Integrated Report on the Allocation and Environmental Impact of Hungary's Green Bond Proceeds, 2021

December 2022

Content

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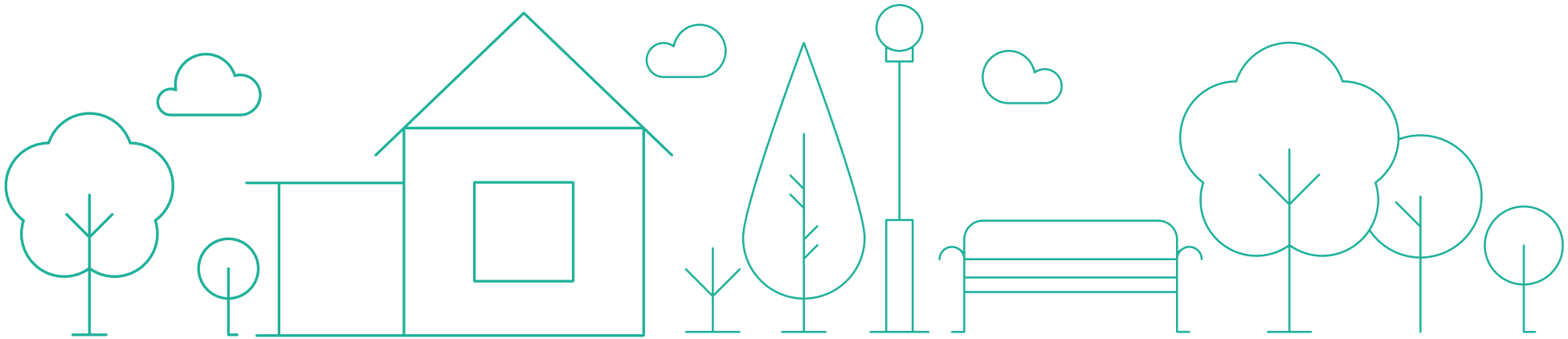


Foreword

Dear Readers,

It is our privilege to present the inaugural Integrated Green Bond Report of Hungary (Integrated Report) for 2021. In this Integrated Report, we aim to provide transparent and reliable information on the use of Hungary's Green Bonds Proceeds, and show how these contribute in fulfilling Hungary's environmental goals and objectives.

The annual average temperature of Hungary rose 1.15°C between 1907 and 2017, outpacing the global average temperature change (+0.9°C). The county's warming rate has increased significantly over the last four decades, with summertime warming particularly pronounced. Meanwhile, regional precipitation patterns and the seasonality of flood and drought risks have changed.[1] These changes highlight the need to take action against the negative effects of climate change, and Hungary is taking its fair share of it.

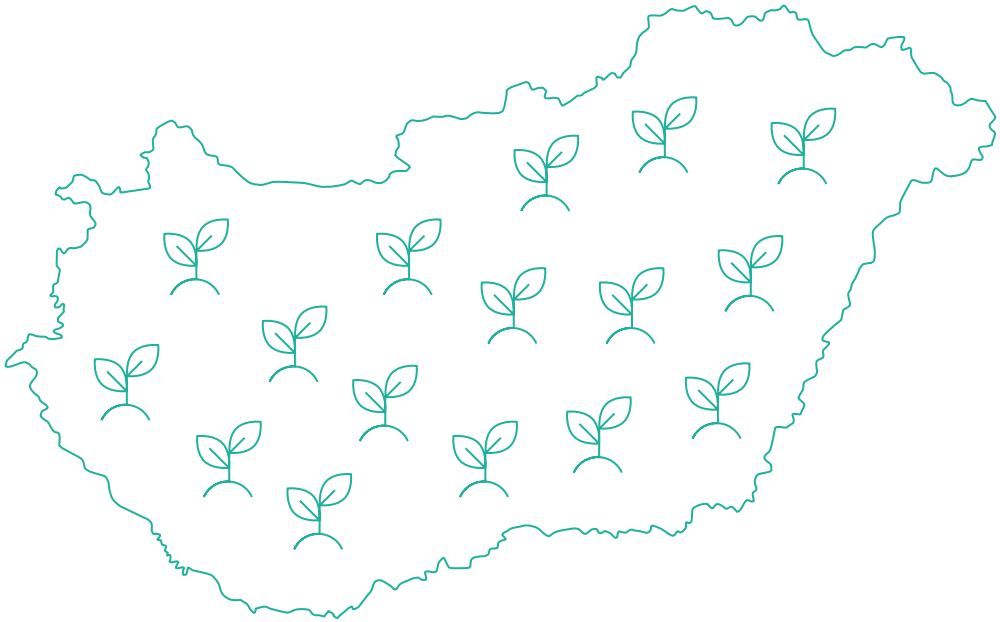
Hungary has set ambitious initiatives to tackle climate change, halt biodiversity loss and support the transition to a low-carbon and environmentally-friendly economy. To support these sustainability ambitions, Hungary has established a framework under which it has issued Green Bonds to finance and refinance projects and expenditures with environmental benefits, such as supporting clean transportation, reducing greenhouse gas (GHG) emissions and pollution, and engaging in biodiversity restoration. The proceeds from several international and domestic capital markets' transactions have also contributed to raising part of the required funding, and have diversified Hungary's international investor base.

We hope that investors and readers will find insightful information about the national environmental actions and measures supported by the Green Bonds in this Integrated Report.

We would like to thank the numerous stakeholders who have supported to the preparation of this Integrated Report for their contribution toward Hungary's climate commitments.

Tibor Tóth

State Secretary for Public Finance and International Relations
Ministry of Finance



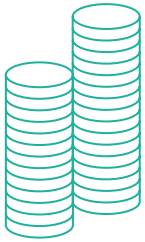
[1] The Second National Climate Change Strategy of Hungary (NCCS-2).

I. Executive Summary

I.1. Executive Summary

The Integrated Green Bond Report of Hungary 2021 (Integrated Report) covers the allocation of budget years 2019 and 2020 and the key environmental impacts resulting in budget years 2019, 2020 and 2021. In assessing the environmental impacts of the Green Bond, the recommendations of the International Capital Market Association (ICMA) Harmonized Framework for Impact Reporting Handbook (June 2022 edition) were followed. The Integrated Report links the aforementioned environmental impacts to the United Nation's Sustainable Development Goals (UN SDGs) and to the EU Taxonomy Climate Change Mitigation and Adaptation objectives[2]. The Integrated Report covers 12 core and 26 other sector-specific indicators achieved by the end of the budget year 2021. The Integrated Report also discusses three case studies in more detail in *Appendix 1 – Case Studies.* The selection of Eligible Green Expenditures and the allocation of Green Bond Proceeds were prepared by the Ministry of Finance (MoF) and the Government Debt Management Agency Pte Ltd. (ÁKK), following the ICMA's Green Bond Principles. Figure 1 outlines Eligible Green Expenditures for 2019 and 2020, and Green Bond Proceeds in 2021.

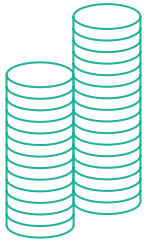
Eligible Green Expenditures for 2019* and 2020 amounted to:



HUF 527.08 billion

*(not allocated per the 2020 issuances)

Green Bond Proceeds in 2021, amounting to:



HUF 151.44 billion

was allocated to the remaining amount of 2019, and part of the 2020 Eligible Green Expenditures.

Figure 1: Eligible Green Expenditures for 2019-2020, and Green Bond Proceeds in 2021

Figure 2 outlines the overview of the allocation of Green Bond Proceeds and their most significant environmental impact, as well as their progress toward SDGs. The majority of expenditures supported clean transportation projects in line with their essential role in GHG emissions reduction in Hungary and the European Union. A variety of projects from other eligible green categories, all aiming to improve robust sustainable environmental practices in Hungary are also included.

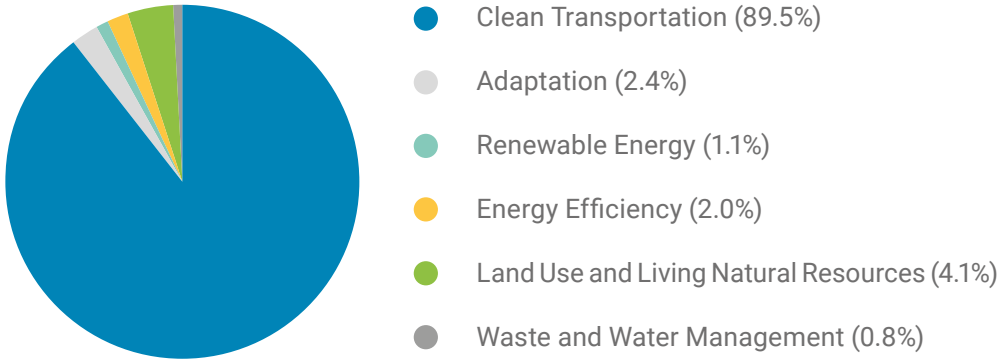


Figure 2: Allocation of the Green Bond Proceeds (rounded values), Source: MoF, ÁKK

In the Integrated Report, multiple environmental and social impacts are interpreted as per the eligible green sectors as well as on a project-by-project basis, as could be seen on *Figure 3.*

[2] Please refer to *Appendix 2* – Other Information Related to the Integrated Report for details on approach to UN SDGs and the EU Taxonomy.

UN SDGs, Green Sector

Positive impacts on the environment

Eligible Green Expenditures (HUF billions)

Clean Transportation	**393.7** Kilotons of CO_2 saved	1,048
Land Use and Living Natural Resources	**107k** **Projects** supporting sustainable agricultural areas **covering 833,716 hectares**	72
Energy Efficiency	**46** Kilotons of CO_2 saved	31
Adaptation	**11** **Developments** supported the **implementation of the Water Framework Directive**	25
Waste and Water Management	**780** **Meters per kilometers increase in length of sewage system** of drinking water system	8
Renewable Energy	**5.01** Kilotons of CO_2 saved	5

2019
2020
2021 (p)

Figure 3: Key Impacts Results by Eligible Green Sectors. Source: ÁKK and relevant Ministries

A key focus of the Green Bond Framework is to contribute to the reduction of GHG emissions. According to the impact results of Eligible Green Expenditures, a total of 445 kilotons of CO_2-equivalent GHG emissions was avoided, which was financed by the issuance of Green Bonds in 2021. One billion HUF invested into Hungary's Green Bonds issued in 2021 therefore contributed to the avoidance of 2,939 tons of GHG emissions measured in CO_2-equivalent units. These results are summarized in Figure 4.

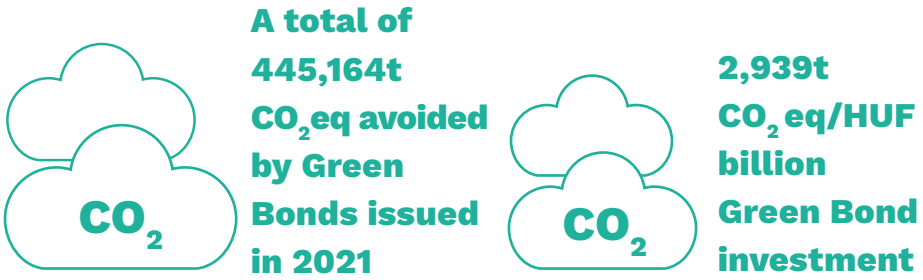


Figure 4: GHG Emission Avoidance due to the Allocation of Green Bonds Issued in 2021 to Eligible Green Expenditures

While ÁKK has launched its first ever Green Bonds in 2020 on the euro market which allowed for decent issue-size, and also launched the first ever Japanese yen-denominated Green Samurai Bonds, issuances in 2021 were characterized by continuous venturing into new markets.[3] Hungary successfully pioneered the green forint market by offering 30Y Green Bonds in April 2021, also contributing to the then-stated goal of maturity extension, and additionally issued the first ever sovereign Green Panda Bond in December 2021. These pioneering acts both served the purpose of investor diversification, and indicates a new stage of Green Bond issuance which could serve as basis for higher future issuance. This, however, also resulted in a comparably smaller issuance amount in 2021 vs. 2020.

[3]See the financing plan for 2021 here:
https://akk.hu/download?path=368740a4-6114-46a6-8492-d00521efb32a.pdf

Hungarian flags on the Hungarian Parliament Building

II. Overview of the Integrated Report

The Green Bond Allocation and Impact Reports of 2020 were published in 2021 as separate documents and stressed the importance of the Green Bonds issued by Hungary, as well as their role in fighting climate change and biodiversity loss. Green Bonds enable the support of key areas of sustainable development, highlighted in Table 1. This Integrated Report intends to provide transparent insights into the environmental performance of projects financed and refinanced through the allocation of Green Bond Proceeds.

Clean transportation	Land use and living natural resources	Waste and water management	Renewable energy	Adaptation	Energy efficiency

Table 1: Activities (Green Sectors) Financed Under the Green Bond Framework

II.1 Reporting Practice

This year, an inaugural Integrated Green Bond Report is presented which outlines the allocation of Green Bond Proceeds toward Eligible Green Expenditures and their associated environmental and social impacts into one combined report.

The objective is to develop a harmonized, transparent and relevant approach to reporting, and to provide comprehensive information to investors.

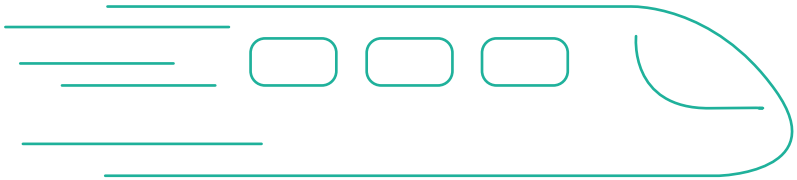
Timing and Scope of Reporting

Green Bond Framework
(May 2020)

First Issuance of Green Bonds in Euro
(5 June 2020)
and in Yen
(18 September 2020)

Publication of inaugural
Allocation Report 2020
(March 2021)

Publication of inaugural Impact
Report 2020
(November 2021)



First Issuance of Green Bonds in HUF
(4 April 2021) and in Yuan
(16 December 2021)

Publication of inaugural
Integrated Green Bond Report
(December 2022)

III. Methodologies Applied

III.1 Allocation Methodology

Within Hungary's Green Bond Framework, Eligible Green Expenditures are falling under the six green sectors that promote the transition to low a carbon and environmentally-sustainable economy. As per the criteria set out in the Green Bond Framework, the Eligible Green Expenditures include investment expenditures, intervention expenditures, tax expenditures and selected operating expenditures. Budget expenditures, which already obtain dedicated funding (e.g. EU funding, proceeds from the sale of EU ETS allowances, a dedicated tax, or EIB and other supranational entities) have been excluded, to avoid double counting. The Ministry of Finance, along with the other relevant Ministries are responsible for the expenditures, including reviewing verifying and ensuring that each budget line complies with the green eligibility criteria defined in Hungary's Green Bond Framework, while also featuring exclusions linked to nuclear power, the armament and defense industry, fossil fuel production and power generation. The Green Bond allocation methodology follows the ICMA Green Bond Principles. In addition, it considers other relevant guidelines and regulations, such as the EU Taxonomy. Further details are available in *Appendix VI.2*.

Each of the budget lines have been individually screened and verified by the dedicated team of the Ministry in charge of the project via specific line reference codes. Accordingly, any expenditures directly related to fossil fuels have been systematically excluded. Granting that state expenditures related to the infrastructure and operation of rail passenger and freight transport are necessary for the maintenance of a green asset, subsidies to Hungarian operators (MÁV Ltd. and GYSEV Ltd.) are considered to meet the green eligibility criteria. The budget items are reviewed regularly, and relevant information is updated in the Integrated Reports annually.[4]

[4] Due to repayments and revisions, the allocated amounts in 2019 have been recalculated and adjusted this year. Therefore, the allocated amounts may not be reconciled at project level with the data from the previous reporting. However, data at green sector level can be reconciled.

