.g. vacuum cleaners, washing machines), once the legal guarantee has expired.

The new CEAP focuses on seven key product value chains and calls for the application of the sustainable product policy framework for electronics and telecommunications, batteries and

vehicles (see above), packaging, plastics, textiles, construction and buildings, and food, water and nutrients. Sectorial initiatives are currently at different policy development stages. For example, the EC is currently assessing whether the existing Waste Electric and Electronic Equipment (WEEE) Directive [97], which sets out collection, recovery and recycling targets for WEEE, is still fit-for-purpose with results to be published by September 2024. As part of this assessment, in October 2023, the EC adopted policy recommendations for national authorities to increase the return of used and waste mobile phones, tablets and laptops [98]. The consumption of plastics is expected to double by 2040 [85], while in 2021 packaging waste in the EU reached 188.7 kg per inhabitant [99]. The EU's efforts to tackle plastics' pollution (e.g. single-use plastics and microplastics) started before the EGD with policy actions, such as the 2018 Plastic Strategy [100] and the Single Use Plastics Directive [101]. The EGD and the CEAP have further reinforced this push towards more sustainability by:

- 1. Adopting in 2020 the plastic "own resource [102]",** that incentivises the reduction of plastic packaging waste pollution by making the Member States' national contributions to the EU Budget dependent on their amount of non-recycled plastic packaging waste.
- 2. Putting forward, in 2022, a revision of the existing Packaging and Packaging Waste Directive** to prevent packaging waste generation (i.e. reducing its quantity, restricting unnecessary packaging and promoting reusable and refillable packaging solutions), to make all packaging on the EU market recyclable in an economically viable way by 2030 and to boost the use of recycled plastics in packaging [103].
- 3. Establishing a policy framework on bio-based, biodegradable and compostable plastics [104].**
- 4. Proposing measures to prevent microplastics**



pollution from the unintentional release of plastic pellets [99] and adopting measures that restricted microplastics intentionally added to products under REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) [105]. Since emissions from tyres may be the largest source of unintentionally released microplastics to the environment, the proposed EURO 7 regulation [106] sets the ground to propose tyre abrasion limits once measurement methods are available (see thematic area 4).

Textiles and food are two of the most high-pressure product categories for the use of primary raw materials and water, as well as GHG emissions [85]. In the EU, nearly 12.6 million tonnes of textiles were discarded in 2019 [107] whilst approximately 59 million tonnes of food were wasted in 2020 [108]. The textile sector is addressed by the EU Strategy for Sustainable and Circular Textiles [109], which looks at the entire life cycle of textile products and sets the 2030 vision for textiles: “all textile products placed on the EU market are durable, repairable and recyclable largely made of recycled fibres, free of hazardous substances, produced in respect of social rights and the environment”. To reduce environmental and climate impacts by textile waste and food waste generation, the EC has proposed amendment of the 2008 Waste Framework Directive setting out, among others, mandatory and harmonised extended producer responsibility schemes for textiles and food waste reduction targets [110]. Preventing food waste would also contribute to food security [111] (see thematic area 5).

The construction and building sector accounts for about 50% of all extracted material [85], contributing to almost 40% of the EU's total waste generation [112] and 5-12% of total national GHG emissions [85]. Improving material efficiency could lead to a reduction of 80% of GHG emissions

[85], while increasing the preparation for reuse and ‘high-quality’ recycling of construction and demolition waste (CDW) to current technologically feasible levels (83% across the EU) would save 33 million tonnes of CO₂e annually. This is more than the combined annual CO₂e emissions from Estonia, Latvia and Luxembourg [113]. To seize this potential, several policy actions have been introduced, such as the Renovation Wave Initiative [114], the Recovery and Resilience Facility [115] and the Transition Pathway for Construction [116] (see thematic area 2). Moreover, the provisionally agreed revised Construction Products Regulation [117] addresses sustainability and circularity performance issues related to construction products, including mandatory climate footprint information. Regarding CDW, the 2018 review of the Waste Framework Directive [118] also requires the EC to report to the Parliament and Council on the feasibility of setting specific “preparing for reuse and recycling” targets for CDW and its material-specific fractions.

Establishing a well-functioning internal market for secondary raw materials is also a key objective of the CEAP. This ambition will not only require policy actions targeting products and recycled content requirements, but also measures to improve the collection and quality of recyclates, and the absence of legacy substances to facilitate safe shipments of waste for reuse and recycling between Member States. As such, on 16 November 2023, a political agreement was reached between the European Parliament and the Council on the future of new Regulation on waste shipments, which will modernise the current procedures for shipping waste making them more digital [119]. This will make it easier for waste to re-enter the circular economy throughout the EU, without lowering the necessary level of control for such shipments. The Regulation also ensures that waste challenges are not exported to third countries [120].



Assessment of progress towards the targets

The report has identified 35 quantifiable targets for this thematic area, while 2 targets are aspirational (only included in the Annex 3). Where available, historic trends, data sources and future projections are also reported in Annex 3. In the case of batteries, besides targets strictly related to material efficiency (i.e. collection, recycling, recycled content and materials recovery), four additional requirements (e.g. on performances during use phase, on life cycle carbon footprint) bring a full life cycle perspective to the regulation (see Annex 3). The quantifiable targets have been classified into: (i)

targets from legal acts (14); (ii) targets from legislative proposals (18); and (iii) targets from communications (3).

Overall, 11 targets are on track to be achieved, while progress at either the EU or Member State level needs to be accelerated for 13 targets. In addition, 2 targets are currently not on track to be achieved or are expected to be hardly achievable. These relate to the CEAP targets on circular material use rate and reduction of municipal waste. The distance to target has not been assessed for 9 targets, because no data is currently available and/or assessment methodologies have yet to be developed. For 4 binding targets related to batteries, an expert judgement indicates if these targets are considered feasible or realistically achievable.

BINDING TARGETS

Targets	Assessment
<p><i>Producers of starting, lighting and ignition batteries, industrial batteries and electric vehicle batteries or, where appointed in accordance with Article 57(1), producer responsibility organisations, shall take back, free of charge and without an obligation on the end-user to buy a new battery, nor to have bought the battery from them, and shall ensure that all waste starting, lighting and ignition batteries, waste industrial batteries and waste electric vehicle batteries regardless of their nature, chemical composition, condition, brand, or origin of the respective category that they have made available on the market for the first time in the territory of that Member State are collected separately.</i></p> <p>Regulation (EU) 2023/1542</p>	<p>Currently, there is no official monitoring system in place and therefore it is not possible to assess if the target will be reached.</p> <p></p>
<p><i>Producers of portable batteries or, where appointed in accordance with Article 57(1), producer responsibility organisations, shall attain, and maintain durably, at least the following collection targets for waste portable batteries:</i></p> <ul style="list-style-type: none">- 45% by 31 December 2023;- 63% by 31 December 2027;- 73% by 31 December 2030. <p>Regulation (EU) 2023/1542</p>	<p>The calculation methodology is under development and these targets will be updated accordingly, whilst maintaining the same level of ambition.</p> <p>Currently, there is no robust data to assess the distance to the targets (e.g. due to new types of batteries entering in the markets, longer lifetime of batteries, new applications).</p> <p>Assuming the ambition of the targets, attention might be paid in the implementation phase at Member State level.</p> <p></p>
<p><i>Producers of LMT batteries or, where appointed in accordance with Article 57(1), producer responsibility organisations, shall attain, and maintain durably, at least the following collection targets of waste LMT batteries:</i></p> <ul style="list-style-type: none">- 51% by 31 December 2028;- 61% by 31 December 2031. <p>Regulation (EU) 2023/1542</p>	<p>The calculation methodology is under development and these targets will be updated accordingly, whilst maintaining the same level of ambition.</p> <p>Considering that light means of transport batteries represent a new market and collection systems need to be adapted, currently it is not possible to assess whether these ambitious targets are reachable or not.</p> <p></p>
<p><i>For industrial batteries with a capacity greater than 2kWh, except those with exclusively external storage, electric vehicle batteries and starting, lighting and ignition batteries that contain cobalt, lead, lithium or nickel in active materials, the minimum recycled content percentage for each battery model per year and per manufacturing plant shall be:</i></p> <p><i>From 18 August 2031, 16% cobalt; 85% lead; 6% lithium; and 6% nickel;</i></p> <p><i>From 18 August 2036, 26% cobalt; 85% lead; 12% lithium; and 15% nickel.</i></p> <p>Regulation (EU) 2023/1542</p>	<p>The assessment methodology is under development. Therefore, it is not possible to assess whether all producers will be able to reach these targets.</p> <p>JRC internal calculations show that these targets are in principle feasible, although significant changes in the industrial production systems are needed.</p> <p></p>

Batteries

Any natural or legal person that places on the market products incorporating portable batteries shall ensure that those batteries are readily removable and replaceable by the end-user at any time during the lifetime of the product. That obligation shall only apply to entire batteries and not to individual cells or other parts included in such batteries.

[Regulation \(EU\) 2023/1542](#)

Recycling shall achieve at least the following targets for recycling efficiency:

No later than 31 December 2025

- 75% by average weight of lead-acid batteries;
 - 80% by average weight of nickel-cadmium batteries
 - 50% by average weight of other waste batteries
- No later than 31 December 2030*
- 80% by average weight of lead-acid batteries;

[Regulation \(EU\) 2023/1542](#)

Recycling shall achieve at least the following targets for recycling efficiency:

- No later than 31 December 2025, 65% by average weight of lithium-based batteries;
- No later than 31 December 2030, 70% by average weight of lithium-based batteries.

[Regulation \(EU\) 2023/1542](#)

All recycling shall achieve at least the following targets for recovery of materials:

- No later than 31 December 2027, 90% for cobalt, copper, lead, nickel;
- No later than 31 December 2031, 95% for cobalt, copper, lead, nickel;

[Regulation \(EU\) 2023/1542](#)

All recycling shall achieve at least the following targets for recovery of materials, 50% for lithium, no later than 31 December 2027; and 80% for lithium no later than 31 December 2031.

[Regulation \(EU\) 2023/1542](#)

This target is ambitious with a very wide coverage of products, many of which are expected to be redesigned in order to be compliant. However, high uncertainty on distance to target lies with existence of derogations and the challenge to establish them at product-specific level. The Delegated Acts expected to specify derogations are not yet in place. Verification and procedures to accept/reject derogation applications will also need to be defined in the Delegated Acts.



Based on current draft guidance for calculation and verification rules for recycling efficiency, the targets for lead-acid, nickel-cadmium and other waste batteries are feasible.

Since, for lead-acid batteries, the battery chemistry and related recycling technologies are fully mature and efficient. For both nickel-cadmium and other waste batteries, it will be important to monitor the performances due to the evolving market for these chemistries.



The 2025 target for lithium-based batteries is in principle feasible, however due to the increasing diversity of lithium-based batteries on the market, it is important to closely monitor the performance towards the target. Furthermore, there are some improvement opportunities when data is available, recycling systems are established and when the target is revised by 2027.



Based on the current draft guidance for the calculation and verification rules for material recovery, the targets for cobalt, copper, lead and nickel are feasible.



Based on the current draft guidance for the calculation and verification rules, the target for lithium is in principle feasible. Significant investments in lithium recycling systems are required.



Batteries

Disclaimer: To construct reliable annual trends for monitoring purposes, a methodology and systematic EU-level knowledge system must be established for each material. This includes determining which products and trade codes to consider, the content and production data, and how to aggregate information in the supply chain. This can build on the EC's Raw Materials Information System, with interactions on related policy support developments from across the EC services.

By 2030, Union extraction capacity should be able of extracting the ores, minerals or concentrates needed to produce at least 10% of the Union's annual consumption of strategic raw materials, to the extent possible in light of the Union's reserves.

[Regulation \(EU\) 2024/1252](#)

The historical time trends (2011-2022) for EU self-sufficiency at extraction phase for the 16 strategic materials can be extracted based on data from [121], [122] and [123]. Results show that:

- In 2022, cobalt, copper, lithium and nickel were above the benchmark of 10%, while their trends have been stably above the benchmark (i.e. copper and nickel) or increased slightly in the period 2011-2022 (i.e. cobalt and lithium)¹.
- For bismuth, boron, gallium, germanium, magnesium, natural graphite, titanium, platinum group metals, heavy rare earth elements and light rare earth elements, the EU's self-sufficiency has always been below 2%.
- Between 2016 and 2022, the EU's self-sufficiency for manganese was below the benchmark, with values ranging from 4 to 10% in the time frame 2016-2022.

¹ Due to high volatility on the data for tungsten (only two date points available from EC studies), this material is not included in the analysis.

By 2030, Union processing capacity, including for all intermediate processing steps, should be able of producing at least 40% of the Union's annual consumption of strategic raw materials.

[Regulation \(EU\) 2024/1252](#)

The historical time trends (2011-2022) for the EU self-sufficiency at processing phase for the 16 strategic materials can be extracted based on data from [121] and [122] and [123]. Results show that:

- The EU's self-sufficiency for copper, cobalt and germanium was above the benchmark in 2022. For copper, this value has been stably above 80% in the period 2011-2022. For cobalt and germanium, the trend was fluctuating and more unstable, but increasing in between 2018 and 2022.
- The EU's self-sufficiency was below the benchmark in 2022 for bismuth, boron, gallium and platinum group metals, with gallium showing a drastic decrease from 2011 (100%) to 2022 (2%).
- The EU has no self-sufficiency to process lithium, magnesium, natural graphite, titanium, and both heavy and light rare earth elements, while there is no sufficient data available for tungsten, nickel and manganese.



Critical Raw Materials

By 2030, Union recycling capacity, including for all intermediate recycling steps, should be able of producing at least 25% of the Union's annual consumption of strategic raw materials and should be able of recycling significantly increasing amounts of each strategic raw material from waste.

[Regulation \(EU\) 2024/1252](#)

Diversify the Union's imports of strategic raw materials with a view to ensuring that, by 2030, the Union's annual consumption of each strategic raw material at any relevant stage of processing can rely on imports from several third countries or from overseas countries or territories (OCTs) and that no third country accounts for more than 65% of the Union's annual consumption of such a strategic raw material.

[Regulation \(EU\) 2024/1252](#)

By 2030, manufacturing capacity in the Union of the strategic net-zero technologies listed in the Annex approaches or reaches a benchmark of at least 40% of the Union's annual deployment needs.

[Net Zero Industry Act](#)

The historical trends of the recycling capacity for strategic materials can be assessed by looking at the evolution of the End-of-Life Recycling Input Rate of strategic materials over time. Out of 16 strategic materials, the recycling capacity:

- was above the 25% benchmark in 2022 for two materials (copper and tungsten),
- was between 22% and 5% in 2022 for eight materials groups (cobalt, magnesium, manganese, nickel, titanium, platinum group metals, and both heavy and light rare earth elements)
- was below 5% for six materials (bismuth, boron, gallium, germanium, lithium and natural graphite)

Half of the 16 strategic raw materials have values above the 65% target, therefore there is a low diversification of sourcing countries. These include bismuth, gallium, lithium, magnesium, platinum group metals, and both heavy and light rare earth elements.



Critical Raw Materials



NON-BINDING TARGETS (FROM PROPOSALS)

Targets

Assessment

All packaging shall be recyclable

[Proposal on packaging and packaging waste](#)



Member States shall take measures to achieve a sustained reduction in the consumption of lightweight plastic carrier bags on their territory. A sustained reduction is achieved if the annual consumption does not exceed 40 lightweight plastic carrier bags per person, or the equivalent target in weight, by 31 December 2025, and subsequently by 31 December in each year thereafter.

[Proposal on packaging and packaging waste](#)

Criteria and assessment methodology under development



Each Member State shall reduce the packaging waste generated per capita, as compared to the packaging waste generated per capita in 2018 as reported to the Commission in accordance with Decision 2005/270/EC by 5% by 2030; 10% by 2035; 15% by 2040

[Proposal on packaging and packaging waste](#)

Data are only available for 18 Member States, 12 Member States have already achieved the 2025 target. The 6 other Member States that are have not met the target yet have indicated a clear drop from 2018 plastic bag consumption values, suggesting that these Member States are on track to reach the 2025 target. Currently, data are not available for the following 9 Member States: Bulgaria, Denmark, Estonia, Greece, Italy, Malta, Netherlands, Romania and Finland [124].



Member States shall take the necessary measures to attain the recycling targets of 65% by weight of all packaging waste generated by 31 December 2025; and of 70% by weight of all packaging waste generated by 31 December 2030.

[Proposal on packaging and packaging waste](#)

On average, the packaging waste generated increased from 157 kg per person in 2011 to 178 kg per person in 2020. Most Member States have reported a steady growth in packaging waste generation per capita in the period of 2011-2020, particularly Romania, Bulgaria, Croatia, Hungary, Poland and Czechia [99]. Currently, none of the Member States is on track to reach the packaging waste reduction targets. However, the newly agreed Plastic and Packaging Waste Regulation intends to bend the currently observed stagnant or upward trend of packaging waste generation through a number of measures, in particular binding reuse and refill requirements.



Member States shall take the necessary measures to attain a recycling target of 50% of plastic by weight of plastic contained in packaging waste generated by 31 December 2025; and of 55% by weight of plastic in packaging waste generated by 31 December 2030.

[Proposal on packaging and packaging waste](#)

For all packaging at the EU level², the 2025 recycling rate target is feasible. However, 10 Member States are at risk of missing the 2025 target, including Bulgaria, Croatia, Cyprus, Greece, Hungary, Lithuania, Malta, Poland, Romania and Slovakia [125].



Plastic is the most critical packaging category for which the targets are clearly above current levels of recycling. 19 Member States are at risk of missing the 2025 target, including Austria, Bulgaria, Croatia, Cyprus, Denmark, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia and Spain [125].



² EU-level, based on a weighted average between Member State population and recycling rate percentage.

Plastic and other packaging

Member States shall take the necessary measures to attain a recycling target of 25% of wood by weight of wood contained in packaging waste generated by 31 December 2025 and of 30% by 31 December 2030.

[Proposal on packaging and packaging waste](#)



Member States shall take the necessary measures to attain a recycling target of 70% of ferrous metals by weight of ferrous metals contained in packaging waste generated by 31 December 2025 and of 80% by 31 December 2030

[Proposal on packaging and packaging waste](#)



Member States shall take the necessary measures to attain a recycling target of 50% of aluminium by weight of aluminium contained in packaging waste generated by 31 December 2025 and of 60% by 31 December 2030

[Proposal on packaging and packaging waste](#)



Member States shall take the necessary measures to attain a recycling target of 70% of glass by weight of glass contained in packaging waste generated by 31 December 2025 and of 75% by 31 December 2030

[Proposal on packaging and packaging waste](#)



Member States shall take the necessary measures to attain a recycling target of 75% of paper and cardboard by weight of paper and cardboard contained in packaging waste generated by 31 December 2025 and of 85% by 31 December 2030

[Proposal on packaging and packaging waste](#)



The plastic part in packaging shall contain the following minimum percentage of recycled content recovered from post-consumer plastic waste, per unit of packaging:

From 1 January 2030

- (i) 30% for contact sensitive packaging made from polyethylene terephthalate (PET) as major component;
- (ii) 10% for contact sensitive made from plastic materials other than PET, except single use plastic bottles;
- (iii) 30% for single use plastic beverage bottles;
- (iv) 35% for other plastic packaging

From 1 January 2040

- (v) 50% for contact sensitive plastic packaging, except single use plastic beverage bottles;
- (vi) 65% for single use plastic beverage bottles;
- (vii) 65% for other plastic packaging

[Proposal on packaging and packaging waste](#)



Reduce the generation of food waste in processing and manufacturing by 10% in comparison to the amount generated in 2020

[Proposal amending Directive 2008/98/EC on waste](#)



Reduce the generation of food waste per capita, jointly in retail and other distribution of food, in restaurants and food services and in households, by 30% in comparison to the amount generated in 2020

[Proposal amending Directive 2008/98/EC on waste](#)



Each vehicle belonging to a vehicle type that is type-approved as of [the first day of the month following 72 months after the date of entry into force of this Regulation] under Regulation (EU) 2018/858 shall be constructed so that it is:

- (a) reusable/recyclable to a minimum of 85% by mass;
- (b) reusable/recoverable to a minimum of 95 % by mass.

[Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles](#)



Plastic and other packaging

Data for these targets is only available for 2020 and for 2021 in Eurostat, therefore it is still early to define a clear trend. However, based on the analysis performed in the impact assessment of the Proposal for a Directive amending Directive 2008/98/EC on waste [108], it is possible to estimate that the target is feasible, but progress needs to accelerate to reach the target value.

Food Waste

The feasibility of the target depends on the calculation method and related data. As stated in the impact assessment study, while substantial progress has been made since 2000 to reach the 85% recycling/reuse target set out in the ELV Directive, a large share of materials, in particular automotive shredder residue, is sent to landfills or incinerated (i.e. not valorised) [128].

Vehicles circularity

The plastic contained in each vehicle type that is type-approved as of [the first day of the month following 72 months after the date of entry into force of the Regulation] under Regulation (EU) 2018/858 shall contain a minimum of 25 % of plastic recycled by weight from post-consumer plastic waste.

[Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles](#)

At least 25% of the target set out in the first subparagraph shall be achieved by including plastics recycled from end-of-life vehicles in the vehicle type concerned.

[Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles](#)

Member States shall ensure that the following targets are met by the waste management operators:

- (a) the reuse and recovery, as calculated together, shall be a minimum of 95 %, by average weight per vehicle, excluding batteries, and year;*
- (b) the reuse and recycling, as calculated together, shall be a minimum of 85 %, by average weight per vehicle, excluding batteries, and year.*

[Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles](#)

Member States shall ensure that waste management operators achieve a yearly target for the recycling of plastics of at least 30 % of the total weight of plastics contained in the vehicles delivered to the waste management operators.

[Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles](#)

Although the calculation method has not been defined, the JRC assumes that these ambitious targets are in principle reachable (also based on [129]). JRC highlights that they require significant changes in the industrial production systems both in the production and uptake of high-quality recycled plastics.



Although the calculation method has not been defined, JRC assumes that this feature of the targets is in principle reachable. JRC highlights that they require significant innovations in the industrial production systems both in the production and uptake of high-quality recycled plastics, in particular in the area of end-of-life vehicle collection and treatment and wide deployment of post-shredder sorting technologies.



The targets should in principle be reached [129], especially if other incentives on demand for recycled materials (See article 6) promote the wide deployment of post-shredder sorting technologies.



The targets should in principle be reached, especially if other incentives on demand of recycled plastics (See article 6) promote the wide deployment of post-shredder sorting technologies.



Vehicles circularity

NON-BINDING TARGETS (FROM COMMUNICATIONS)

Targets

Halve the amount of residual (non-recycled) municipal waste by 2030³

[A new Circular Economy Action Plan](#)

³ For this target, 2020 was assumed as the reference year, since the new CEAP was published in March 2020. This target is also recalled in the 'Zero Pollution Action Plan'.

Double EU's circular material use rate in the coming decade

[A new Circular Economy Action Plan](#)

Assessment

The target aims at halving the amount of residual municipal waste by 2030. Assuming as a reference year the 2020, the residual municipal waste should be reduced from 119 to 59.5 Mtonnes.

Looking at historical trends, the amount of residual municipal waste decreased by only 5% in the time frame 2012–2021 and slightly increased in the last seven years (2015–2021, +2.6%). Despite increasing recycling levels, the amount of waste generated is increasing at a higher pace [130].



This target aims to increase the circular material use rate (CMUR) from 11.7% in 2020 to 23.4% in 2030. At the EU level, this target has been steady since 2010, registering an increase of less than 1 percentage point [131]. As such, there is a stagnation in the pace of improvement of the CMUR indicator. At the Member State level, CMUR shows a high variability with values ranging from 0.6 to 27.5% in 2022.



Circular Economy

At least 20% of the carbon used in the chemical and plastic products should be from sustainable non-fossil sources by 2030, in full consideration of the EU's biodiversity and circular economy objectives and of the upcoming policy framework for bio-based, biodegradable and compostable plastics.

[Communication on Sustainable Carbon Cycles](#)

The current lack of data does not allow to assess the status of this target.



Sustainable carbon cycles

Implementation challenges

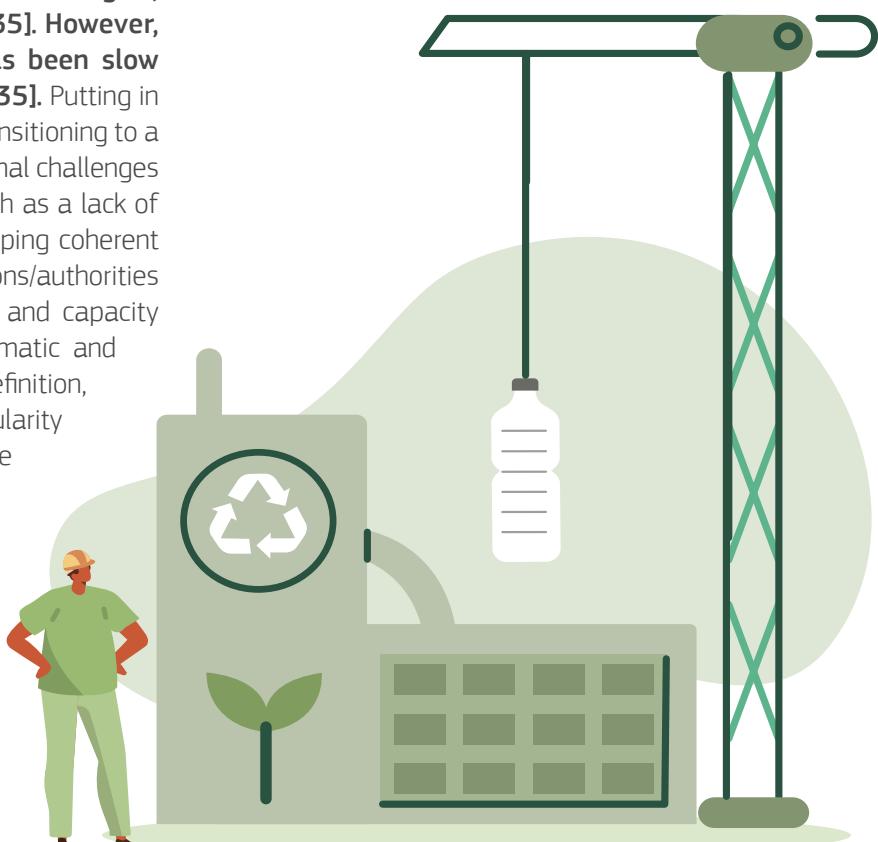
Note: This section provides a snapshot of major challenges associated with implementing this policy package, based on existing reports, such as the *European Court of Auditors Special Report on Circular Economy* [133], the *EEA Report on Accelerating the circular economy in Europe*.

Under the EGD, the new CEAP has prompted several innovative legislative and policy actions (e.g. Ecodesign for Sustainable Products Regulation), as well as the inclusion of CE principles in other EU policies and strategic areas, such as the European Semester process and the new Industrial Strategy. Nonetheless, currently several key legislative proposals still lack political agreement and/or are waiting to be adopted by the co-legislators, for example End-of-Life Vehicles Regulation and Environmental Claims Directive. In addition, the EC is still evaluating whether the WEEE Directive 2012/19/EU [97] and Regulation 1257/2013 on ship recycling [134] are fit-for-purpose. Future EC work on CE will also involve developing guidance and Delegated Acts to further support the implementation of ESPR and the Batteries Regulation, among others. EU leadership and policy agenda on CE have been the main drivers to push for circular action at the Member State level [135]. As such, potential future guidance and updated legally binding circularity targets for key sectors (e.g. WEEE) can clarify strategic paths for Member State action.

Most Member States now have CE strategies, roadmaps or action plans in place [135]. However, progress in increasing circularity has been slow and varied across countries [133], [135]. Putting in place policies is the first step towards transitioning to a circular economy; nevertheless, institutional challenges still exist at the Member State level, such as a lack of collaboration and coordination in developing coherent policies across responsible institutions/authorities and insufficient institutional knowledge and capacity to implement CE strategies in a systematic and effective way [136]. Due to the broad CE definition, Member States have approached circularity from different perspectives – some have prioritised waste management, whilst others focus on consumption [136] – leading to the development and implementation of measures, which will contribute to varying degrees

to the achievement of CE. First reporting on national programmes concerning the circularity of CRMs by 2026 (through the application of Art 26 of CRMA) will be an interesting tool to benchmark Member States practices.

Monitoring progress can play a key role in informing and shaping future actions, as well as supporting the implementation of CE policies. Currently, there are several initiatives at both national and EU levels, including the Circular Economy Monitoring Framework (CEMF) launched in 2018 by the EC. In 2023, the CEMF was updated to better capture the production side of the economy and overcome monitoring gaps related to products. This update includes indicators related to consumption and material footprints, and the contribution of circularity to the EU's goals of open strategic autonomy. Despite this, there are still challenges in comprehensively measuring CE progress, especially related to lack or partial data related to certain aspects (e.g. CRM material flows), lack of harmonised indicators and targets for monitoring and assessing circular practices [135], [136].



THEMATIC FOCUS

Progress towards the 2020 CEAP Ambitions

Besides the targets extracted for the EGD progress assessment, the 2020 CEAP has put forward four non-binding and overarching ambitions to provide inspiration and guidance on implementing policies: (i) Decoupling economic growth from resource use; (ii) Reducing total waste generation; (iii) Reducing EU consumption footprint; (iv) Keeping EU resource consumption within planetary boundaries.

Progress towards these ambitions is currently monitored under the EC's Circular Economy Monitoring Framework. The Material Footprint, measured in tonnes per capita, refers to the amount of material extracted from nature, both inside and outside the EU, to provide the goods and services consumed by EU citizens. On the other hand, the Consumption Footprint [132] refers to the environmental and climate impacts resulting from the consumption by EU citizens of goods and services, whether produced within or outside of the EU. The Consumption Footprint is based on life cycle assessment data for a basket of representative products, used to calculate environmental impacts across 16 impact categories, including climate change and resource depletion.