Green bus in Buda

III.2 Impact Methodology

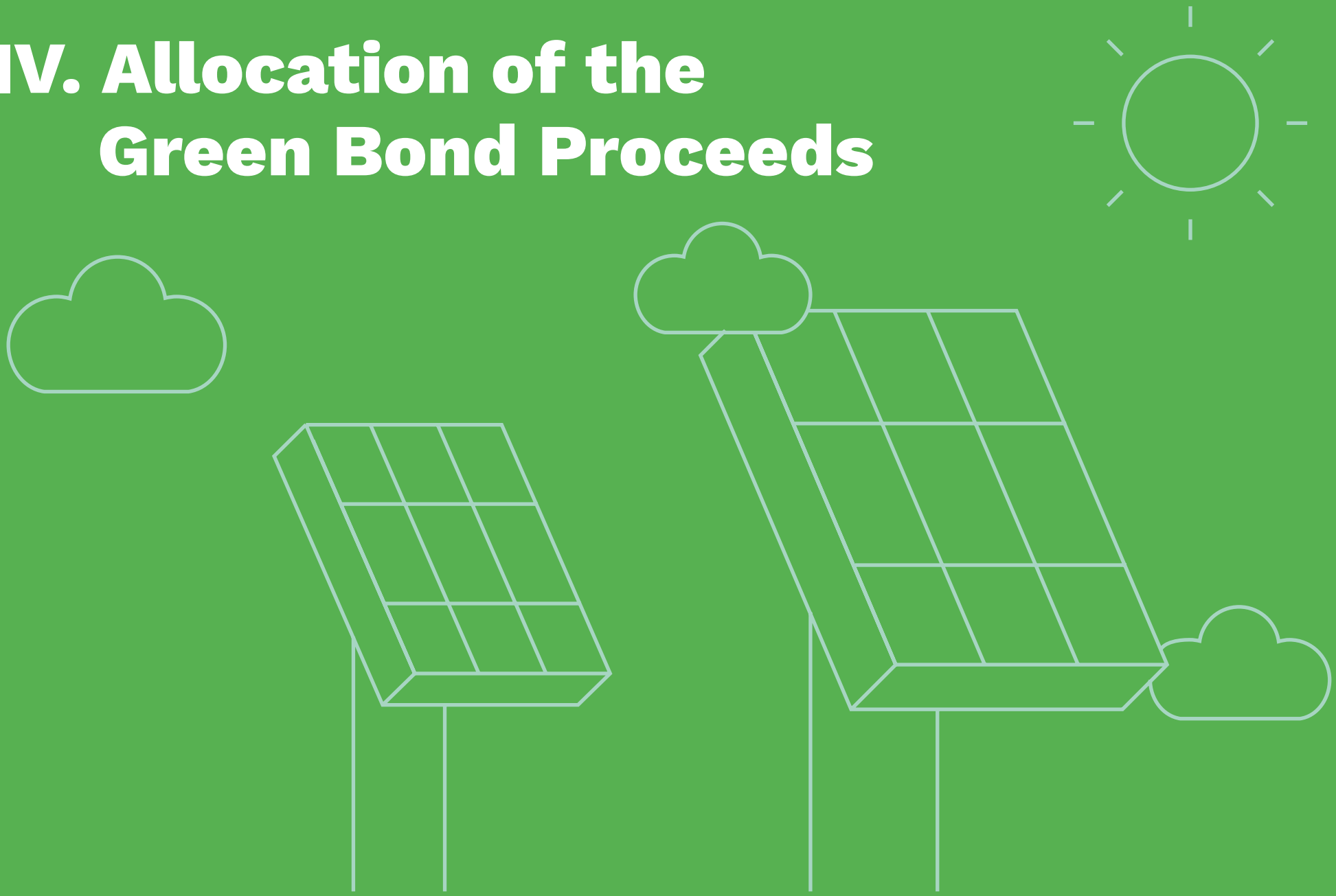
To assess the impact of Eligible Green Expenditures, several methodologies and guidelines were taken into account. The assessment was, in particular, based on the ICMA Harmonized Framework for Impact Reporting (June 2022 edition) published by the ICMA. The report includes the ex-ante and ex-post impact data of eligible green projects financed by Green Bonds issued in 2021 an annual breakdown per Green Bond main program. The impacts are calculated based on various methodologies taking into account the features of the projects. A detailed compilation of outputs and impacts is available in *Chapter VI.2 – Appendix 2* – Other Information Related to the Integrated Report.

Throughout the impact assessment, multiple environmental and social benefits were linked to the projects within the six expenditure categories. This Integrated Report presents information on 38 sector-specific core and other indicators in line with the principles and recommendations of the ICMA Harmonized Framework for Impact Reporting (June 2022 edition). The impact results are showcased with a project-by-project approach on a three-year time horizon from the year of allocation.

Note that two spending items were removed from the Green Bond allocation in 2019 and 2020. The first expenditure relates to Environmental Administration under the Land Use and Living Natural Resources green sector (SDG 15), and the second expenditure relates to PM_{10}/National Air Pollution Control Program (NAPCP) under the Adaptation green sector (SDG 6, 13). Environmental Administration is categorized as an operating expenditure, with a considerable part of spending on personnel costs. As for NAPCP, this item has been allocated mostly to air quality monitoring. While these items are fully compliant with the requirements of Eligible Green Expenditures under the Green Bond Framework dated May 2020, their removal aims to prioritize expenditures that we consider have a higher impact on our climate and environmental objectives. Due to the removal, associated impacts of the aforementioned items have also been excluded.

Woman holding paper green light, Budapest

IV. Allocation of the Green Bond Proceeds



IV.1 Main Items of Green Bond Allocation

Market	ISIN	Issue date	Amount	Maturity	FX rate to HUF[5]	Total Green Bond Proceeds (in HUF)[6]	FX rate to EUR[7]	Total Green Bond Proceeds (in EUR)[8]
Eurobond	XS2181689659	05/06/2020	EUR 1,500 million	15 yrs.	345.57	504,525 million	N/A	1,459.98 million
Samurai	JP534800CL92	18/09/2020	JPY 15,500 million[11]	7 yrs.	287.55/JPY 100	44,570 million	358.95	124.2 million
Samurai	JP534800DL91	18/09/2020	JPY 4,500 million[11]	10 yrs.	287.55/JPY 100	12,940 million	358.95	36.0 million
Domestic	HU0000404991	04/28/2021[9]	HUF 100,078 million	30 yrs.	N/A	100,078 million	N/A[10]	277.3 million
Panda	CND10004QFJ7	12/16/2021	CNY 1,000 million[11]	3 yrs.	51.37	51,367 million	368.92	139.2 million

Table 2: Details of the Value of Green Bonds on Issue. Source: ÁKK

Market	Trade date	Maturity date	Face Amount (in CNH)	Maturity	FX rate to HUF	Total Amount Booked (in HUF)	FX rate to EUR	Total Amount Booked (in EUR)
CNH-EUR CCIRS	12/17/2021	12/16/2024	1,000 million	3 yrs.	51.37	51,367 million	7.182	139.2 million

Table 3: Details of the CNH-EUR Cross-currency Swap Used to Convert the FX Risk of the Green Panda Bond

[5] The Hungarian National Bank ("MNB") exchange rate one day before the date of issuance of Euro Bond (4 June 2020): HUF 345.57 = EUR 1.00
MNB exchange rate two days before the day of issuance of Samurai Bonds (16 September 2020): HUF 287.55=JPY 100.00 and HUF 357.44=EUR 1.00

[6] Actual proceeds received at issuance, at market price.

[7] The MNB exchange rate vs EUR on the same date of FX rate to HUF.

[8] Actual proceeds received at issuance, at market price.

[9] Date of first issuance. There were four auctions in 2021: on 04/22/2021, on 07/08/2021, on 09/30/2021 and on 11/25/2021 for the same security. Additional sales from ÁKK's own portfolio and redemptions of outstanding bonds prior to maturity are also included.

[10] Due to the four auctions and additional sales from ÁKK's own portfolio and redemptions of outstanding bonds prior to maturity are also included. The EUR amount is calculated with respect to each transaction by the exchange rate on the date of issuance of the Green Bonds.

[11] AKK converts non-euro bonds into euro liabilities through swap transactions. Further details are in Table 3.

In total, Hungary issued HUF 151,444 million Green Bonds in 2021, according to *Table 2*.

In order to hedge the CNY currency risk of the Green Panda Bond, ÁKK entered into a CNH-EUR cross-currency swap agreement. This was the first such hedge instrument for ÁKK where the terms and conditions of the swap confirmation included the purpose of the instrument to hedge currency risk of a specific Green Bond. The details of the corresponding swap transaction are shown in *Table 3*. Given that the contractual purpose of the swap was to hedge a Green Bond's currency risk, the amount of Green Bond proceeds obtained were adjusted in case of the Panda Bond. ÁKK will perform similar Green Bond specific swap transactions in the future non-EUR Green Bond issuances.

In accordance with the strategy of ÁKK and benchmarks, all non-euro bonds must be converted into euro liabilities through swap transactions. To reduce counterparty risk associated with the swap transactions so-called marked-to-market deposits are being placed as collateral covering the net value of their swap positions. Such deposits placed with ÁKK are shown as part of the government debt among 'other obligations'. In recent years, some currencies have appreciated compared to some currencies, but the resulting additional debt can be eliminated with the swap transactions.

In relation to the issuance of the Green Panda Bond in 2021, a CNY-EUR cross-currency swap was concluded by ÁKK with CNY 1 billion swapped to EUR 139 million. The volume of outstanding foreign currency bonds after the swap is HUF 51.367 billion. The term of the swap is identical to the maturity of the bond, which is 16.12.2024.

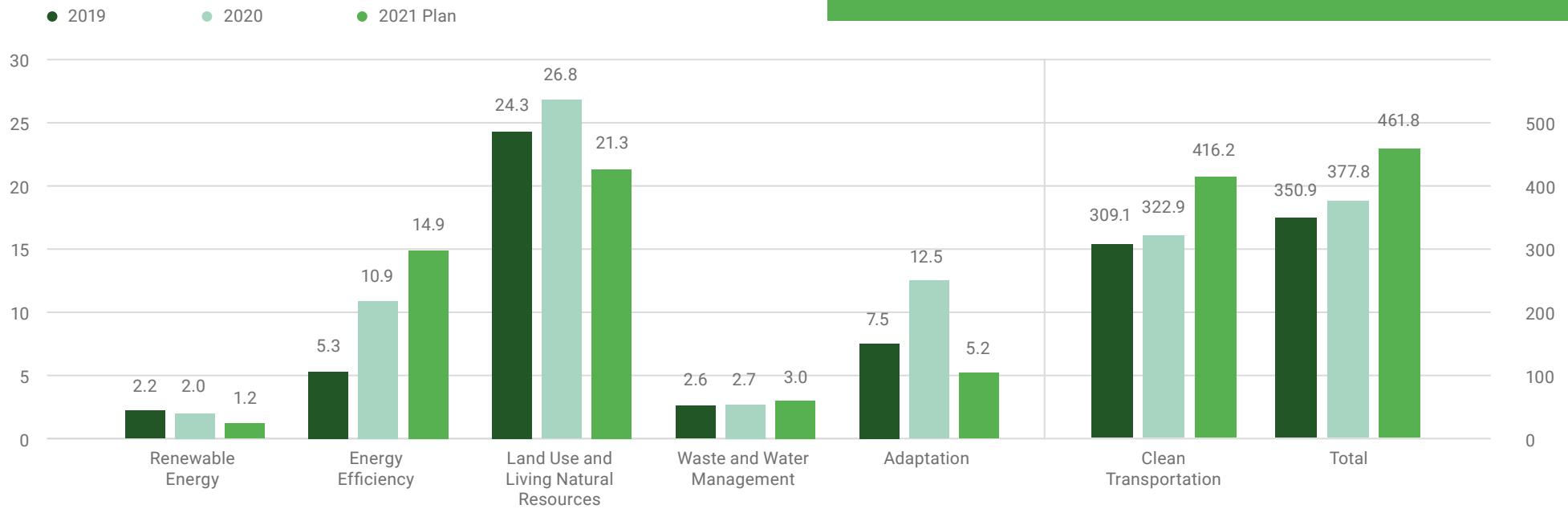


Figure 5: Eligible Green Expenditures per Sector and Budget Years (in HUF billion). Source: MoF

The allocated amount is the amount of Eligible Green Expenditures equal to the net proceeds raised from the issuance under the Hungary Green Bond Framework, during the reporting period. For any given year, the amount of Green Bond (GB) issued (or tapped) in that year will be allocated in priority to the older eligible budget years and receive a proportional allocation of the final year to be allocated. Figure 6 shows the Eligible Green Expenditures and the allocated amounts as per the amount of issued Green Bonds.

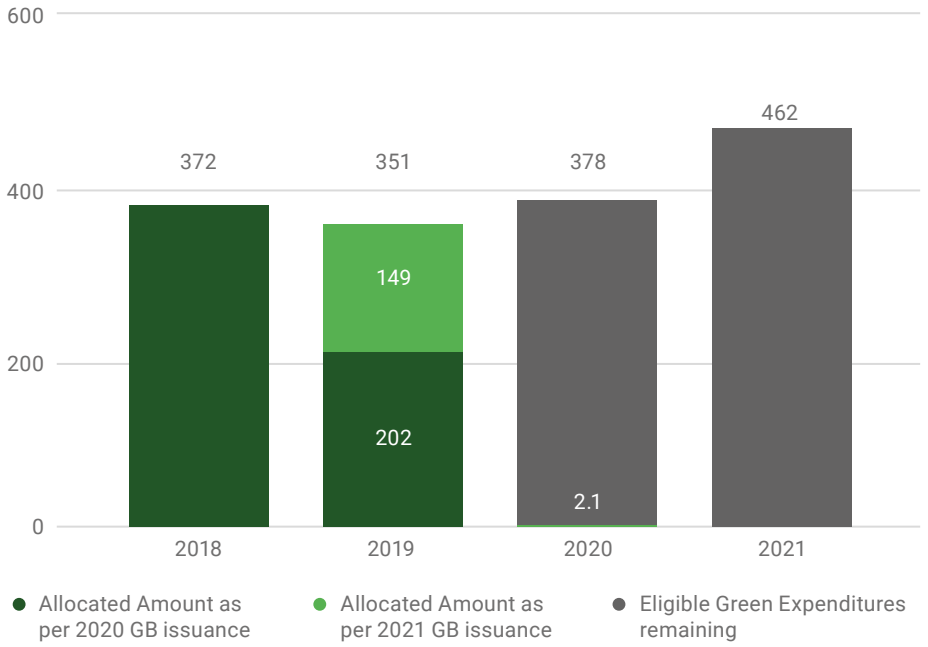
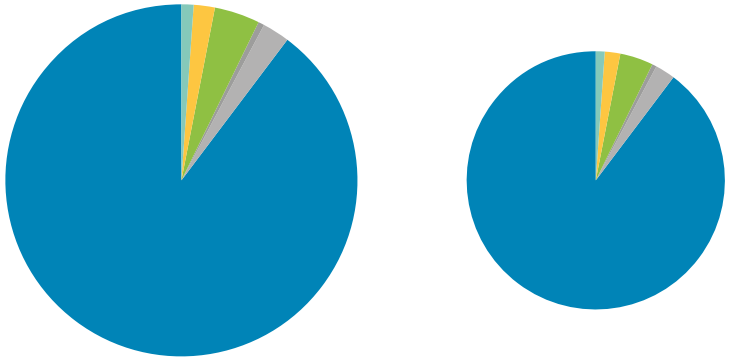


Figure 6: Breakdown of Green Eligible Expenditures, Allocated Amounts and Green Bond Issuances. Source: ÁKK, Ministry of Finance (in HUF billion). Source: MoF

The allocated amounts are equal to the total Green Bond Proceeds that cover a certain share of the total Eligible Green Bond Proceeds. The allocation of the two Green Bonds issued in 2021 are summarized in Figure 7.

2051/G
(amt issued: EUR 277.3mn)

Green panda
(amt issued: EUR 139.2mn)



ISIN: HU0000404991

ISIN: CND10004QFJ7

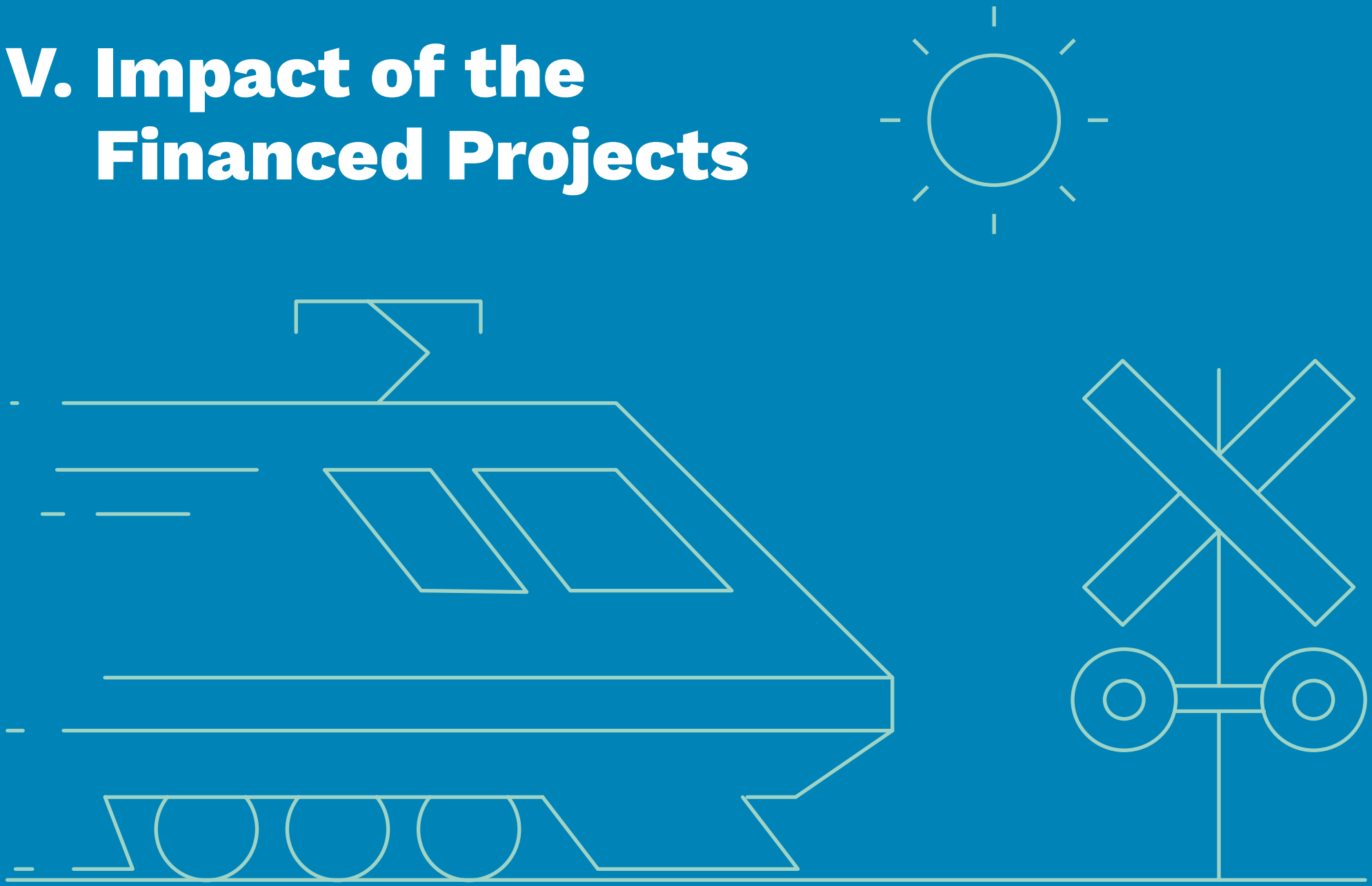
- Renewable Energy (1.14%)
- Energy Efficiency (2.01%)
- Land Use and Living Natural Resources (4.09%)
- Waste and Water Management (0.8%)
- Adaptation (2.41%)
- Clean Transportation (89.5%)

Figure 7: Breakdown of Allocation of Green Bond Proceeds per Issuances. Source: ÁKK, MoF

The available Green Expenditure amounts to HUF 375,639 million in 2020 and HUF 461,823 million in 2021, which is equal to the remaining amount of the Eligible Green Bond Proceeds as of the end of the reporting period.[12]

[12] Available Green Expenditures equal the difference between all Eligible Green Expenditures identified within Hungary's central government budget and the net proceeds of Green Bond issuances as of the end of the reporting period. This share of Green Expenditures remains available for allocation to future Green Bond issuance.

V. Impact of the Financed Projects



V.1. Clean Transportation (SDGs 11 & 13)

Hungary has a longstanding commitment to green transportation through the financing and re-financing of clean transportation projects, with a strong emphasis on rail transportation; therefore, the majority – 89.5% – of Green Bond Proceeds were allocated to projects supporting clean transportation. The main purpose of clean transportation expenditures is to make public transportation more attractive, more efficient and more modern, so that people will choose it over less environmentally-friendly alternatives, such as passenger cars. A summary of avoided CO_2 (where measurable) could be seen on Figure 8.

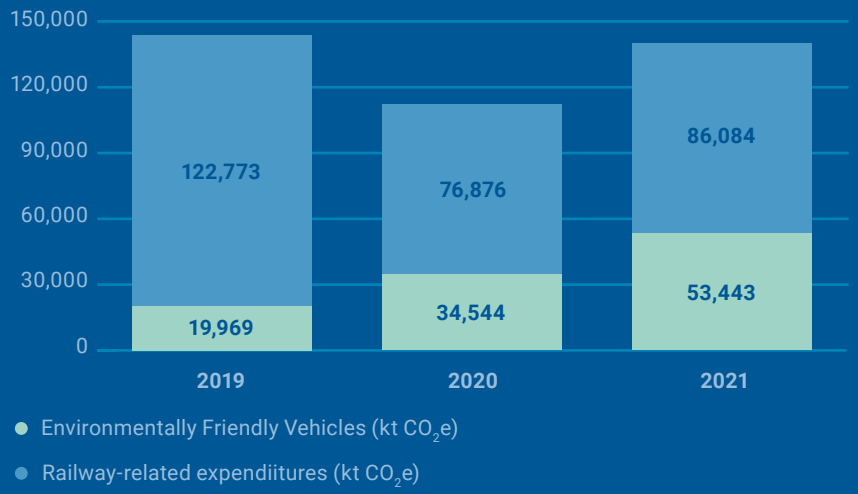


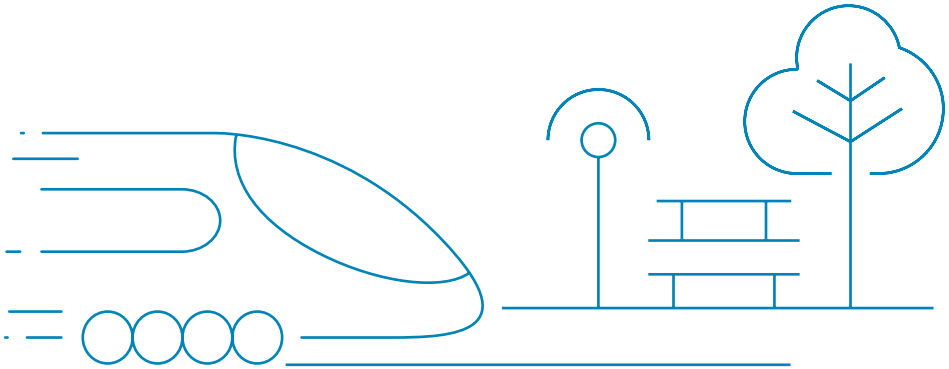
Figure 8: Avoided GHG emissions related to Green Bond Proceeds (kt CO_2eq).
Source: Hungarian Central Statistical Office (KSH), MoF, OPTEN[13], MÁV Ltd.

[13] Hungarian business and company information database provider

V.1.1. Reimbursement of the Operation of the Railway Network

Costs related to the reimbursement of the operation of the railway network cover several operating expenses, *inter alia* buying devices to enhance the comfort of wagons, auxiliary devices, the procurement of special services, and the personnel costs of railway infrastructure companies.[14]

To measure the outcome of expenditures, the length of Hungary's railway lines and its rolling stock on public railways was used. The indicators show the length of operated lines on a greater regional level as well as the adjustments of rolling stock belonging to public railways[15] (*Appendix 3 – Key Figures: Figure 24*). The extension of the railway network as well as the amount of rolling stock remained steady between 2019-2021. The development of the railway network and railway fleet is important to ensure the accessibility and interoperability of the railway system.



Train arrival at railway train station

[14] The expenditures do not contain cost elements related to fossil fuels. For example, buying oil for the maintenance of machines and units.

[15] Data source: KSH (rolling stock of public railway; length of railway lines by county and region)

V.1.2. Reimbursement of Uncovered Costs of Railway Passenger Traffic

Passenger transportation in Hungary is mainly associated with cars followed by other road transport modes[16] and then trains. To promote climate efficient traveling, rail transportation has great importance in public transportation. Since 2017, the share of rail transportation has slightly increased (Figure 25 and Figure 26 in Appendix 3) in terms of the number of passengers carried until 2019. Due to the COVID-19 pandemic, the numbers in the second and fourth quarter of 2020 and the first and second quarter of 2021 have decreased significantly. Therefore, the share of rail transportation decreased in 2020, but rose again in 2021 to almost 2019 figures as the re-opening of the economy revived demand for rail transportation. In 2020, the share of rail transportation was the eighth highest in the European Union.[17] In order to support the development of rail transportation and the post-pandemic recovery of public transportation modes, future developments and grants are crucial.

The indicators selected are used to measure the results of the modal shift to railway transportation. According to Hungarian Central Statistical Office (KSH), 354.1 million passengers (18,042 billion passenger-kilometers) were carried by rail between 2019-2021, as shown on Figure 9.

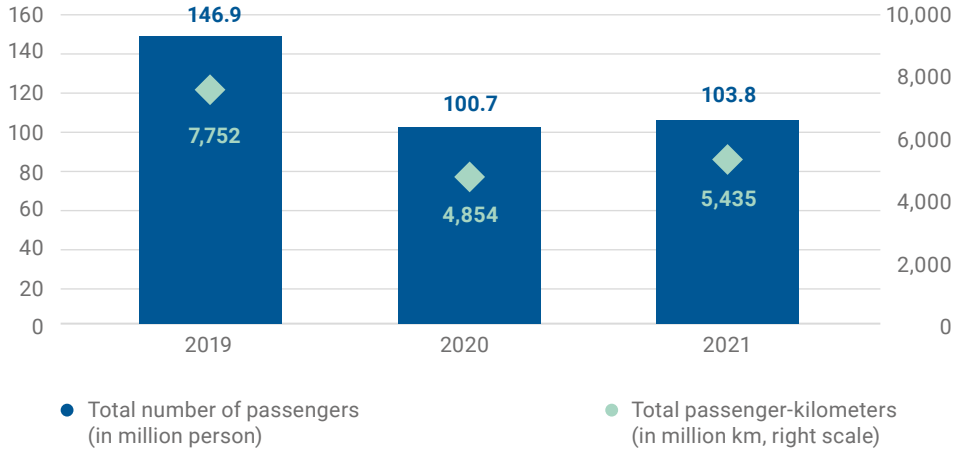


Figure 9: Passenger-kilometers and Number of Passengers Using Railway Transportation (Including Domestic and International Passengers). Source: KSH.

As a result of the pandemic and the restrictive measures it imposed, the number of passengers decreased by 30% in 2020 and 29% in 2021, compared to 2019 (the last pre-pandemic year). Considering the length of passenger journeys (in passenger-kilometers), the decrease was higher (35% in 2020) or similar (29% in 2021), since among the precautionary measures in place long-distance journeys and non-essential trips were not recommended at that time.

[16] Other road transport describes motor coaches, buses and trolley buses.

[17] Source of data is Eurostat: modal split of passenger transport.

V.1.3. Modernization of Rail Transport

Maintaining the popularity of railway transport over other forms of transport with typically higher GHG emissions requires new, large-scale investment to improve the quality of services. The aim of these modernization initiatives includes reduced travel time in the Trans-European Transport Network (TEN-T); high-quality urban-suburban community transport performance and a reduction in particulate matter (PM_{10}) and nitrogen oxides (NO_x) emissions in the urban community transport sector. In the framework of these modernization projects, the Connecting Europe Facility (CEF) had a major role as a funding instrument (it is co-financed from the Green Bond), aiming to build and upgrade the European transport infrastructure. The main transport infrastructure program (Integrated Transport OP) focuses on developing railway, highways, improving public transportation, and regional accessibility.

Due to further technical design and construction work, the railway modernization projects are either ongoing or will commence after 2021, therefore, further impacts can be captured later. As part of the Modernization of Rail Transportation project, infrastructure upgrades related to the implementation of European Train Control System (ETCS) and Global System for Mobile Communications-Railway (GSM-R) systems were completed. These aim to improve railway line safety and facilitate seamless rail transport. The development of these systems increases the reliability, safety and efficiency of international and high-speed railway transportation, and supports significant automation of the train control and management system. The first phase of the GSM-R system ended in 2020 and was commissioned on 935 km railway line.

The Stage I. of the bridge upgrade program in 2019 (0.65 km) and 2020 (0.17 km) in the national public railway network of MÁV Ltd. aimed to eliminate bottlenecks on the affected routes and to ensure uniform technical parameters. The bridges upgraded in the project are so old that, despite regular maintenance, their complete renovation was necessary to reduce congestion and increase speed on the lines concerned.

The upgrade of four MÁV Ltd. railway crossings in 2020 served a similar purpose. The lack of a straight section between opposing connections, visibility problems, cant lying on separate planes, and crossed tracks at different crossings elevations all increased the risk of an accident, and were proving costly to maintain. Their renovation improved the safety and reliability of the railway network.

These modernization projects contribute to the upgrading of railway lines so as to further encourage the shift to rail transportation as a means of carrying passengers and goods.

Train in motion

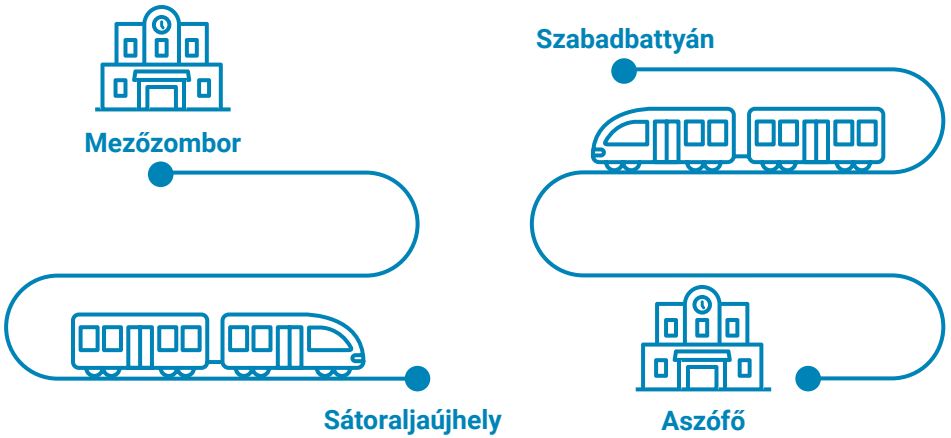
V.1.4. Electrification of Railway Lines

The electrification of railway lines intends to improve the competitiveness of public transportation by making it more appealing to the public on the basis of its green credentials. Changing traction to a more environmentally-friendly mode. Some of the main projects are related to the development of the trans-European (TEN-T) railway and the broader provision of electric railway lines in Hungary. The program is applied nationwide on different lines, including mainlines and branch lines.

Rail transportation accounts for a smaller amount of air pollution than road transportation. However, this proportion can be further reduced by the electrification process. By boosting the number of electrified rail lines, the speed of rail transportation can increase, thereby reducing environmental load and GHG emissions.

Shifting passenger and goods transportation to the railway network leads to energy efficiency improvements and averted GHG emissions. Additionally, reduced travel times can help to attract new passengers.

Under the electrification projects, 101.3km of new electrified railway lines were constructed between 2019 and 2021, including the Mezőzombor–Sátoraljaújhely (46.3km) and Szabadbattyán–Aszófő (55km) lines in 2019 and 2021, respectively.