The Material Footprint monitors the progress towards decoupling economic growth from resource use, while the Consumption Footprint can be used to monitor the progress towards reducing and keeping the EU Consumption Footprint within planetary boundaries. Figure 2 shows the evolution of Consumption Footprint, Material Footprint and total waste generation compared to Gross Domestic Product (GDP) in the decade 2010-2022. For the Material Footprint, the trend has increased slightly in the time frame 2010-2022 (+1.26%), while the economic growth (measured in real GDP) grew by 15% in the same period. In 2020, due to the economic slowdown caused by the COVID-19 pandemic, the

Material Footprint fell by 4% compared to the previous year, but then increased back to pre-pandemic levels in 2021/2022. While some relative decoupling has been observed, achieving absolute decoupling appears improbable in the years, considering the relatively stable trend of the last decade.

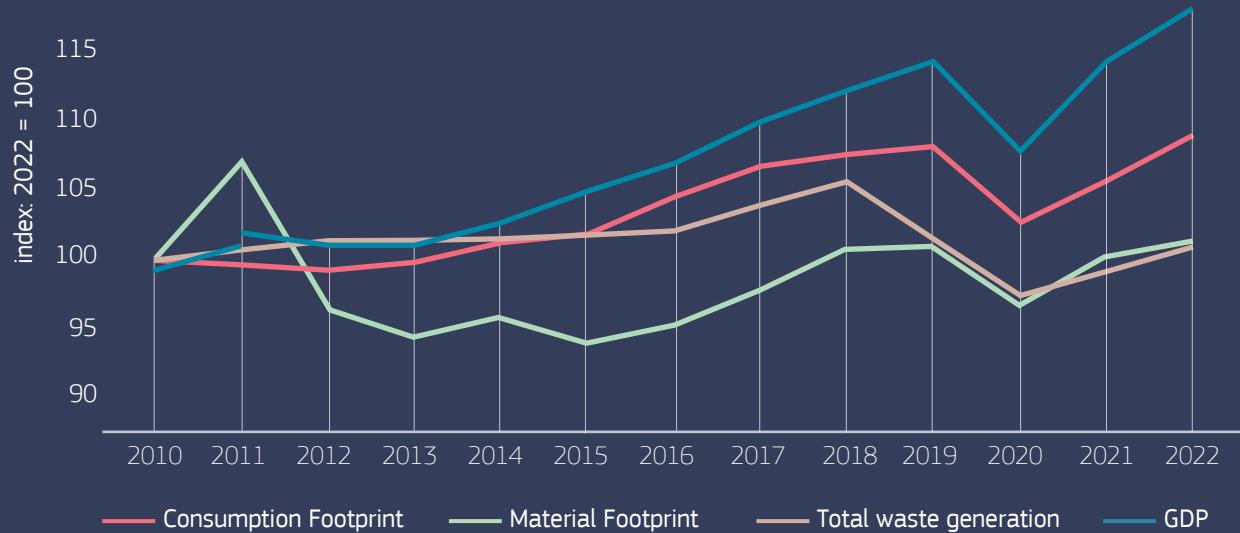
The generation of total waste increased by 5.4% in the time frame 2010-2018, and then dropped as a result of the pandemic-related economic slowdown in 2020. However, it reached again the 2010 levels in 2022 with percentage change of +0.9% in the overall period 2010-2022.



Considering the 2010 level, the Consumption Footprint at the EU level has increased by 8.3% until 2022, showing a reverse trend with respect to the ambition set in 2020 CEAP. Similarly to the Material Footprint, the EU's Consumption Footprint fell by 5% in 2020 (compared to 2019 level), because

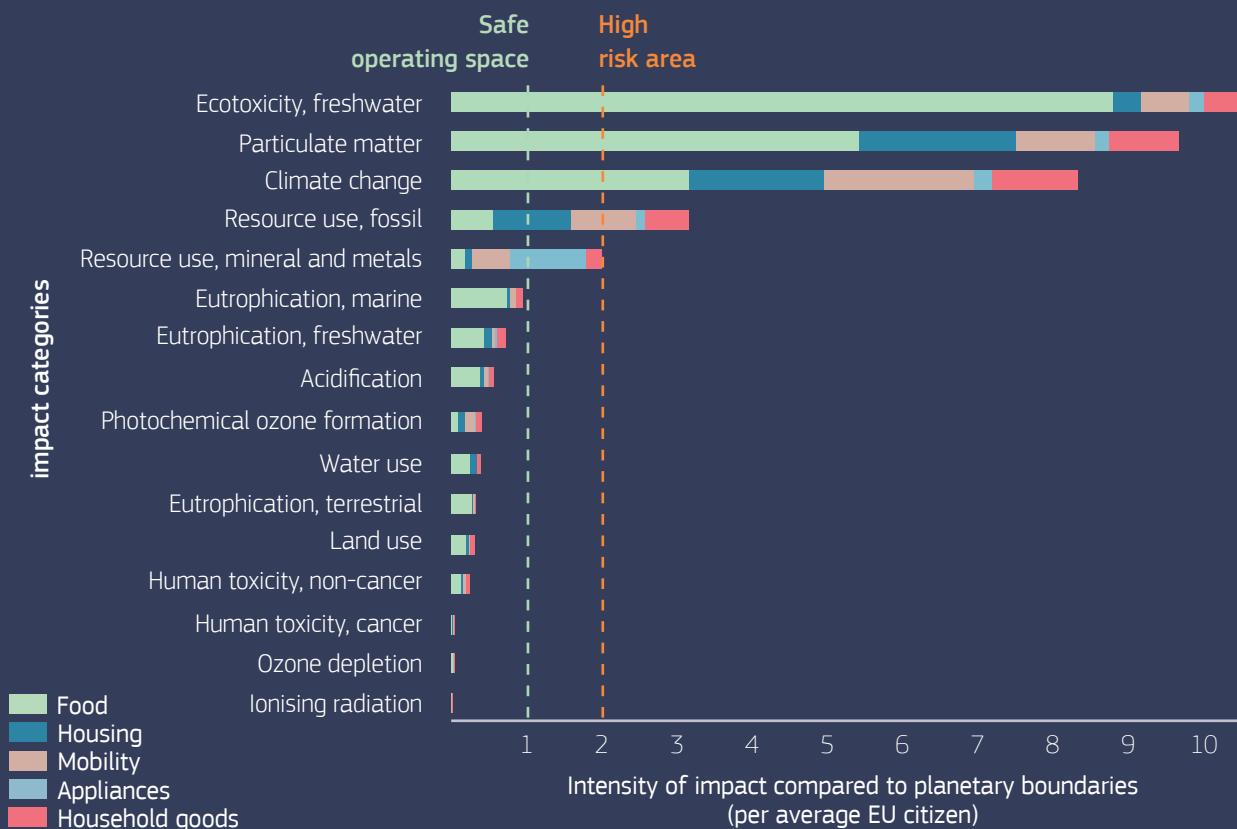
of the COVID-19 pandemic. The EU faces a significant challenge in achieving a significant reduction of the Consumption Footprint by 2030. Furthermore, the EU Consumption Footprint exceeds the planetary boundaries (the quantitative estimation of the Earth's carrying capacity, i.e. the "safe operating space for humanity") in several impact categories, as shown in Figure 3. Despite the differences in the robustness of the various impact categories, these results show that for most categories the impacts are close to the threshold, when not already over it. For example, the climate change impact is eight times beyond the limit of the planet.

Figure 2. Evolution of Consumption Footprint, Material Footprint and total waste generation compared to GDP (2012-2022). Note: The Consumption Footprint refers to the environmental and climate impacts resulting from the consumption by EU citizens of goods and services, whether produced within or outside of the EU; the Material Footprint (measured through the indicator Raw Materials Consumption, refers to the amount of material extracted from nature, both inside and outside the EU, to provide the goods and services consumed by EU citizens. The values of total waste generation for 2013, 2015, 2017, 2019, and 2021 have been extrapolated. GDP trend refers to real Gross Domestic Product.



Source: Authors' elaboration based on Consumption Footprint Platform - EPLCA;
Eurostat codes: env_ac_rme; sdg_12_51).

Figure 3. Assessment against Planetary Boundaries by impact category in EU (2021).



Source: Consumption Footprint Platform - EPLCA.



Garbage in the Himalayas.
Photo by Sylwia Bartylewicz on Unsplash

Key messages

Overall, 37 targets have been identified, of which 35 are quantifiable and two are aspirational. The current legally binding targets (13) are those included in the Battery Regulation and in the Critical Raw Materials Act. For batteries, these focus on collection, material recovery, recycling efficiency and recycled content. For strategic raw materials, the targets address the diversification of suppliers and increasing the EU's extraction, processing and recycling capacities. Most quantifiable targets can be found in legislative proposals, which are not yet adopted (19). These focus on recycling and recovery of plastic and other packaging, food waste reduction and the circularity of end-of-life vehicles.

Legally binding targets on the recycling and recovery of lead acid and nickel-cadmium batteries appear to be more achievable compared to other battery types. Progress on battery collection targets cannot be estimated, due to the lack of standardised calculation methods and recent data.

Acceleration will be needed to meet the benchmarks of the recently adopted Critical Raw Materials Act for the EU extraction, processing and recycling capacity of strategic minerals, and to achieve supply diversification.

Under the 2020 Circular Economy Action Plan, several policy initiatives have been proposed and/or adopted to improve the circularity and environmental performance of products, to protect and empower consumers against greenwashing and to increase repairability. However, most legally binding targets are still focused on recycling and material recovery, rather than waste prevention (e.g. reuse) and preparing for reuse (e.g. repair). As such, future legislative framework reviews and updates could consider this.

The pace of progress is sufficient to achieve recycling targets for wood, ferrous metals, aluminium, glass, paper and cardboard packaging. Despite the results achieved so far, more effort is needed to meet the targets for packaging waste and food waste reduction as well as those for recycling and recycled content in plastic packaging.

New policy measures, including possible new targets, may be needed to reduce the generation of waste electric and electronic equipment and construction and demolition waste or to improve the return of materials and products from these categories to the economy.

No progress has been made to reduce EU's consumption footprint, keep EU resource consumption within planetary boundaries, increase the circular material use rate, or reduce waste generation (apart from that seen during the pandemic). Furthermore, little progress has been made on decoupling economic growth from resource use.

Monitoring progress can play a role in supporting the implementation of circular policies. Therefore, improving data availability on material and waste flows, as well as harmonising indicators and targets for monitoring and assessing circular practices, is key.

ON

4

Sustainable and smart mobility

3 GOOD HEALTH
AND WELL-BEING



7 AFFORDABLE AND
CLEAN ENERGY



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



11 SUSTAINABLE CITIES
AND COMMUNITIES



13 CLIMATE
ACTION



smart



København, Denmark

Photo by Steinar Engeland on Unsplash

Sustainable and Smart Mobility

Factsheet

The transport sector (including international aviation and maritime) is responsible for nearly 27% of Europe's GHG emissions, the majority of which (76% in 2021) come from road transport. In December 2020, the Commission published the Sustainable and Smart Mobility Strategy, laying out its vision to ensure a green, smart and affordable mobility and curb emissions from transport by 90% by 2050. It also encompasses several milestones, showing the European transport system's path towards achieving our objectives of a sustainable, smart and resilient mobility, thereby indicating the necessary ambition for our future policies.



Policy context

24

Quantifiable targets

extracted from Policy Documents
in this Thematic Area

83%

of all targets assessed
in this Thematic Area are
legally binding

42%

of all targets assessed
in this Thematic Area regard
**renewable and
low-carbon fuels**



FUEL INTENSITY

Transition of EU fisheries
1 target

GHG EMISSIONS

Sust. Smart Mobility Strategy
1 target

EU Urban Mobility Framework
1 target

RENEWABLE AND LOW-CARBON FUELS

Renewable Energy Directive III
4 targets

'ReFuelEU Aviation'
3 targets

CO₂ emission performance standards for new HDVs batteries
2 targets

Renewable and low-carbon fuels in maritime
1 target

INTERMODALITY

Intermodal transport
1 target

EV INFRASTRUCTURE

Alternative Fuel Infrastructure Regulation
5 targets

ELECTRIFICATION OF NON-ROAD TRANSPORT

Alternative Fuel Infrastructure Regulation
5 targets

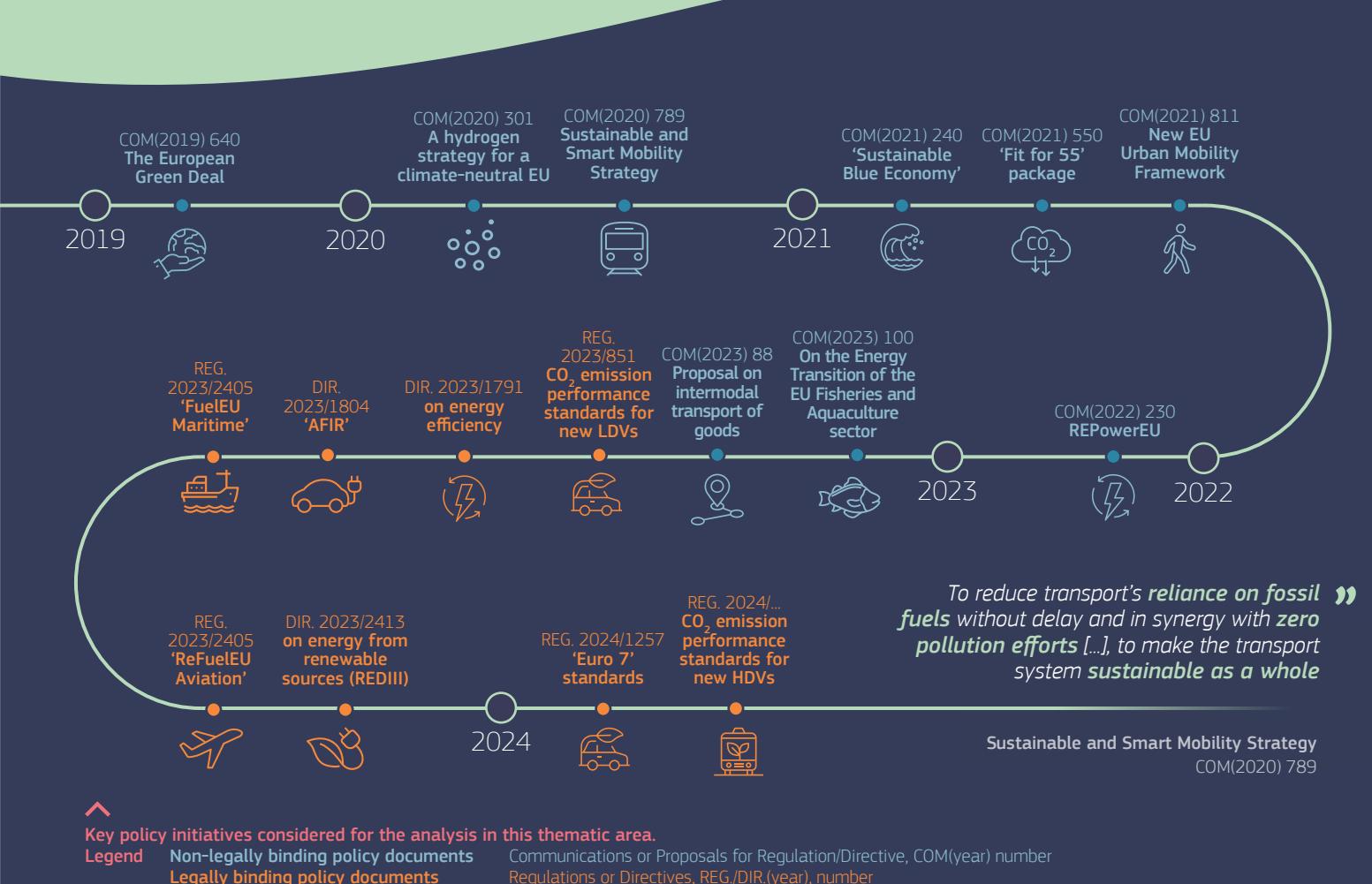
REN. HYDROGEN

Alternative Fuel Infrastructure Regulation
2 targets

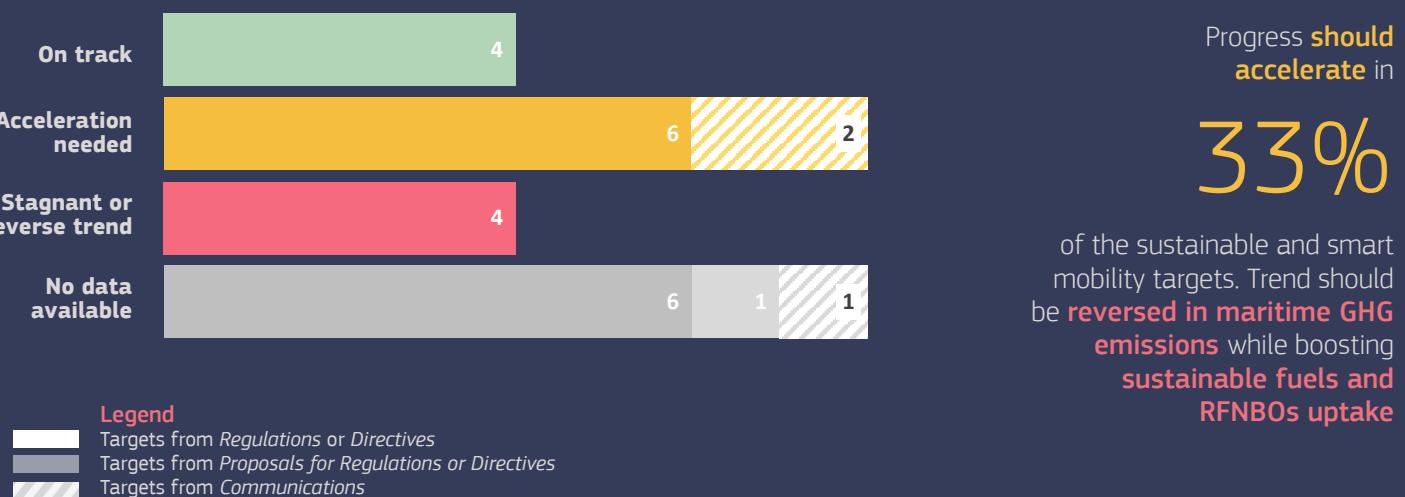


Number of targets per policy document
and topic detected in the analysis

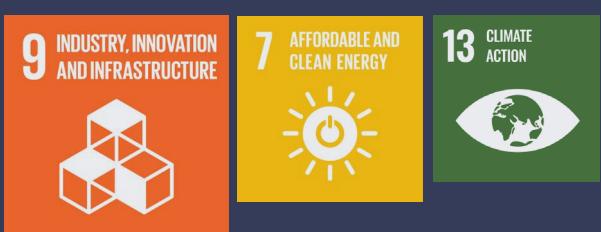
Legend
Non-binding targets from Communications and Proposals for Directives/Regulations
Binding targets from Directives and Regulations



Progress towards the targets



Contribution to the 2030 Agenda



Targets of this thematic area contribute to 2030 Agenda targets **13.2 (climate change measure integration)** and **9.1 (sustainable infrastructure)**. They also foster SDG **7.2 (renewable energy)**, **7.3 (energy efficiency)** and **9.4 (sustainable industry and infrastructure)**.

04. SUSTAINABLE AND SMART MOBILITY

Policy context

In December 2020, the Commission published the 'Sustainable and Smart Mobility Strategy' [137], laying out its vision to ensure green, smart and affordable mobility. The transport sector (including international aviation and maritime) is responsible for about one quarter of Europe's GHG emissions, the majority of which (73% in 2022) comes from road transport. In addition, this sector has proven difficult to decarbonise, and has not shown the same decreases in GHG emissions since 1990 as other sectors. Therefore, it is important to track the progress in the transport sector in detail and project changes in GHG emissions based on the possible reductions with policy measures that have already been adopted or are planned in the EU Member States [138]. The EGD targets discussed in this section focus on the decarbonisation of road transport and sustainable fuels.

Road transport

To achieve economy-wide climate neutrality by 2050, transport emissions need to be reduced by 90%. Road transport will have to provide the strongest contribution, as emissions from aviation and waterborne transport are more difficult to abate. Throughout the past decades, passengers and goods road transport volumes have shown an increasing trend and are strongly coupled with economic growth [139]. At the same time, active mobility (walking and cycling) has also increased in many cities, and the European Declaration on Cycling underlines the important role of cycling in transport decarbonisation. Sales of electric bikes in the EU-27 increased by around 265% between 2015 and 2021. 20 million e-bikes have been sold in the EU-27 since 2015 (4.8 million in 2021 alone). To reduce its detrimental impacts, road transport is addressed by a wealth of EU regulations and market-based instruments:

- New CO₂ standards for light and heavy-duty vehicles [140], [141];
- The alternative fuels infrastructure Regulation (EU) 2023/1804 [142];

- The Directive (EU) 2023/2413 on renewable energies [25];
- The European Emissions Trading System (ETS) covering aviation, extended to maritime sectors through Regulation (EU) 2023/957 [30];
- A new ETS for fossil fuel consumed in road transport and buildings has been created. The Social Climate Fund, funded by the revenues from this new ETS, will provide financial assistance to vulnerable households in the area of road transport;
- Fuel related regulations: Regulation (EU) 2023/1805 on FuelEU Maritime [143], and Regulation (EU) 2023/2405 on ReFuelEU aviation [144];
- The Energy Performance of Buildings Directive with its obligations to provide electric vehicle charging infrastructure and bike parking facilities;
- The Eurovignette Directive regarding the charging of vehicles for the use of certain infrastructures [145].

In the field of decarbonisation, one prominent stream of regulation is the EU CO₂ emission standards for new vehicles.

For cars and vans, post-2030 standards have been set in 2019 [140], then revised and extended within the Fit for 55 package in 2023. The latest regulation [146] foresees reductions in CO₂ emissions for the annual new vehicle fleet per manufacturer compared to the 2021 target. The table below details the percentage reduction values relative to 2021, using the WLTP (Worldwide harmonised Light-duty vehicles Test Protocol) emissions in g/km as reference. For 2025-2029, a specific incentive scheme for zero- and low-emission vehicles is in place.

The regulation includes a recital stating, "Following

	Passenger cars	Light Commercial Vehicles (Vans)
2025	15% / 93.6 g/km	15% / 153.9 g/km
2030	55% / 49.5 g/km	50% / 90.6 g/km
2035	100% / 0g/km	100% / 0g/km

consultation with stakeholders, the Commission will make a proposal for registering after 2035 vehicles running exclusively on CO₂ neutral fuels in conformity with Union law, outside the scope of the fleet standards, and in conformity with the Union's climate neutrality objective".

For heavy duty vehicles, CO₂ standards for the most active and emission intense vehicle groups (trucks of groups 4, 5, 9 and 10) have been set in 2019. The EC has proposed extending the scope of standards to almost all heavy-duty vehicles with certified CO₂ emissions, including additional truck classes, buses, coaches and trailers. The proposal suggests CO₂ emission reductions, relative to 2019/2020 levels, as specified in the below table. It also includes a zero-emission mandate for new city buses from 2030 on.

	Standards in place for trucks of Group 4, 5, 9 & 10 (Regulation (EU) 2019/1242)	EC Proposal for HDV of almost all certified groups
2025	15%	15%
2030	30%	45%
2035		65%
2040		90%

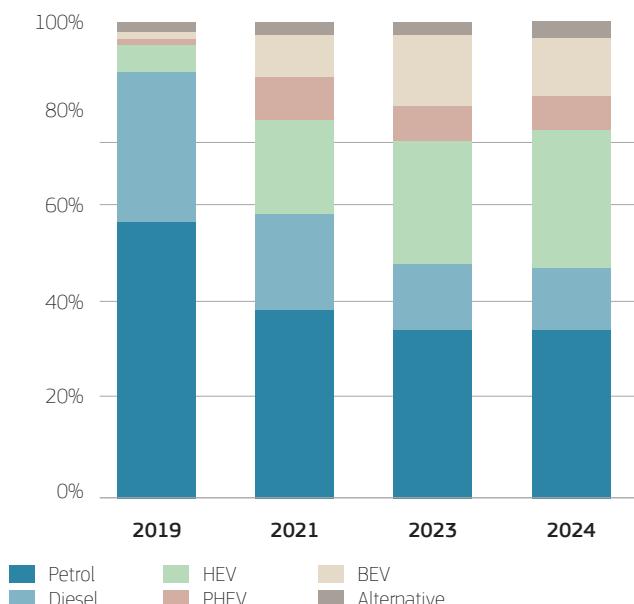
It is important to highlight that the foreseen zero tailpipe emissions mandate does not constitute a "ban" on internal combustion engines. There is a widespread misconception that internal combustion engine vehicles will be removed from the EU fleet as a result of the standards regulations. There is a conceptual difference

in the regulation approaches for CO₂ standards versus pollutant emission limits. CO₂ targets apply at a fleet level for vehicle manufacturers and are not applicable to individual vehicles. Exceeding these targets is associated with penalties proportional to sales and the margin of exceedance. In addition, CO₂ emitting vehicles equipped with internal combustion engines sold prior to 2035, or vehicles fuelled exclusively with CO₂-neutral fuels before or after 2035 may remain in the European fleet for several years following. When it comes to pollutant emissions limits, a vehicle can only be sold and circulated in Europe if its pollutant emission levels (NO_x, CO, particulate matter, particle number and hydrocarbon) are lower than the applicable limits. Procedures apply to make sure that the limits are respected in actual operation. The regulation also incentivises vehicle manufacturers to increase the number of low and zero emission vehicles on the market, proposing 25% share of the fleets of new passenger cars and 17% of respective fleets of new light commercial vehicles from 2025.

As shown in Figure 4, electrified vehicle share in the new sales have increased substantially over the past five years.

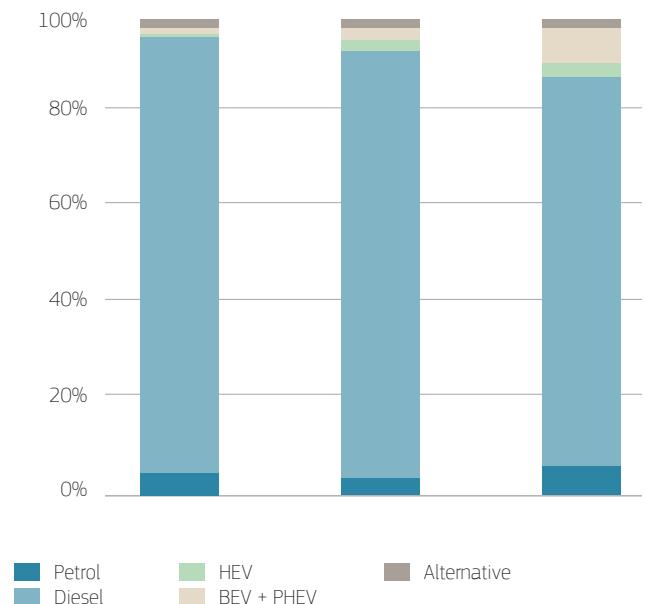
As foreseen by the former Alternative Fuels Infrastructure (AFI) Directive 2014/94/EU [147], the EU Member States, after submitting their plans to the Commission in 2016, reported their progress toward the achievement of the alternative fuel market for the years 2016-2018 in their National Implementation Reports (NIRs). These reports also outlined the planning for the deployment of the relevant alternative fuels

Figure 4. Share development of new car sales (2024 data up to March). HEV: Hybrid Electric Vehicle, PHEV: Plug-in Hybrid Electric Vehicle, BEV: Battery Electric Vehicle.



Source: Authors' elaboration based on ACEA data.

Figure 5. Share development of new light commercial vehicle sales (2024 data up to March). HEV: Hybrid Electric Vehicle, PHEV: Plug-in Hybrid Electric Vehicle, BEV: Battery Electric Vehicle.



Source: Authors' elaboration based on ACEA data.

infrastructure up to 2030. As not all the necessary data were provided by all Member States, missing values were estimated according to the methodology presented in a study from Marotta and colleagues [148] to produce a complete database at the EU level. Estimates from the complete NIR data set for electric vehicles indicate around 2.5 million lower than the EGD plan set out for 2025 (to have 13 million zero- and low-emission vehicles on EU roads). Even with the contribution of fuel cell electric vehicles (another 88000 vehicles according to the NIRs), the complete NIR estimates are around 20% lower than the EGD goal for 2025 of 13 million zero- and low-emission vehicles. As explained in the “Methodology” chapter, targets that refer to specific manufacturing/production requirements for certain products have been excluded from the analysis. Therefore, all the targets mentioned above from Regulation 2023/851 on new CO₂ emission performance standards are not included in the targets assessment tables below.

Regarding the decarbonisation of road transport and its contribution to the Fit for 55 package and carbon neutrality, the main target is derived from the 2020 Sustainable and Smart Mobility Strategy. This non-binding target calls for 90% reduction of emissions of transport sector, the strategy also includes the ambition of at least 30 million zero-

emission cars and 80.000 zero-emission lorries. Within the EU’s Fit for 55 package, it is worth mentioning some initiatives related to transport decarbonisation:

- The Alternative Fuels Infrastructure Regulation (AFIR) 2023/1804, which enables low-carbon alternative fuel vehicles to be refuelled or charged (this replaces AFI Directive 2014/94/EU) and the provisions on recharging points and bike parking in buildings in the Energy Performance of Buildings Directive;
- The revision of the Renewable Energy Directive, tackling renewable energy used in the transport sector;
- The revision of the EU emission trading system (ETS), introducing a separate new ETS for buildings and road transport.