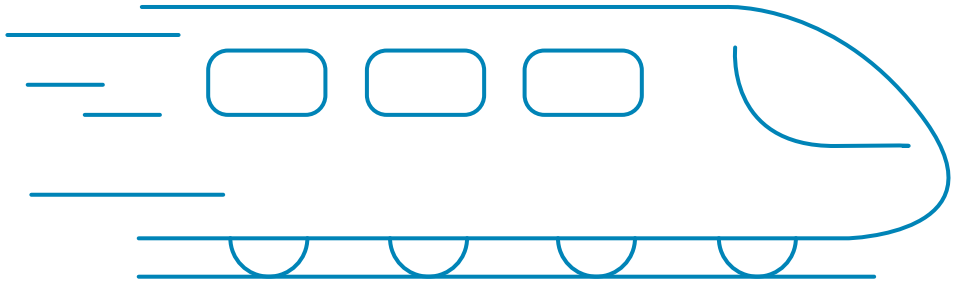


V.1.5. Rolling Stock Development

A modern and environmentally-friendly railway rolling stock can reduce energy consumption and associated GHG emissions while elevating the competitiveness of public transport. Due to the new financial investments, electric trains, tram-train vehicles, bimodal electric multiple units (EMUs) and intercity carriages were purchased. The Green Bond Proceeds were used directly in the purchase of environmentally-friendly vehicles, or indirectly to support services or additional costs related to the vehicles.

The modernization of the fleet has numerous advantages in terms of energy consumption and associated emissions as well as improving passenger comfort. With less energy consumption and fewer GHG emissions, these modern fleet vehicles will be more sustainable. The bimodal trainsets ensure a more environmentally-friendly mode of transport.

As a result of the project, 28 new InterCity cars were deployed in 2020. A further 19 InterCity cars and 19 high-capacity EMUs were deployed in 2021.



V.1.6. Effects of the Railway Transportation Projects

The operation, modernization, expansion, upgrades, and maintenance of railway system and related assets (including rolling stocks) are all essential to lower energy consumption and related emissions while shifting the passengers or freight to a more sustainable and environmentally-friendly means of transportation. The previously presented five main programs are interconnected hence it is beneficial to calculate and demonstrate their aggregated environmental impacts and benefits (e.g. reduction of the emissions of both GHG and air pollutants).

As a main element of the impact assessment, a calculation for GHG emission avoidance was based on the length of passenger journey (passenger-kilometers) when using rail transport instead of a passenger car.

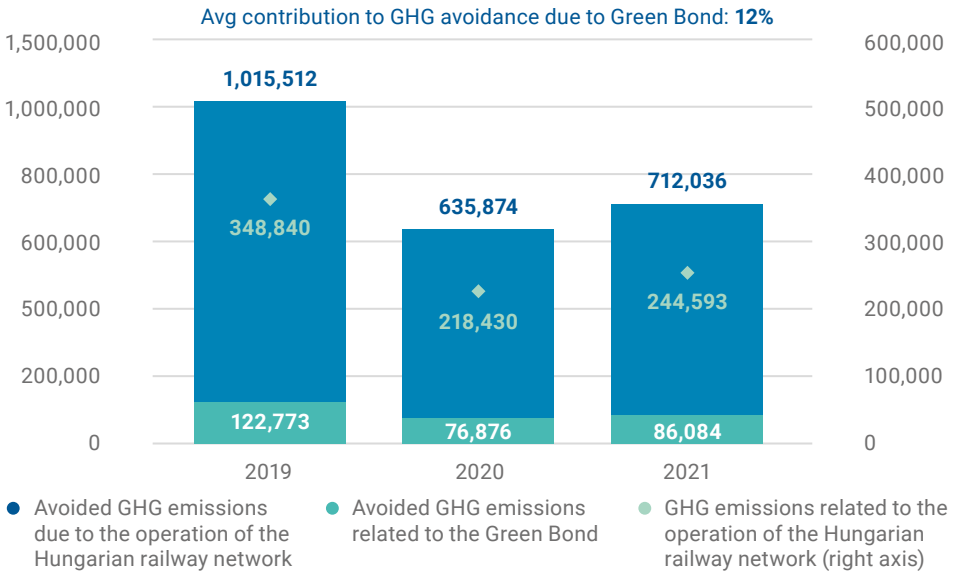


Figure 10: GHG Emission Avoidance (tCO_2eq) due to the Operation of the Railway Network. Source: KSH, OPTEN Ltd. and MÁV Ltd.

Overall, the GHG emissions avoided due to the Green Bond expenditures allocated to the Hungarian railway network operation between 2019-2021 were estimated at 285,733 t CO_2eq, as shown in Figure 10. Average contribution to GHG emission avoidance related to the Hungarian railway network due to the Green Bond expenditures is estimated at 12%[18] between 2019-2021.

Railway transportation involves various stationary activities that are also main sources of atmospheric pollution. Therefore, atmospheric pollutants such as sulfur oxides (SOx), nitrogen oxides (NOx), and particulate matter emissions (PM_{10} and $PM_{2,5}$), could also be used as indicators of transport developments which might adversely impact human health. On the basis of year-over-year comparison, railway transportation reduced its emissions of air pollutants, particularly NOx, PM_{10}, and $PM_{2,5}$ by 22-24% between 2018 and 2020[19] showcased on Figure 11. Due to this decrease, air quality could improve and the associated negative effects of air pollution could be somewhat eliminated.

Reduction compared to 2018

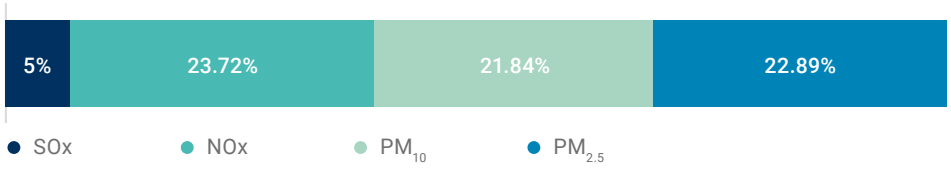


Figure 11: The Reduction in Emission of Certain Air Pollutants and Particulate Matter Arising from Railways Transportation. Source: EEA

[18] The ratio was affected by several externalities that are detailed in *Appendix 2 – Other Information Related to the Green Bond Integrated Report*.

[19] Data source: https://cdr.eionet.europa.eu/hu/eu/nec_revised/inventories/envyjd8ew/HU_NFR16_1990_2020_v2.xlsx/manage_document

V.1.7. Tax Exemptions of Environmentally-friendly Vehicles

The tax exemptions introduced by the Jedlik Ányos Plan aimed to lower the cost of environmentally-friendly vehicles in four categories: purely electric cars; extended-range externally chargeable hybrid electric cars; externally chargeable hybrid electric cars or plug-in hybrid cars; and zero-emission cars, which do not emit pollutants listed in the regulation. This year, data compilation has changed due to tax exemptions methodology, which now include registration tax, motor vehicles tax and motor vehicle duty, and which uses final data on related taxes instead of preliminary estimations.[20] Therefore, the allocated amounts increased compared to last year.

Our impact assessment focuses on the larger categories of battery-powered and plug-in hybrid vehicles. The number of battery-powered and plug-in hybrid environmentally-friendly vehicles increased by 157% between 2019 and 2021, from 12,144 to 31,187. However, in 2021 these vehicles were still only a very small (~0.8%) share of the four million passenger cars in Hungary.[21]

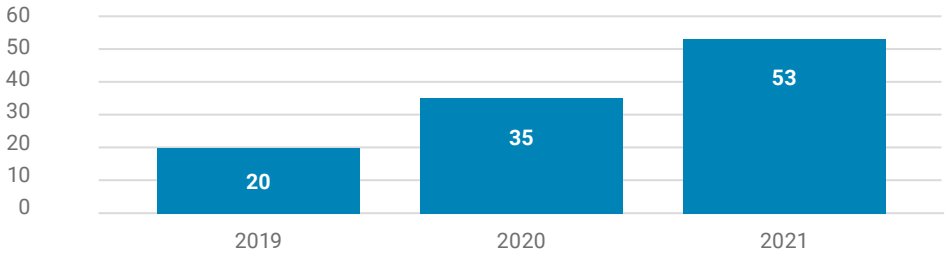


Figure 12: Reduction of GHG Emissions for Environmentally Friendly Vehicles (in kt CO_2eq). Source: MoF

[20] The Eligible Green Expenditures of tax exemptions for environmentally-friendly vehicles increased to HUF 3.93 billion (from HUF 0.8 billion) for 2019 and HUF 7.32 billion (from HUF 0.6 billion) for 2020.

[21] Data source: KSH (road vehicle fleet by county and region).

Greenhouse gas emissions from environmentally-friendly vehicles was determined using Worldwide Harmonized Light-Duty Vehicles Test Procedure (WLTP) standards and the European Environment Agency (EEA) emission report. The results were 47 g/km CO_2 emissions for electric cars and 111-139 g/km CO_2 emissions for plug-in hybrid cars. Figure 12 shows the estimated GHG emission reduction impact of the tax exemption program compared to the baseline as presented by the Ministry of Finance methodology was 20, 35 and 53 thousand tons of CO_2 in 2019, 2020 and 2021, respectively. The avoided emission estimations for carbon monoxide (CO) and nitrogen oxides (NOx) were calculated based on the Euro 6 emission standards for passenger vehicles.[22] Taking into account zero emissions from electric vehicles, the reduction of CO emissions were as follows: 9 tons (2019); 15 tons (2020); 24 tons (2021). NOx emissions were as follows: 5 tons (2019); 8 tons (2020); 13 tons (2021). Table 4 contains details of emission avoidance.

	2019	2020	2021
Number of battery-powered electric vehicles	5,182	8,831	14,950
Number of plug-in hybrid electric vehicles	6,962	11,244	16,237
Ratio of electric vehicle kms – private[23]	54%	56%	60%
Ratio of electric vehicles kms – company[23]	45%	44%	44%
Total GHG emissions avoided (in tCO_2eq)	19,969	34,544	53,443
Total CO avoided (in tons)	9.173	15.436	24.180
Total NOx avoided (in tons)	4.587	7.718	12.90

Table 4: Number and Ratio of Environmentally friendly Vehicles and Emissions Avoided. Source: Ministry of Finance, International Council on Clean Transportation (ICCT), EEA

[22] Data source: European Environment Agency—Explaining road transport emissions (2016).

[23] Weighted average for battery-powered electric and hybrid electric vehicles. Assumptions for the electric vehicle km ratio of plug-in hybrid electric vehicles based on ICCT (2020): 43% (private), 18% (company).

V.1.8. Modernization of Urban Public Transport

A developed urban public transport system is key to improving the accessibility of suburban railway stations. Investment in environmentally-friendly vehicles (e.g. trams, electric buses/trolleybuses, CNG vehicles, etc.) directly reduces the GHG emission of local public transportation, and supports GHG emissions reduction by increasing the public use of the railway system.

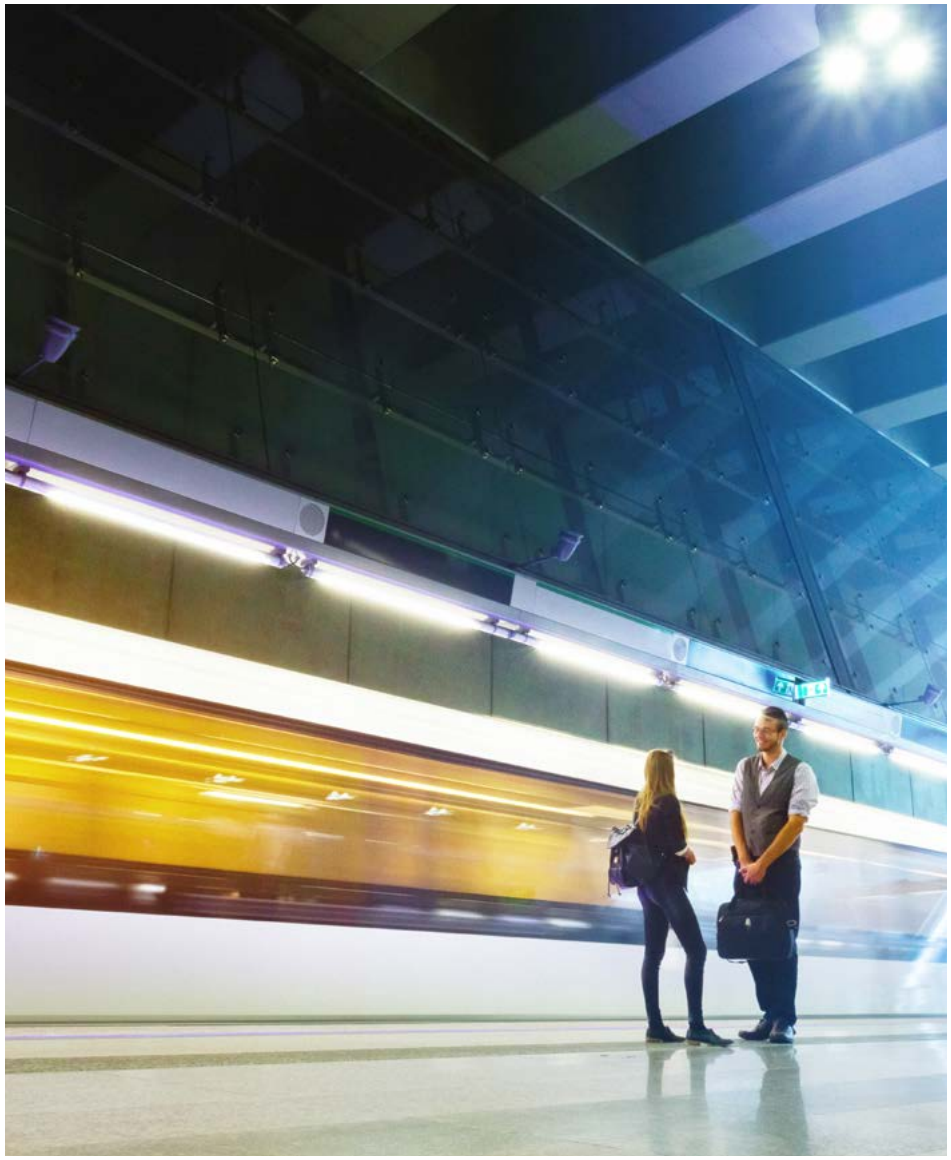
The largest project in the 2019-2021 period was the upgrade of metro line M3 in Budapest, which will create a great opportunity for more people to travel by public transportation. By developing and strengthening the capacity of the metro line, more travelers will be able to use it with improved accessibility in a safer and more comfortable way. Given that the construction is still ongoing, the expected results and related indicators of this project can be measured after installation.

In addition, tram lines that supports the accessibility of the main railway station (Kelenföld) in Budapest were either newly built or renewed in 2019, and total 1.6km.

Other associated expenditures for fleet modernization include tram, trolleybus purchases; tram renewal in Budapest; purchasing of electric buses; and the construction of a filling station in Pécs. As shows on Figure 13, as a result of the project, 21 trolleybuses[24] and 2 trams entered into service in Budapest in 2019, while a further 12 trams entered into the public transport system in 2020 and 12 more in 2021. In Pécs, 10 buses entered into services in 2020.

Figure 13: Number of New Vehicles Purchased for the Public Transportation System in Budapest and Pécs. Source: Prime Minister's Office

[24] The purchases in 2020 is not presented in the Report as they were not included in the current allocation of Green Bond Proceeds.