Renewable and low-carbon fuels

Renewable and low-carbon fuels include a range of low-carbon fuels, such as crop-based or waste-based liquid biofuels, electro-fuels (synthetic fuels) and biomethane that are produced sustainably and can contribute to the decarbonisation of the transport sector. Renewable Fuels of Non-Biological Origin (RFNBO) are electro-fuels such as pure hydrogen deriving from water and renewable energy (other than biomass), or fuels deriving from hydrogen combined with carbon dioxide or nitrogen.

The use of advanced biofuels, produced from wastes and residues feedstock can reduce the competition for

THEMATIC FOCUS

More stringent air pollutant emissions standards for combustion-engine vehicles: **EURO 7 standards**

Transport contributes to over two-thirds of NO_x emissions and around 10% of other pollutants, with these emissions coming from both exhaust and non-exhaust sources (e.g. Non-Methane Volatile Organic Compound (NMVOC) from fuel evaporation, and primary particulate matter from tyre and brake wear, as well as road abrasion). The Euro 7 standards set new limits for emissions from cars, vans, and heavy-duty vehicles. Despite declining pollutant emissions due to stringent standards over the past 20-30 years, some unregulated pollutants like NH₃ and N₂O have remained constant or even increased. Stringent emission standards are crucial as there is no safe air pollution threshold. The target for 100% zero tailpipe-CO₂ emission light-duty vehicles by 2035 should further reduce emissions, although many internal combustion engine vehicles will remain on the roads. Euro 7 includes key advances, such as reducing the size of regulated exhaust particles and addressing non-exhaust emissions from brakes and tyres, but it falls short compared to stricter US and Chinese standards. On-road testing of Euro 6d vehicles carried out by the JRC in the period 2020-2022 using Portable Emissions Measurement Systems (PEMS) and measuring NO_x, CO, and solid particle numbers, indicates they can mostly comply with Euro 7 limits, showing continued progress in reducing road transport emissions.

water and land between food and feed-based biofuels. The Renewable Energy Directive 2009/28/EC (RED) [149] established sustainability and GHG emission saving criteria for biofuels, bioliquids and biomass fuels that became stricter with the RED II Directive 2018/2001 [39]. The GHG emissions savings from the use of biofuels, bioliquids and biomass fuels has increased over time to 65% of GHG savings for plants in operation after January 2021, in comparison to the fossil fuel comparator. Differently, the sustainability of RFNBO is set at 70% GHG emissions savings and the calculation methodology is provided in a delegated act [150].

Biofuels and biomass fuels must be certified in the EU against one of the recognised sustainability certification schemes. To reduce competition between land use for food versus fuel, the Indirect Land Use Change (ILUC) Directive introduced a cap on food-based biofuels (set at 7% of the overall transport energy target). The Delegated Regulation 2019/807 on ILUC [151] sets provisions to determine the high ILUC-risk feedstock (where significant expansion of the production area occurs on land with high carbon stock) and establishes the criteria to certify low ILUC-risk biofuels, bioliquids and biomass fuels.

The EU legal framework for renewable energy started with the Biofuel Directive 2003/30 EC [152] which set a target of 5.75% biofuels in transport by 2010. The Fuel Quality Directive 2009/30/EC [153] required a reduction in the GHG intensity of transport fuels by at least 6% by 2020. The RED and RED II replaced the Biofuels Directive and set the targets for 2020 and 2030, updating and aligning the 2030 targets and policy with more ambitious climate goals. To promote the production of advanced biofuels, the RED II Directive set a sub-target of 3.5% for advanced biofuels in transport and additional measures to promote the use of renewable energy in transport, and biofuels in the aviation and maritime sectors. The RED II Directive introduced new reinforced sustainability criteria and GHG emission savings thresholds for biofuels and biomass fuels.

As part of the Fit for 55 package [38], the later adopted proposal for RED III [25], updated and aligned the renewable energy sources targets for 2030 with the more ambitious climate goals. The RED III shifted the focus from a specific energy target to emphasising emissions savings, establishing a target of a 14.5% reduction in GHG intensity in transport and a share of at least 29% renewables in the final energy used in transport. Electrification of road transport is key, while biofuels and renewable fuels of non-biological origin contribute to decarbonise sectors, such as aviation and waterborne transport. RED III proposed a

sub-target for advanced biofuels increasing from 3% to 5.5% and introduced a target for RFNBOs.

A significant part of biofuels is expected to be used in the aviation and maritime sectors. This leaves little space for an increased use of biofuels in the road transport sector. RED III proposes stronger sustainability criteria as well as a risk-based approach capping the contribution of food-based biofuels to the targets to address the trade-off between the production of biofuels and bioenergy and land use and land use change. It also introduced a cascading principle to avoid distortions in the raw material market [154].

Two additional regulations from the Fit for 55 package are the REFuelEU Aviation Regulation and the FuelEU Maritime Regulation [143]. The aviation regulations seek to ensure a level playing field for sustainable air transport. It obliges fuel suppliers to distribute sustainable aviation fuels (SAF) and envisages a growing share of SAF (including synthetic aviation fuels, or e-fuels) over time, to increase their uptake by airlines and thereby reduce emissions from aviation. Additionally, airlines must limit the uptake of jet fuel before departing from EU airports to what is needed for the safe operation of flights, to ensure a level playing field for airlines and airports, and to avoid additional emissions relating to the extra weight of aircraft carrying excessive fuel. The maritime regulation limits the carbon intensity of the energy used on board ships. Accordingly, the proposal sets a fuel standard for ships, incentivising the uptake of renewable and sustainable fuels, and introduces a requirement for the most polluting ship types to use onshore power supply in main European ports.

The REPowerEU Plan proposed by the European Commission in 2022 and adopted in February 2023 aims at rapidly substituting fossil fuels and reducing the dependence on Russian gas. Biomethane and renewable hydrogen will be key to replacing natural gas in industry and transport. REPowerEU has set a target of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of renewable hydrogen imports by 2030, as well as a 35 billion cubic meters target of biomethane production by 2030. To meet this target, it is necessary to mobilise sustainable biomass, mostly waste and residue feedstocks, and build additional production capacity. Scaling up biomethane production capacity requires significant capital investments of almost EUR 70 billion on top of currently planned investments. Incentives for biomethane are essential because it is more expensive than fossil natural gas, even if the EU ETS price is added.

Assessment of progress towards the targets

This section provides an overview of 24 targets identified as relevant for this thematic area. They are divided into legally binding targets from legal acts, targets from legislative proposals for regulations and

directives, and targets from communications that are not legally binding. Where available, historical trends, data sources and future projections are reported in Annex 4.

BINDING TARGETS

Targets	Assessment	
<p><i>Member States shall ensure that, by 31 December 2030, at least one publicly accessible hydrogen refuelling station is deployed in each urban node.</i></p> <p>Regulation (EU) 2023/1804</p>	<p>The extent of the urban nodes equipped with publicly accessible hydrogen refuelling stations is mostly localised in the central-northern EU (see TENtec Interactive Map Viewer). The number of Hydrogen refuelling stations is steadily increasing in the EU. The Alternative Fuels Infrastructure Regulation sets the minimum goals for hydrogen refuelling stations deployment until 2030, which should significantly increase from the current 200 operational stations (see Clean Hydrogen Monitor 2023, p. 145)</p>	
<p><i>Member States shall ensure that, by 31 December 2030, publicly accessible hydrogen refuelling stations with a total capacity of at least 1 tonne per day, and equipped with at least a 700 bar dispenser, are deployed at least every 200 km along the TEN-T (Trans-European Transport Network) core network</i></p> <p>Regulation (EU) 2023/1804</p>		
<p><i>The yearly average GHG intensity of the energy used on board by a ship during a reporting period shall be reduced, compared to the reference value (91.16 gCO₂ e/MJ) by: 2% from 1 January 2025; 6% from 1 January 2030; 14.5% from 1 January 2035; 31% from 1 January 2040; 62% from 1 January 2045; 80% from 1 January 2050.</i></p> <p>Regulation (EU) 2023/1805</p>	<p>EU shipping emissions increased by 5.6% in 2021 from the previous year, rebounding from the COVID-19 induced slump of 2020. The target for 2025 seems unlikely to be reached. The EEA projections suggest that, even with measures currently planned in the Member States, emissions from domestic navigation are projected to remain relatively stable in the coming years. International maritime transport emissions are projected to continue increasing.</p>	
<p><i>Each Member State shall set an obligation on fuel suppliers to ensure that: (B) the combined share of advanced biofuels and biogas produced from the feedstock listed in Part A of Annex IX and of renewable fuels of non-biological origin in the energy supplied to the transport sector is at least 1% in 2025 and 5.5% in 2030, of which a share of at least 1 percentage point is from renewable fuels of non-biological origin in 2030.</i></p> <p>Directive (EU) 2023/2413</p>	<p>According to EurObserv'ER [155] the contribution of advanced biofuels already reached 1% in 2022 (indicative data). The target for 2025 has already been reached. Nevertheless, the sub-target for RFNBO of 1 percentage point for 2030 is not on track as of 2022 data, but the uptake of RFNBO is expected to grow in the coming years, providing enough time to reach the 2030 target.</p>	
<p><i>The share of biofuels and biogas produced from the feedstock listed in Part B of Annex IX in the energy content of fuels and electricity supplied to the transport sector shall, except in Cyprus and Malta, be limited to 1.7%.</i></p> <p>Directive (EU) 2023/2413</p>	<p>The EU share (including Cyprus and Malta) was 1.28% in 2021, it increased to 1.35% in 2022. This target is currently on track.</p>	
<p><i>Achieve an annual production of sustainable biomethane of 35 billion cubic meters by 2030</i></p> <p>Directive (EU) 2023/2413</p>	<p>In 2021, the total biomethane production in the EU was 3.5 billion cubic meters, produced in about 1300 biomethane plants. Production increased in 2022 to reach 4.2 bcm. In order to reach 35 billion cubic meters, an estimate of 5000 additional plants are required.</p>	
<p><i>Member States with maritime ports shall endeavour to ensure that as of 2030 the share of renewable fuels of non-biological origin (RFNBOs) in the total amount of energy supplied to the maritime transport sector is at least 1.2%.</i></p> <p>Directive (EU) 2023/2413</p>	<p>Synthetic fuels are not available on the market and conversion pathways are at early technology development levels, facing major techno-economic challenges. E-fuels facilities are still at the demo-scale, with only a few plants currently operated at the EU level [156]. RFNBOs is a promising solution for hard-to-electrify sectors, such as the maritime one. However, a market for maritime RFNBO is currently yet to develop. Regulation (EU) 2023/1805 also introduces a combination of measures to ensure the support to the uptake of sustainable RFNBOs. The deal also set a 2% renewable fuels usage target as of 2034 if the Commission reports that in 2031 RFNBO will amount to less than 1% in fuel mix.</p>	

Aviation fuel suppliers shall also ensure that Sustainable Aviation Fuel (SAF) made available to aircraft operators at each Union airport will be at least 2% from 2025, 6% from 2030, 20% from 2035, 34% from 2040, 42% from 2045 and 70% from 2050.

[Regulation \(EU\) 2023/2405](#)

Of the SAF targets reported above, synthetic aviation fuels should represent a minimum share of 1.2% from 2030, 5% from 2035, 10% from 2034, 15% from 2045, and 35% from 2050.

[Regulation \(EU\) 2023/2405](#)

The yearly quantity of aviation fuel uplifted by a given aircraft operator at a given Union airport shall be at least 90% of the yearly aviation fuel required, to avoid tankering practices which would bring additional emissions from extra weight.

[Regulation \(EU\) 2023/2405](#)

Several plants are being built to produce sustainable aviation fuels and sustainable aviation fuels are tested by companies. The contribution of aviation fuels is practically negligible currently. No sustainable biofuel use was reported in Eurostat in aviation in 2021.



Synthetic fuels are not available on the market, conversion pathways are at early technology development levels, facing major techno-economic challenges.



No data available.



Renewable and low-carbon fuels

Member States shall ensure that, at the end of each year, the following power output targets are met cumulatively: (a) for each light-duty battery electric vehicle registered in their territory, a total power output of at least 1.3 kW is provided through publicly accessible recharging stations; and (b) for each light-duty plug-in hybrid vehicle registered in their territory, a total power output of at least 0.80 kW is provided through publicly accessible recharging stations.

[Regulation \(EU\) 2023/1804](#)

Member States shall ensure that along the TEN-T core and comprehensive network, publicly accessible recharging pools dedicated to light-duty vehicles deployed in each direction of travel with a maximum distance of 60 km in-between them offering a power output of at least 600kW and including at least one recharging point with an individual power output of at least 150 kW.

[Regulation \(EU\) 2023/1804](#)

Member States shall ensure that, by 31 December 2030 (with intermediate 2025 and 2027 targets), along the TEN-T core road network, publicly accessible recharging pools dedicated to heavy-duty electric vehicles are deployed in each direction of travel with a maximum distance of 60 km between them [...] Along the TEN-T comprehensive road network, recharging pools dedicated to heavy-duty electric vehicles are deployed in each direction of travel with a maximum distance of 100 km between them and each recharging pool offers a power output of at least 1.500 kW and includes at least one recharging point with an individual power output of at least 350 kW.

[Regulation \(EU\) 2023/1804](#)

Based on charging infrastructure data from Eco-Movement 2022 and estimates of electric vehicles on the roads, most Member States are already compliant with this fleet-based target (see [European Alternative Fuels Observatory – Target tracker](#)). Research also highlights that the total power output needed per electric vehicle (including battery electric vehicles and plug-in hybrid vehicles) is highly dependent on the share of electric cars and vans on the road, with AFIR targets on cumulative power outputs per vehicle being sufficient in the long term (when a rise in the market share of battery electric vehicles and plug-in hybrid vehicles is expected) [157].



The target supports the vision of 3 million charging points by 2030 under the Sustainable and Smart Mobility strategy. As of mid-2024, around 730.000 charging points are available in the EU (see [TENtec Interactive Map Viewer](#)). According to the [EC Dashboard towards zero-emission vehicle](#), around 60% of charging points in the EU are concentrated in three EU countries (Germany, France, Netherlands), while Eastern EU is lagging behind. To meet the 3 million charging points ambition, around 400.000 new points need to be installed annually, with a significant gap with respect to the 153.000 new public charging points installed in 2023 [158].



Despite the lack of specific data regarding recharging pools for heavy-duty electric vehicles, the extent of the TEN-T network served by high voltage recharging points stays so far limited to central Europe, with significant infrastructure improvement needed in Southern and Eastern EU, alongside the core and comprehensive networks (see [TENtec Interactive Map Viewer](#)).



By 31 December 2030, in each safe and secure parking area at least four publicly accessible recharging stations dedicated to heavy-duty electric vehicles with an individual power output of at least 100 kW are deployed.

[Regulation \(EU\) 2023/1804](#)

The extent of the TEN-T network equipped with safe and secure parking complying with the target is localised in central-northern EU (see [TENtec Interactive Map Viewer](#)). However, data available is not updated and it is not possible to assess whether the current number of secure parking areas for heavy-duty electric vehicles and the speed of installation is sufficient to reach the 2030 target.



By 31 December 2030, in each urban node publicly accessible recharging points dedicated to heavy-duty electric vehicles with an aggregated power output of at least 1 800 kW are deployed, provided by recharging stations with an individual power output of at least 150 kW.

[Regulation \(EU\) 2023/1804](#)

No data available.



Electric Vehicle Infrastructure

Member States shall ensure that, at all airports of the TEN-T core network and TEN-T comprehensive network, the provision of electricity supply to stationary aircraft is ensured by 31 December 2029, at all aircraft remote stands used for commercial air transport operations to embark or disembark passengers or to load or unload goods

[Regulation \(EU\) 2023/1804](#)

No data available.



Member States shall ensure that a minimum shore-side electricity supply for seagoing container ships and seagoing passenger ships is provided in TEN-T maritime ports. To that end, by 31 December 2029 TEN-T core and comprehensive maritime ports [...] are equipped to provide each year shore-side electricity supply for at least 90 % of the total number of port calls of seagoing container ships above 5.000 gross tonnes that are moored at the quayside at the maritime port concerned and 90% of the total number of port calls of seagoing ro-ro passenger ships above 5.000 gross tonnes and seagoing high-speed passenger craft above 5.000 gross tonnes that are moored at the quayside at the maritime port concerned

[Regulation \(EU\) 2023/1804](#)

No data available.



Member States shall ensure that at least one installation providing shore-side electricity supply to inland waterway vessels is deployed at all TEN-T core inland waterway ports by 1 January 2025; at least one installation providing shore-side electricity supply to inland waterway vessels is deployed at all TEN-T comprehensive inland waterway ports by 1 January 2030.

[Regulation \(EU\) 2023/1804](#)

No data available



The average CO₂ emissions of the Union fleet of new heavy-duty motor vehicles [...], off-road vehicles and off-road special purpose vehicles shall be reduced by the following percentages compared to the average CO₂ emissions of the reporting period of the year 2019:

- (a) 15% for vehicle sub-groups 4-UD, 4-RD, 4-LH, 5-RD, 5-LH, 9-RD, 9-LH, 10-RD and 10-LH for the reporting periods of the years 2025 to 2029;
- (b) 45% for all vehicle sub-groups other than vocational vehicles for the reporting periods of the years 2030 to 2034;
- (c) 65% for all vehicle sub-groups for the reporting periods of the years 2035 to 2039;
- (d) 90% for all vehicle sub-groups for the reporting periods of the year 2040 onwards

[Regulation \(EU\) 2024/1610](#)

The average specific CO₂ emissions of new heavy-duty vehicles in groups 4, 5, 9 and 10 has decreased by 0.55%, from 52.75g/t.km in 2019 to 52.45g/t.km in 2020. The rate of decrease is therefore slow and acceleration is needed to achieve the targets.



For [...] “urban buses” manufacturers shall comply with the 90% (in the reporting period 2030-2034) and 100% (as from 2035) minimum shares in their fleet of new heavy-duty vehicles

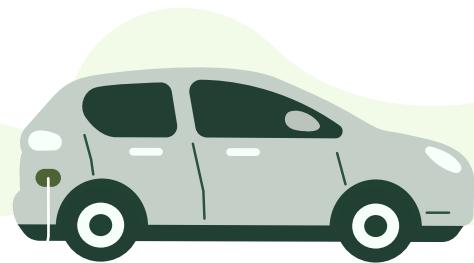
[Regulation \(EU\) 2024/1610](#)

Following the Regulation, due to the technical readiness of urban buses and the need to improve urban air quality, this target supports the need to have a mandatory minimum share of new zero-emission urban buses. According to the European Automobile Manufacturers' Association (ACEA) and Rabobank, the whole EU bus fleet consists of around 715.000-750.000 vehicles, with city buses representing around 215.000 units (around 30%). Looking at city buses only, there has been a steady decrease in the number of new city buses fuelled by Diesel since 2016, increasingly being replaced by electric vehicles. A market growth average close to 18% could help achieve the 2030 target. This is feasible, given the 2020-2023 market trend (source: Rabobank). It should be finally noted that a collapse of the diesel buses market is unlikely (e.g. due to the need in rural areas), and new electrically chargeable buses accounted for 12.7% in the total EU bus market in 2022, making up only 1.4% of total buses on EU roads (source: ACEA).



Decarbonisation of road transport





NON-BINDING TARGETS (FROM PROPOSALS)

Targets

Reduce the average door-to-door cost of combined transport operations by at least 10% within 7 years
[Proposal for a Directive to support framework for intermodal transport of goods](#)

Assessment

No available data.



Intermodality

NON-BINDING TARGETS (FROM COMMUNICATIONS)

Targets

Cut the emissions of transport sector by 90% by 2050 relative to 1990.
[Sustainable and Smart Mobility Strategy](#)

Assessment

Following six years of steady growth in greenhouse gas emissions from the EU's transport sector, transport emissions dropped substantially in 2020 because of reduced activity during the COVID-19 pandemic. In 2022 they were still 6% below 2019 levels. However, Eurostat quarterly GHG emission data shows that this rebound continued in 2023. According to the Report "Towards EU climate neutrality: progress, policy gaps and opportunities" by the European Scientific Advisory Board on Climate Change, the average rate of emission reduction since 2005 (-2 MtCO₂e per year) should be more than 10 times higher (-26 MtCO₂e per year in 2023-2030) to be consistent with the trajectories towards the overall 2030 net GHG emission reduction target by the EU Climate Law. When considering the 90% reduction objective for transport GHG emissions by 2050, the average rate of emission reduction should be higher (-31 MtCO₂e in 2031-2050).



Zero-emission in urban logistics
[The new EU Urban Mobility Framework](#)

Although it has been estimated that urban freight is an important traffic component (10% to 15% of vehicle equivalent miles) and is responsible for 20% to 25% of urban transport related CO₂ emissions [159], [160], there is no sufficient data to assess the trend.



GHG Emissions

EU fisheries are encouraged to continue the positive trend, as observed for the period 2009-2019, towards reducing fuel intensity by reducing the fossil-fuel consumption per kg of landed product for at least an additional 15% for the period 2019-2030.

[Energy Transition of the EU Fisheries and Aquaculture sector](#)

The Communication notes that "Fisheries and aquaculture operators began reducing their energy intensity between 2009 and 2014, but the progress they made has stagnated in recent years. Therefore, there is a need to accelerate the energy transition". In turn, this statement grounds on the JRC science for policy report "The 2022 Annual Economic Report on the EU Fishing Fleet" [161] by the Scientific, Technical and Economic Committee for Fisheries, assessing that the sector fuel intensity (i.e. fuel consumption per tonne landed) dropped by more than 15% between 2009 and 2014, but that this trend has stagnated since then.



Fuel intensity in fisheries

Milestones towards a decarbonised transport

In addition to the targets extracted for the progress assessment, the 2020 Sustainable and Smart Mobility Strategy outlines various Milestones. They are intended to “show the European transport system’s path towards achieving our objectives of a sustainable, smart and resilient mobility, thereby indicating the necessary ambition for our future policies”. Some of them, like the ones related to the hydrogen and electric vehicle charging infrastructure, have already been transposed into binding targets through legislation (e.g. the AFIR). These Milestones encompass aspects aimed at ensuring that transport becomes sustainable, smart, and resilient.

The multimodal Trans-European Transport Network (TEN-T). According to the Strategy, it must be equipped and fully operational for sustainable and smart transport with high-speed connectivity for the core network by 2030. It is expected to be operational for the comprehensive network, by 2050. The state of implementation of TEN-T transport infrastructure at the level of the Core Network Corridors reached in 2017 between 81% and 100% for most (10 out of 13) of the available indicators, whereas for the remaining three requirements the compliance rates range from 11% to 67%. These compliance rates do not always fully reflect the reality in terms of the quality or operational functionality of the transport network and the real needs on the ground [171]. Nonetheless, a strong acceleration is needed to meet this Milestone and have the core network operating at full capacity by 2030 [172]. Directive 2021/1187 [162] acknowledges that different and complex permit-granting procedures, cross-border procurement procedures and other procedures result, in many cases, in significant delays and increased costs.

The death toll for all modes of transport should be close to zero in the EU. This Milestone is in line with the UN Global Plan to reduce road traffic deaths by 50% by 2030, which was welcomed by the EC in October 2021. Road traffic deaths in the EU showed a decrease of 63% in the last 10 years, but in 2022 the fatalities increased by 4% compared to 2021, as traffic levels recovered after the pandemic. However, they remain below pre-pandemic levels. Additional efforts are needed to meet the 2050 milestone, as well as doubling the average annual fatalities pace to be in line with the UN Global Plan by 2030 [163].

30 million zero-emission cars and 80 000 zero-emission lorries by 2030. This Milestone is also reflected in the Eurostat’s dashboard “Statistics for the Green Deal” (zero-emission vehicles: percentage of new vehicles registered in the year). The share of new electric vehicles registered in 2017 was 0.7% while it was 12.1% in 2022, with a percentage increase of more than 1600%. In 2022, the zero-emission (battery electric) vehicles represented 1.2% of the passenger car fleet in the EU, i.e. around 3 million zero-emission vehicles [164]. A fully operative charging infrastructure and additional measures, also at Member State level, are expected to accelerate what foreseen by the Strategy.

Rail freight traffic to increase by 50% by 2030 and double by 2050 compared to 2015. The rail freight traffic, measured in billion tonne-kilometres (tkm), showed an increase of 2.8% in 2021 compared to 2015.

High-speed rail traffic to double by 2030 and triple by 2050 compared to 2015. The trend of high-speed rail transport, in terms of billion passengers-kilometres (pkm), increased from 2010 until 2019 (+25% in 9 years) with a fall in 2020 due to the COVID-19 pandemic. A small increase was registered in 2021.

Transport by inland waterways and short sea shipping to increase of 25% by 2030 and 50% by 2050 compared to 2030. Considering the gross weight of goods transported (in thousand tonnes), it increased by 7.4% from 2015 to 2021, while it decreased by -9.8% in inland waterways. The cumulative thousand tonnes show an increase of 4.4% from 2015 to 2021.

Additional Milestones foresee that **scheduled collective travel** for journeys under 500 km will be carbon neutral, **automated mobility** will be deployed at large scale, and **zero-emission marine vessels** will be market-ready by 2030. According to the Strategy, **zero-emission large aircraft** will also be market-ready by 2035.



Implementation challenges

Note: This section reports on major challenges to implementing the Sustainable and Smart Mobility targets. It grounds on critical reviews of the Environmental Implementation Reviews, Communication on the EU wide assessment of the draft updated National Energy and Climate Plans (COM(2023) 796) [7], the Commission Recommendation on National Support Programmes for Sustainable Urban Mobility Planning [9], the SWD(2021) 470 for the New Urban Mobility Framework [165], and sectorial studies. This section will be expanded providing a focus on selected enablers to possibly overcome challenges and boost the achievement of the targets in the follow-up of this report.

According to the EIR 2022, the mobility, buildings and renewables sectors have been allocated 71% of green investments from the Recovery and Resilience Plans. Investments and progress in sustainable and smart mobility primarily focus on enhancing public transportation, promoting cycling and walking, implementing measures to reduce vehicle emissions, deploying electric vehicles and developing the charging infrastructure.

In view of meeting the 2030 climate targets, the most significant cuts in emissions are needed in buildings and transport, where the pace of decarbonisation is too slow or even moving in the opposite direction [166]. Here, the Fit-for-55 package (including ETS2) will be supportive to deliver expected results and push towards targets achievement. However, the EU strategy is mostly focused on modal shifts and technological, supply-side improvements, while complementary measures to curb growth in overall transport demand are needed, as stated also by the European Scientific Advisory Board on Climate Change [10].

Total passenger transport (excluding water-based transport and extra-EU aviation for lacking data) has increased from 2005 to 2019. About three quarters of this increase is due to higher demand per capita, especially in aviation (+62% in 2005-2019), followed by rail (+23%) and private road transport (+11%) [10].

While transport demand is usually considered linked to household income and overall economic activities, there is evidence that it is possible to decouple this correlation, as suggested by the 2021 IPCC [167]. For this to happen, many challenges should be addressed, namely the complexity and cost of changing urban layouts towards new planning paradigms, ensuring equitable access to amenities, overcoming public resistance to lifestyle changes, filling the urban-rural gap, and maintaining the economic viability of local businesses. Furthermore, despite progress in the coverage and accessibility of public transport, many improvements are needed to increase its quality, accessibility, integration with shared mobility services [168].

Lack of safe cycling infrastructure remains a hindrance to increasing the share of cycling, which has proven successful in Member States like the Netherlands and Denmark, where cycling can account for high percentages

of trips (50% in the Netherlands [169], and 21% of trips under 10 kilometres and 15% of all trips in Denmark [169], [170]). For example, in Germany, a recent study found that implementing appropriate measures could triple the share of cycling trips for distances up to 30km, saving 19 MtCO₂e per year [171]. Increasing cycling by just one trip per day, replacing a car trip, for 200 days a year could decrease mobility-related life cycle CO₂ emissions by about 0.5 tonnes annually. Additionally, another study found that individuals who switch from driving to cycling can reduce life cycle CO₂ emissions by 3.2 kgCO₂/day [172]. Reducing Value Added Tax (VAT) rates on the supply, rental and repair of bikes and e-bikes, as Portugal and Luxembourg have done in compliance with Council Directive (EU) 2022/542 would further facilitate the expansion of cycling.

As it emerges, urban areas (cities, towns, and suburbs) are key elements for accelerating the transition in the transport sector, as they host 70% of EU citizens and generate 23% of all transport GHG emissions. Furthermore, 'urban nodes' are the core of a well-functioning TEN-T network. However, cities face major challenges in dealing with increased and continued congestion and consequently pollution and road safety; peak demands by public transport; and deployment of multi-modal transport hubs and terminals for logistics and freight [168].

The EC initiative on the Urban Mobility Framework encourages Member States to support cities in developing sustainable and smart transport systems. The Sustainable and Smart Mobility Strategy expects all large and medium-sized cities to have their Sustainable Urban Mobility Plan (SUMP) by 2030. The SUMPs are practical guidelines to address mobility challenges, including synergies with spatial, energy, and climate planning [173]. Scholars highlighted the need for skilled and trained staff in departments dealing with direct responsibilities in the transport sector from implementing such cross-sectorial projects [35]. This is especially true for the 100 cities involved in the smart and climate-neutral initiative by 2030.

Nonetheless, the evaluation of the 2013 Urban Mobility Package found that many challenges prevent cities to implement their SUMPs and, thus, deliver on the EGD climate goals.

There is uneven implementation of SUMPs between and within Member States, also due to a lack of common approach to monitoring and providing information to assess progress. In particular, several Member States do not collect relevant data systematically, despite this being crucial for the TEN-T deployment and monitoring. Data collection and sharing should be increased on traffic flows of people, congestions, deaths, serious injuries, modal share for all modes, access to mobility services, air and noise pollution.

The draft NECPs assessment by the EC highlights that most Member States already also set out emission reductions measures in the transport sector, but only few of the drafted plans include an overall target for GHG emissions by transport.

The need to urgently accelerate the emission reduction by transport calls for further action by Member States. It also unveils governance challenges, highlighting the need to involve more actively Member States and LRAs [168] in the implementations of transport policies, as also recommended by the EC [9].

In this regard, the report by the European Court of Auditors [174] claimed that no substantial improvement is possible without major commitment by Member States, especially regarding the support to cities for the adoption and implementation of SUMPs by proper regulatory frameworks, and the link with national and EU funding schemes.

According to a recent report by ACEA [158], acknowledged by the European Alternative Fuels Observatory, Member States also need to ramp up investments in charging infrastructure and swiftly implement the AFIR. Furthermore, the study highlights that meeting the power needs by 2030 will be highly challenging. Their projection suggests a significantly higher demand, estimating the necessity of more than 8 million charging points by 2030 (in light of the around 3 million envisaged under the AFIR, which are minimum requirements only). In turn, this can have positive effects on the sales of battery electric vehicles and the decarbonisation of road transport.



Leuven, Belgium

Photo by Tobias Cornille on Unsplash

Key messages

Reducing net GHG emissions by 90% will be highly challenging, considering the average rate of emissions reduction since 2005. Achieving this goal will require a reduction pace that is 10 times higher up to 2030. The recently adopted regulations ETS2, AFIR and CO₂ emission performance standards, as part of the Fit-for-55 package, will be key to achieving this goal.

The successful decarbonisation of road transport requires a robust capillary infrastructure for alternative fuels. Renewable hydrogen and electric charger infrastructure deployment must accelerate. Based on available data, tripling the number of new electric charging stations compared to 2023 is required to meet the ambition of 3 million charging points. Currently, 60% of stations are installed in three countries only (Germany, France and the Netherlands). Member States are urged to implement the Alternative Fuel Infrastructure Regulation swiftly.

Advanced sustainable biofuel and biogas will play their role in decarbonising the EU aviation and maritime transport sectors, progress in this area is sufficient to meet the requirements. Renewable fuels of non-biological origin (RFNBOs) are a promising solution for these hard-to-electrify sectors, although the market is still developing. The recently adopted RED III and FuelEU Maritime are expected to boost this sector.

Urban transport contributes to around 23% of the EU's transport-related GHG emissions. The electrification of the urban bus fleet is happening fast and the EU is likely to meet the target of 90% of new electric urban buses in 2030. However, electric buses still represent a small proportion of the entire EU fleet. Furthermore, the CO₂ emissions from heavy-duty vehicles must decrease more rapidly to meet the ambitions. Increased efforts in promoting cycling, as outlined in the European Declaration on Cycling, can make a strong contribution to sustainable urban transport.

The quality and accessibility of public transport must improve. The design and implementation of Sustainable Urban Mobility Plans (SUMPs) is key, but effective governance, monitoring, and technical skills are needed.

Member States should support urban areas in the implementation of SUMPs and links with national and EU funding schemes. Furthermore, data is missing in many transport-related areas (e.g. traffic, people flow, implementation of AFIR and pollution), these data are essential for the assessment of progress.

05

Greening the CAP
'Farm to Fork' Strategy

2 ZERO
HUNGER



3 GOOD HEALTH
AND WELL-BEING



6 CLEAN WATER
AND SANITATION



7 AFFORDABLE AND
CLEAN ENERGY



8 DECENT WORK AND
ECONOMIC GROWTH



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



13 CLIMATE
ACTION



15 LIFE
ON LAND



Greening the CAP | 'Farm to Fork' Strategy

Factsheet

The EU food system provides **food to more than 450 million people** in the EU and many more in the world while contributing to **economic development and employment**. The **CAP 2023-2027** and **Farm to Fork (F2F) strategy** are central to the European Green Deal ambitions towards **climate neutrality** and **zero pollution**. The analysis in this chapter grounds on **7 key targets from the F2F**. It also provides a snapshot on additional 25 objectives to better capture the EU Food System as a whole, in alignment with the food system monitoring exercise by the JRC.



Policy context and key figures

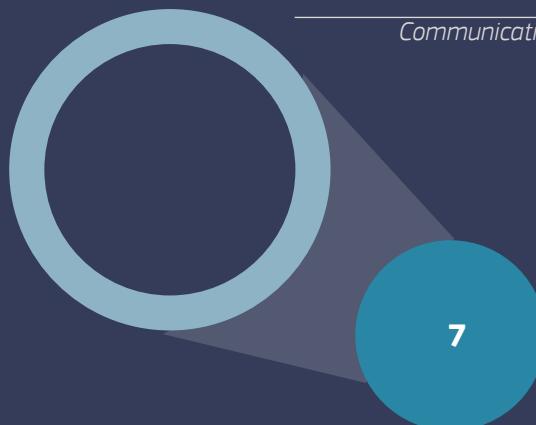
7

Quantifiable targets
extracted from the
Communication on the
'Fork to Fork'

100%

of all targets assessed
in this Thematic Area are
not legally binding

Targets from the
Communication on Farm to Fork



LAND AND SOIL

'Farm to Fork' Strategy
1 target

ANTIMICROBIALS

'Farm to Fork' Strategy
1 target

POLLUTION

'Farm to Fork' Strategy
3 targets

Number of targets per topic
from the Farm to Fork

Legend

Non-binding targets from
Communications

FOOD WASTE

'Farm to Fork' Strategy
1 target

TECHNOLOGY & DIGITALISATION

'Farm to Fork' Strategy
1 target



31%

contribution of agrifood system
to total EU emissions in 2020
(source: [EP 2023](#))



12.9%

EU household consumption
expenditure for food in 2021



9.1 million

farms across the EU in 2020,
employing 8.7 million people

38.4%

of the EU's land area
is used by farms

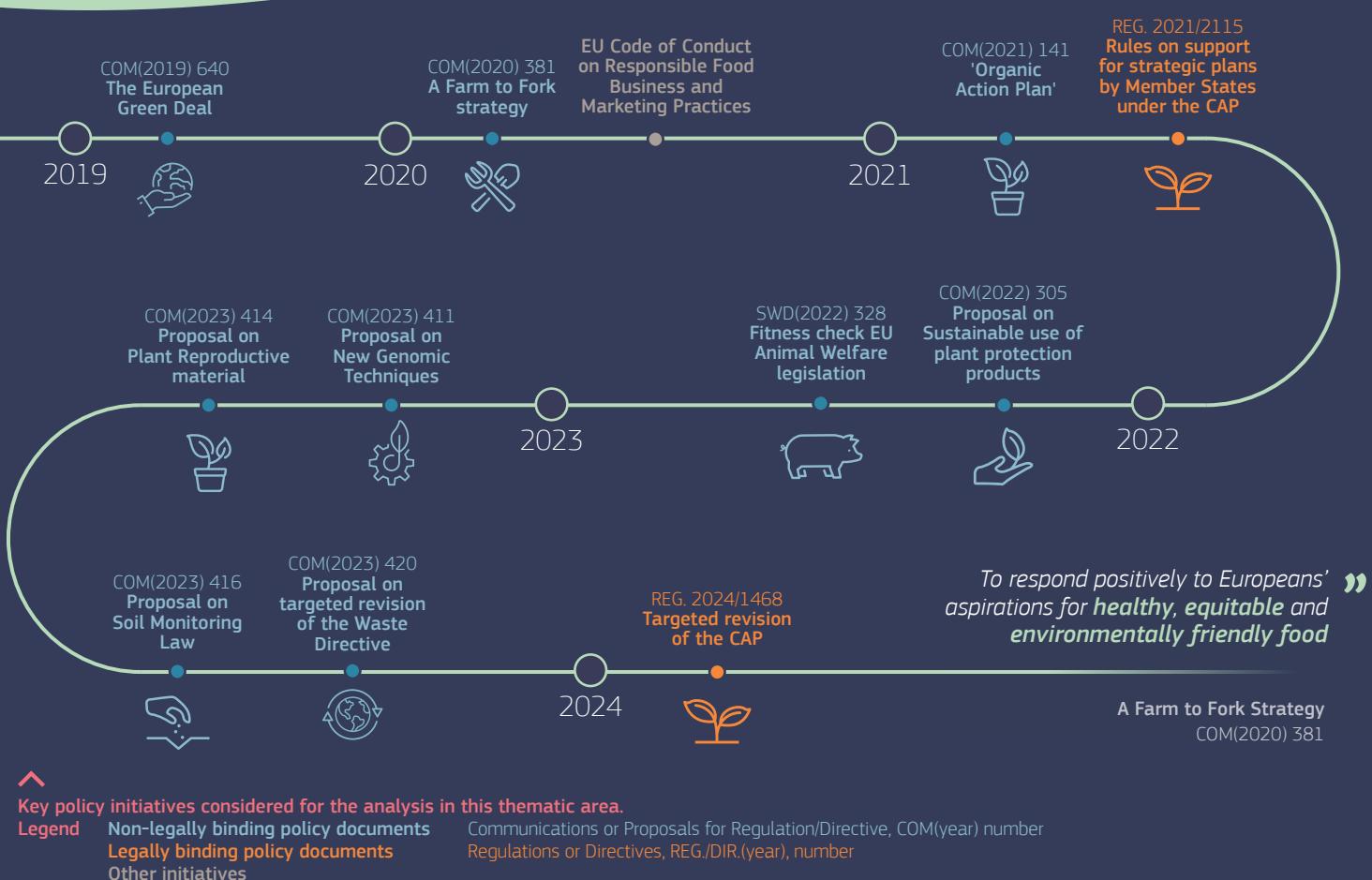
222 billion €

value of exports for EU agricultural,
fisheries, food and
beverage products in 2022

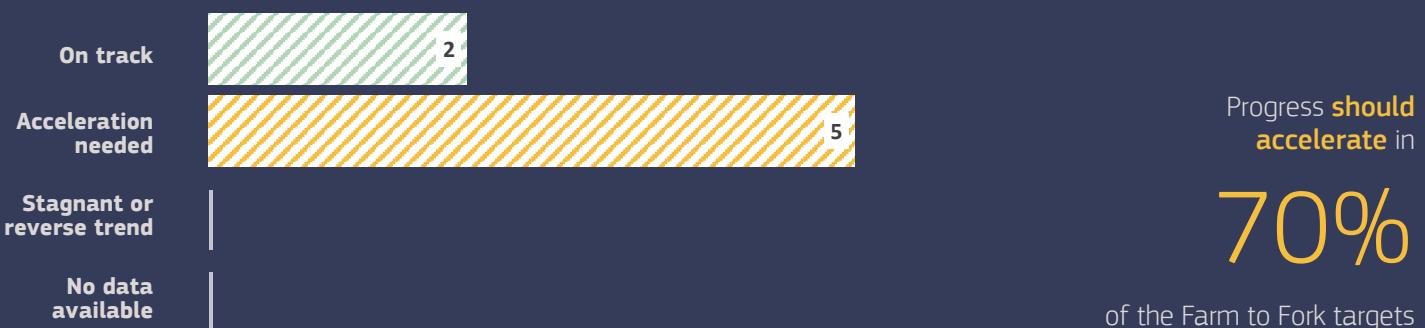
2.9 million

holdings/enterprises in the EU
food and beverage processing
and distribution sector





Progress towards the targets



Contribution to the 2030 Agenda



The targets of the Farm to Fork contribute to 2030 Agenda targets **2.4 (sustainable food production system)**, **9.1 (sustainable infrastructure)**, **12.3 (food waste)** and **12.4 (chemicals and waste management)**. The overall strategy also addresses SDG 3, 6, 7, 8, 13, and 15.

05. GREENING THE CAP / FARM TO FORK STRATEGY

Policy context

The EU food system provides food to over 450 million people in the EU and many more around the world, contributing to the EU's economic development and employment. At the same time, it faces important challenges in environment, health, the society and the economy. In the EU, food contributes to around 45% of the environmental impacts of EU consumers [184], while globally it accounts for one third of the total greenhouse gas (GHG) emissions [175].

The Farm to Fork (F2F) strategy [176], adopted on 20 May 2020, is central to the European Green Deal [32], for the transition to a more sustainable and resilient EU food system, and towards achieving climate neutrality. Its aim is to comprehensively address the challenges of sustainable food systems. The Farm to Fork strategy recognises the inextricable links between healthy people, healthy societies and a healthy planet ('One health' concept). The strategy sets a direction of travel bringing together various sectoral policies that affect food production, processing, distribution and consumption, and refocusing all action on the transition to sustainability. It aims to accelerate the transition to a sustainable food system that should:

- **Have a neutral or positive environmental impact;** help to mitigate climate change and adapt to its impacts; reverse the loss of biodiversity;
- **Ensure food security, nutrition and public health,** making sure that everyone has access to sufficient, safe, nutritious, sustainable food;
- **Preserve affordability of food while generating fairer economic returns,** so that ultimately the most sustainable food also becomes the most affordable, fostering competitiveness of the EU supply sector and promoting fair trade.

Achieving these objectives entails transforming both supply and demand of the food system. For instance, in relation to demand, in the F2F Strategy, the Commission stated that 'Current food consumption patterns are unsustainable from both health and

environmental points of view. While in the EU, average intakes of energy, red meat, sugars, salt and fats continue to exceed recommendations, consumption of whole-grain cereals, fruit and vegetables, legumes and nuts is insufficient.'

The transition to sustainability would involve a reduction in the consumption of animal-based products, which are over-consumed in many EU regions. Other foods such as legumes, cereals and vegetables and new, innovative products could contribute to a balanced food diet. Food consumption, and by extension, dietary choices, not only have a major impact on climate change, biodiversity, environmental pollution and degradation, and soil health but also have major health implications. The hidden costs associated to food system externalities in high-income countries have recently been estimated by the Food and Agriculture Organization of the United Nations (FAO) to stand at 8% of GDP - the majority of which come from productivity losses from unhealthy dietary patterns that lead to non-communicable diseases [177]. Furthermore, food consumption can affect farm income and food prices, competing land uses and, in general, trade dynamics. Dietary choices are also linked to food loss and waste.

The COVID-19 pandemic and the Russian invasion of Ukraine have altered the geopolitical and economic circumstances of the EU's food system. Accordingly, Europe reacted with different strategies and actions on food security to "Safeguarding food security and reinforcing the resilience of food systems" and setting up a European Food Security Crisis preparedness and response Mechanism (EFSCM). According to the EGD, the Common Agricultural Policy (CAP) and the Common Fisheries Policies (CFP) remain key policy tools for driving and supporting the transition of EU food systems. These policies ensure a decent living for farmers, fishers and their families.

Aiming at further improving the sustainable development of farming, food and rural areas, the CAP 2023-2027 [178], [179], [180] means to be a key enabler for achieving certain objectives outlined in the F2F and Biodiversity strategies, and targets for GHG emissions mitigation of the primary sector. The CAP is centred around ten specific objectives reflecting the dimensions of sustainability: ensure a fair income for farmers, increase competitiveness, improve the position of farmers in the food chain, climate change action, environmental care, preserve landscapes and biodiversity, support generational renewal, vibrant rural areas, protect food and health quality, and fostering knowledge and innovation, and digitalisation. In the context of innovation and digitalisation, the respective enabling initiatives of Horizon Europe and Digital Europe Programmes are also important drivers towards the objectives of the F2F strategy as well as CAP and CFP. To meet the EU-level objectives, EU Member States implemented CAP Strategic Plans (CSPs) at the national level, which are tailored to local conditions and specific national needs, align with the CAP legislation and support the goals of the EGD.

The Common Fisheries Policy (CFP) [181] is a comprehensive legal framework, featuring attention to the environmental, economic and social dimensions of fisheries; fish stock management at maximum sustainable yield for all managed stocks; gradual introduction of a landing obligation by 2019; continued application of the so-called multiannual plans to manage fisheries in different sea basins; regionalisation to allow EU countries with a management interest to propose detailed measures, which the Commission can then adopt as delegated or implementing act and transpose them into EU law; and fleet capacity ceilings per EU country in combination with the obligation for EU countries to ensure a stable and enduring balance between fishing capacity and fishing opportunities over time. EU countries may need to develop action plans to reduce overcapacity. Regarding aquaculture, the EGD, the F2F Strategy, the Sustainable Blue Economy Communication, and the Strategic Guidelines for a more sustainable and competitive EU aquaculture emphasise its potential as a major contributor to building a sustainable and responsible food system, in particular as a low-carbon footprint source of protein.

In the following, the state of some important initiatives is summarised. While the Legislative Framework for a Sustainable Food System (FSFS), which had been planned for 2023, has not been proposed by the Commission, the Nature Restoration Law, which provides several provisions relevant to the restoration

of agricultural ecosystems, entered into force on 18 August 2024. The EP adopted the revision of the Directive on Industrial Emissions, which aims to curb harmful emissions from industrial installations, including large livestock farms. On the other hand, the Sustainable Use of Plant Protection Products Regulation proposal was withdrawn by the European Commission in February 2024.

On 5 July 2023, a package of proposals to ensure the sustainable use of the EU's natural resources was published. It includes legislative proposals to strengthen the resilience of European food and farming, legislation for plants produced by certain new genomic techniques, a Directive on soil monitoring and resilience ('soil monitoring law'), a Regulation on the sustainable use of plant protection products, and the Revision of Waste Framework Directive, with legally binding national targets to reduce food waste by 2030. Regarding animal welfare, the revision of the corresponding legislation was announced in the Farm to Fork Strategy. This revision includes updating the rules for the protection of animals at farms, during transport, and at slaughter, as well as introducing a new proposal for an animal welfare label. In response to the successful European Citizens' Initiative "end the cage age", the Commission has committed, as part of the revision, to ban the use of cages for certain species of farmed animals. On the 7 December 2023 the Commission proposed an overhaul of EU rules for the protection of animals in transport and new rules on the welfare and traceability of dogs and cats, while leaving out any new provisions concerning animal farming and the phasing out of cages, animal welfare at killing, or animal welfare labelling.

As a major step to help shape a shared vision for the future of EU's farming and food systems, the "[Strategic Dialogue on the future of agriculture](#)" was launched in January 2024 among key stakeholders from across the whole agri-food chain to help shape a shared vision for the future of EU's farming and food systems. The forum seeks the best ways to pursue the multiple objectives of safeguarding income for farmers, while keeping rural areas vibrant, ensuring a stable food supply and contributing to climate and environmental objectives. On Member State level, the conclusions of the Special meeting of the European Council on 18 April 2024 underlined the Union's key strategic interest in having a competitive, sustainable and resilient agricultural sector.

Assessment of progress towards the targets

The EGD proposes a new and inclusive growth strategy, which highlights the need for a holistic and cross-sectoral approach. In this context, the F2F strategy introduces a more integrated approach in food policy, highlighting the inextricable links between healthy people, healthy societies and a healthy planet. The main objective of this integrated approach is to accelerate the transition towards a general sustainability of the EU food system, respecting the planetary boundaries and welfare of society.

Within the F2F Strategy, some quantitative targets are established, complemented by aspirational objectives to steer EU food system actors and policymakers towards sustainable food systems.

The present report considers the seven quantifiable targets defined within the F2F Strategy to assess progress towards the EGD. However, these relate only to a few food system domains, focusing mainly on primary production. To provide a more holistic picture of

the EU food system, additional information is provided on other domains relevant to the sustainability of the EU food system by using selected indicators and assessing the entire supply chain, even though these aspects may not be specifically addressed by EU-level initiatives.

To monitor the transition towards sustainable food systems, the JRC, in cooperation with stakeholders, developed the EU Food System Monitoring Framework (JRC Publications Repository - [EU food system monitoring framework. From concepts to indicators](#) and [Annex 5](#)). The framework provides a systemic perspective and comprises of the three sustainability dimensions (environmental, economic and social), 12 thematic areas, and 38 domains. It aims to measure the progress towards the explicit targets and the high-level objectives of the F2F strategy, as well as sustainability goals embedded in other policy instruments. Where available, historical trends, data sources and future projections are reported in Annex 5. Specific selected indicators are published on the [EU Food System Monitoring Dashboard](#).

NON-BINDING TARGETS (FROM THE COMMUNICATION ON FARM TO FORK)

Targets	Assessment
<p><i>Reduce overall EU sales of antimicrobials for farmed animals and in aquaculture by 50% by 2030.</i></p> <p><i>Target in Common with Biodiversity Strategy (see Thematic Area 6) and Zero Pollution Action Plan (see Thematic Area 7)</i></p>	<p>Indicator: Sales of antimicrobials for food producing animals (Source: EMA). According to the 13th European Surveillance of Veterinary Antimicrobial Consumption report, the overall sales of antimicrobials for use in food-producing animals within the EU have fallen between 2018 and 2022 by 28.3%. During this period, the overall EU sales have thus reached more than half of the reduction target, which shows that the target can be achieved by 2030.</p> <p>Antimicrobials</p>
<p><i>Reduce by 50% the use and risk of chemical pesticides</i></p> <p><i>Target in Common with Biodiversity Strategy (see Thematic Area 6) and Zero Pollution Action Plan (see Thematic Area 7)</i></p>	<p>Indicator: Use and risk of chemical pesticides (Source: DG SANTE). According to data published by DG SANTE, the use and risk of chemical pesticides decreased by 33 % between the baseline period of 2015–2017 and 2021. The use and risk of chemical pesticides shows a decrease of 6% from 2020 to 2021. These overall downward trends show that the target can be achieved by 2030¹. [182]</p> <p><small>¹ It should be noted that the current EU-wide indicator, which applies risk weightings to four different groups of chemical pesticides and is based on pesticide sales, is not considered scientifically robust by some. This indicator is based on a similar harmonised risk indicator, which, according to the European legislation (Commission Directive (EU) 2019/782), is considered hazard-based. This is due to the absence of statistics on the use of plant protection products needed to develop a risk indicator. The Commission is committed to developing more sophisticated indicators in future, such as improved weightings that take hazard properties into account in a more granular way or by using EU-level data on pesticide usage when it becomes available. An example of such an improvement is the new risk indicator assessing the toxicity of pesticide residues in soil from samples collected under the LUCAS Soil Pesticide survey coordinated by JRC. According to this indicator, in 2018, 14% of sites in the EU were at risk of negative effects on soil organisms due to pesticide residues. The analysis of samples from 2022 is currently ongoing and will shed light on the EU's progress towards pesticide risk reductions. This indicator is relevant to only one compartment (soil) but is just one of many being examined for usefulness and relevance. .</small></p> <p>Pollution</p>



Reduce by 50% the use of more hazardous pesticides
Target in Common with Biodiversity Strategy (see Thematic Area 6) and Zero Pollution Action Plan (see Thematic Area 7)



Indicator: Use of more hazardous pesticides (Source: DG SANTE).

According to data published by DG SANTE, the use of more hazardous pesticides fell by 21 % between the baseline period of 2015–2017 and 2021. The use of more hazardous pesticides shows an increase of 5% from 2020 to 2021. Achievement of the 50% reduction target by 2030 remains challenging.

It should be noted that while this indicator intends to monitor the use of the more hazardous pesticides, it does not take into account the exposure and hence the impact they might have on the environment and human health. In the future, this indicator could be complemented with a risk indicator showing changes in the actual risks².

² Options include better grouping of substances, group weighting reflecting substances' toxicities, standardisation of sales data with recommended application rates and utilisation of pesticide use data instead of the sales data as the basis for a new indicator



Reduce nutrient losses by at least 50%, while ensuring that there is no deterioration in soil fertility.

Indicator: Nitrate in groundwater (Source: EEA).

The EU aggregate for nitrate content in groundwater based on 18 Member States shows a positive trend (−0.7% annual growth rate) between 2015 and 2020. However, this slight reduction is still far away from the 50% aimed by 2030. It should be noted that the long-term trend (2005–2020) for the EU aggregate was rather stagnant (0.003% annual growth rate).



Pollution

Increase organic farming with the aim to achieve at least 25% of total farmland under organic farming by 2030

Target in Common with Biodiversity Strategy (see Thematic Area 6)

Indicator: Area under organic farming (% of the total utilised agricultural area) (Source: Eurostat). Moderate progress rate, but not enough to reach the target by 2030. The compound annual growth rate (CAGR) is 6.7% per year observed i.e. an increase from 5.6% to 9.1% (2012–2020), while 9.3% per year would be required to meet the target.



Land and soil

*Reduce food waste. Prevent food loss and waste. Halve per capita food waste at retail and consumer levels**

*See also Directive (EU) 2018/851 on waste with a target on food waste reduction of 30% by 2025

Indicator: Food Waste (Source: Eurostat). It should be noted that at the moment only two data points are available, 2020 and 2021, therefore, it is still early to define a clear trend. The Member States should report on food waste every year, using primary data at least once every four years. Based on the analysis performed in the impact assessment of the Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste, this target was not deemed to be feasible to achieve [108]. In the proposal the target has been redefined with a reduction of food consumption by 30% at retail and consumption level, plus a reduction of 10% in manufacturing (see Thematic Area 3).



Food waste

Digitalisation and knowledge transfer. Ensure access to fast broadband to all farmers and all rural areas to achieve the objective of 100% access by 2025 (enabler for jobs, businesses, investments, improvement in quality of life in rural areas and enabler to mainstream precision farming and use of artificial intelligence)

Indicator: Rural next generation access (NGA) broadband coverage, as a % of households (Source: DG DIGIT).

Next generation access broadband availability has significantly improved over the past decade, with the percentage of households having access increasing from 18% of rural households in 2013 to 73% in 2022. However, the objective of achieving 100% coverage by 2025 is at risk at the current pace. Most Member States remain above the EU average of 73%. However, despite showing growth in the last decade, some Member States such as France (2013: 16%, 2022: 59%), Poland (2013: 18%, 2022: 40%), and Croatia (2013: >1%, 2022: 52%), still lag behind.



Technology and digitalisation

THEMATIC FOCUS

A broader perspective. Selected indicators for additional food system domains

In order to track progress, from a more holistic food system angle, this report also considers selected indicators related to additional domains relevant to the sustainability of the EU food system, in addition to the seven quantitative targets presented above. Such proposed indicators are derived from the Food System Monitoring Framework (JRC Publications Repository - [EU food system monitoring framework. From concepts to indicators](#)) and specific selected indicators are available on the [EU Food System Monitoring Dashboard](#).

GHG Emissions

Ensure that agriculture, fisheries and aquaculture, and the food value chain contribute to the target of reducing net greenhouse gas emissions to at least 55% below 1990 levels by 2030 and to the achievement of the objective for a climate-neutral Union in 2050. The trend (from 1990 to 2018) of this indicator for the EU 27 countries covering the GHG emissions from the entire food value chain (from production to consumption within the EU territory) is in the desired direction to contribute to the 55% net reduction and climate neutrality targets set by the EC for all economic sectors in the EU combined. However, the lack of current data, and the unpredictability of certain components of the GHG food system emission indicator (as temporal or geographical changes in LULUC), make the prediction to 2030 very uncertain. In 2018 (the last recorded year in the time series) the total EU GHG food system emissions represented 85.86% of the GHG food system emissions in 1990. **Indicator: GHG food system emissions (Source: JRC EDGAR Food).**



Sustainable use of resources

Water: Preserving freshwater, boosting water reuse in agriculture.

Overall, using a 3-year moving average, the EU has seen a 14% improvement in the Water Exploitation Index (WEI+) compared to 2011. This improvement was observed in 14 Member States. However, further improvements are necessary.

Efforts are needed to reduce the inequality in total water use as a percentage of the renewable freshwater resources between Member States, especially in the Mediterranean area. (Renewable freshwater resources in the WEI+ index are computed considering mainly a change in the water storage capacity (groundwater and surface water) of a given territory. For example, Cyprus had a WEI+ of 113% in 2019, in contrast to France's 2.8%. Seven Member States recorded a WEI+ score of less than 1, indicating that their water storage capacity exceeded their consumption. **Indicator: Water use in agriculture (Water exploitation index, plus - WEI+) (Source: EEA).**

Aquatic living resources: Increase sustainable fishing and aquaculture. Bring fish stocks to sustainable levels. Significant increase in organic aquaculture. This is the objective of the CFP to ensure that fishing and aquaculture are environmentally sustainable and managed in a manner consistent with the objectives of achieving economic, social and employment benefits. This indicator shows the modelled average ratio of fishing mortality to its associated reference point (FMSY or its proxy) over time since 2003. It monitors the trend of F/FMSY at the level of European waters (Northeast Atlantic, Mediterranean and Black Sea). The aim is to have a decreasing trend (as the starting point was 1.56) and to reach the lowest possible level below 1. A downward trend was observed throughout the time series, thus showing an improvement in the sustainable exploitation of fish stocks. Although the indicator in 2021 stands at 0.88, lower values are expected in case of full sustainable exploitation since some stocks are still overfished (F>FMSY). **Indicator: Fishing pressure relative to maximum sustainable yield (trends in F/FMSY) (Source: JRC).**

Energy: Increase renewable energy in the agriculture and food sector. Adopt energy efficiency solutions in the agriculture and food sector, by reducing energy consumption. Overall, there has been an increase in energy consumption for both agriculture and forestry, as well as the overall food industry, by 7.4 % and 13.5% respectively compared to 2011. The annual rate of increase is 0.8% for agriculture and forestry and 1.7% for the food industry. Across Europe, these two sectors have consumed 54.32 million tonnes of oil equivalent, evenly split between them. France and Germany lead in total energy consumption. For the overall food industry, there has been a noticeable decrease of 1% in France, while Germany experienced an increase of 5.8% compared to 2011. In agriculture and forestry, France and the Netherlands lead in energy consumption, with increases of 1.3% and 9.9%, respectively. Consequently, efforts are required to enhance energy efficiency and achieve the objective of reducing energy consumption at the EU level.



Indicator: Final energy consumption in agriculture, forestry and food industry (Source: Eurostat).