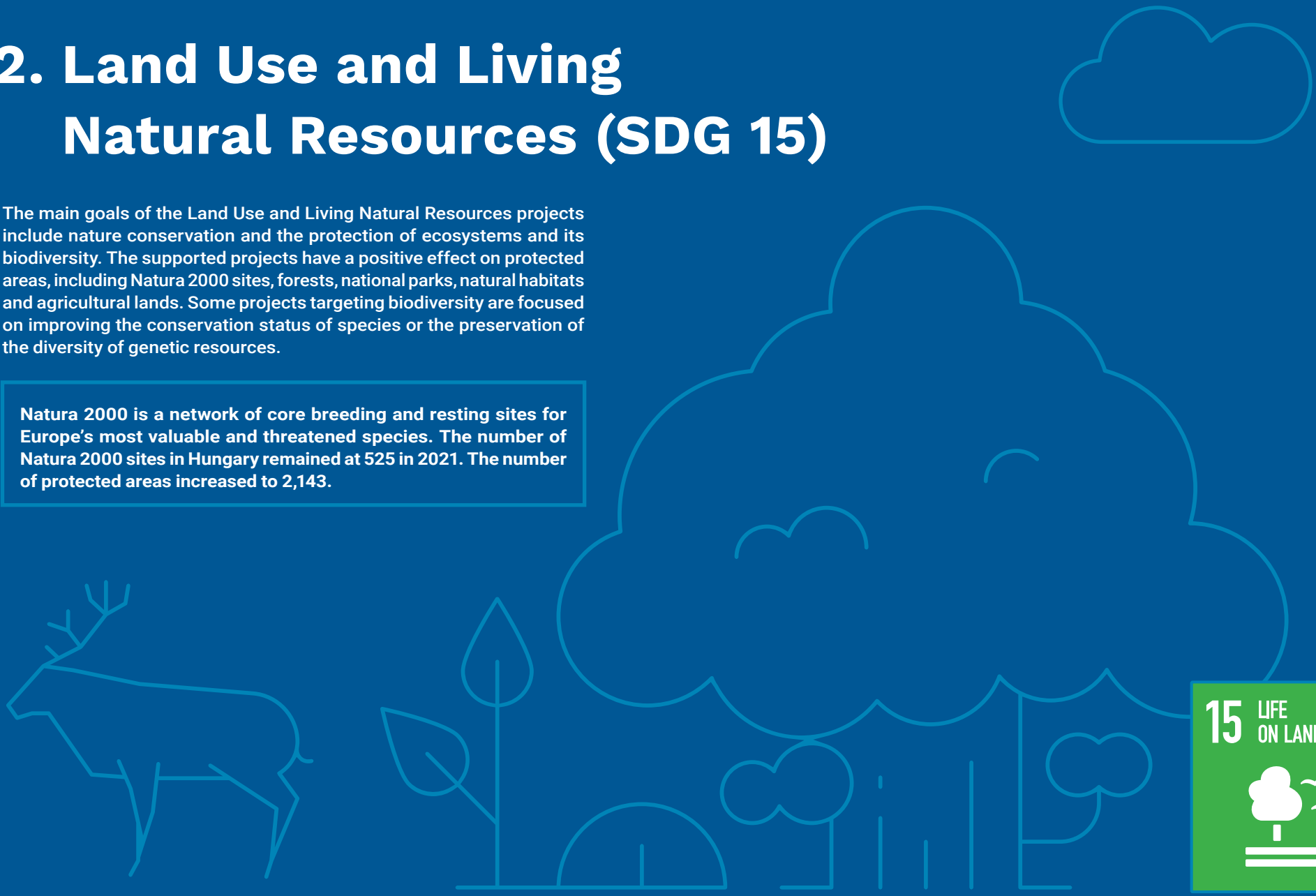


People at the subway station

V.2. Land Use and Living Natural Resources (SDG 15)

The main goals of the Land Use and Living Natural Resources projects include nature conservation and the protection of ecosystems and its biodiversity. The supported projects have a positive effect on protected areas, including Natura 2000 sites, forests, national parks, natural habitats and agricultural lands. Some projects targeting biodiversity are focused on improving the conservation status of species or the preservation of the diversity of genetic resources.

Natura 2000 is a network of core breeding and resting sites for Europe's most valuable and threatened species. The number of Natura 2000 sites in Hungary remained at 525 in 2021. The number of protected areas increased to 2,143.



V.2.1. Nature Protection and Biodiversity

The expenditures related to nature protection and biodiversity support a wide range of projects focusing on improving of the conservation status of species and habitats, the protection and conservation of genetic resources (e.g. traditional varieties), and promotion of the sustainable utilization of preserved genetic resources. The projects are financially supported by the state budget (15%) and the European Regional Development Fund (85%).

The conservation status of those habitats and species of community interest is measured by conducting national-scale assessments, which follow a common methodology used by each EU member state, in line with the EU's Habitats Directive and Birds Directive. The conservation in a biogeographical region is based on the identification of threshold values for range and area of habitat types, and the range and population of the species, in order to evaluate whether the actual range, area or population is sufficiently large enough to conclude whether the parameter is "favorable," and if "unfavorable," whether the status is "inadequate" or "bad". Favorable reference values are based purely on scientific grounds and may have to change between reporting cycles.

Fifty-two nature protection and biodiversity projects were completed during the period in question. As a result of these projects, the ecological conditions and infrastructure necessary for the improvement of the conservation status of species and habitats were enhanced on 148,857 hectares. Table 5 shows the results and the targets of the projects.

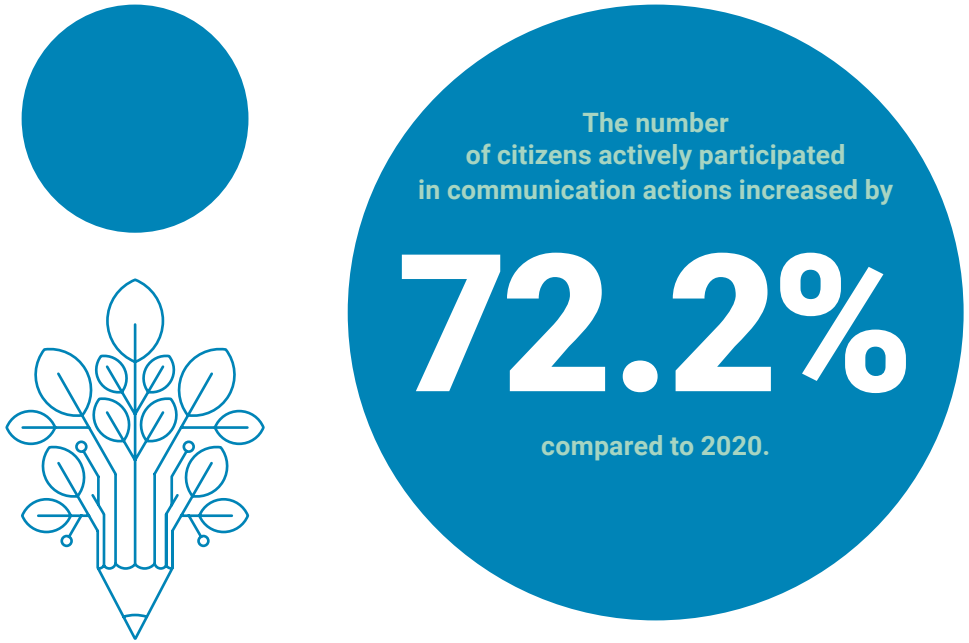
		2020	2021	2023 Goal
Habitats of community interest with an improving conservation status	Share (%)	7	18	31
	number	3	8	14
Species of community interest with an improving conservation status	Share (%)	5	7	11
	number	10	15	24

Table 5: Results Achieved by 2021 and 2023 Targets. Source: Ministry of Agriculture

Close-up of lilac perching on branch, Nagyhegyes

V.2.2. Education and Awareness-Raising

The program aims to support the implementation of environmental awareness-raising and knowledge-sharing on topics such as sustainable agriculture and food production, nature conservation and protection, and sustainable forestry. Throughout the project, 50-60 non-governmental organizations concerned with sustainability, the environment, and climate protection education were supported. The number of Hungarian citizens that actively took part in communication actions related to nature interpretation measures promoting Natura 2000 was 8,953 in 2021. The total number for 2020 and 2021 was 14,153. The target figure for the end of 2023 is 30,000 people.



V.2.3. Sustainable Agriculture

One of the main objectives of the Hungarian Rural Development Program is to support the development of a sustainable, low-carbon, resilient and competitive agri-food and forestry sector. The program aims to assist in the sustainable development of rural areas and promote the sustainable utilization of the environment, its natural resources and landscape, as well as the promotion of preserving genetic resources and ecological farming. The number of supported projects is presented in Figure 14.

Number of projects that support sustainable agriculture

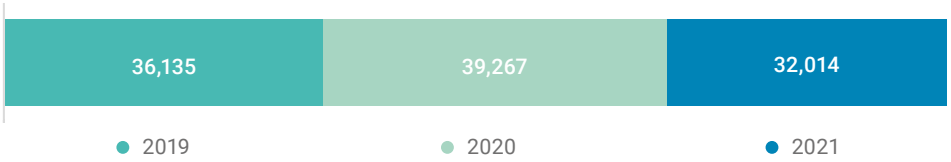


Figure 14: The number of Supported Projects.[25] Source: Ministry of Agriculture

The program's total affected area is 833,716 hectares. The financial resources are provided by the state budget (17%) and EU Funds (83%). One project supporting investments in physical assets was removed from the Green Bond allocation as of 2020.

[25] Number of supported projects in 2019 and 2020 were reviewed and corrected by the Ministry of Agriculture. The number of beneficiaries depends on the timing and nature of the measure. In 2021, the reason for the decrease is the termination of the "Compensatory payments in areas with natural disadvantages" call, for which payments were made to over 6,000 beneficiaries in 2020.

V.2.4. Others (Remediation and Environmental Projects)

REMEDIATION PROJECTS

Remediation projects are focused on the removal of dangerous and poisonous substances from contaminated land and groundwater and the protection of air, water, soil and wildlife. Eleven projects were still in progress in 2021 with the goal of remediating 50 hectares of contaminated water, land or wildlife. Remediated areas include Esztergom Strázsa-hegy, the Szekszárd Lőtéri water base, Peremarton, Berhida, Gyálai Holt-Tisza, Taszár, Mezőkövesd, Kaposvár, Ócsa, Berhida, and the Szentendre South water base. The number of remediation projects between 2019 and 2021 is shown in Figure 15.

Number of official remediation projects

Figure 15: Number of Official Remediation Projects.[26] Source: Former Ministry of Technology and Industry

ENVIRONMENTAL PROJECTS

LIFE (*L'Instrument Financier pour l'Environnement*) is the EU's financial instrument supporting environmental, nature conservation and climate action projects. From 2018, financial support has been available for traditional and integrated LIFE projects that contribute to achieving local environmental objectives on a regional level, as well as across borders. The number and type of supported projects can be obtained from Table 6.

2019	· 3 protection and sustainable use of soil projects · 1 improving energy efficiency and savings project · 1 improving resource efficiency and savings project · 1 waste management project · 1 nature and health project
2020	· 1 prevention of environmental damage project · 1 nature and health project · 1 validation of innovative environmental technologies project
2021	· 1 protection and sustainable use of soil project · 1 prevention of environmental damage project · 1 eco-innovation project · 1 improving resource efficiency and savings project · 1 reducing the environmental impact of consumption project

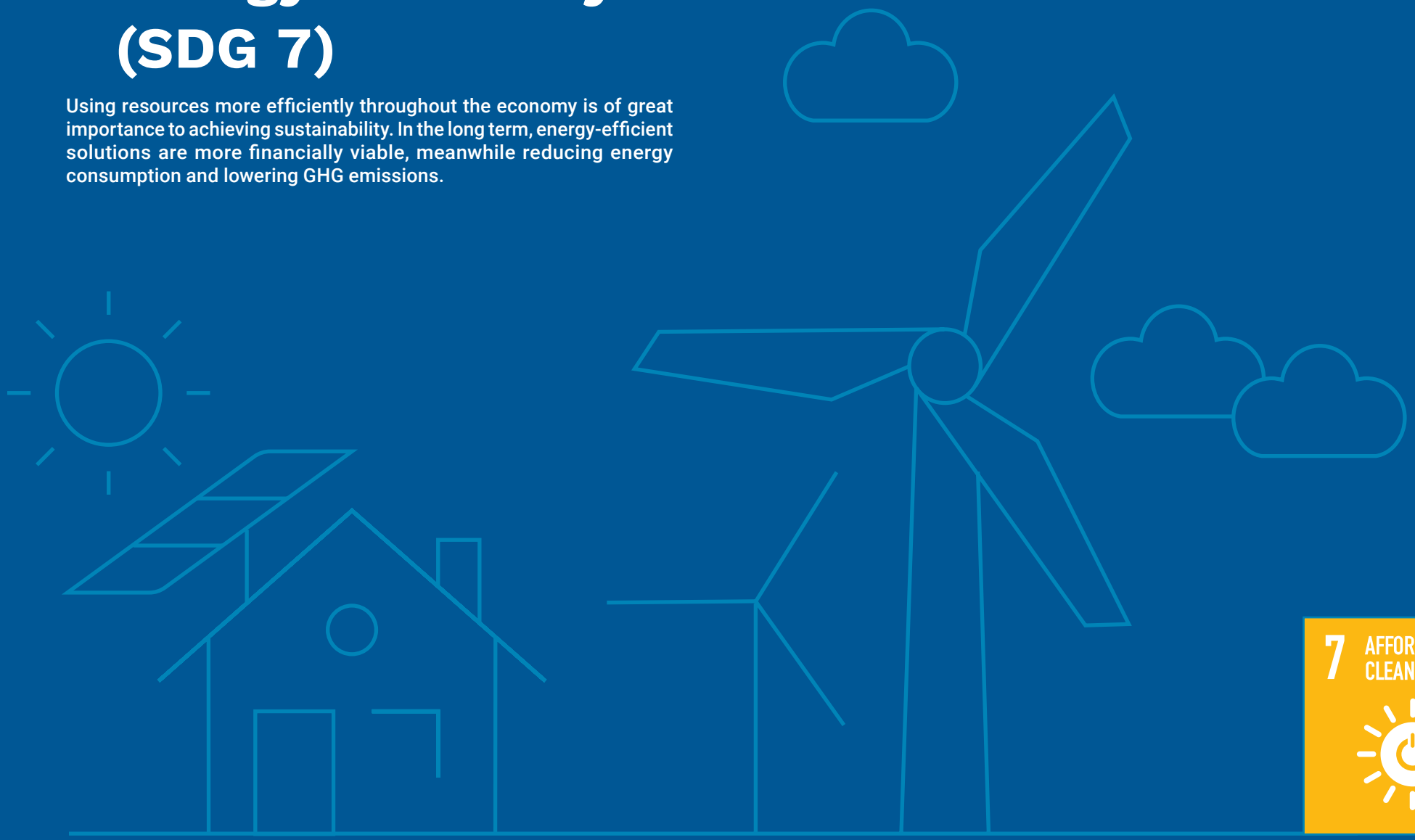
Table 6: Number and Nature of Supported Traditional LIFE Projects. Source: Former Ministry of Technology and Industry

The LIFE HungAIRy is the most significant integrated project based on the amount of support received. HungAIRy runs between 2019 and 2026 and aims to improve air quality in 10 Hungarian municipalities within 8 Hungarian regions through 18 project elements.

[26] The number of projects should be interpreted as not being aggregated.

V.3. Energy Efficiency (SDG 7)

Using resources more efficiently throughout the economy is of great importance to achieving sustainability. In the long term, energy-efficient solutions are more financially viable, meanwhile reducing energy consumption and lowering GHG emissions.



7 AFFORDABLE AND CLEAN ENERGY

V.3.1. Energy Efficiency Grant Scheme

The Energy Efficiency Grant Scheme gathers different projects that seek to promote energy efficient investments or environmental awareness-raising programs.

Energy Projects for Greening Buildings

The energy projects for green buildings aim to support projects for energy-efficient and sustainable real estate. Energy-efficient buildings are essential in the transition to a low carbon economy and in building sustainable communities. One of the sub-projects aims to develop a so-called "Green Campus" at the University of Pannonia by establishing smart solutions for framing an approach to producing energy and sustainability as a whole. Meanwhile, the main goal of the Budapest and Pest County Chamber of Engineers' audit energy certificates project is to raise energy awareness and improve professional of the topic. The projects started in 2020 with a total grant support of HUF 0.23 billion entirely from the state budget.

Development of a Green Campus at the University of Pannonia

As a result of the Green Campus project,

10.3 MWh*

energy were reduced in 2021, due to the renovation of the campus building.

The aim of the aid was to implement an energy-consciousness-raising program in energy-inefficient building "I" of the University of Pannonia's Campus in Veszprém. The structure was modernized, renovated and converted into a demonstration area to showcase research, development and infrastructure developments related to sustainability, environmental awareness and energy efficiency. The Green Campus Project sought to serve as a pilot project to promote awareness-raising generational change and sustainable development.

* The energy savings were calculated by comparing the performance of the building before (March 2020) and after the renovation (November 2021).

Auditing Energy Certificates

In the framework of the project

6,395

energy certificates were assessed.

Within the framework of the project, the Budapest and Pest County Chamber of Engineers verified energy certificates issued in 2019 and the first half of 2020, as well as reviewing the preparedness of the professionals responsible for issuing these certificates. As a result of the assessment and its related interpretation, it was identified that mandatory training could lead to performance improvements among energy auditors which would also affect the energy awareness of building users.

Future Hungarian Multinationals - IV. "Green National Champions"

To improve standards of living and ensure long-term sustainable growth, the support of Hungarian businesses is essential. The economic development program called Future Hungarian Multinationals intends to encourage technological development and the improvement of energy-efficient investments among SMEs. As part of the program, the acquisition of new equipment, machinery, and technological systems and the development of production technologies and intelligent manufacturing solutions was supported. The project design and implementation must meet the environmental and equality legislation requirements, including the conservation of protected natural and cultural values, inclusion, and equality between men and women. Between 2014 and 2020, 37 beneficiaries were supported by the scheme with a total grant contribution of HUF 8.46 billion, of which the national funding was around 15%.

V.3.2. Tax Allowance for Energy Efficiency Improvement

To incentivize companies and energy suppliers to improve their energy efficiency, a corporate income tax and an income tax of energy suppliers were financed through tax allowance, using the proceeds of the Green Bond.

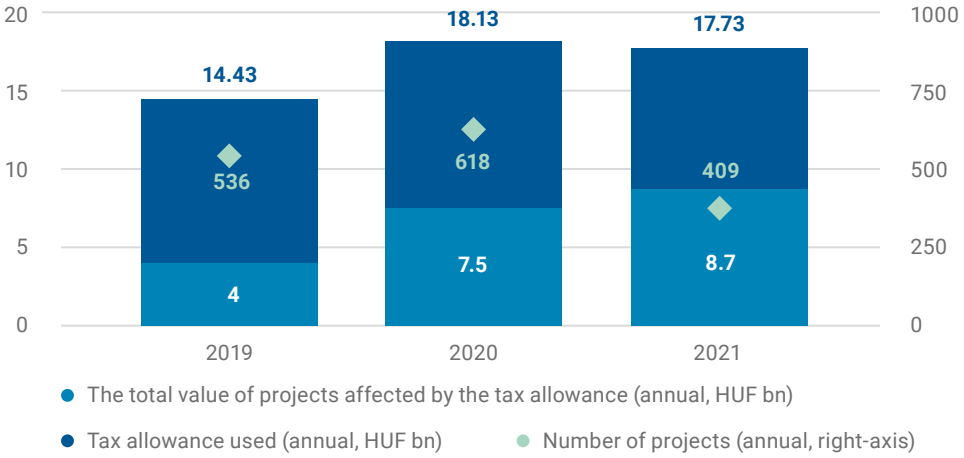


Figure 16: Results of the Program. Source: MoF

Part of the corporate income tax due from the company can be claimed as a tax allowance in the tax year following the commissioning of the investment by taxpayers who undertake renovation work, or make an investment resulting in the reduction of their final energy consumption. A total of 536 projects related to building energy reduction, heating reconstruction, renewables and heat reclaim projects took place between 2019 and 2021, along with the purchase of 819 electric vehicles. Two hundred and eight other investments were also implemented in this period. Details are summarized on Figure 16.

Indicators show the annual energy savings and avoided CO_2eq emissions based on tax returns of eligible companies, as well as the number and nature of companies benefiting from the scheme, the number of projects financed, their geographical distribution, and the total value invested in the tax allowance scheme.

Overall, 186,607 MWh energy savings were estimated from 2019 to 2021 with associated CO_2 emission avoidance at 46,645 tons. Findings are summarized in Figure 17, *Figure 18* and *Table 7*.

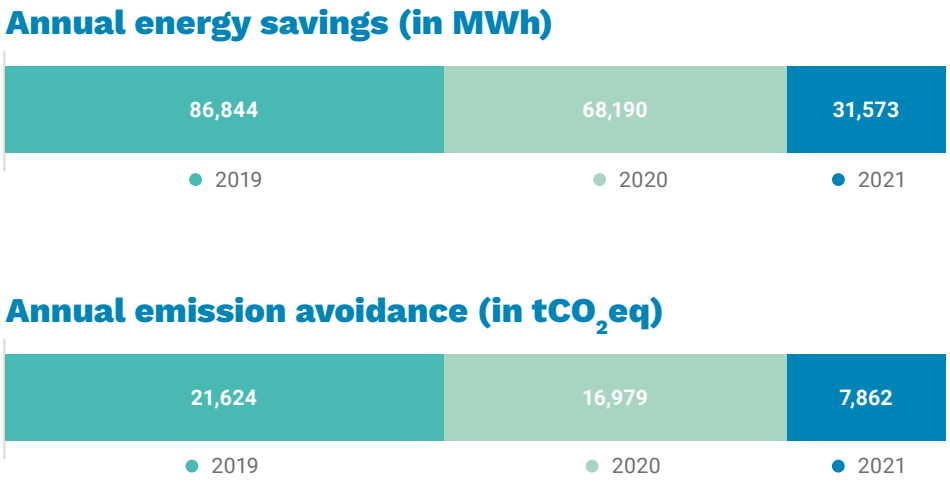


Figure 17: Energy Savings and Emission Avoidance Due to the Tax Allowance Scheme. Source: MoF

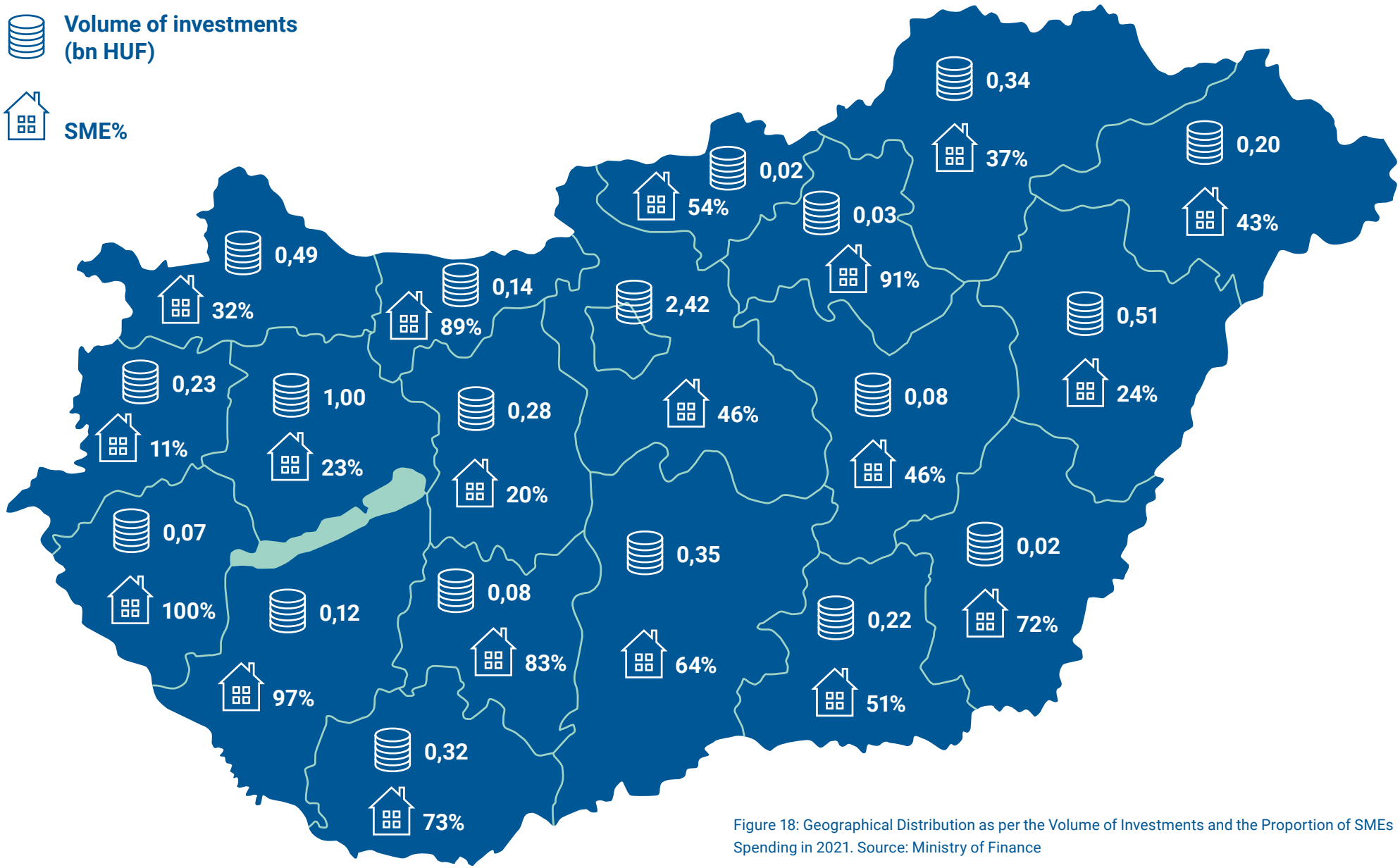
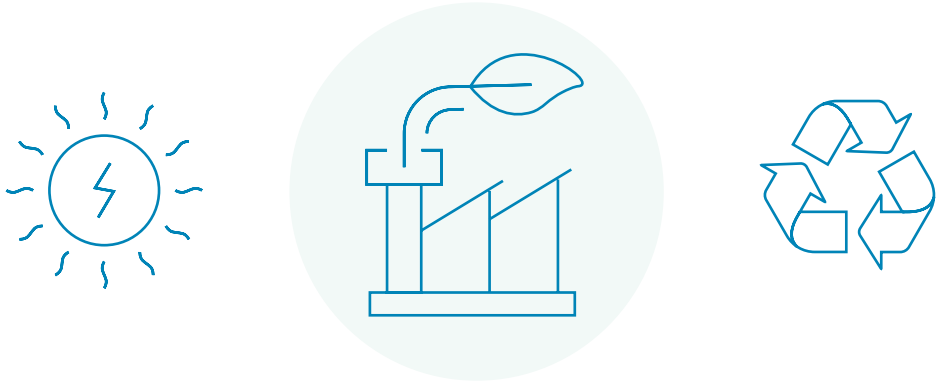


Figure 18: Geographical Distribution as per the Volume of Investments and the Proportion of SMEs Spending in 2021. Source: Ministry of Finance

	2019	2020	2021
By number of projects (cumulated)	54%	61%	63%
By total value of projects affected by the tax allowance (cumulated)	41%	35%	30%
By tax allowance used (cumulated)	35%	29%	24%

Table 7: The proportion of SMEs in the beneficiaries. Source: Ministry of Finance



V.3.3. Investment Expenditures for Agriculture

To enhance the energy efficiency of the agricultural sector, proceeds from the Green Bond were used to finance focus area 5B of the Hungarian Rural Development Program, aiming to improve the energy efficiency of livestock farming. The focus area increased the energy efficiency use of its agriculture and food processing industry and facilitated the transfer to and use of renewable energy sources, reusing its by-products, waste, residues and other non-food raw materials for organic farming. The measure also improved the modernization of energy production by applying technologies that use renewable energy.

The total value of investments includes the total amount of funding, which in turn also includes the amount of national funding received from the proceeds of the Green Bond. The percentage of national funding was 20% in 2019 and 25% in 2020 and 2021. The annual energy savings and the annual renewable energy productions are estimated through data reporting by beneficiaries in all relevant projects. The collected data is validated and the incorrect data is filtered out by third-party professionals. Based on the results, the ratio between nominal and actual data is also calculated. Since 2021, a new and more sophisticated method has been used to calculate the ratio. The actual energy saving and energy production data for the previous years was also revised and recalculated, and is shown in *Figure 19* and *Figure 20*.

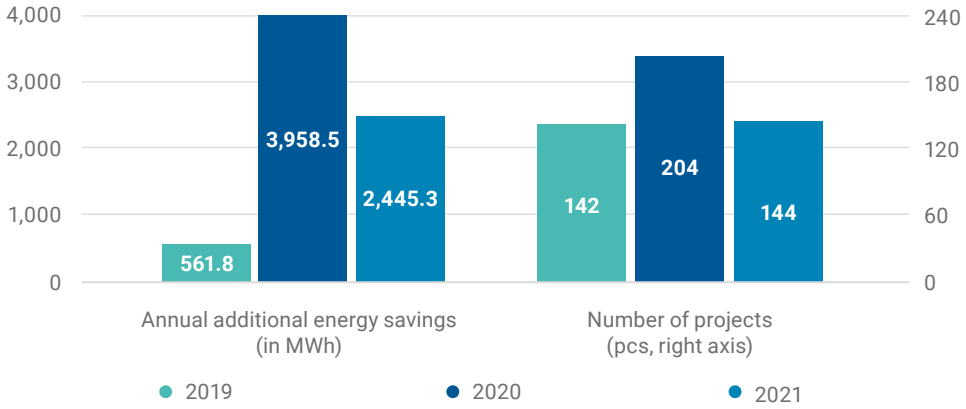


Figure 19: Energy Savings due to the Hungarian Rural Development Program Focus Area 5B. Source: Ministry of Agriculture[27]

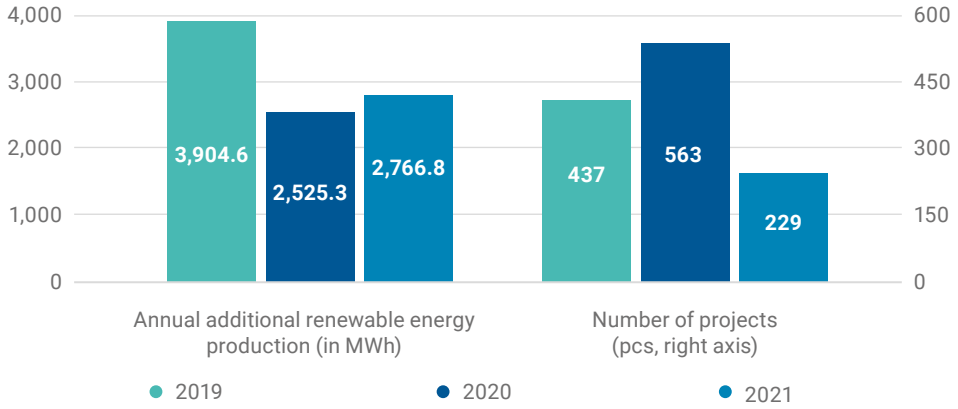


Figure 20: Renewable Energy Production due to the Hungarian Rural Development Program Focus Area 5B. Source: Ministry of Agriculture

The focus area 5B of the Hungarian Rural Development Program enhances efficient energy utilization overall 6,965.6 MWh of additional energy was saved, and 490 individual projects were supported between 2019-2021.

As the programs were also focused on improving energy efficiency by applying renewable energy resources, a total of 9,196.7 MWh of additional energy were produced and 1,229 individual projects were supported between 2019-2021.

[27] The number of supported projects is not prorated with the percentage of national funding, as most projects received both EU and national funding.

V.4. Adaptation (SDGs 6 & 13)

Adaptation projects support activities related to the anticipation of the adverse effects of climate change and natural disasters and take action to strengthen the resilience and adaptive capacity of the country.

V.4.1. Development of the Monitoring Stations for the Implementation of the Water Framework Directive

The goal of the Water Framework Directive (WFD) is to halt deterioration in the status of water bodies and achieve a “good status” for Europe’s rivers, lakes and groundwater. To accomplish this goal, it is necessary to develop a monitoring system that provides information on the quality and quantity of water bodies. The purpose of this project is to create a data and knowledge base in readiness for adaptation to climate change, and to prevent natural disasters in the whole territory of Hungary. The developments and their results are demonstrated in *Table 8*.

One project which supported the monitoring examinations in accordance WFD regulations has been removed from the Green Bond allocation as of 2020.