Biodiversity

Biodiversity conservation and restoration of natural resources: Protect the environment and restore natural resources. Preserve biodiversity and reduce biodiversity loss. The impacts on global species richness due to the supply chain of food products consumed in the EU (produced either in the EU or in other world regions) have increased during the last decade. This results from increasing food consumption, as well as increasing consumption of animal-based products. Main drivers of biodiversity loss are associated to land use and climate change impacts. Observed trends in consumption patterns are not expected to change to an extent to revert this trend by 2030.

Indicator: Consumption Footprint - Food (biodiversity loss) (Source: JRC).

Genetic biodiversity of food production systems: Secure and ensure access to a range of quality seeds for plant varieties in order to adapt to the pressures of climate change. The FAO progress assessment of SDG indicator 2.5.1.a, for the period 1995-2021, observes a global trend of improvement in Europe, with a slowdown in improvement particularly in the last five years. **Indicator:** Number of plant genetic resources for food and agriculture secured in either medium- or long-term conservation facilities (Source: FAO).

Cross-cutting environmental

Circular economy: Scale-up and promote sustainable and socially responsible production methods and circular business models in food processing and retail. No adequate indicator is available at the moment to assess this objective.



Consumption footprint: Reduce the environmental and climate footprint of the EU food system, operating within planetary boundaries. Reduce the EU's contribution to global deforestation and forest degradation. According to JRC study [183], the EU food system is transgressing several planetary boundaries including climate change and those related to novel entities (particulate matter, freshwater ecotoxicity). The Consumption Footprint related to food consumption has shown an increasing trend since 2010, with the consumption of animal-based products dominating the impacts (around 70%). This increasing trend was common for most of the Member States (20 out of 27) [184].

Indicator: Consumption Footprint (Food) (Source: JRC).



Income distribution: Ensure fair income and salaries. Improve income of primary producers to ensure their sustainable livelihood.

This indicator compares agricultural income to average wages in the economy and provides an estimate of the average income opportunities that a person would have outside of agriculture. It has increased from 31% to 52% between 2005 and 2021 at the EU level, reflecting a CAGR of 3% in this time frame. However, there are discrepancies among Member States. While in certain Member States, such as Hungary and France, farmers' income compared to other wages in the economy has grown more than the EU average, in other Member States like Italy and Belgium, have remained below the EU average or have shown a decreasing trend (e.g. Estonia and Austria). In addition, although the average farm income per worker in the EU has steadily increased over the past decade (by 56% from 2013 to 2021), income levels do not only vary significantly across EU countries, but also across the farming sector and farm size. In particular, farm economic size significantly influences income as higher costs per hectare associated with larger farms are compensated by higher production, leading to greater overall profitability. **Indicator: Farmers income compared to wages in the rest of the economy (Source: DG AGRI).**

Sectorial growth: Help farmers and fishers to strengthen their position in the supply chain and to capture a fair share of the added value of sustainable production. This indicator measures the economic contribution in the agriculture, fishing and aquaculture, as well as the food, beverage, and tobacco sectors. The food, beverage, and tobacco sectors constitute the largest portion of the overall agri-food value chain (over 50%), followed by the agriculture sector. The total value added in the food and agriculture sectors has increased from 340K in 2008 to 433.5K in 2020 in the EU, with a CAGR of 2%. The compound growth in the manufactured food sector has been higher (2.5%) than the growth in the agriculture sector (1.5%). **Indicator: Value added along the food chain (Source: JRC).**

Market power and business structure: Improve agricultural rules that strengthen the position of farmers (e.g. producers of products with geographical indications), their cooperatives and producer organisations in the food supply chain. This indicator is important to assess the level of investment and development in the agricultural sector. Among Member States, the level of gross fixed capital formation varies. Most Member States surpass the EU average. While countries such as France and Germany have the highest capital formation in agriculture, some Member States lag behind e.g. Czechia, Bulgaria and Estonia. In the EU, gross fixed capital formation in agriculture has increased from EUR 44 Billion in 2005 to EUR 68 Billion in 2022, corresponding to a CAGR of 2.8% and a 55% percentage increase. The growth rates also vary across Member States. As expected, the countries with highest capital formation show limited growth trend e.g. Germany, while the highest growth rates are observed in countries that had lower starting values e.g. Romania, Bulgaria. **Indicator: Gross fixed capital formation in agriculture (Source: DG AGRI).**

Price: Preserve the price affordability of food. The annual average of food prices, indexed to 2015, has increased from 80% (2005) to 125% (2022), an average yearly inflation of almost 2.5%. Since 2015, food prices have risen by 25%, and the biggest increase has taken place in 2022. **Indicator: Consumer food inflation (Source: Eurostat).**

Trade: Foster the competitiveness of the EU supply sector. The EU agri-food trade balance has shown stable growth over the last twenty years, despite a marginal decrease in 2022. It has reached a record level in 2023, with a total surplus of EUR 70.1 billion. While the overall agri-food trade balance shows a surplus, there are variations at the category level. The EU has a trade deficit in several product categories, with the most significant deficits observed in oilseeds and protein crops, and some fruits and nuts. The surplus is spread across product categories, driven mainly by cereal preparations, dairy products, and wine.

Indicator: Agricultural and food products trade balance (Source: Eurostat).

Transport & Infrastructure

Transport, accessibility and infrastructure: Create shorter supply chains will support reducing dependence on long-haul transportation. There have been almost no changes in the number of tonnes transported across difference distance categories. Since 2013, approximately 30% of the freight of food products, beverages and tobacco has been transported less than 50 km, and another 30% has been transported between 50 and 150 km. Between 2013 and 2021, the tonnes per kilometre transported for all activities related to the food system (agriculture, fisheries, food manufacturing, trade and services) have increased by 9%, although the tonnes per kilometre transported in the food and beverages manufacturing sector decreased by 5%. [Indicator: Annual road freight transport by distance class. \(Source: Eurostat\)](#).

Fair, inclusive and ethical food system

Employment and working conditions: Create new job opportunities. Improve working conditions, ensure occupation health and safety. This indicator gives total employment in agriculture, the food industry and food services in absolute terms and also as a share of total employment. The employment in the food sector by economic activity has decreased over the last decade, from 8,474 (in 2013) to 6,326 (in 2022) million persons. During this period the mean annual decrease was 2.88% based on CAGR calculation, therefore around 25% of the employment moved out from the food sector in almost a decade. The share of total employment has also decreased, from 5% (in 2013) to 3% (in 2022). This negative trend indicates a move away from the objective, which aims at creating new job opportunities in the food sector. [Indicator: Employment by economic activity \(Source: Eurostat\)](#).

Social protection and poverty: Ensure fair, inclusive and ethical value chains. Ensure workers' social protection and housing conditions; promote socially responsible production methods; Mitigate the socio-economic consequences impacting the food chain and ensure that the key principles enshrined in the European Pillar of Social Rights are respected, especially when it comes to precarious, seasonal and undeclared workers. No adequate indicator is available at the moment to assess this objective.

Animal welfare: Promote better animal welfare to improve animal health and food quality. No adequate indicator is available at the moment to assess this objective.

Food environment

Food messaging: Provide food information and labelling to empower consumers to make informed, healthy and sustainable food choices. Strengthen educational messages on the importance of healthy nutrition, sustainable food production and consumption, and reducing food waste. No adequate indicator is available at the moment to assess this objective.

Food availability: Improve availability of sustainable food. Ensure that the healthy option is always the easiest one. Ensure food supply. The ratio plant to total protein supply indicator is derived from FAO supply data. The closer the value is to 1, the higher the contribution of plant-based sources to protein supply; the average of the previous three years is taken to reduce error variation. This indicator examines the contribution of plant food sources to total protein (animal and plant) supply and can inform on the transition towards more plant-based food diets based on food supply data. Since 2012, a slight decrease has been observed across most EU countries (between 1 and 5%). The average ratio for the EU region has slightly decreased from 0.42 to 0.40 between 2012 and 2020. This change indicates that a transition towards increased supply of plant-based foods in the EU remains a challenge, possibly linked to a slow progress in the transition towards more plant-based diets in the region. [Indicator: Ratio plant to total protein supply \(Source: FAO\)](#).

Food affordability: Ensure affordability to sufficient, nutritious and sustainable food. The percentage of population who cannot afford a healthy diet is reported by FAO and the World Bank for global monitoring. A healthy diet is considered unaffordable when its cost exceeds 52% of income per capita per day. This percentage accounts for a portion of income that can be credibly reserved for food, based on observations that the population in low-income countries spend, on average, 52% of their income on food. The estimated proportion of the population who cannot afford a healthy diet in Europe has dropped 40% from 2.5% in 2017 to 1.5% in 2021. Across EU countries, values ranged between <1% for several countries and 7% in Romania in 2021. The indicator does not account for non-food spending and likely underestimates food affordability issues in the context of the EU region. **Indicator: Percent of the population who cannot afford a healthy diet in the EU (Source: FAO).**

Properties of food: Increase reformulation of food products in line with guidelines for healthy and sustainable diets. No adequate indicator is available at the moment to assess this objective.

Nutrition and health

Nutrition and healthy, sustainable diets: Move to healthier and more sustainable diets. EU diets are poorly aligned with dietary recommendations, as none of the EU Member States is on track to meet the dietary-related guidelines. In the EU, no country fulfils simultaneously the recommendations for healthy food consumption [185]: the consumption of fruit, vegetables, legumes, whole grains nuts and seeds as well as milk and fish is lower than the recommended intake levels (when compared to either national food based dietary guidelines [186] or World Health Organization (WHO) and EAT-Lancet recommendations [187], [188]), while the consumption of red meat is above.

However, at the moment there is no adequate indicator available to assess the progress on this objective. The lack of regular, consistent and methodologically harmonised surveys across the EU Member States challenges the coverage and the comparability of such data, being an important gap for the use of these indicators. To overcome the lack of regularity and timeliness of the data, the development of food consumption indicators using data from national dietary surveys to monitor dietary components of healthy diets is being explored.

Health impact of diets: Reversing of the rise in overweight and obesity rates across the EU by 2030. The indicator as reported in Eurostat indicates that the proportion of overweight adults in the EU has slightly increased from 51% in 2014 to 53% in 2019. Reversing the prevalence of overweight in the EU remains a public health challenge considering the negative trends observed.

Indicator: Obesity rate by body mass index (Source: Eurostat).

Food security: Ensuring food security and access to quality, safe, sustainable, nutritious food for all. In 2022, the FAO estimated that 7.8% of the population in Europe experienced moderate or severe food insecurity. Among EU countries, values for 2022 ranged between 2% in Italy and 19% in Romania. Analysis of the trends indicate prevalence of food insecurity has slightly improved until 2019 but reversed in the last years.

Indicator: Prevalence of moderate or severe food insecurity in the EU population (Source: FAO).

Resilience



Preparedness, shock resilience, adaptation and transformation: Strengthen the resilience of the EU food system. Build up resilience to climate change, possible future diseases and pandemics. Increasing the sustainability of food producers will ultimately increase their resilience. In the absence of agreed categories and calculation methodology, currently, the resilience of food system cannot be described with a single indicator.

Implementation challenges

Note: This section is grounded on the *Report from the Commission (COM(2023)707) on the summary of CAP Strategic Plans (CSPs) for 2023-2027* [8]. In addition, the EIR 2022, the *Climate Action Progress report* and the draft assessment of NECPs were consulted, as well as the ESABCC report on climate neutrality [6], [10], [15]. This section will be expanded providing a focus on selected enablers to possibly overcome challenges and support a more sustainable food system in the EU in the follow-up of this report.

As far as the primary production is concerned, the Report from the Commission on the summary of CAP Strategic Plans (CSPs) for 2023-2027 provides first qualitative indications on the Plans' combined efforts towards the CAP's objectives [8]. The CSPs are the single planning tool for Member States with a view to move towards a performance-based CAP implementation. By addressing their specific needs the CSPs are expected to be consistent with and contribute to the Union's environmental and climate legislation and commitments, contributing to meet the 2030 targets outlined in the Farm to Fork Strategy and the EU Biodiversity Strategy. The analysis recognises that the implementation of the Plans has had limited impact so far given the timing, with first data on the implementation only available in 2025.

Income support and viability

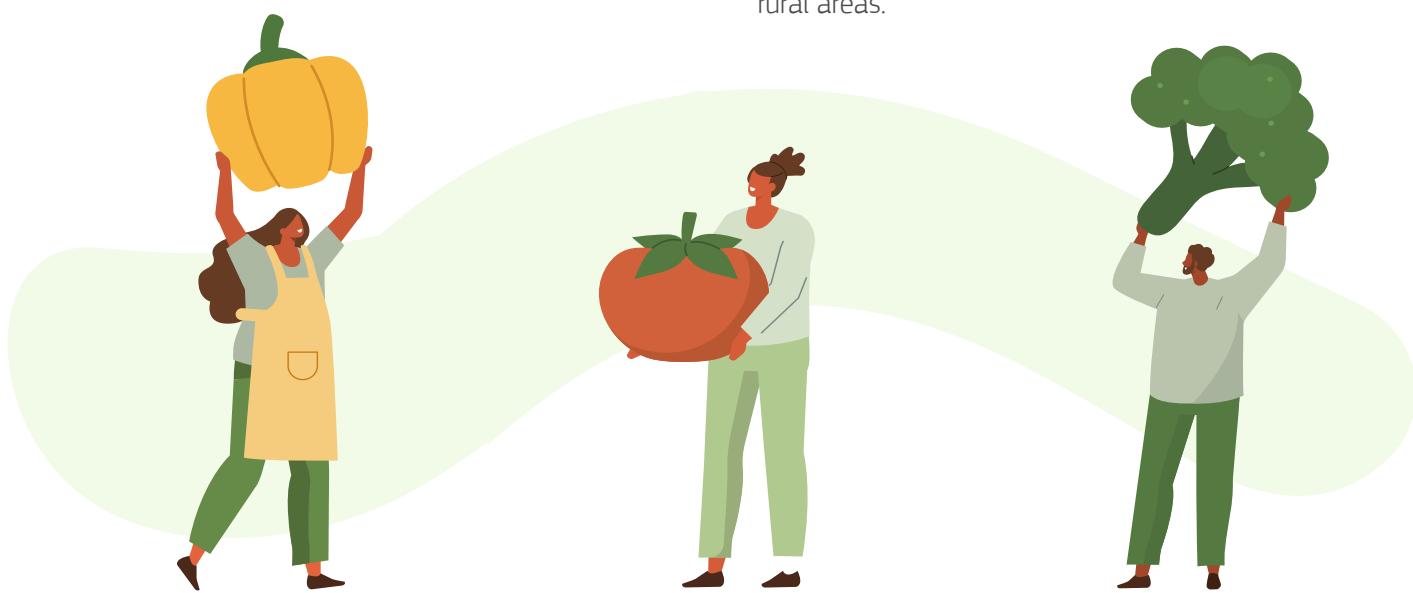
Despite farm modernisation and consolidation dynamics to date, agricultural income remains significantly lower than the average wage in the rest of the economy of all Member States. CAP support plays a significant role in many sectors and MS although unevenly distributed. Many Member States continue to face challenges with sluggish (and sometimes stagnant) growth in agricultural productivity, further strained by high costs, particularly in labour and land. The CSPs emphasise enhancing productivity and encouraging the adoption of innovative practices and technologies to address these issues.

Environmental and Climate Goals

Important challenges remain in terms of the status of biodiversity, especially on intensively farmed land. The report by the European Scientific Advisory Board on Climate Change [10] asks for more support and ambitious measures and incentives to meet the emission and pollution reduction targets. In addition, the State of the Energy Union Report 2023 (COM(2023) 650) [72] and Climate Action Progress Report 2023 [15] highlight that progress in emission reduction has been recently far too slow in agriculture, i.e. stable at the same level as ten years ago. Furthermore, reducing non-CO₂ emissions is also important to achieve the ESR targets, and around half of the non-CO₂ emissions come from the agriculture sector. In this regard, the ESABCC acknowledges that the contribution to climate change mitigation is largely qualitative under the CAP, which might result in inconsistent CSPs by Member States with respect to the EU climate goals. In turn, this is also due to the lack of GHG emission-pricing regimes in the agricultural sector.

Socio-economic disparities

There are socio-economic challenges within the agricultural sector and rural areas, such as ageing workforce and a decline share of rural employment, access to capital, basic services and infrastructures especially in remote areas. These challenges are considered to undermine the long-term sustainability and attractiveness of farming as a career, in turn undermining EU food security, and the resilience of EU rural areas.



Technological and Innovative Practices

Adoption of innovative practices and technologies is still slow, which hampers productivity growth and environmental sustainability. Investment in such areas is critical but the planned financial allocation does not appear to match the broad range of needs.

Resource Efficiency

Issues like water scarcity, nutrient management, and the reduction of chemical inputs are prominent. While some plans aim to address these through improved management practices and investments, greater collective effort is required to meet the environmental targets set by the EU. This is confirmed by the Environmental Implementation Review 2022, which reports that over 70% of Member States are at a high risk of not meeting their ammonia emission reduction targets for 2020-2029 and beyond 2030. To comply with these targets, it is crucial to adopt low-emission agricultural practices, particularly in livestock, manure, and fertiliser management. A number of Member States have problems in relation to the implementation of the Nitrates Directive and should step up their efforts to further reduce nitrate pollution from agriculture in groundwater and eutrophication.

Sustainable Food System

The Farm to Fork, the Common Agricultural Policy and the Common Fisheries Policy are the foundations, together with the EU Biodiversity strategy and the EU forest strategy, for a transformative change towards a sustainable food system, fisheries and forest management in the EU as envisaged by the EGD. The transition to a more sustainable food system should include identifying cross-sectoral mitigation

opportunities, including both technological and behavioural options [189]. However, many challenges persist and the outcome of the CSPs will also depend on many external factors, as well as farming community's level of engagement, according to the Commission report. Besides, the ESABCC registered both a policy and ambition gaps with respect to the initial schedule under the EGD and the Farm to Fork initiative, with no legislative framework proposed for sustainable food system in the EU. The first step was the launch of a strategic dialogue on the future of the EU agriculture between key EU food system stakeholders in January 2024. The dialogue aims at developing a joint understanding and a common vision around four major questions raised by President von der Leyen at the launching event, namely regarding how to ensure a fair standard of living to farmers and rural communities, the support to agriculture within the planetary boundaries, and the role of knowledge and technological innovation in agriculture while staying competitive, and the role of EU's food systems in the world. Additional input will be harvested by consulting EU-wide organisations present in Commission consultative bodies with an interest in the future of EU Agriculture. Finally, the transition towards more sustainable food systems is challenged by personal choices, which could also be driven by low income households and food affordability. The Farm to Fork strategy acknowledges that shifting towards healthier and plant-based diets is key to change consumption patterns, curb food waste, and eventually contributing to GHG emission reduction. Consumer behaviours, often influenced by a lack of transparency and difficulty in accessing sustainable food options, further complicate efforts towards a more sustainable food system.



Key messages

- The EU food system provides food to over more than 450 million people in the EU and many more around the world, contributing to the EU's economic development and employment.
- While it is a competitive and diversified sector, the EU food system faces challenges regarding the environment, health, society and economy. A system approach is needed to tackle these challenges, encompassing all sustainability dimensions and involved actors.
- To achieve the overall 55% net GHG reduction target in the EU by 2030, further efforts are also needed in the food system. Progress is ongoing but is hindered by data gaps and the unpredictability of certain components of the GHG food system emissions indicator.
- Meeting reduction targets for more hazardous pesticides and nutrient losses remains challenging and requires acceleration.
- Available data indicate that further efforts are necessary in particular to expand the area of organic farming, reduce fishing pressure, and address issues related to food waste reduction.
- While overall productivity in the agrifood sector has grown, also energy consumption in agriculture, forestry, and the food industry has increased, necessitating improved energy efficiency.
- The consumption footprint of food showed an increasing trend, primarily driven by animal-based products (despite recent decreasing trends of pro-capita consumption for bovine and pig meat). The EU food system contributed to the transgression of some planetary boundaries.
- The agrifood sector, mainly primary production, shows a structural reduction in employment, indicating that there is still work to be done in creating new job opportunities and reducing socio-economic disparities. Next Generation Access broadband availability in rural areas has significantly improved; however, acceleration is needed to achieve the objective of 100% coverage by 2025.
- The EU faces public health challenges from unhealthy diets, including high rates of overweight, obesity, and non-communicable diseases, which pose significant health and economic burdens. Addressing these issues alongside the transition to more sustainable diets requires creating food environments that offer more affordable healthy and sustainable food choices, particularly for low-income groups, to improve health and ensure food security.
- The CAP Strategic Plans are designed to implement the CAP objectives while contributing to the EU's climate ambitions and the Farm to Fork and Biodiversity goals. Achieving these goals will require addressing socio-economic disparities, ensuring wider technological innovation uptake and full consistency with quantitative EU GHG reduction targets, fostering climate resilience, and behavioural change. A concerted effort is needed to enable low-emissions agriculture, combining policy ambition, community engagement, and support for vulnerable actors.

A honeybee sips nectar from a lavender flower
Photo by David Clode on Unsplash

06

Preserving and protecting
biodiversity

A close-up photograph of a bee with brown and yellow stripes on its body, covered in pollen, hovering over a purple flower. The flower has several stamens visible. The background is a soft, out-of-focus green.

2 ZERO HUNGER



6 CLEAN WATER AND SANITATION



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



14 LIFE BELOW WATER



15 LIFE ON LAND



Preserving and protecting biodiversity

Factsheet

Enabling transformative change is one of the main purposes of the *EU Biodiversity Strategy* and the consequent *Nature Restoration Law* and *New EU Forest Strategy*. Together and in tandem with other initiatives (e.g. the *Farm to Fork* and *Chemical Strategy*), they aim to ensure that biodiversity is considered in the economy and society, addressing the direct as well as indirect drivers of biodiversity loss. In particular, the EU puts the concept of healthy soils at the core of the European Green Deal, with the *Soil Monitoring Law* and the *EU Soil Strategy for 2030* issued in 2021 and 2023 respectively.



Policy context

33

Quantifiable targets

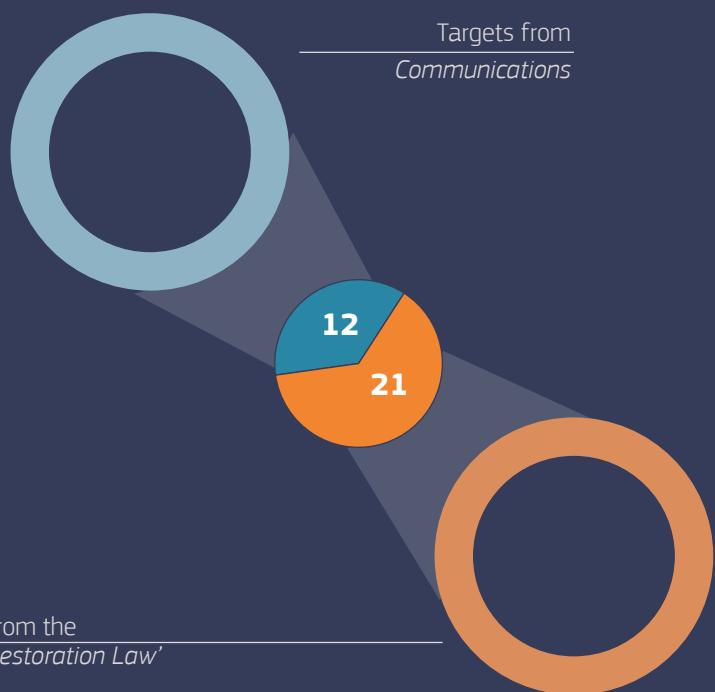
extracted from Policy Documents
in this Thematic Area

85%

of all targets assessed
in this Thematic Area are
legally binding

42%

of all targets assessed
regard **habitat restoration**
and preservation



FISHERIES & ACQUACULT.

Ocean Pact
1 target

SOIL

EU Soil Strategy
1 target

HABITATS PROTECTION

EU Biodiversity Strategy
2 targets

FORESTS ECOSYSTEMS

EU Biodiversity Strategy
2 targets

HABITATS RESTORATION

EU Biodiversity Strategy
2 targets

Nature Restoration Law
11 targets

Nature Restoration Law
3 targets

POLLINATORS

EU Biodiversity Strategy
1 target

Nature Restoration Law
1 target

AGRICULTURAL ECOSYST.

EU Biodiversity Strategy
2 targets

Nature Restoration Law
3 targets

PESTICIDES AND FERTIL.

EU Biodiversity Strategy
2 targets

INVASIVE ALIEN SPECIES

EU Biodiv. Strategy 1 target

URBAN ECOSYSTEMS

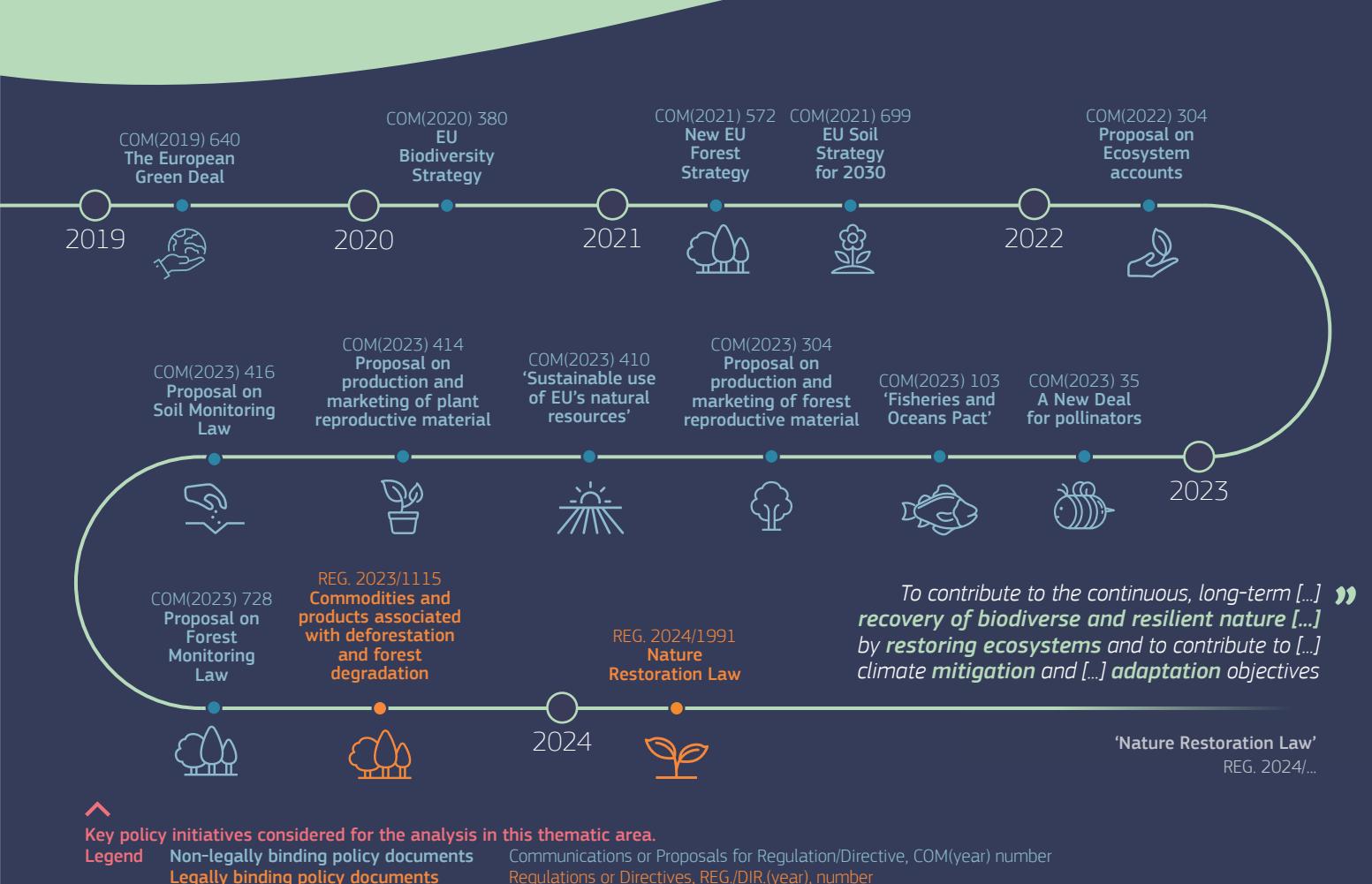
EU Biodiv. Strategy 1 target



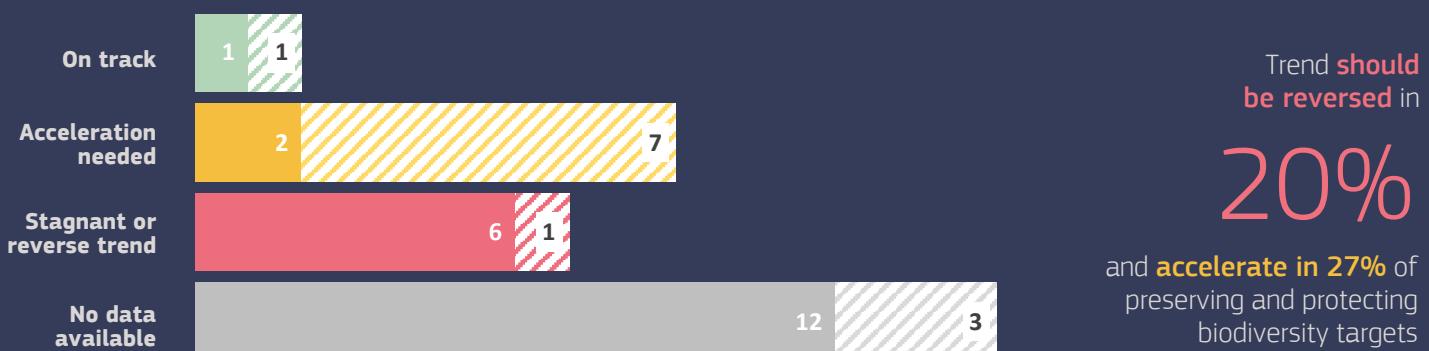
Number of targets per policy document

and topic detected in the analysis. Targets from the *Biodiversity Strategy* and *Nature Restoration Law* are displayed, but are **not double-counted for the progress assessment**.

Legend
Non-binding targets from Communications
Binding targets from Directives and Regulations



Progress towards the targets



Legend

- Targets from Regulations or Directives
- Targets from Communications

Contribution to the 2030 Agenda



Targets of this thematic area mostly contribute to many 2030 Agenda SDGs, such as **15.1 (terrestrial and inland freshwater ecosystems)**, **15.4 (mountain ecosystems)**, **15.5 (biodiversity loss)**, and **15.3 (soil)**.

They also foster **SDGs 14, 2, 11, 12 and 6**.

06. PRESERVING AND PROTECTING BIODIVERSITY

Policy context

The Convention on Biological Diversity (a tool of Agenda 21) comprehends the action plan for biodiversity conservation at the global, national and local level by organisations of the United Nations System. It defines biodiversity as more than living beings and their ecosystems, including people, their need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. This definition is used throughout this chapter, focusing on three key aspects of biodiversity mentioned in the European Green Deal: nature protection and restoration, soil quality and biodiversity in the economy and society. To do so, the concept of sustainable use is defined in Article 2 of the Convention on Biological Diversity as the use of components of biodiversity *in a way and at a rate* that allows the long-term maintenance or improvement of biodiversity for the generations to come. This approach agrees with the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Assessment Report on Sustainable Use of Wild Species [190], which speaks about the social-ecological systems and the sustainable use that allows their functioning while contributing to human well-being [191].

Moreover, the concept of transformative change from the UN Agenda 2030 designates “a fundamental, system-wide reorganisation across technological, economic and social factors, including paradigms, goals and values”, necessary to achieve the SDGs. Change is needed, since biodiversity and ecosystem services are on a trajectory of decline [190]: “goals for 2030 and beyond may only be achieved through transformative changes across economic, social, political and technological factors”. At the EU level, Birds and Habitats Directives [192], [193] are the EU's oldest environmental laws that form the backbone of EU biodiversity policy and are the legal basis for Natura 2000 (i.e. the largest coordinated network of protected areas in the world).

The assessments of habitats and ecosystems [194], [195] show that most habitats protected under the Habitats Directives are in an unfavourable conservation status. The analysis of trends of pressures highlights a mixed picture, but overall, the current potential of ecosystems to deliver services is equal to or lower than the baseline value in 2010. This decrease suggests ecosystem degradation in many jurisdictions. In line with the IPBES, enabling transformative change is one of the main lines of action of the Nature Restoration Law (NRL), the EU Biodiversity Strategy for 2030 (BDS) and the New EU Forest Strategy for 2030, which aims to ensure that biodiversity is considered in the economy and society, addressing the direct as well as indirect drivers of biodiversity loss. In particular, the EU puts the concept of healthy soils at the core of the European Green Deal, with the Soil Monitoring Law and the EU Soil Strategy for 2030, issued in 2021 and 2023 respectively. The mentioned documents aim to ensure that all soils in Member States can provide as many essential ecosystem services as possible and will be substantiated by measurable indicators based on reliable data.

According to the EUSO Soil Health Dashboard [196], [197], 61% of EU soils are affected by one or more soil degradation processes and, therefore, can be considered unhealthy. The current value is in line with the headline assessment made for the establishment of a Mission Soil that 60-70% of the soils of Europe were in an unhealthy state. Soil erosion is the major land degradation process which may threaten land productivity, ecosystem services and food security. The mean soil erosion rates in EU are currently around 2.5 tonnes per hectare per year. This is much higher than the soil formation rates which is between 1-1.4 tonnes per hectare per year and implies that a major part of EU agricultural soils is degrading. Soil erosion has decreased by around 10% in the period 2000-2016

mainly in association with the Good Agricultural and Environmental Conditions introduced in the Common Agricultural Policy (CAP) and awareness raising activities in the Soil Thematic Strategy. Nevertheless, future trends remain alarming due to climate change. Soil loss by water erosion is projected to increase by 13–22.5 % in EU and UK by 2050 [198]. In addition to soil erosion, the EU Soil Observatory estimated carbon changes in agricultural soils based on the Land Use/Land Cover Area Frame Survey [199]. In the EU, the estimated topsoil (0–20 cm) Soil Organic Carbon stock in agricultural land has decreased by 0.75% in the period 2009–2018.

In 2020 the Biodiversity Strategy to 2030 (whose 16 targets are listed in the [EU Biodiversity Strategy Dashboard](#), the EC reporting tool on progress in the implementation of the strategy) was accompanied by the Farm to Fork and Chemicals Strategies, as well as the Circular Economy Action Plan, and the European Climate Law, which included actions to protect the soil. In 2021, these were followed by the Fit for 55 package, the Zero Pollution Action Plan and the EU Soil Strategy for 2030. The new strategy updates the 2006 EU Soil Thematic Strategy and intends to address land degradation in a comprehensive way. Finally, in November 2023 the Council and the European Parliament reached an agreement on the Nature Restoration Law, which is included in the same table as legally binding targets in this report for the sake of better organisation of information, and the Council vote finally approved the law in mid-2024. The amendment to the regulation on Environmental Economic accounts, introducing, ecosystem accounts, also plays a central role, since ecosystem accounting is needed to estimate the dependencies and impacts of economic activities on the biodiversity. Specific laws and actions such as Marine Action Plan [200] are in place to regulate maritime activities, in particular fisheries and aquacultures, and protect and restore marine areas, since the seas offer important ecosystem services to a large part of the EU population, but they are particularly hard to account for.

The rich package of EU laws introduced and proposed aims to mitigate or solve the problems highlighted in the evaluation of the EU Biodiversity Strategy for 2020 [201].

Despite the progress made, there have been significant challenges and gaps in implementation. Funding has increased but has not reached the level needed to meet the needs, and leverage opportunities. Notably, the instruments provided by the EU policies have not been taken up fully in Member States. So far, overall biodiversity protection and restoration have not yet been well integrated into policy and investment decisions. On one hand, robust mechanisms are needed to track progress at the EU level and ensure these measures are implemented. On the other hand, a clearer framework of obligations to ensure predictability and provide a level playing field is also needed.

Finally, data and knowledge gaps remain on ecosystem condition and pressures: more knowledge of the value of natural capital and the cause effect relationships between socio-economic systems and ecosystems is needed to systematically integrate into policy and investment decisions. The latter issues have been partially addressed in the Taxonomy, the Nature Restoration Law, and the ecosystem accounts Regulation. As regards funding, the External Dimension of EU Green Deal, and more specifically the EU spending targets, includes a target on financing the biodiversity objectives [202], [203], [204]. However, this target is not included into the EU Green Deal legislation.



Assessment of progress towards the targets

This section provides an overview of the assessment for the 33 targets identified as relevant for this thematic area. They are extracted from the 'Nature Restoration Law' regulation as well as from communications. Where available, historical trends, data sources and future projections are reported in Annex 6.

Note 1. Many targets from the Nature Restoration Law appear to lack the indicators or data necessary to quantify the state of progress towards the target. The NRL allows, in principle, Member States to use data sets alternative to the EU-level ones. These data sets will have to be scrutinised in the National Restoration Plans drafting process, and if deemed appropriate, Member States will be allowed to use them. Currently, such information is not available.

Note 2. Considering that specific Biodiversity Strategy targets have been turned into binding targets by the Nature Restoration Law, they have been merged and reported in the related table to avoid double counting.

Note 3. The numbering of the Biodiversity Strategy targets make reference to the [EU Biodiversity Strategy Dashboard](#).

BINDING TARGETS

Targets	Assessment
<p><u>Terrestrial ecosystems</u>. Member States shall put in place [...] measures [...] to jointly cover, as a Union target, throughout the areas and ecosystems [...] defined in Art. 2, by 2030, at least 20% of land areas in need of restoration and, by 2050, all ecosystems in need of restoration.</p> <p>'Nature Restoration Law'</p>	<p>Data on restoration has not been systematically collected at the EU level yet.</p> <p></p>
<p><u>Marine ecosystems</u>. Member States shall put in place [...] measures [...] to jointly cover, as a Union target, throughout the areas and ecosystems [...] defined in Art. 2, by 2030, at least 20% of sea areas in need of restoration and, by 2050, all ecosystems in need of restoration.</p> <p>'Nature Restoration Law'</p>	<p>Data on restoration has not been systematically collected at the EU level yet. The EU has reached 12% of Marine Protected Areas (MPA), with less than 1% being strictly protected. The target could be partially achieved if the NRL is immediately implemented (including a clear financial system), along with the targets of the Biodiversity Strategy (i.e. 30% MPA and 10% strictly protected areas), and if Member States react in a timely manner. The complete achievement of the target also depends on the restoration methods used and the specific marine ecosystems to be restored. The recovery period length varies with the marine habitats targeted for restoration. In addition, Member States face several other challenges in implementing these strategies [205]. The actual implementation of the Biodiversity Strategy target on effective marine protected areas (30% overall and 10% strictly protected by 2030), through passive restoration methods, as well as the other directives such as the Water Framework Directive and the Marine Strategy Framework Directive, and the 2023 Marine Action Plan would contribute to achieving this target.</p> <p></p>
<p><u>Terrestrial, coastal and freshwater ecosystems</u>. Member States shall put in place the restoration measures [...] to improve to good condition areas of habitat types listed in Annex I which are not in good condition. Such measures shall be in place: (a) on at least 30% by 2030 of the total area of all habitat types listed in Annex I that is not in good condition [...], and (b) on at least 60 % by 2040 and on at least 90% by 2050.</p> <p>'Nature Restoration Law'</p>	<p>Protected areas do not necessarily mean that they have a restoration programme. Currently, data on the extension of areas under restoration is not available at the EU level.</p> <p></p>
<p><u>Terrestrial, coastal and freshwater ecosystems</u>. Member States shall put in place the restoration measures [...] to re-establish the habitat types listed in Annex I in areas not covered by those habitat types with the aim to reach their favourable reference area. Such measures shall be in place on areas representing at least 30% of the additional overall surface needed to reach the total favourable reference area of each group of habitat types listed in Annex I [...] by 2030, at least 60% by 2040, and 100 % by 2050.</p> <p>'Nature Restoration Law'</p>	<p>Data on the extension of areas under restoration measures are not yet available at the EU level.</p> <p></p>

Habitats Restoration

Terrestrial, coastal and freshwater ecosystems.

Member States shall put in place the restoration measures for the terrestrial, coastal and freshwater habitats of the species listed in Annexes II, IV and V to Directive 92/43/EEC and of the terrestrial, coastal and freshwater habitats of wild birds covered by Directive 2009/147/EC [...] to improve the quality and quantity of those habitats, including by re-establishing them, and to enhance connectivity, until sufficient quality and quantity of those habitats is achieved.

'Nature Restoration Law'



Terrestrial, coastal and freshwater ecosystems.

Member States shall ensure that condition is known for at least 90% of the area distributed overall habitat types listed in Annex I by 2030 and 100% by 2040.

'Nature Restoration Law'



Terrestrial, coastal and freshwater ecosystems.

Member States shall ensure that there is: (a) an increase of habitat area in good condition for habitat types listed in Annex I until at least 90% is in good condition and until the favourable reference area for each habitat type in each biogeographic region of the Member State concerned is reached; (b) an increasing trend towards the sufficient quality and quantity of the terrestrial, coastal and freshwater habitats of the species referred to in Annexes II, IV and V to Directive 92/43/EEC and of the species covered by Directive 2009/147/EC.

'Nature Restoration Law'



Natural connectivity of rivers and natural functions of the related floodplains.

Member States shall make an inventory of artificial barriers and remove them to connectivity of surface waters and, taking into account their socio-economic functions, identify the barriers that need to be removed to contribute to the achievement of the restoration targets set out in Article 4 of this Regulation and of the objective of restoring at least 25.000 km of rivers into free-flowing rivers in the Union.

'Nature Restoration Law'

(Parallel target of the Biodiversity Strategy: "11. At least 25.000 km of free-flowing rivers are restored")



Marine ecosystems. Member States shall put in place the restoration measures [...] to improve [...] areas of habitat types listed in Annex II which are not in good condition. Such measures shall be in place: (a) on at least 30% by 2030 of the total area of groups 1–6 of habitat types listed in Annex II [...]; (b) on at least 60% by 2040 and on at least 90% by 2050 of the area of each of the groups 1–6 of habitat types listed in Annex II [...]; (c) on at least two thirds of the percentage, referred to in point (d), by 2040 of the area of group 7 of habitat types listed in Annex II [...]

'Nature Restoration Law'



The EU has reached only 12% of MPA, with less than 1% being strictly protected. In addition, for sea bird species connectivity, it is important to align the BDS and the REPowerEU targets. For habitat connectivity, it is crucial to develop a useful indicator in time for Member States' reporting. Because of the recent approval of the Nature Restoration Law, not enough data is available yet.

Considering the last report on the conservation status and trends in conservation status of marina habitats, a significant percentage of their status remains unknown [206]. Member States should implement more effective monitoring program to assess the status of marine habitats to achieve this target.

The EU has reached so far 26% terrestrial protected area and 12% of MPA.

The JRC and the EEA are developing an indicator to characterise the number of free-flowing rivers, no data is available yet.

The EU has reached only 12% of MPA, with less than 1% being strictly protected. The target could be partially achieved if the NRL is immediately implemented (including a clear financial system), along with the targets of the Biodiversity Strategy (i.e. 30% MPA and 10% strictly protected areas), and if Member States react in a timely manner.

The complete achievement of the target is strictly dependent on the restoration methods and selected marine ecosystems to be restored. The timescale of the recovery period varies as diverse are the marine habitats to restore. Beyond this there are other challenges that Member States have to face [205].

The actual implementation of the BDS target on effective marine protected areas (30% overall and 10% strictly protected by 2030), through passive restoration method, as well as the other directives (e.g. WFD and MSFD), and the 2023 Marine Action Plan would contribute to achieve this target.

Regarding the condition and restoration, there are only two ways to judge this: (a) comparison with old large fully protected MPA, and (b) the use of indicators, some of which still need to be developed. There is no data on how impacted most areas are, but indicators such as present fishing activities altering food webs, or bottom trawling and dredging destroying benthic habitats, would contribute to the final assessment. However, the precautionary principle should be applied, assuming marine ecosystems everywhere are impacted unless evidence suggests otherwise.

Habitats Restoration

Marine ecosystems. Member States shall put in place the restoration measures that are necessary to re-establish the habitat types of groups 1–6 listed in Annex II in areas not covered by those habitat types with the aim to reach their favourable reference area. Such measures shall be in place on areas representing at least 30% of the additional overall surface needed to reach the total favourable reference area of each group of habitat types, as quantified in the national restoration plan referred to in Article 12, by 2030, at least 60% of that surface by 2040, and 100% of that surface by 2050.

['Nature Restoration Law'](#)

Considering the last report on the conservation status and trend in conservation status of marine habitats, most of the marine areas are between categories UNFAVOURABLE (U1/U2) and UNKNOWN (XX) status.

There are some examples of restoration measures already put in place across European Sea, but without an immediate implementation of NRL, as well as other directives (e.g. BDBS, WFD, MSFD), the EGD target would not be achieved

Additional observation: As mentioned before, marine restoration can be achieved passively by no take MPA. Therefore, the increase in area that is fully protected would be a reasonable indicator of restoration. To the best of available knowledge, there is no evidence that part-protection works. Evidence of recovered species usually appear within five years but full recovery e.g. of urchin-kelp trophic cascades, may take 20 years. Since restoration is by definition a return to fully natural conditions, partly protected areas do not qualify as restoration.



Regarding the condition and restoration of marine areas, there are only two ways to judge this: (a) comparison with old, large fully protected MPA, and (b) the use of indicators, some of which still need to be developed. There is no data on how impacted most areas are, but indicators such as current fishing activities altering food webs, or bottom trawling and dredging destroying benthic habitats, would contribute to the final assessment. However, the precautionary principle should be applied, assuming marine ecosystems everywhere are impacted unless evidence suggests otherwise.

Marine ecosystems. Member States shall ensure, by 2030 at the latest, that the condition is known for at least 50% of the area distributed over all habitat types listed in groups 1–6 of Annex II. The condition of all areas of groups 1–6 of habitat types listed in Annex II shall be known by 2040. Member States shall also ensure, by 2040 at the latest, that the condition is known for at least 50% of the area distributed over all habitat types listed in group 7 of Annex II. The condition of all areas of group 7 of habitat types listed in Annex II shall be known by 2050.

['Nature Restoration Law'](#)

In the last report on the conservation status and trend in conservation status of marine habitats, there is still a quite important percentage of marine environments with UNKNOWN status (either XX or U1/U2) [206]. Member States should implement more effective monitoring programmes to assess the status of marine habitats in order to achieve the EGD target.



Habitats Restoration

By 2030, Member States shall ensure that there is no net loss in the total national area of urban green space, and of urban tree canopy cover in urban ecosystem areas. Member States may exclude from that total national area the urban ecosystem areas in which the share of urban green space in the urban centres and urban clusters exceeds 45% and the share of urban tree canopy cover therein exceeds 10%.

['Nature Restoration Law'](#)

Recent EU-wide data to measure this target according to the reference year of the regulation is not available yet. However, national data from Member States might be available



Member States shall achieve thereafter an increasing trend in the total national area of urban green space, including through the integration of urban green space into buildings and infrastructure, in urban ecosystem areas, determined in accordance with Article 14(4), measured every six years after 31 December 2030, until a satisfactory level identified in accordance with Article 14(5) is reached.

['Nature Restoration Law'](#)

Data on urban green space is not yet available, nor is the implementing act that provides a methodology to identify satisfactory levels.



Member States shall achieve, in each urban ecosystem area, determined in accordance with Article 14(4), an increasing trend of urban tree canopy cover, measured every six years after 31 December 2030, until the satisfactory level identified in accordance with Article 14(5) is reached.

['Nature Restoration Law'](#)

Data on tree canopy cover is not yet available, nor is the implementing act that provides a methodology to identify satisfactory levels.



Member States shall, by putting in place in a timely manner appropriate and effective measures, improve pollinator diversity and reverse the decline of pollinator populations at the latest by 2030 and thereafter achieve an increasing trend of pollinator populations, measured at least every six years from 2030, until satisfactory levels are achieved, as set in accordance with Article 14(5).

['Nature Restoration Law'](#)

Parallel target of the Biodiversity Strategy: "5. The decline of pollinators is reversed"

Urban Ecosystems

Based on trends in the grassland butterfly index, pollinators are still declining. Another indicator that would include more pollinators is under development to better characterise the decline of pollinators.



Pollinators

Member States shall achieve an increasing trend at national level of at least six out of seven of the following indicators in forest ecosystems, as further set out in Annex VI, chosen on the basis of their ability to demonstrate the enhancement of biodiversity of forest ecosystems within the Member States concerned: (a) standing deadwood (b) lying deadwood (c) share of forests with uneven-aged structure (d) forest connectivity (e) stock of organic carbon (f) share of forests dominated by native tree species (g) tree species diversity.

'Nature Restoration Law'

Member States shall achieve an increasing trend at national level of the common forest bird index, as further set out in Annex VI, measured in the period from the date of entry into force of this Regulation until 31 December 2030, and every six years thereafter, until the satisfactory levels identified in accordance with Article 11(3) are reached

'Nature Restoration Law'

Parallel target of the Biodiversity Strategy: "4. By 2030, significant areas of degraded and carbon-rich ecosystems are restored. Habitats and species show no deterioration in conservation trends and status; and at least 30% reach favourable conservation status or at least show a positive trend"

When identifying and implementing the restoration measures to meet the objectives and obligations set out in Articles 4, 6, 7, 8, 9 and 10, Member States shall aim to contribute to the commitment of planting at least three billion additional trees by 2030 at Union level.

'Nature Restoration Law'

Parallel target of the Biodiversity Strategy: "9. Three billion trees are planted in the EU, in full respect of ecological principles"

New target, data not yet available



After a steady decline over the period 1992-2010, common forest bird populations have stopped deteriorating and started showing some signs of recovery since 2010 [2], [207], [208]. Next data points for the common forest bird index will be crucial to confirm this recent increasing trend.



At the time of writing (mid-2024), over 23.000.000 trees have been planted since 2021 (see the [Live Status Counter for EU dashboard](#)). The pace of new trees planted has to massively speed up to reach the target by 2030.



Forests ecosystems

Member States shall put in place measures which shall aim to achieve an increasing trend at national level of at least two out of the three following indicators in agricultural ecosystems, as further specified in Annex IV, measured in the period from the date of entry into force of this Regulation until 31 December 2030, and every six years thereafter, until the satisfactory levels, identified in accordance with Article 14(5), are reached: (a) grassland butterfly index; (b) stock of organic carbon in cropland mineral soils; (c) share of agricultural land with high-diversity landscape features.

'Nature Restoration Law'

Member States shall put in place restoration measures which shall aim to ensure that the common farmland bird index at national level based on the species specified in Annex V reaches the following levels: (a) 110 by 2030, 120 by 2040 and 130 by 2050, for Member States listed in Annex V with historically more depleted populations of farmland birds; (b) 105 by 2030, 110 by 2040 and 115 by 2050, for Member States listed in Annex V with historically less depleted populations of farmland birds.

'Nature Restoration Law'

Member States shall put in place measures which shall aim to restore organic soils in agricultural use constituting drained peatlands. Those measures shall be in place on at least: (a) 30% of such areas by 2030, of which at least a quarter shall be rewetted; (b) 40% of such areas by 2040, of which at least a third shall be rewetted; (c) 50% of such areas by 2050, of which at least a third shall be rewetted.

'Nature Restoration Law'

At the moment the trend in the grassland butterfly index is still declining. The carbon stocks in EU agricultural soils have declined by 0.75% in the period 2009-2018 based on measured LUCAS data. So at the moment at least 2 out of three indicators are moving against the desired direction [199].



The common farmland bird index is steadily decreasing [207], [208].



The EU Soil Observatory (EUSO) established [196], [197] that over 60% of the EU land is affected by soil degradation. This is considered an underestimation due to the lack of data currently available.



Agricultural ecosystems

NON-BINDING TARGETS (FROM COMMUNICATIONS)

Targets	Assessment	
<p><i>1. Legally protect a minimum of 30% of the EU's land area and of 30% of the EU's sea area</i></p> <p>Biodiversity Strategy</p>	<p>The 26% of EU's land area is covered by protected areas, including 18.6% by Natura 2000 designated protected areas and 17.3% by nationally designated protected areas. If the designation of protected areas continues at the rate seen in the past decade (1.7 percentage points increase since 2011), the target will not be met [209].</p>	
<p><i>2.a Strictly protect at least a third of the EU's protected areas</i></p> <p>Biodiversity Strategy</p>	<p>12% of EU's sea area is currently covered by protected areas, including 9% by Natura 2000 designated protected areas and 4.5% by nationally designated protected areas.</p>	
<p><i>2.b Strictly protect all remaining EU primary and old-growth forests</i></p> <p>Biodiversity Strategy</p> <p>Target in common with the New EU Forest Strategy</p>	<p>Indicators are missing to check whether the EU is on track or not. Seven out of the nine actions set in the EU BDS to foster biodiversity protection in the EU still need to be implemented by 2030, but they all appear on track so far. Member States did not report official information reported to EEA. An independent scientific assessment [210] shows that currently only 3.5 % of protected areas are strictly protected.</p>	
	Habitats protection	
<p><i>9. Three billion trees are planted in the EU, in full respect of ecological principles</i></p> <p>Biodiversity Strategy</p> <p>Target in common with the 'Nature Restoration Law'</p>	<p>The target has been welcomed and endorsed by the European Council, which is key for this target. The Commission issued Guidelines [211] for defining, mapping, monitoring and strictly protecting EU Primary and Old-Growth Forests in 2023. However, there is still a lack of a clear, uniform definition of what constitutes primary and old-growth forests. As a result, while it is likely that the target will be met, it remains unclear whether all forests that should be protected will actually receive protection.</p>	
	Forests ecosystems	
<p><i>4. By 2030, significant areas of degraded and carbon-rich ecosystems are restored. Habitats and species show no deterioration in conservation trends and status; and at least 30% reach favourable conservation status or at least show a positive trend.</i></p> <p>Biodiversity Strategy</p> <p>Target in common with the 'Nature Restoration Law'</p>	<p>See table above.</p>	
<p><i>11. At least 25.000 km of free-flowing rivers are restored</i></p> <p>Biodiversity Strategy</p> <p>Target in common with the 'Nature Restoration Law'</p>	<p>See table above.</p>	
	Habitats restoration	
<p><i>5. The decline of pollinators is reversed</i></p> <p>Biodiversity Strategy</p> <p>Target in common with the 'Nature Restoration Law'</p>	<p>See table above.</p>	
	Pollinators	
<p><i>7. At least 10% of agricultural area is under high-diversity landscape features</i></p> <p>Biodiversity Strategy</p>	<p>The JRC has developed an indicator [212] to monitor progress in the share of agricultural area covered by landscape features, showing that currently, at the EU level, 5.6% of agricultural land is covered by landscape features. However, this indicator does not capture high-diversity landscape features and no temporal trend is available, so at this stage no conclusion can be made regarding the likelihood to reach the target.</p>	
<p><i>8. At least 25% of agricultural land is under organic farming management, and the uptake of agro-ecological practise is significantly increased</i></p> <p>Biodiversity Strategy</p> <p>Target in common with the Farm to Fork Strategy, already assessed in Thematic Area 5.</p>	<p>Indicator: Area under organic farming (% of the total utilised agricultural area) (Source: Eurostat). Moderate progress rate, but not enough to reach the target by 2030. The compound annual growth rate (CAGR) is 6.7% per year observed i.e. an increase from 5.6% to 9.1% (2012-2020), while 9.3% per year would be required to meet the target.</p>	
	Agricultural ecosystems	

6. The risk and use of chemical pesticides is reduced by 50%, and the use of more hazardous pesticides is reduced by 50%

Biodiversity Strategy

Target in common with the Farm to Fork Strategy and already assessed in Thematic Area 5

Indicator: Use and risk of chemical pesticides (Source: DG SANTE).

According to a trend analysis by DG SANTE, the use and risk of chemical pesticides decreased by 14% between the baseline period of 2015–2017 and 2020. The use and risk of chemical pesticides shows a decrease of 6% from 2020, and an overall decrease in the first four years of observation of 33% from the baseline period of 2015–2017. These overall downward trends shows that the first part of the target can be achieved by 2030 [182]. On the other side, according to data published by DG SANTE, the use of more hazardous pesticides fell by 21% between the baseline period of 2015–2017 and 2021. The use of more hazardous pesticides shows an increase of 5% from 2020 to 2021. Achievement of the 50% reduction target by 2030 remains challenging. It should be noted, while this indicator intends to monitor the use of the more hazardous pesticides, it does not take into account the exposure and hence the impact they might have on the environment and human health. In the future, this indicator should be complemented with a risk indicator showing changes in the actual risks.



¹It should be noted that the current EU-wide indicator, which applies risk weightings to four different groups of chemical pesticides and is based on pesticide sales, is not considered scientifically robust by some. This indicator is based on a similar harmonised risk indicator, which, according to the European legislation (Commission Directive (EU) 2019/782), is considered hazard-based. This is due to the absence of statistics on the use of plant protection products needed to develop a risk indicator. The Commission is committed to developing more sophisticated indicators in future, such as improved weightings that take hazard properties into account in a more granular way or by using EU-level data on pesticide usage when it becomes available. An example of such an improvement is the new risk indicator assessing the toxicity of pesticide residues in soil from samples collected under the LUCAS Soil Pesticide survey coordinated by JRC. According to this indicator, in 2018, 14% of sites in the EU were at risk of negative effects on soil organisms due to pesticide residues. The analysis of samples from 2022 is currently ongoing and will shed light on the EU's progress towards pesticide risk reductions. This indicator is relevant to only one compartment (soil) but is just one of many being examined for usefulness and relevance. .



13. The losses of nutrients from fertilisers are reduced by 50%, resulting in the reduction of the use of fertilisers by at least 20%*

Biodiversity Strategy

See also assessment in Thematic Area 7

The average river nitrate concentration in Europe decreased steadily over the period 1992–2009 but has levelled off since then. Agriculture remains the main contributor to nitrogen pollution, but the EU Nitrates Directive and national measures have contributed to lower concentrations. However, the apparent stabilisation in recent years calls for further measures.

Pesticides and fertilisers

12. There is a 50% reduction in the number of Red List species threatened by Invasive Alien Species (IAS)

Biodiversity Strategy

The expected acceleration in the number of alien species introductions and establishment due to global trade (including web trade), travel, and climate change, can lead to increased adverse impacts on biodiversity and ecosystems, human health and the economy. The Regulation (EU) 1143/2014 (IAS Regulation) includes a set of measures to be taken across the EU in relation to IAS, aiming to prevent, minimise and mitigate their adverse impacts. The implementation is underpinned by EASIN (European Alien Species Information Network), which also hosts the European early warning system on IAS of Union concern. The actions fostered by the EU biodiversity Strategy for 2030 aim at stepping up the IAS Regulation and other relevant legislation and international agreements with the objective of managing established IAS, decreasing the number of Red List species they threaten.



Invasive Alien Species

14. Cities with at least 20.000 inhabitants have an ambitious Urban Greening Plan

Biodiversity Strategy

No data is yet available.



Urban Ecosystems

Reach no net land take
[EU Soil Strategy for 2030](#)

Over the 2012–2018 period, the majority (78%) of the net land take happened in commuting zones. The net land take in urban areas during 2012–2018 amounted to 2.696 km², corresponding to 450km² annually. 1 415km² or 47% of all land take took place in arable lands, impacting food security, carbon sequestration and the maintaining of biodiversity. The second largest land take took place in pastures – a loss of 945km² or 36% of all land take. Pastures are among Europe's most important biodiversity hotspots and soil carbon sinks.