Aerial view of Danube river near Visegrad in Hungary

Projects	Achieved and expected results	Status (2021)
Review and coordinate the national quantitative monitoring station and measuring point network	Creating a network of stations for the quantitative monitoring and evaluation of waters and water bodies in the medium term, which can meet the requirements of the WFD.	✓
Design and develop sectoral software elements and regional subsystems	Creation of computer applications that meet the spatial data collection, processing, and data provision needs not covered by the central IT developments.	✓
Renew and modernize hydrographic monitoring stations	Renovation of 64 measuring stations and 41 monitoring wells. Establishing a network of stations for quantitative monitoring and evaluation.	🔧
Upgrade and replace mobile measuring devices	Improving measuring capability by replacing devices. Upgrading mobile and on-site digital equipment for different measurements.	🔧
Acquire measuring boats	Acquire ships and drones to improve the measurability of quantitative monitoring.	🔧
High-precision measurement	Improvements to the accuracy of the quantitative and hydromorphological monitoring system by creating a high-precision altitude base point network.	✓
Expansion of the accreditation of the directorate, water quality sampling groups	Acquisition of water sampling and analysis equipment. Development of the equipment necessary for water quality monitoring.	🔧
Development of groundwater chemical monitoring	Renovation or construction of new wells.	🔧
Research and development of evaluation and data system	Method development and data collection program relating to assessment biological and chemical quality elements. Fill the professional knowledge gaps to complete the tasks of the ecological inter-calibration procedure.	🔧
Development of hydromorphological monitoring	Elaboration of the methodological background of hydro morphological monitoring.	✓
Renovation and establishment of water quality monitoring stations	On-site water quality monitoring stations (including sensors, water samplers, etc.) and data collectors, and communication systems in the Eastern Hungarian region.	🔧

Table 8: Development of the Monitoring Stations for the Implementation of WFD and Their Status by the End of 2021. Source: Ministry of Interior

✓ completed 🔧 ongoing

V.4.2. Water Management Developments for Sustainability

Water Level Rehabilitation of the Mosoni-Danube

As a result of natural processes and human interventions, the natural state of the Mosoni-Danube has changed: the tributaries have dried up, the extent of wetlands has gradually decreased, and its ecological diversity has declined. To rehabilitate the river and regulate the water level, a weir/floodgate at the mouth of the Mosoni-Danube has been constructed. The main goals of the project are to improve water quality and to regulate the fluctuations of the river, to restore the natural ecosystem of the Szigetköz region, and to protect the human population and its property from flood damage. The total cost of the project is HUF 29.9 billion, of which 54.5% was allocated from Green Bond proceeds. The main developments and their expected ecological, social, and economic impacts are presented in Table 9 and Table 10.

	Details	Status (2021)
Construction of weir/floodgate	Weir is equipped with movable closure mechanisms which are used to raise the water level in mid and low-water situations while the floodgate function is used to protect 660 hectares from inundation.	
Flood bank	Flood banks were built in Vének and Gönyű to guarantee the continuity of safety against significant flood levels.	
Related projects	Necessary alteration of the riverbed. The operating building, service road, five monitoring wells, and utilities have been installed.	

completed ongoing

Table 9: Main Developments and Their Status by the End of 2021. Source: Ministry of Interior

Ecological impacts
· Mitigate the effects of the diversion of the Danube main branch · Retain water in the Szigetköz area · Restore the natural ecosystem of the Mosoni-Danube tributary · Mitigation of the effects of climate change on surface water and groundwater · Regulate the water level of the branches · Reduction of flooding · Affect the microclimate by increasing evapotranspiration, leading to lower ambient temperatures · Increase the proportion of water bodies in good status according to the WFD
Social impacts
· Less reduction in tourist arrivals following climate-related hazardous events · Less damage to natural heritage and sites of tourist interest · Lessened reduction in direct economic loss to cultural heritage damaged or destroyed by disasters · Contribution to people's well-being through developed tourism · Contribution to nourishment by better soil conditions · Contribution of nourishment by improved ecosystem services like more and healthier fishes and forest
Economic impacts
· Reduction of port dredging cost at Gönyű · Economic development of the region by creating recreational opportunities · Water damage becomes less significant

Table 10: Expected Ecological, Social and Economic Impacts. Source: Ministry of Interior

Thorough Environment Monitoring and Information System on the Lake Balaton

Adapting to climate change is key to protecting Lake Balaton as an ecosystem and to safeguarding its economic potential. This project aims to monitor the effects of the changing climate on the water quality and quantity of Lake Balaton, and its ecological condition. The protection of the lake's ecosystem is crucial, since society, infrastructure and the economy also rely on the living system of Balaton. To achieve this goal, more up-to-date systems need to be developed to provide thorough environmental data. Table 11 shows the main developments of the projects.

	Details	Status (2021)
Monitoring system	Development of a monitoring system that ensures the quantitative and qualitative monitoring of water bodies to satisfy information needs.	
Reduction in data loss	Reduction of identified data gaps for the ecological and chemical status assessment of Lake Balaton and its sub-basins in terms of the areas of biological elements and hazardous substances.	
Data assimilation system	Development of a data assimilation system of meteorological equipment covering Lake Balaton and its catchment area, which can provide a high-resolution spatial and temporal grid. This will provide basic information for all further environmental modeling, calculations, and decision support.	
Build a unified system	Building of a unified information and decision-support system by connecting subsystems belonging to several organizational units to facilitate decision support.	

completed ongoing

Table 11: Main Developments and their Status by the End of 2021. Source: Ministry of Interior

Planning for Water Retention and Land Use Change in the Ancient Drava Program

The project aims to improve the infrastructural conditions in the region of the ancient Drava Program to implement a sustainable water management system that supports water retention and conservation and the protection of water quantity and quality. It takes into account the change in landscape use and other ecological aspects. Based on the assessed and estimated water needs and the available water resources several water management interventions are planned, including:

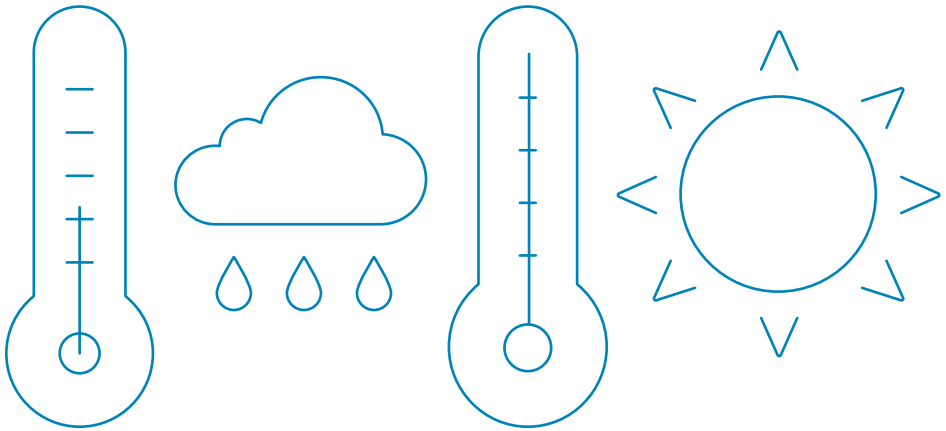
- Renovation and construction of reservoirs and other water facilities for inland water protection and local water damage control.
- Establishing of reservoirs to provide water for the summer dry season.
- Provision of water recharge to tributaries, oxbows, and other water bodies.
- Preserving wetlands/water-related natural habitats.
- Design and installation of water pump stations.
- Implementation of deep water retention options.

The system was implemented and set into operation in 2020, and the system provided effective water retention and water recharge in the area, and in 2022 has been proven beneficial in the mitigation of the effects of drought.

Drava River

V.4.3. Hungarian Meteorological Service

The key aspect of this project is to support the operation and activities of the Hungarian Meteorological Service (HMS), which collects processes and provides meteorological data and information. Nine developments were implemented that mainly focused on air pollution, climate change, weather forecasting and droughts. The developments displayed in Table 12 support the HMS in fulfilling its duties to a high standard.



	Detailed information	Status (2021)
Development of an air pollution forecasting system	Development of a mesoscale model and predict the formation of air pollution. Understand the interaction between aerosol particles and atmospheric water.	✓
Mapping the effects of climate change in Hungary	Conduct regional climate model simulations. Carry out sensitivity studies, validation experiments, and projection simulations. Develop a representative database.	🔧
Electronic General Aviation Forecast	Cooperation of meteorological service providers in Central and southeastern Europe. Develop a system for low-level flights.	✓
Interreg Romanian-Hungarian cross-border	Construction of a hail-suppression system with a soil generator in the territory of Satu Mare (Szatmár) County, Romania. Mitigate the negative effects of hail.	🔧
LIFE-IP HungAiry 2016	Improve air quality at the most relevant Hungarian municipalities. Implement air quality plans and measures. Set up a national network of experts and consultants.	🔧
Special products developed for the energy sector	Modification and development of a weather forecasting system serving the needs of the energy sector.	✓
Establishment of a weather radar	Part of the national ice damage prevention system. Reduce the most significant damage caused by hail.	✓
WASTE_Service Contract	Analyze the effect of residential solid waste burning on ambient air quality in central and eastern Europe and potential mitigation measures.	✓
Drought risk in the Danube region	Development of a drought response strategy. Improvement of cooperation between operational services and decision-makers in the region. Development of a methodology for near real-time assessment and forecasting of drought risks and impacts.	✓

Table 12: Developments Supporting the HMS and Their Status by the End of 2021.
Source: Former Ministry of Technology and Industry

✓ completed 🔧 ongoing

V.5. Waste & Water Management (SDGs 6 & 11)

Waste management tasks include the collection, transportation, disposal and recycling of different types of waste materials. The water management tasks are mainly related to the process of planning, developing, managing and distributing water resources, as well as the collection and treatment of wastewater. Both waste and water management are a matter of cherishing the environment and maintaining human health.

V.5.1. State Reconstruction Fund for Water Utilities

The Rolling Development Plan defines a 15-year planning phase for local governments and water utility companies for the renovation or replacement of equipment in the water utility system in order to develop its technical conditions and expand the availability of their services. Approximately HUF 1,300 billion (approximately HUF 90 billion annually) is planned for investments until 2033.[28] This is partially financed by the Green Bond. The implementation of various projects has started, including the renovation of drinking water and wastewater treatment systems and the reconstruction of drinking water and wastewater pipelines in many territories. Major parts of the projects are ongoing, and significant resources are earmarked for further renewal and reconstruction activities in the next 10-15 years. Table 13 provides an overview of the Hungarian water utility system.

[28] Source: data provided by the Hungarian Energy and Public Utility Regulatory Authority.

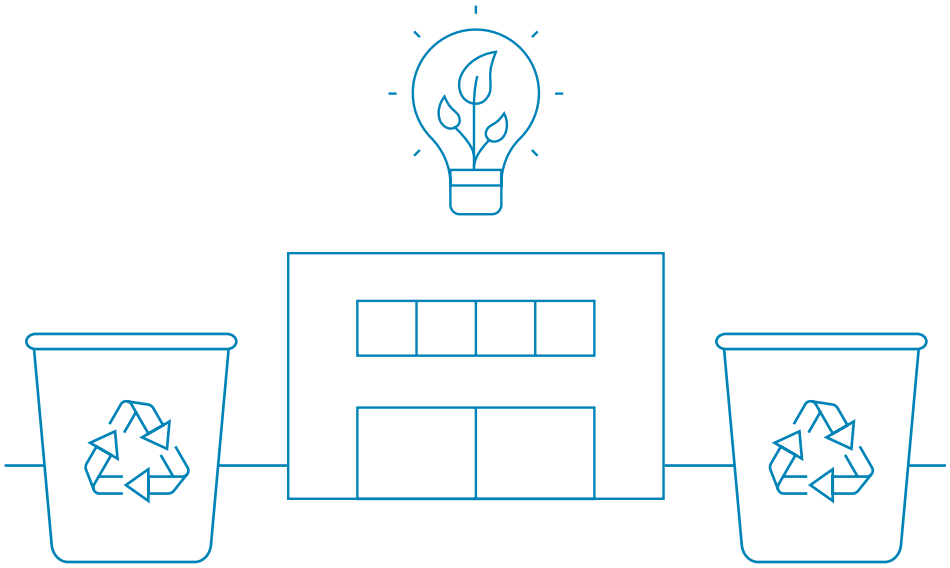
	2019	2020 (Latest available data)
The number of households connected to the drinking water system	4,246,837	4,273,784
The number of households connected to the sewage system	3,694,654	3,726,141
The length of the sewage system per kilometer of the drinking water system (in meters)	761	780
Wastewater also treated with tertiary treatment (in thousand m^3)	492,050	488,325
The number of breaks per 10 kilometers of drinking water pipelines	6.947	7.404
The number of breaks per 10 kilometers of sewage pipelines	15.628	15.443

Table 13: Overview of the Hungarian Water Utility System. Source: KSH

As per the latest data, the length of the drinking water system was 67,200 km, whereas the length of the sewage system was 52,446 km in 2020. 94.9% of Hungarian households were connected to the drinking water network and 82.8% were connected to the sewage network. The ratio of breaks for both drinking water and sewage pipeline decreased, which also reduces water loss.

V.5.2. Subvention for Waste Separation and Reutilization as an Energy Resource

In 2016, the Hungarian Government adopted the Irinyi Plan to support small- and medium-sized enterprises with the development and commercialization of state-of-the-art technologies and services. The Plan pays special attention to green technologies and products that hold considerable promise regarding protecting the environment. The projects that received grants under the Irinyi plan are associated with the development and optimization of technologies related to waste management, the utilization of different waste items to generate valuable products, and the design, and development of reusable packaging materials. The impact of the expenditures was first realized in 2020 when three waste separation and reutilization projects received grants. The supported projects were still ongoing in 2021, the results will be available upon compilation.



V.5.3. Supporting Waste Management Tasks

Financial support was dedicated to the renewal and development of inland waste management infrastructure to help facilitate the transition to a circular economy and achieve the EU's waste management and recycling targets. The collection, pre-treatment and recycling of specific waste categories (e.g. packaging, electrical and electronic equipment, batteries, and tires) was supported. As can be obtained from Figure 21, 5 out of 17 projects that have applied received waste management support in 2019. This proportion was 14 out of 37 in 2021.

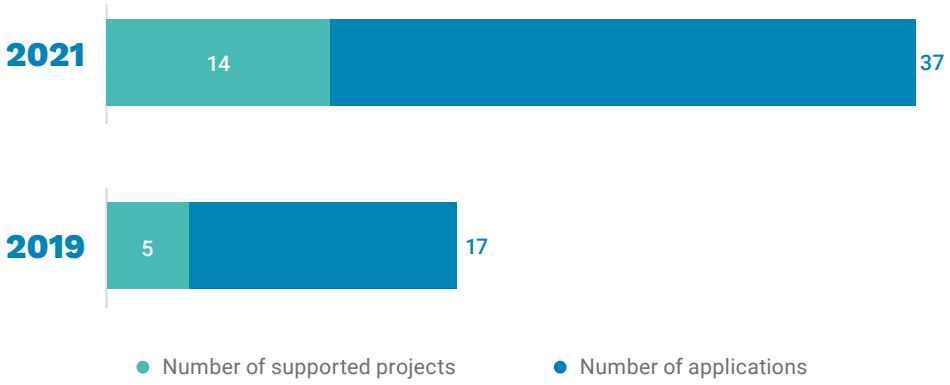


Figure 21: Number of Projects that Received Waste Management Support. Source: Former Ministry of Technology and Industry

V.5.4. Others (Monitoring, Remediation, Efficient Water Use in Agriculture)

Monitoring and Remediation

The ecological monitoring of Szigetköz is a joint Hungarian and Slovakian project that focuses on the monitoring and evaluation of changes in the environmental and ecological condition of the Bős Hydropower Plant's impact area. During the project, the main drivers and trends that influence the environmental and ecological status of Szigetköz were identified. An overview of the status of surface and groundwater resources, riverbed characteristics, forests, and bioindicator species was also completed.

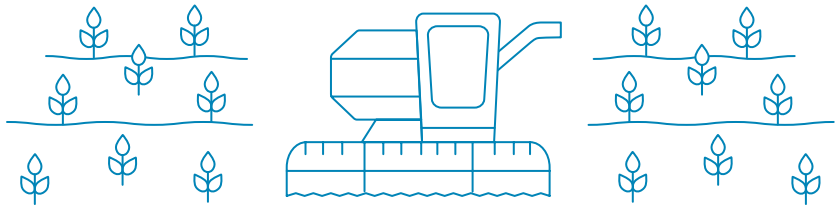
The other project focuses on the development of innovative technologies which can support remediation activities at the former "Magyar Optikai Művek" factory in Mátészalka, which is polluted with volatile chlorinated hydrocarbons. The research consortium is studying the most effective remediation technology for the site and its contamination, which will also serve to protect the local water base. The project preparation phase started in 2020; impact results will therefore be captured later.