Soil

In accordance with the CFP, it is crucial to continue and accelerate the work of rebuilding and keeping fish stocks above MSY levels (Maximum Sustainable Yield)
['Fisheries and Ocean Pact'](#)

In the Northeast Atlantic (both EU and non-EU waters), stock status has significantly improved from 2003 to 2021, but still an important share of stocks is overexploited.



Fisheries and Aquacultures

Implementation challenges

Note: This section highlights major challenges in implementing the biodiversity preservation and protection targets. This section is based on critical reviews of the *Environmental Implementation Review 2022*, *Communication on the EU wide assessment of the draft updated National Energy and Climate Plans* (COM(2023) 796) [7], and sectorial reporting. Biodiversity-related initiatives are cross-cutting (they might contribute to initiatives in Thematic Areas 1, 4, 5 and 7), and additional insights may be referenced in other chapters. This section will be expanded to focus on selected enablers aimed at overcoming challenges and enhancing the achievement of the biodiversity preservation and protection targets, in the follow-up of this report.

The Biodiversity Strategy has been designed to work in tandem with many other initiatives (e.g. the Farm to Fork, with which it shares some targets; the new EU Forest Strategy to support sustainable management practices; the Common Agricultural Policy to engage in the transition towards fully sustainable agricultural practices; the new EU Soil strategy to address soil degradation and restoration).

While there are improvements in the preservation and health status of landscapes, habitats, ecosystems, biodiversity, and species, biodiversity in the EU continues to decline and shows deteriorating trends. Net land take still constitutes a major concern, and forests are under significant pressure. Numerous challenges remain in fully implementing biodiversity and nature restoration initiatives. The EIR 2022 country reports indicate that human activities, especially those with economic relevance, are directly or indirectly causing environmental pressures on habitats and species, for example deforestation, habitat loss, and the introduction of invasive alien species. The draft NECPs assessment stresses that nature restoration and Nature Based Solutions should be better integrated into Member States plans, since they contribute to overarching removal targets by LULUCF. However, some Member States still fail to designate special areas of conservation, establish conservation measures and objectives to be compliant with Natura 2000 networks.

Public awareness and the funding for mitigating the harmful consequences of biodiversity deterioration are still lagging behind those related to climate change. Data gaps are still widespread, leaving room for mounting misinformation and resistance to change. Natural capital accounting is promising but needs more development and might not be enough for the management of global commons. Behavioural barriers play a particular role in this thematic area since existing economic incentives do not seem to be sufficient to effectively shift farming practices and dietary changes, which can also play a major role. Additionally, investments, expertise and clear management plans for nature protection and restoration programmes are often lacking. In the framework of the former Natura 2000 and Biodiversity strategy, at least 30% of the European Regional Development Fund (ERDF), 37% of the Cohesion Fund, and 35 % of ‘horizon Europe’ will support climate action (mitigation and adaptation). The 2021–2027 inter-institutional agreement will allocate at least 7.5 % of annual spending to biodiversity objectives in 2024 and 2025 and 10% in both 2026 and 2027 [12].

Most of consulted Local and Regional Authorities (LRAs) claimed to have their own biodiversity strategy and policy targets with proper monitoring systems, often in alignment with national targets, but they are struggling to implement them [77]. Preserving and enhancing

Photo by Douglas Raggio on Unsplash



biodiversity in urban environments is often linked to the implementation of Nature Based Solutions, redesigning public spaces to improve traffic congestion (see thematic trea 4), resilience and adaptability. It involves finding a balance between development programmes, private interests, and allocating areas for improving soil permeability, enhancing green/blue infrastructures and biodiversity while mitigating Urban Heat Islands [213]. However, individual or group interests and priorities might prevail over sustainability criteria, which are also seldom consistently included in the early stages

of design processes [214], [215]. In turn, this might be hampered by pressures from the housing market [216], siloed municipal/regional departments, non-flexible regulatory plans, and urban/regional legislative frameworks (working with mechanisms of “minimum” quantitative standards), difficulties in assessing and communicating economic, social, and environmental values of ecosystem services, a shortage of skills, and insufficient monitoring, report, and verification [35].

Key messages

- The EGD's biodiversity targets aim to protect and restore biodiversity across all EU ecosystems. The implementation of the EU Biodiversity Strategy is driving transformative change and reinforcing the EU's role in global conservation efforts.
- The adopted Nature Restoration Law is a key legal instrument to fulfil the objectives of the EU Biodiversity Strategy, focusing on species and ecosystem restoration. Not only will it make a positive impact on species and ecosystems restoration, but it will also promote data collection for better monitoring and policy implementation.
- Biodiversity targets have a broad scope in the EGD, requiring multiple indicators to assess progress. While some data is available, more is needed for a comprehensive evaluation. Meanwhile, ecosystem restoration and protection remain crucial for progress toward EGD targets.
- The EU Biodiversity and Soil strategies aim to reduce soil contamination, land take and erosion, particularly in agricultural areas. Despite improvements, EU soil data reveals issues, such as expanding contamination and shrinking carbon sinks.
- The EU Forest strategy is expected to accelerate the protection and restoration of EU forests, with the remaining 3% of primary and old-growth forests to be strictly protected by 2029.
- Biodiversity preservation supports human well-being and is strongly connected to food systems and zero-pollution efforts. Protecting biodiversity also helps mitigate risks like new diseases, food shortages, floods, and droughts. Despite progress, biodiversity still continues to decline due to human activities. Funding is insufficient for mitigating the effects, and data gaps persist. EU policy instruments have not been fully adopted by Member States.
- Biodiversity is linked to ecosystem management, especially in the agriculture and forestry sectors. Forest management, which impacts 80% of EU forests, is crucial for forest ecosystem and biodiversity conditions. Agricultural intensification contributes to biodiversity and ecosystem degradation (in particular, the decline of pollinators and soil erosion), while healthy ecosystems are essential for food security. The decline of pollinators can have a huge economic and productivity impact on agriculture.

07

Towards a zero pollution
for a toxic free environment



ution ambition
ronment

Towards a zero pollution ambition for a toxic free environment

Factsheet

The zero pollution vision for 2050 is for air, water and soil pollution to be reduced to levels no longer considered harmful to health and natural ecosystems, that respect the boundaries with which our planet can cope. The EU Action Plan *Towards a Zero Pollution for Air, Water and Soil* is a key deliverable of the European Green Deal. The action plan identifies nine Flagships, such as reducing health inequalities, supporting zero pollution action in cities and across regions and minimising the EU's external pollution footprint. In addition, it identifies 33 key actions, such as the revision of critical legislation on air, water or chemicals.



Policy context

14

Quantifiable targets

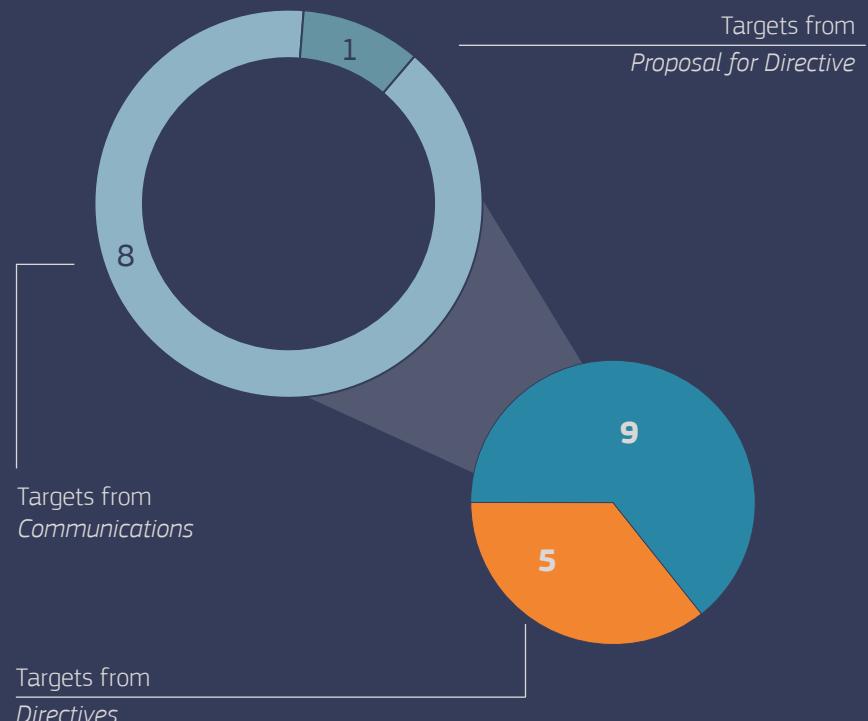
extracted from Policy Documents
in this Thematic Area

35%

of all targets assessed in this Thematic Area come from the **Zero Pollution Action Plan**

20%

of targets assessed
are **legally binding**



SOIL

EU Soil Strategy
3 targets

ENVIRONMENTAL POLLUTION

Zero Pollution Action Plan
5 targets

WASTEWATER

Urban Wastewater Treatment
1 target

WATER QUALITY

'Drinking water Directive'
1 target

Regulation on water reuse
1 target

'Water Quality Directive'
1 target

GHG EMISSIONS

Industrial Emission Directive
1 target

AIR QUALITY

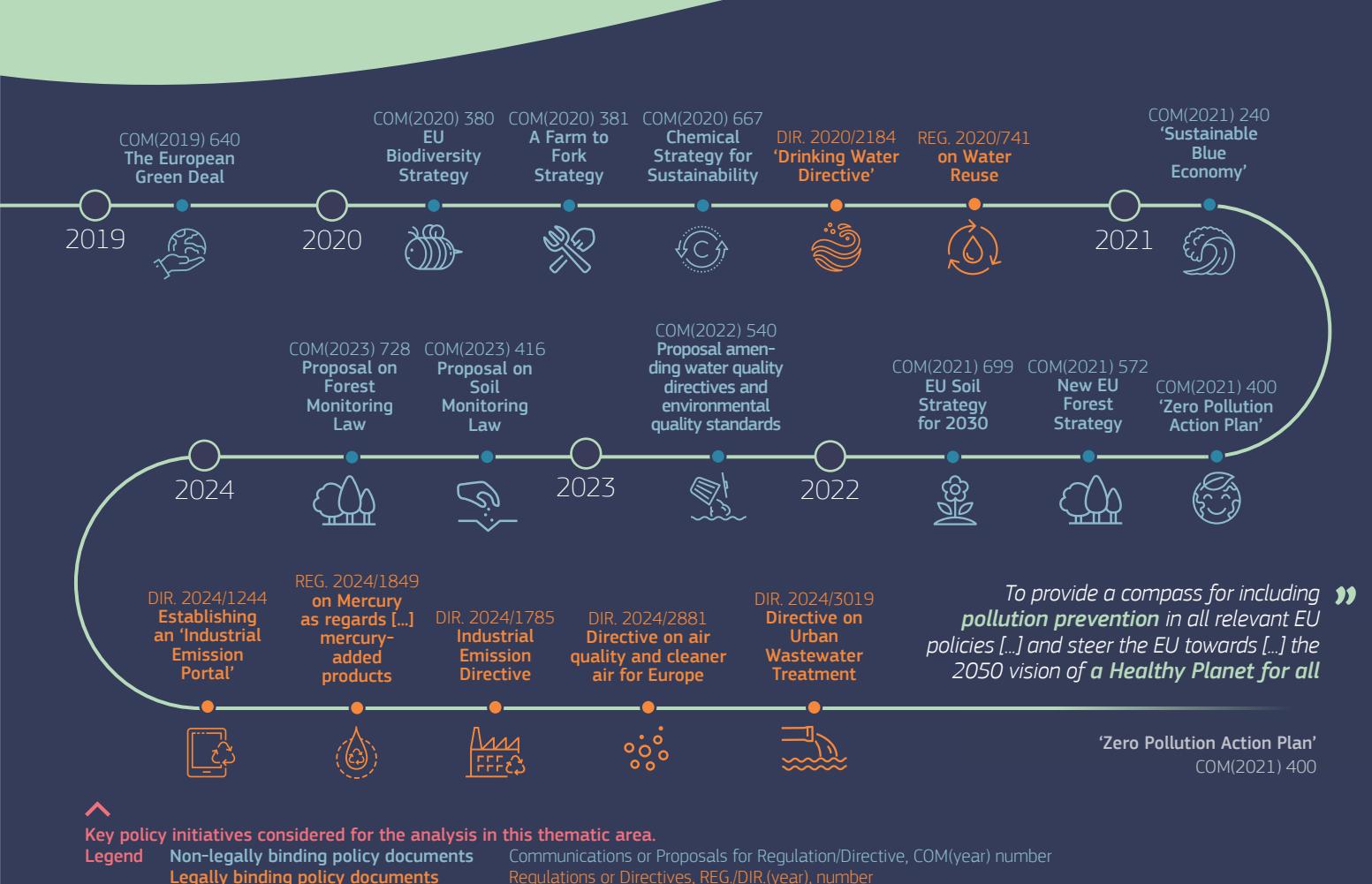
Air Quality Directive
1 target



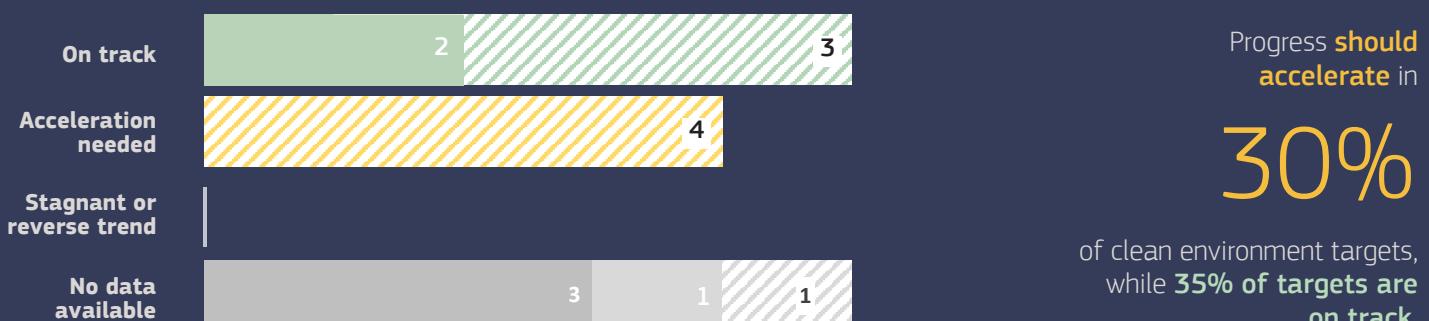
Number of targets per policy document
and topic detected in the analysis

Non-binding targets from Communications and Proposals for Directives/Regulations
Binding targets from Directives and Regulations

Legend



Progress towards the targets



Contribution to the 2030 Agenda



Targets of this thematic area directly contribute to 2030 Agenda SDGs **6.1, 6.2, 6.3 (access to clean water and equitable sanitation), 12.4 (management of chemicals and waste), 11.6 (air quality), 11.1 (sustainable housing), 3.9 (deaths from pollution), 9.4 (sustainable infrastructure), and 15.3 (soil quality)**.

07. TOWARDS A ZERO POLLUTION AMBITION FOR A TOXIC FREE ENVIRONMENT

Policy context

The zero pollution vision for 2050 is for air, water and soil pollution to be reduced to levels no longer considered harmful to health and natural ecosystems, respecting the boundaries within which our planet can cope, thereby creating a toxic-free environment. The European Green Deal announced three headline actions on zero pollution:

- *Zero pollution action plan for water, air and soil* to better prevent, remedy, monitor and report on pollution.
- *Chemicals strategy for sustainability* to protect citizens and the environment from hazardous chemicals.
- Revising measures to address pollution from large industrial installations - to ensure they are consistent with climate, energy and circular economy policies.

On 12 May 2021, the European Commission adopted the EU Action Plan "Towards a Zero Pollution for Air, Water and Soil" [217], a key deliverable of the European Green Deal. This includes key 2030 targets to speed up reducing pollution at source:

- Improving air quality to reduce the number of premature deaths caused by air pollution by 55%;
- Improving water quality by reducing waste, plastic litter at sea (by 50%) and microplastics released into the environment (by 30%);
- Improving soil quality by reducing nutrient losses and chemical pesticides' use by 50%;
- Reducing by 25% the EU ecosystems where air pollution threatens biodiversity;
- Reducing the share of people chronically disturbed by transport noise by 30%, and
- Significantly reducing waste generation and by 50% residual municipal waste.

The action plan identifies nine Flagships, such as reducing health inequalities, supporting zero pollution action in cities and across regions and minimising the EU's external pollution footprint. In addition, it identifies 33 key actions, such as the revision of critical legislation on air, water or chemicals (see the [Action tracker](#)).

The first Zero Pollution Monitoring and Outlook (ZPMO)

[218], published on 8 December 2022, offers a snapshot of the current state of the pollution in the EU, and answers questions on the pollution trends over the past years, and give an outlook on whether the EU is likely to achieve the 2030 zero pollution targets. The ZPMO is a joined effort of the European Environment Agency (EEA) on monitoring and of the JRC on outlook. A new edition will be published in 2024. This work is an integral part of the 8th Environment Action Programme (EAP) monitoring framework [2], [219], which sets out key indicators per priority objective and other sector-specific monitoring tools, or highlights that there are still knowledge and data gaps in some areas (e.g. noise pollution, microplastics and pesticides). Similarly to climate and energy predictions, it also establishes a forward-looking analysis based on modelling capacities in the areas of air, water and marine, as well as an integrated environmental assessment based on consumption patterns and, in the future also other areas (e.g. soil ecosystems).

Water pollution

The Zero Pollution Action Plan (ZPAP) enhances the protection of water resources from pollution including the revision and review of Directives on drinking water, bathing water, urban wastewater, nitrates and sewage sludge as well as water reuse. In addition, the implementation of the Framework Directives on water (WFD) [220] and marine strategy (MSFD) [221] are key to ensure the quality of freshwater and marine environments.

A legislative proposal to revise the Urban Wastewater Treatment Directive (UWWTD) [222], which will have an important contribution to reducing pollutants in urban wastewater emissions [223], has been put forward and adopted in November 2024. The new Directive includes emerging pollutants, new pollution sources and specific policy targets, with reinforced requirements for nutrients, new standards for micro pollutants combined with a producer responsibility system making industry pay for the additional treatment, measures to prevent

and manage pollution from polluted rainwaters, and obligations to monitor health relevant parameters in wastewaters.

Among emerging water pollution issues, these efforts also address plastic pollution by targeting the reduction of macro- and microplastics in the environment as well as associated risks from micropollutants (e.g. chemicals in plastics, per- and polyfluoroalkyl substances or pharmaceuticals). Many of these emerging pollutants are part of the Commission's proposal to revise the lists of pollutants in surface water and groundwater, which was published in October 2022, as well as of the revised UWWT. The Water Reuse Regulation sets out harmonised minimum water quality requirements for the safe reuse of treated urban wastewaters in agricultural irrigation, including monitoring requirements, risk management provisions and provisions on transparency.

Air pollution

Air pollution is the single largest environmental health risk in the EU and causes significant damage to ecosystems. As part of the European Green Deal's zero pollution ambition, on 26 October 2022 the Commission tabled a proposal for a revision of the Ambient Air Quality Directive [224]. The Directive sets air quality standards for 2030 that are more closely aligned with the World Health Organization's recommendations [225], as updated in 2021.

It also includes a mechanism for the standards' regular review based on the latest scientific information. To achieve them on time, the Member States, where relevant, should establish air quality plans before 2030. Provisions on air quality monitoring and assessment have also been updated, including through new requirements for monitoring pollutants of emerging concern, such as ultrafine particles.

Noise pollution

The ZPAP aims to address noise pollution by reinforcing and further contributing to the objectives of the Environmental Noise and the Outdoors Noise Directives. This includes better tackling noise at its source, such as by improving the EU noise-related regulatory framework for tyres, road vehicles, railways, aircrafts (also at the international level), as well as outdoor equipment.

Addressing noise pollution is important for a green and just transition, particularly from an equity perspective, as low-income communities, minorities and migrants are on average more affected by transport noise.

Soil pollution

The EU Soil Strategy for 2030, issued in 2021, and the Soil Monitoring Law, proposed in 2023,

put healthy soil at their heart addressing also soil pollution with measures to identify and remediate contaminated sites. The Soil Strategy has a long-term objective that, by 2050, soil pollution should be reduced to levels no longer considered harmful to human health and natural ecosystems, while respecting the boundaries within which our planet can cope, thereby creating a toxic-free environment. Preventing diffuse and point-source soil pollution remains the most effective way to ensure clean and healthy soils in the long-term. This can be achieved through non-polluting industry practices, sustainable product design, improved recycling, waste management, nutrient recovery and more efficient fertiliser application, alongside a reduced use of pesticides and antimicrobials. As part of this Strategy, a key element that will be improved is the consideration of soil biodiversity in environmental risk assessment for chemicals, food and feed.

In a proposal for a Soil Monitoring and Resilience Law, the Commission has suggested that the concentration of a number of metal elements should be measured while the levels of a selection of organic contaminants can be established by the Member States that consider existing concentration limits for water quality and air emissions in Union legislation. Member States should also establish a spatial inventory and register of contaminated sites that pose a significant risk to human health and the environment.

Finally, the Commission is considering the development of an EU priority list for contaminants of major and/or emerging concerns that pose significant risks for European soil quality and for which vigilance and priority action at EU and national level would be needed.

Industrial Emissions Directive

A revised and strengthened Industrial Emissions Directive (IED) has been adopted and will enter into force, once it is published in the Official Journal of the EU. The co-legislators co-signed the revised IED on 24 April 2024. The current directive [226] covers around 52,000 large industrial installations and intensive livestock farms in Europe. These installations must comply with emissions conditions by using "Best Available Techniques", which are agreed upon by industry representatives, non-governmental organisations (NGOs), and Member States competent authorities. The revised IED aims to promote innovation, support frontrunners, and create a level playing field in the EU market.

Key elements of the revised Directive include the establishment of the Innovation Centre for Industrial Transformation and Emissions (INCITE) to provide clear guidance to industry on effective investments to reduce emissions effectively, the promotion of deep transformation allowing substantial reductions in GHG

emissions, a simplified permitting process for livestock rearing, the widening of the IED's scope to cover new industrial activities, notably the inclusion of batteries giga-factories, and mining activities (i.e. extraction of metals). The IED is a key instrument to support the transition of the EU industry towards a climate neutral, clean and circular economy. The revised legislation will lead to a considerable reduction of pollution from industry and level the playing field. For example, it is expected to deliver up to a 40% additional reduction of key air pollutants by 2050 at the latest.

The new EU Industrial Emissions Portal Regulation (IEPR) will also improve the reporting of and access to data related to the environmental impact of industrial installations (emissions of pollutants, consumption of water, energy and raw materials). The IEPR entered into force on 22 May 2024 (repealing the European Pollutant Release and Transfer Register) and applicable from 1 January 2028. The IEPR aligns the scope and reporting level with the revised IED, modernises rules on updating the list of pollutants and provides for reporting on resource use and contextual information and enhances data quality.

Chemicals Strategy for Sustainability (CSS)

The strategy, adopted by the Commission in 2020 [227], aims to ensure that chemicals are produced and used safely and sustainably by 2030. The CSS includes 85 actions designed to mitigate the negative impacts of chemicals on human health and the environment, while maximising their benefits for the economy and society. The CSS proposed a revision of the CLP (Classification, Labelling and Packaging) Regulation, introducing new hazard classes for endocrine disruptors and other harmful substances [228].

In 2023, the Commission proposed a revision of the Mercury Regulation that was adopted in May 2024, and the "One substance, one assessment package" with three legislative proposals to: streamline assessments of chemicals across EU legislation; strengthen the knowledge base on chemicals; and ensure early detection and action on emerging chemical risks. Specifically, the Mercury Regulation aims at addressing the last intentional uses of mercury in the EU. The new provisions prohibit the use and export of dental amalgam by 1 January 2025 and prohibit the manufacture, import and export of certain categories of mercury-containing lamps as of 31 December 2025 and 31 December 2026 (depending on the lamp category). The revision of the Mercury Regulation contributes to the Zero Pollution goal to create a toxic-free environment, as mercury is a highly toxic substance and exposure to high levels of

mercury can be extremely damaging to human health and the environment. The Mercury Regulation is the most comprehensive EU legal instrument, addressing the entire life cycle of mercury from primary mining to final waste disposal, and implementing the Minamata Convention on mercury.

Within the context of the CSS, the Commission has proposed the 'Safe and Sustainable by Design' framework, a voluntary approach to guide the innovation process for chemicals and materials, announced on 8 December 2022 in a Commission Recommendation [91]. The framework itself was developed by the JRC [229]. The JRC has also published the first application of the Safe and Sustainable by Design framework in a case study, on plasticisers in food contact materials [230]. In addition, the EU has achieved several specific milestones set out in the CSS. Some of these achievements include (a) stricter maximum levels for lead and cadmium in certain foodstuffs were adopted in August 2021 and for per- and polyfluoroalkyl substances in certain foodstuffs in December 2022; (b) restriction roadmap published in 2022 [231] prioritises the most harmful substances for restrictions under REACH for all uses and through grouping, instead of regulating them one by one; (c) Toy Safety Regulation to improve protection, in particular from harmful chemicals proposed in July 2023 [232]; and (d) Proposal to revise the Water Framework Directive, Environmental Quality Standard Directive, and Ground Water Directive to update lists of water pollutants and recognise the cumulative effects of mixtures from 2022.

In April 2024, the European Chemicals Agency and the EEA launched the 'EU indicators framework for chemicals' [233]. Some positive trends are observed, such as the substantial increase in the number of industrial chemicals scrutinised under the EU's chemicals legislation as well as better knowledge among authorities about the hazardous properties of chemicals that can be used for better risk control of substances. However, increasing trends are observed in the overall use of the most harmful chemicals, like carcinogenic, mutagenic and reprotoxic. Next developments aim to avoid the use of so-called substances of concern, implement the principles of the Safe and Sustainable by Design framework and work towards effectively ensuring that consumer products do not contain the most harmful substances (e.g. endocrine disrupting chemicals).

Assessment of progress towards the targets

The ZPAP has pushed for a number of new legislative acts or updates to longstanding policies (as in the case of water and air policies). The approach adopted to update the environmental legislation results in very complex and technical new obligations and requirements for Member States and sector operators to comply with data collection and reporting on the updated pollutants list. In order to provide a full picture in line with other chapters but limit the extent of the analysis, the overarching targets have been summed up for policies in one entry for each of them. However,

further details on specific pollutant lists, values and thresholds can be retrieved in specific policy documents. As such, this section provides the assessment for the 14 quantifiable targets identified as relevant for this thematic area. The following overview is divided into (i) legally binding targets from legal acts, and non-legally binding targets from (ii) legislative proposals for directives, and (iii) communications of the Commission. Where available, historical trends, data sources and future projections are reported in Annex 7.

BINDING TARGETS

Targets

Assessment

Member States shall take the measures necessary to ensure that water intended for human consumption is wholesome and clean, by meeting several requirements related to micro-organisms and parasites which constitute a potential danger to human health and quality standards recalled in the Directive.

[Directive 2020/2184 \('Drinking Water Directive'\)](#)

The level of access to clean drinking water in Europe is high according to the [WASH database](#) by the WHO and UNICEF. However, [as reported by the EEA](#), the levels of treatment and accessibility are lower in rural areas than in urban locations. Disparities in access to safe drinking water among ethnic groups in Europe emerged as well. The revised Drinking Water Directive includes additional parameters than the 46 microbiological, chemical and indicator parameters of the first Drinking Water Directive. The new parameters include per- and polyfluorinated compounds and bisphenol A, setting limit values for their presence in drinking water. As of the end of 2022, EU level data on drinking water quality were still limited, with the latest data available dating from 2011 and 2013. The new directive also foresees a watch list mechanism for emerging pollutants.

The Directive's Impact Assessment includes the calculation of the "SAPEA" Population Potentially at Health Risk indicator, estimating the share of the population that could potentially suffer from health problems because of the presence of contaminants in drinking water. According to the indicator, in 2015, 22.7 million people were potentially at health risk due to non-safe drinking water, equivalent to 4 % of the EU population. The revised Directive is expected to positively impact drinking water quality. However, estimated data for 2015 is not sufficient to assess the status of drinking water quality with respect to its evolution over time and new additional parameters by the revised directive, as confirmed by the EEA. Member States have started complying with the reporting requirements in 2023.



The Water Reuse Regulation aim to encourage and facilitate water reuse in the EU by harmonised minimum water quality requirements for the safe reuse of treated urban wastewaters in agricultural irrigation. Further requirements are set for monitoring, risk management, transparency and permits on production and supply of reclaimed water for agricultural irrigation

[Regulation 2020/741 \('Water reuse Regulation'\)](#)

Before the introduction of the Regulation, the EU was not equipped with a legislative framework for water reuse. More than 40,000 million m³ of wastewater is treated in the EU every year but only the 2.4% is further treated to be reused. As of April 2024, water reuse for agricultural irrigation is allowed in most Member States. Some Member States, where freshwater resources are abundant and irrigation demand is low, have planned not to allow water reuse for irrigation in their countries. Some Member States have not yet made a final decision, as resource and infrastructure costs still are being evaluated
(source: [WISE Freshwater website](#)).



Water quality

The Industrial Emissions Directive (IED) aims at preventing or reducing emissions from large industrial installations and intensive farming into the environment. The revised IED includes new provisions related to resource, energy and water efficiency and to the reduction of use and emissions of hazardous substances. The scope has been widened to include metal mining, batteries giga-factories, waste landfills and intensive farming. The revised IED contains also a set of measures to facilitate and accelerate the uptake of innovative techniques by industry.

[Directive 2024/1785 on Industrial Emissions and the landfill of waste](#)

The IED is a key instrument to support the transition of the EU industry towards a climate neutral, clean and circular economy. The revised legislation will lead to a considerable reduction of pollution from industry and level the playing field. For example, it is expected to deliver, latest by 2050, up to 40% additional reduction of key air pollutants.



Industrial Emissions

The Ambient Air Quality Directives set EU air quality standards for 12 air pollutants that Member States must not exceed: sulphur dioxide, nitrogen dioxide, nitrogen oxides, fine particulate matter, ozone, benzene, lead, carbon monoxide, arsenic, cadmium, nickel, and benzo(a)pyrene. With the revised Ambient Air Quality Directive, the annual limit value for the main pollutant – fine particulate matter – will be cut by more than half.

[Directive on ambient air quality and cleaner air for Europe](#)



In the European Union, air pollution is the single largest environmental health risk, causing cardiovascular and respiratory diseases that lead to the loss of healthy years of life and, in the most serious cases, premature deaths (about 240 000 reported in the European Union (EU) for 2021). Although emissions of air pollutants have been reduced over recent decades (primarily as a result of legislation), air quality remains a major concern in many parts of Europe. Air quality limits set by EU legislation for particulate matter, nitrogen dioxide and ozone continue to be exceeded, especially in many urban areas.

Air Quality

The revised Urban Wastewater Treatment Directive (UWWTD) extends the scope of the 1991 UWWTD to improve and maintain access to sanitation for all, in particular for vulnerable and marginalised groups, while aligning with the ZPAP and EGD climate and energy objectives.

This will be ensured by a number of new obligations on secondary treatment, now extended to all agglomerations with at least 1 000 population equivalent, by 2035. Member States will ensure the application of:

- Tertiary treatment, for the removal of nitrogen and phosphorus (by 2039)
- Quaternary treatment, for the removal of a broad spectrum of micropollutants (by 2045)

These apply to larger plants of 150 000 p.e. (and above, with intermediate targets).

[Directive concerning urban wastewater treatment](#)

Access to sanitation. There is a positive trend in the access to basic sanitation and connection to secondary wastewater treatment. Overall, the share of population without a bath, shower, or indoor flushing toilet in their household decreased from 2.2% in 2015 to 1.5% in 2020 [234]. However, in some Member States, there were still high shares of the population without access to basic sanitary facilities in 2020. The share of the EU population connected to secondary wastewater treatment has also increased continuously since 2000, reaching 81.1% in 2020 [234]. The revision of the Urban Wastewater Treatment Directive aims to bring additional improvements not only for water quality, but also for access to sanitation [235].

Secondary treatment. Small agglomerations constitute a significant pressure on 11% of the EU's surface water bodies [236]. Currently, the situation varies across the EU, with some Member States requesting all urban wastewater to be treated and others having set standards for small agglomerations beyond the requirements set in Directive 91/271/EEC [237].



Tertiary treatment. In many cases, nitrogen and phosphorus are well removed from wastewater, but there are still regions where additional removal could bring a significant benefit to the environment. In many cases, the costs of additional removal are well below the benefits that could be achieved, and some wastewater treatment plants operate already beyond the requirements of Directive 91/271/EEC. The revision of the Directive aims to push nutrient removal further by imposing stricter standards. This would also contribute indirectly to the reduction of GHG emissions.

Quaternary treatment. While secondary and tertiary wastewater treatment is being implemented compliant with Directive 91/271/EEC, several chemical micropollutants escape treatment plants and contribute to pollution of the receiving waters (e.g. pharmaceuticals and ingredients in personal care products). The revision of the Directive aims to require quaternary treatment for all larger plants, also based on an extended producer responsibility scheme that would help finance the corresponding treatment costs.

Water Quality

NON-BINDING TARGETS (FROM PROPOSALS)

Targets

By means of an updated and harmonised list of pollutants affecting surface and groundwater, updated existing quality standards, new monitoring requirements, improved and more accessible data, and a more flexible framework for addressing pollutants of emerging concerns, the proposal aims at setting new high standards for a series of chemical substances of concern to address chemical pollution in water.

[Proposal for a Directive amending the Water Framework Directive, the Groundwater Directive, and the Environmental Quality Standards Directive](#)

Assessment

Micro-pollutants pose a significant challenge. The necessity of removing them at wastewater treatment facilities increases treatment costs, and complete removal is not always feasible. The proposal encourages more proactive measures upstream by reducing emissions at their source. By avoiding water pollution, the proposal will also benefit the potential for water reuse. The enhanced watch list mechanism requiring Member States to monitor new substances, will enable the Commission, with the support of the European Chemicals Agency and the Member States, to determine the need for additional or stricter quality standards. More frequent reporting of actual monitoring data, and its analysis by the EEA, will provide the EU Institutions, Member States, and the general public with a more precise and current understanding of the status of surface and groundwater bodies in the EU. The analysis of more regular monitoring and status data will effectively feed into the broader Zero Pollution Monitoring and Outlook framework.



Water Quality

NON-BINDING TARGETS (FROM COMMUNICATIONS)

Targets

Assessment

Improve air quality to reduce the number of premature deaths caused by air pollution by 55% by 2030 (2030 target contributing to the 2050 ambition of a toxic-free environment)

[Towards Zero Pollution for Air, Water and Soil](#)

Improve water quality by reducing waste, plastic litter at sea (by 50%) and microplastics released into the environment (by 30%), by 2030

(2030 target contributing to the 2050 ambition of a toxic-free environment)

[Towards Zero Pollution for Air, Water and Soil](#)

Reduce by 25% the EU ecosystems where air pollution threatens biodiversity, by 2030 (compared to 2005) (2030 target contributing to the 2050 ambition of a toxic-free environment)

[Towards Zero Pollution for Air, Water and Soil](#)

Reduce the share of people chronically disturbed by transport noise by 30%, by 2030 (compared to 2017) (2030 target contributing to the 2050 ambition of a toxic-free environment)

[Towards Zero Pollution for Air, Water and Soil](#)

As a result of the revision to the new Ambient Air Quality Directive, it is likely that reductions by over 70%, compared to 2005 levels, can be achieved by 2030. Source: Zero Pollution Outlook [218].



Concentration of plastic litter at sea: 14% reduction of plastic litter (in 8% of the basin surface of the Mediterranean Sea and 44% of all beaches) with a total ban on single-use-plastic items. Source: Zero Pollution Outlook [218].



Microplastics concentration in soils is expected to increase, mainly due to the incorporation through the disposal of the sewage sludge and other agricultural practices such as plastics greenhouse, mulching films, drip irrigation, polymer-controlled release fertilisers and silage films. However, there is no harmonised methodology for their identification and quantification, and one should still be developed. The current database on soil pollution with plastics is still poor and no good prediction could be done. The EU has taken measures to combat microplastic pollution on all fronts (e.g. ban of certain single-use plastic products, restriction of intentionally produced microplastics and reduction of plastic pellet loss), aiming at reducing microplastic releases to the environment by 30% by 2030.



Current and proposed EU policies do not appear sufficient to enable the EU to reduce the area of EU ecosystems under threat from air pollution by 25% in 2030 compared to 2005. Nonetheless, with the implementation of the recently revised of the Ambient Air Quality Directives, this target could be achieved. Source: Zero Pollution Outlook [218].



Current estimates show that the number will not decline by more than 19% by 2030. Source: Zero Pollution Outlook [218].



Environmental Pollution

Note: Additional targets from the Soil Strategy are in TA6 or in Annex (non-quantifiable targets)

Improve soil quality by reducing nutrient losses and chemical pesticides' use by 50%, by 2030

[EU Soil Strategy for 2030](#)

Considering soil quality and pesticides, reduction of (more hazardous) pesticide concentration in soil due to increased organic farming (as well as other agricultural practices) and other farm-to-fork objectives. Under current legal limitations (28 kg of copper per hectare over 7 years), a potential risk of increased organic farming could be an accumulation of copper in soil.



Considering water quality and nutrient losses, there is a possible reduction of nutrient inputs into marine ecosystems: nitrogen 32%, phosphorous 17%. 50% reduction of nutrient input could be achieved in four out of ten examined regions for nitrogen and in two out of ten for phosphorous. Source: Zero Pollution Outlook [218].



Considering water quality and chemical pesticides, and in particular chemicals load (diuron and terbutylazine, as examples of low- and high-persistence chemicals, respectively) in water: 56% reduction in pesticides concentration can be achieved in shelf seas, 12% in open seas, depending on the persistence of the pesticide. Source: Zero Pollution Outlook [218].

Having all soils in healthy condition by 2050

[EU Soil Strategy for 2030](#)

The EU Soil Health Assessment (see [EUSO Dashboard](#)) estimated that 60-70% of EU soils are not in healthy condition, in accordance also with other reports [196], [238]. 25% of the EU soils and 33% of EU Agricultural soils have soil erosion rates higher than sustainability ones. Soil erosion has decreased by around 10% in the period 2000-2016, but future trends are alarming due to climate change. Soil loss by water erosion is projected to increase by 13-22.5 % in EU and UK by 2050.



Implementation challenges

Note: This section highlights major challenges to implementing the Zero Pollution Action Plan targets (and related environmental policies). This section grounds on critical reviews of the *Environmental Implementation Review 2022*. Pollution-related initiatives are cross-cutting, and they might contribute to biodiversity-related initiatives (further insights might be found in the thematic area 6 chapter). This section will be expanded providing a focus on selected enablers to possibly overcome challenges and boost the achievement of the ZPAP targets in the follow-up of this report.

The path to making the EGD Zero Pollution ambitions a reality is challenging, as highlighted by the Environmental Implementation Review 2022. Significant gaps in the implementation of EU environmental policies for air pollution, water quality and management, and chemicals have emerged. Furthermore, gaps also exist in financing and governance, which are fundamental to environmental policy mainstreaming. Environmental investments were estimated to be around 0.6% - 0.7% of GDP, of which 14% come from EU expenditure (close to 50% in some Member States). This was confirmed by some LRAs consulted by the CoR regarding the EGD implementation, which reported spending less than 1% on environmental policy implementation.

The first gap identified is the expected investment needs for 2021-2027, which are projected to be 0.9% - 1.5% of GDP, with two thirds related to water management. Nonetheless, biodiversity, circular economy, water and pollution prevention and control accounted for just 13% of the total green contribution under the Recovery and Resilience Plans by Member States. Smaller local authorities often struggle to align with international green agendas, due to the complexity of managing environmental protection and climate action expenditures. Integrating environmental considerations into all stages of public investment, from planning through implementation, requires specific expertise that may not be readily available in all localities [35]. This can impact the strategic planning and implementation of infrastructure investments across EU municipalities [12] and underscores the importance of environmental multi-level governance.

Enhancing national access to justice is key for enforcing environmental laws, as highlighted by the EIR 2022. The Commission has enabled NGOs and the public to challenge decisions on issues like air pollution, mining permits, and hunting. Despite progress, more can be done to improve public judicial access, especially in the water, nature, and air quality sectors. Additionally, Member States should better inform the public about their rights to access justice. This would help overcome challenges in environmental awareness, increase engagement in environmental

decision-making, and lead to better environmental outcomes.

Air

Although emissions of air pollutants have been reduced over recent decades (primarily as a result of legislation), air quality remains a major concern in many parts of Europe. Infringements in compliance with EU air quality law constitutes the third cause of infringements procedures of the EC against Member States (20%), after Nature (23%) and water (21%) related infringements (source: [Environmental Infringements interactive map](#)). About half of Member States risk not meeting their emission reduction targets for NO_x, fine particulate matter, and non-methane volatile organic compounds (NMVOCs) for 2030. More consistent monitoring is needed by Member States.

Water

The 1998 Drinking Water Directive is well implemented overall. The Bathing Water Directive shows high rates of excellent or good performance, with differences among Member States. However, as seen in the previous section, progress towards achieving good status for water bodies is generally slow. Many challenges might be hindering the amelioration of EU water bodies: incomplete or incorrect assessment of pressures and impacts of activities on water bodies, insufficient monitoring, organisational flaws and a lack of funding and prioritisation.

Soil

The “A Soil Deal for Europe” EU Mission will support the EU’s ambition to manage land in more sustainable ways [239]. Many challenges might hinder the achievement of soil-related status, but the EC proposal on the Soil Monitoring will put in place a solid and coherent monitoring framework for all soils across the EU, which will address the current knowledge gap on soils. Further challenges pertain to technical and knowledge sharing domains (including inadequate data interoperability, communication gaps between stakeholders, and deficiency in training and education related to soil health practices) [240].

Key messages

This thematic area focuses on environmental objectives related to pollution and its effects on human health and ecosystems quality, including air pollution, transport noise, nutrient loss, antimicrobials, waste generation, plastic litter, and microplastic generation.

Progress has been achieved in reducing air pollution, leading to a significant decrease in air pollution-related deaths. Moreover, the EU is on track to cut the use and risk of chemical pesticides by 50%, as well as a reduction in antimicrobial sales for farmed animals and aquaculture by 2021.

The implementation of the recently agreed Ambient Air Quality Directives is expected to reduce the area of EU ecosystems under threat from air pollution by 25% in 2030 compared to 2005.

Progress is slower in other areas, such as noise, which is not expected to decline by more than 19% by 2030.

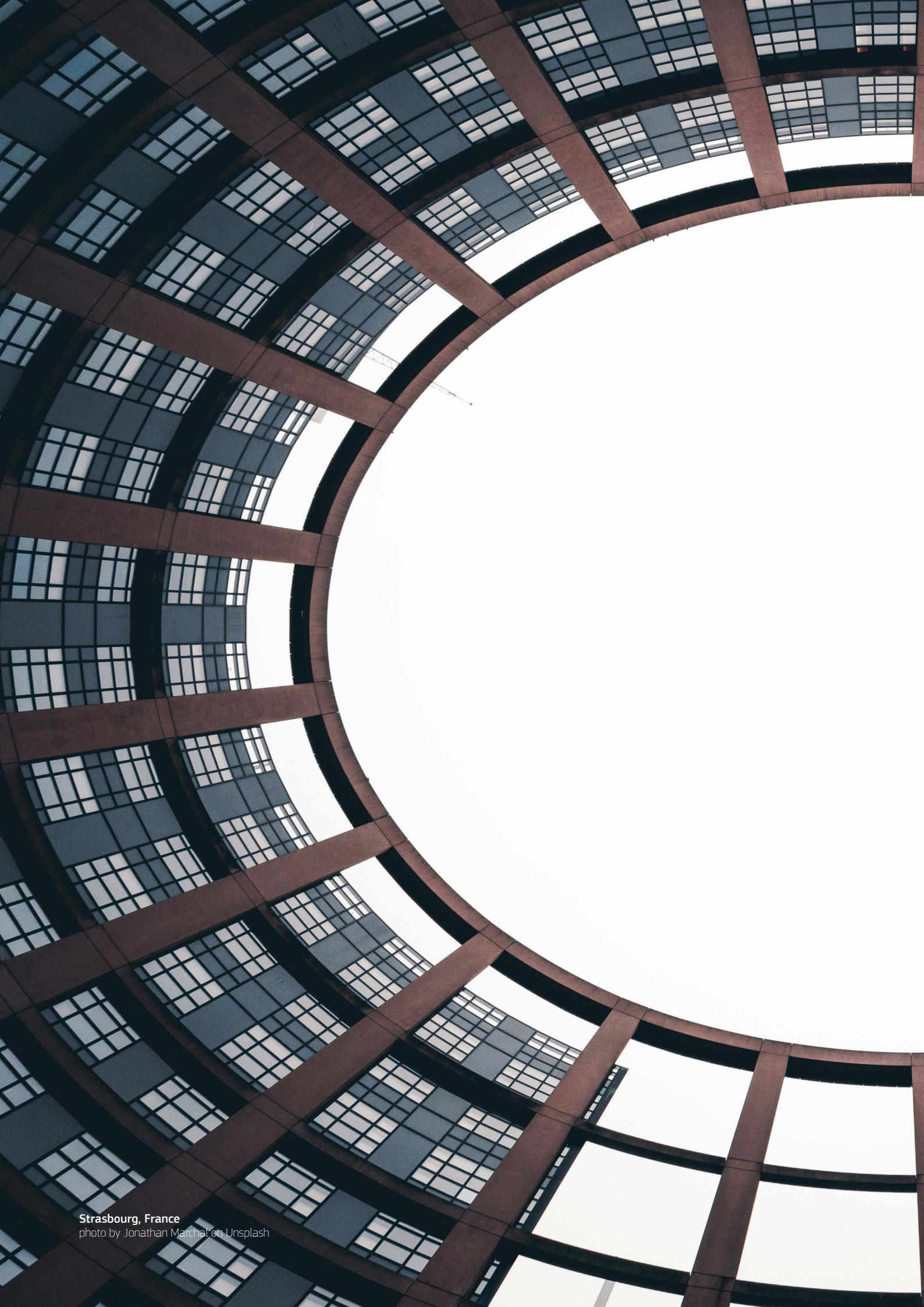
Similarly, concerning water quality, the input of nutrients into water, the chemical load and the concentration of plastic litter at sea are reducing at a low pace and acceleration is needed in order to reach the target of a 50% reduction by 2030.

Aligning longstanding water policies with the Zero Pollution and EGD ambitions required a number of updates to legislative frameworks. These updates will result in revised lists of pollutants that Member States will be required to monitor and report on in coming years. They are also expected to enhance data quality, thereby facilitating the monitoring of the Zero Pollution Action Plan.

Additional efforts will be needed to reach the EU's ambitions of significantly reducing waste generation and ensuring that all soils are in a healthy condition. Waste generation experienced a reduction as a result of the pandemic-related economic slowdown. The future trends for soils are alarming, with climate change exacerbating erosion.

Emerging pollution concerns, such as microplastics in the environment, still lack data for a thorough assessment of expected progress by 2030.

Photo by Ivan Bandura on Unsplash



Strasbourg, France
photo by Jonathan Marchal on Unsplash

Conclusions

CONCLUSIONS AND NEXT STEPS: MAKING A SUCCESS OF THE GREEN TRANSITION

The European Union has set unprecedented objectives for achieving climate neutrality by 2050, with a sustainable, green transition, through the European Green Deal (EGD). Around 30% of the policy initiatives proposed by the European Commission between 2020 and 2024 directly concern the implementation of the EGD. This includes new initiatives such as the ground-breaking European Climate Law, as well as ambitious revisions and updates of previous directives and regulations, such as the Renewable Energy Directive. Achieving these ambitions requires increased scientific and technical support to policies, including an integrated assessment of progress towards targets, now and in the future, as well as the early identification of potential knowledge gaps. Complying with the ambitions of the EGD requires a sustained, collective effort, since it entails a societal, economic, and governmental shift towards alternative and more sustainable ways of producing, consuming and behaving. Despite these structural challenges and the relatively recent implementation of some policies, progress is under way in many areas.

As the Commission's in-house research service, the JRC has explored in this report how the Green Deal ambitions can be achieved, based on robust scientific expertise across all of the EGD's domains (climate, energy, circular economy, mobility, food system, biodiversity and pollution). This is the first integrated benchmark offering a comprehensive update on progress made towards the EGD goals and targets. Internal data was combined with external, publicly available data, resulting in both qualitative and quantitative assessments. This report helps to identify the areas which require additional and more urgent efforts, highlighting the need for increased attention from Member States to implement the EGD policies effectively and foster the transformation to sustainability. Notably, the analysis is limited to providing a snapshot of the current status of target implementation based on available knowledge and data, without aiming to evaluate the policies themselves. The effects of the policies that have recently come into force to boost acceleration towards targets achievement will only become evident in the coming years.

This report has identified 154 quantifiable policy targets, either legally binding (from directives and regulations) or non-legally binding from communications and legislative proposals (most of which have already been agreed upon). The results of the assessment indicate progress for 96 targets (62%). However, only 32 targets are fully on track (21%), while acceleration is needed for 64 targets (41%). Additionally, 15 targets (10%) are not progressing – they are either moving in the opposite direction or stagnating. Data are not available or insufficient for the remaining 43 targets (28%). Legally binding targets account for 56% of all those identified (87 out of 154). Almost half of these (42 targets) show a positive trend, although only 13 are currently on track, with the majority requiring accelerated progress. Conversely, 12 legally binding targets are off-track or stagnating, while data are not yet available for the remaining 33 targets. The timing of the binding policies, most of which have been recently agreed and are expected to deliver results in the coming years, is a significant factor influencing these assessments. The effective implementation of the Fit for 55 package will contribute to the 2030 climate ambitions.

Addressing the high number of implementation challenges that have emerged demands dedicated efforts at all levels, alongside parallel actions with other institutions (see the box below). Climate change mitigation efforts must be intensified as current reductions in sectors covered by the Effort Sharing Regulation and the LULUCF regulation are falling short. Accelerated action is especially critical in agriculture and carbon removal strategies. Methane emissions also require intensified abatement efforts. Despite a 32.5% decrease in EU GHG net emissions from 1990 to 2022, the pace of reduction from 2020 to 2030 must accelerate significantly compared to previous decades.

THEMATIC FOCUS

What other research shows about the EU Green Transition

A comprehensive, cross-cutting, and interdisciplinary approach is crucial to effectively assess the EGD ambitions and verify our alignment with set targets. Two recent reports are particularly noteworthy for their consensus on the assessment of EGD's progress: the 2023 "Monitoring report on progress towards the 8th EAP objectives" by the European Environment Agency (EEA) [2], and the 2024 report from the European Scientific Advisory Board on Climate Change (ESABCC), "Towards EU climate neutrality: progress, policy gaps, and opportunities" [10]. These reports highlight a scientific consensus on the actual state of play regarding the implementation of targets, and collectively confirm the achievement of crucial objectives, while also indicating that there is still distance to cover towards the EGD policy goals. The report from EEA presents 28 indicators across different sectors, including several socio-economics indicators. In addition, the report from ESABCC focuses on GHG emissions, considering about 50 indicators in different areas. Overall, both reports include indicators in common with the JRC report, and their assessment is well aligned with the one presented in this work (see details in Annex).

While acknowledging policy gaps and implementation challenges, a shared perspective emerges on the necessity of consistent and coherent policy responses to achieve our ambitious goals. This consensus is a positive indicator of the overall EGD's direction and serves as a foundation for further strategic discussions and analyses.

The transition to clean energy should also be accelerated, with a focus on increasing the share of renewable energy sources. This requires substantial investments in renewable energy infrastructure, scaling up renewable hydrogen production, and strengthening power grids. To support this shift, it is crucial to accelerate the adoption of renewable hydrogen in industry and transport, along with developing dedicated infrastructure and an efficient hydrogen market. Additionally, current trends in energy consumption and energy efficiency must be reversed.

Conversely, the EU is progressing to meet its ambitions in circular economy, where about 30% of set targets are on track. However, trends must be reversed in the circular material use rate, and urgent acceleration is needed in recycling and preparation for reuse of waste, as most Member States are at risk of missing these 2025 targets. Initiatives must therefore prioritise waste reduction and material recovery, while addressing challenges related to data availability and the adoption of circular practices.

In sustainable mobility, decarbonisation of road transport requires a robust infrastructure for alternative fuels, with significant acceleration in deploying renewable hydrogen and electric charging stations.

Advanced biofuels, biogas and renewable fuels of non-biological origin (RFNBOs) will be vital for decarbonising hard-to-electrify sectors like aviation and maritime transport. While urban transport is moving towards electrification, more rapid reductions in CO₂ emissions from heavy-duty vehicles are still needed.

In the food system, trends need to be reversed in dietary patterns and health outcomes, employment quality, food affordability, consumption footprint, energy consumption, and waste generation. It is also essential to address challenges such as reducing greenhouse gas emissions, promoting sustainable agriculture practices, and reducing food waste.

The biodiversity thematic area presents particular challenges: 45% of the targets cannot currently be evaluated due to the lack of defined parameters and indicators for comprehensive biodiversity monitoring. In general, biodiversity and ecosystem restoration efforts should be accelerated, accompanied by improved data collection and monitoring to better assess progress towards targets. Progress has been made towards zero pollution in the areas of air pollution, chemical pesticides, and antimicrobial sales. However, challenges remain in the areas of noise pollution, water quality, waste generation and emerging concerns such as microplastics.

Next steps

This preliminary assessment of progress on EGD targets serves as a gauge of the complexity of the systemic transformation necessary for the success of the green transition in general, and the EGD in particular. This work is an important piece of the puzzle in understanding where the EU stands, identifying what is needed to bridge the remaining gaps and accelerate progress, and anticipating the challenges ahead. This “distance to target” analysis is just the first step. The follow-up will provide an integrated perspective of the EGD policy targets, diving deeper into the barriers to implementation and into potential enablers, to gain a better understanding of the state of the green transition in the EU.

Furthermore, targets associated with EGD policies vary widely and are often interlinked across different policies. Their synergies and trade-offs must be viewed holistically. In future work, an integrated environmental assessment will address the evolution of production and consumption patterns, estimating

the overall life cycle related impacts. This will enable the assessment of key environmental interlinkages as well as the consideration of the role of supply chains in either helping to reach the targets or hampering their achievement. As growing consumption is a key megatrend, the accounting of direct emissions from EU production will be accompanied by an estimation of those produced indirectly through consumption. This will be crucial to consider the externalisation of impacts through international trade and global value chains.

The work carried out so far will stimulate a speedy assessment of ways to boost the achievement of the EGD ambitions in this decade. Future work will present examples of effective solutions and cross-cutting conditions, such as the role of digital technologies, research and innovation, education, training and skills, green finance, just transition and multi-level governance.

The findings of this work will provide valuable insights towards developing effective strategies in the future: it is only through science and policy collaboration, innovation, and evidence-based policy that the transformative changes required for a sustainable future can be identified and achieved. Fostering the sustainability transformation and achieving the ambitions of the European Green Deal requires closer cooperation between scientists and policymakers. Only when policies are based on robust scientific evidence, can they make a significant contribution to the Green Deal's environmental, social and economic objectives, thereby making a success of the green transition.



List of abbreviations and definitions

ACEA	European Automobile Manufacturers' Association
AFI	Alternative Fuel Infrastructure
AFIR	Alternative Fuel Infrastructure Regulation
BDS	Biodiversity Strategy
BEV	Battery electric vehicle
CAP	Common Agricultural Policy
CAGR	Compound Annual Growth Rate
CBAM	Carbon Border Adjustment Mechanism
CCS	Carbon Capture and Storage
CDW	Construction and demolition waste
CE	Circular Economy
CEAP	Circular Economy Action Plan
CEMF	Circular Economy Monitoring Framework
CFP	Common Fisheries Policies
CLP	Classification, Labelling and Packaging
CMUR	Circular material use rate
CoR	Committee of Regions
CO	Carbon monoxide
CO₂	Carbon dioxide
CO₂e	CO ₂ equivalent
CRMA	Critical Raw Materials Act
CRMs	Critical Raw Materials
CSPs	CAP Strategic Plans
CSS	Chemicals Strategy for Sustainability
EAP	Environment Action Programme
EC	European Commission
EEA	European Environment Agency
EED	Energy Efficiency Directive
EFSCM	European Food Security Crisis preparedness and response Mechanism
EGD	European Green Deal
EIR	Environmental Implementation Review
EP	European Parliament
EPBD	Energy Performance of Buildings Directive
ERDF	European Regional Development Fund
ESABCC	European Scientific Advisory Board on Climate Change
ESR	Effort Sharing Regulation
ETS	Emission Trading System
EU	European Union
EUREC	The Association of European Renewable Energy Research Centers
FMSY	Fishing pressure relative to maximum sustainable yield
F-GAS	Fluorinated gases
F2F	Farm-to-Fork

FAO	Food and Agriculture Organization of the United Nations
FEC	Final Energy Consumption
FS	Food System
FSFS	Framework for Sustainable Food Systems
GHG	Greenhouse Gas
GDP	Gross Domestic Product
HEV	Hybrid Electric Vehicle
HFC	Hydrofluorocarbons
IAS	Invasive Alien Species
IED	Industrial Emissions Directive
IEPR	Industrial Emissions Portal Regulation
ILUC	Indirect Land Use Change
INCITE	Innovation Centre for Industrial Transformation and Emissions
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPCEI	Important Projects of Common European Interest
JRC	Joint Research Centre
LRAs	Local and Regional Authorities
LUCAS	Land Use and Coverage Area frame Survey
LULUCF	Land Use Land Use Change and Forestry
MPA	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
MSY	Maximum sustainable yield
Mtoe	Millions of Tonnes of Oil Equivalent
N₂O	Nitrous oxide
NECPs	National energy and climate plans
NECPRs	National energy and climate progress reports
NGO	Non-governmental organisation
NH₃	Ammonia
NIR	National Implementation Report
NMVOC	Non-Methane Volatile Organic Compound
NO_x	Nitric oxide (NO) and nitrogen dioxide (NO ₂)
NRL	Nature Restoration Law
NZIA	Net Zero Industry Act
PCIs	Projects of Common Interest
PEMS	Portable Emissions Measurement Systems
PET	Polyethylene terephthalate
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RED	Renewable Energy Directive
RFNBO	Renewable Fuels of Non-Biological Origin
SAF	Sustainable Aviation Fuels
SAPEA	Science Advice for Policy by European Academies
SDGs	Sustainable Development Goals
SUMP	Sustainable Urban Mobility Plan
TEN-E	Trans-European Networks for Energy
TEN-T	Trans-European Transport Network
TENtec	European Commission's information system set up to coordinate and support the TEN-T
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund
UWWTD	Urban Wastewater Treatment Directive

VAT	Value Added Tax
WASH	Water Supply, Sanitation and Hygiene
WEEE	Waste Electric and Electronic Equipment
WEI+	Water Exploitation Index Plus
WFD	Water Framework Directive
WHO	World Health Organization
WISE	Water Information System for Europe
WLTP	Worldwide harmonised Light-duty vehicles Test Protocol
ZPAP	Zero Pollution Action Plan
ZPMO	Zero Pollution Monitoring and Outlook

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