Efficient Water Use in Agriculture

This project element focuses on efficient water use in agriculture, including water-saving irrigation methods, climate-resilient production methods and sustainable land use as part of the Rural Development Program. Nearly 700 projects were supported between 2019 and 2021, as detailed in Table 14.

	2019	2020	2021
Support for the construction of water reservoirs	1	4	3
Construction of land reclamation roads	0	3	2
Improving the water efficiency of existing irrigation equipment	35	35	52
Purchase of new irrigation equipment	58	82	96
Improving the energy efficiency of irrigation equipment	33	39	33
Number of new projects relating to new irrigated orchards	88	81	31

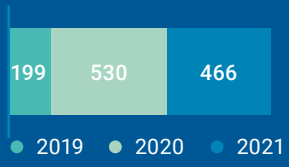
Table 14: Number and Nature of the Supported Projects. Source: Ministry of Agriculture



V.6. Renewable energy (SDG 7)

By switching to renewable energy, the transition to a low-carbon economy can be facilitated and emissions of GHGs can be minimized. Renewables provide several benefits compared to conventional energy sources: they are clean, inexhaustible and abundant. The purpose of the project is to provide subsidized loans for the use of renewable energy sources in Hungary among residents and SMEs to avert emissions from non-renewables and increase energy efficiency. Avoided GHG emissions are shown in Figure 22.

Subsidized Loan for Renewable Energy Use in Buildings



Subsidized Loan for Increased Energy Efficiency and Renewable Energy Use in Residential Buildings

Figure 22: Annual GHG emission avoidance (in tCO_2eq)[29]
Source: Prime Minister's Office

[29] The GHG emission avoidance is estimated based on the difference between the building's emission after the renewable asset installation and the baseline value before the project using the dataset of the official Energy Certifications.

V.6.1. Subsidized Loan for Renewable Energy Use in Buildings

The energy consumption of buildings is responsible for over 40% of the national energy consumption in Hungary, with a similar proportion of GHG emissions coming from them. In Hungary, the overall proportion of renewable energy from the total gross final energy consumption reached almost 14%[30] in 2020, and is intended to be increased to a minimum of 21% by 2030.[31]

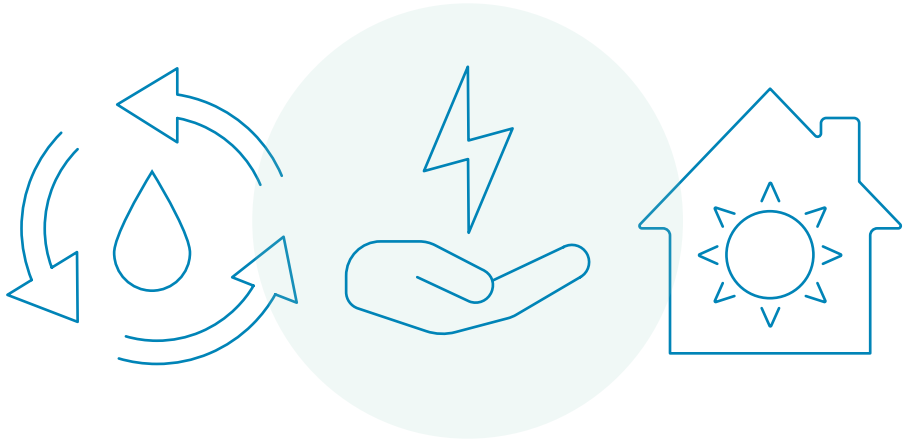
This financial support program provides combined loan and non-refundable support for micro, small and medium-sized enterprises located in Pest county and Budapest and aims to reduce their primary energy use while increasing the use of renewable energy sources in buildings. To generate energy consumption from renewable resources most of the beneficiaries installed solar panel systems, modernized their non-productive heating systems or lighting systems, introduced renewable electricity generation, or developed their domestic cooling or hot water systems. The program was partially (50%) financed from the Green Bond Proceeds to complete the European Union funds.

Table 15 shows indicators such as the number and capacity of the installed renewable assets and annual energy production.

	2019	2020	2021
Number of projects (pcs)	11	20	10
Installed capacity (in MW)	0.1	0.4	0.3
Annual energy production (in MWh/year)	296.13	708.39	354.67

Table 15: The Number and Nature of Supported Projects. Source: Prime Minister's Office

In total, 0.8 MW of renewable resource capacity were installed over the length of the program, which resulted in 1,195 tCO_2eq of emission avoidance.



[30] KSH: share of use of renewable energy sources in gross final energy consumption (2000-2020) as per the latest data available.

[31] Ministry of Innovation and Technology: National Energy and Climate Plan of Hungary (2018); Ministry of Innovation and Technology: National Energy Strategy (January 2020)

V.6.2. Subsidized Loan for Increased Energy Efficiency and Renewable Energy Use in Residential Buildings

The residential sector is responsible for one-third of total energy consumption in Hungary. Its energy use is mainly generated from buildings in which the main sources of consumption are heating, ventilation and air conditioning. In Hungary, the proportion of gross final energy used for heating and ventilation from renewable energy sources was on average 20% over the last 5 years.[32] According to the National Energy and Climate Plan, it aims to be increased to 28.7% by 2030.[33]

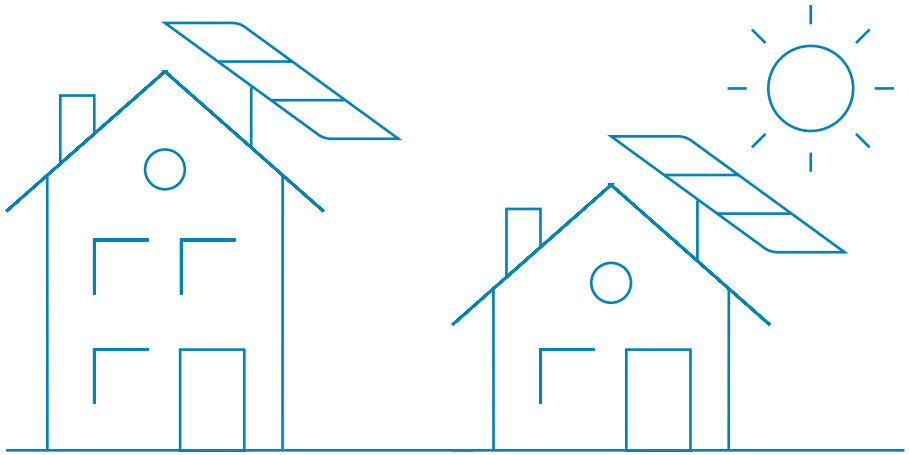
This loan program's main objective is to finance the installation of renewable energy resources or energy efficiency initiatives in residential buildings. This includes private individuals, condominiums and flat cooperatives. The program was partially (50%) financed from Green Bond Proceeds completing the European Union funds.

Indicators in Table 16 show the number and capacity of installed renewable assets in the 2019-2021 period, along with their generated electrical production. The GHG emission avoidance estimate is based on the performance of the building after the renewable asset installation, with the baseline value before the project.[34]

	2019	2020	2021
Number of projects (pcs)	1,290	1,040	147
Installed capacity (in MW)	3.4	3.1	0.5
Annual energy production (in MWh/year)	4,429	4,061	665

Table 16: Results of the Program. Source: Prime Minister's Office

In total, 2,477 loans were provided to different residents to install renewable energy systems. These were mainly solar systems, geothermal water, water-to-water- and air-to-water heat pump systems. In other cases, loans were provided for the construction of new boiler systems utilizing briquettes, pellets or wood chips. Due to these energy efficiency and renewable energy developments, 7.0 MW capacity was installed, resulting in 3,815 tCO_2eq of emission avoidance.



[32] KSH: share of use of renewable energy sources in gross final energy consumption (2000-2020) as per the latest data available.

[33] National Energy and Climate Plan of Hungary (2018).

[34] Official Energy Certification data was used in the compilation.

VI. Appendices

VI.1. Appendix 1 – Case Studies

Case Study 1 – Support for Gene Conservation Tasks

Green Sector: Land Use and Living Natural Resources (Nature protection and biodiversity)

Objective:

This project supports the identification, collection, conservation, and sustainable use of our genetic resources, which are the basis of agricultural production and food supply. Gene conservation institutions' tasks are the conservation and maintenance of genetic resources, as well as providing professional support for the sustainable utilization of genetic resources.

Description:

Hungary was among the first countries in the world to recognize the importance of gene conservation. In 2017 the Ministry of Agriculture prepared a specific Gene Conservation Program, which was approved by the Government. In 2019, the implementation of the 5-year-long National Gene Conservation Strategy was launched. The primary goal was to develop the capacities of gene conservation institutions to maintain and expand the collections of the gene banks and national park directorates, and to establish a state gene bank network as an inventory of values, as a separate duplicate in case of any disease, natural disaster, or simply as a basis of the gene pool for the improvement of the variety. A great opportunity for the conservation of genetic resources that provide the basis for agriculture and food production.

A specific Government Resolution provided resources for the implementation of the Program, including the collection of the rare genetic values still found in the Carpathian Basin and the introduction of specific sample programs. The Government Resolution provided for a total of HUF 12.3 billion for the implementation of the Gene Conservation Program.

Figure 23 summarizes the main results of the program.

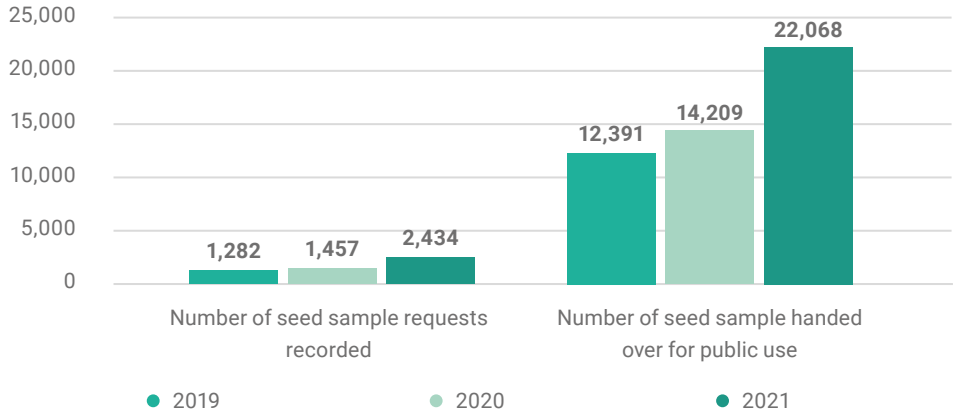


Figure 23: Quantitative Results of the Project. Source: Ministry of Agriculture

Hungarian gray cattles

Case Study 2 – Examination of the Effects of Climate Change on the Water Resource and Flow Conditions of Lake Balaton and the Impact of These Factors on Wildlife

Green Sector: Adaptation (Developing of the monitoring stations for the implementation of the Water Framework Directive)

Objective:

Climate change and its hydrological consequences are one of the most important challenges that Hungarian water management has to face. As a result of climate change, hydrological factors (e.g. precipitation and evaporation rate) are shifting. This has a significant effect on the water regime of Lake Balaton. It can also cause ecological problems by increasing eutrophication. The project's elements contribute to reducing the vulnerability of Lake Balaton to climate change.

Description:

The project aims to examine the link between water level regulation and climate change by the establishing a flow model based on the analysis of the quantity and quality of sediment in Lake Balaton and an environmental impact assessment of the changed water regime.

During the project, water level regulations are reviewed by taking into account interventions in the whole basin and the impact of global climate change, which can help to determine the correct use of the surplus of the lake's basin. This can also support more stable recreational uses of its water.

The effects of elevated maximum raised water levels on shoreline areas, artificial structures and the flora and fauna of the lake and its shores are also assessed. In addition to the impact of climate change on Lake Balaton, this project also examines and reviews the parameters necessary for a more stable operation of the Lake by maintaining a constant water level as well as the economic impact of both, identifying positive and negative aspects. The beneficiary of the project is the General Directorate of Water Management. The total gross cost of the project is funded by the Green Bond at around 14%.

Swans swim along the shore at Lake Balaton

Case Study 3 – Bottleneck Elimination and Electrification of the Mezőzombor-Sátoraljaújhely Railway Line

Green Sector: Clean Transportation (Electrification of railway lines)

Objective:

This railway development project included the electrification of the Mezőzombor-Sátoraljaújhely railway line and its track renovation, with the aim of significantly reducing travel time by installing modern safety devices and barrier-free facilities, along with general improvements to the standard of public transport.

The main goal of the enhancements was to fulfill the parameters required by the EU, ensuring an axle load of 225kN and a minimum track speed of 100 km/h, eliminating the speed limit of 60 km/h speed limit.

Description:

The electric overhead line system, along with the necessary energy supply system, was built on a 46.3km-long railway line section. At all stations and stops, the street lighting had already been renewed. Modern acoustic and partly visual passenger information devices will be installed along with 55 cm-high platforms. Data transmission equipment, fire and property protection signaling equipment, video camera surveillance equipment and other technological connection equipment and devices were installed on the line section. New electric relay heating equipment was installed at three stations, and at Sátoraljaújhely station an assembly pre-heating plant was established. A new line cable and power cable were installed along the entire length of the line. Between the Sárospatak and Sátoraljaújhely stations, the earthwork and track level—which also fulfills the task of flood protection—were raised by one meter over a length of 4km.

This project contributes to the development of safe and sustainable forms of travel, enabling the shift of a proportion of daily trips from public road transport to environmentally-friendly and sustainable fixed-track transport. This helps to reduce the environmental, technical and public safety risks of daily private transport, as well as their resulting burdens and damages.

By prioritizing electric-powered fixed-track transport over travel by road, life quality will improve for those who live along current transport routes as well as those that do not use public transport due to the reduction of air pollution and noise from fewer road trips. The implementation of the project, including the modernization and electrification of the affected railway track, directly reduces GHG emissions, since electric trains (instead of diesel) run more smoothly and at higher speeds.

The decrease in road vehicle mileage is significant. As a result of the project, a sizable improvement is expected primarily in long-distance connections (e.g. Budapest-Sárospatak (255km) / Sátoraljaújhely (265km)), thus some journeys which change modes will also cause a significant change in mileage. The length of the routes with higher traffic within the region is also significant (e.g. Miskolc-Sárospatak 75km). New passengers are also expected on these routes. The improvement measured by the feasibility study is 7,543 kpvpd (Kilometers per Vehicle per Day).

VI.2. Appendix 2 – Other Information Related to the Integrated Report

Methodology for GHG Emission Avoidance in terms of Modal Shift to Railway Transportation

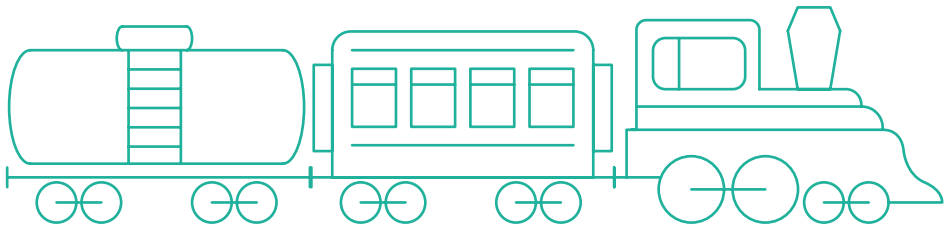
The GHG emissions avoided as a result of the cumulated effects of the railway transportation projects was determined as following:

- GHG emissions avoidance is based on the assumption that those passengers who use rail transportation shifted from using passenger cars. Therefore, the calculation is based on a method of carbon foot printing of rail passengers who use trains instead of motor vehicles.

- The calculation method determines specific GHG emissions from rail passenger transport per passenger-kilometer (average value), specific GHG emissions from road transport per passenger-kilometer (average value), and the difference between rail and road journey GHG emissions (in passenger-kilometers) determined as an average value.[35]

- For determining the carbon footprint of rail passenger transport, data on traction energy (diesel and electricity) was considered, therefore GHG emission avoidance for electrification projects is not indicated separately to prevent double counting.

The contribution of Green Bond expenditure to emission avoidance is based on the assessment of the two beneficiaries' (MÁV-Start Ltd. and GYSEV Ltd.) main expenses (e.g. material expenses, personnel expenses and other expenses of their profit and loss (P&L) statement) which the Green Bond could cover. The share of the Green Bond expenditures to cover these expenses is, on average, approximately 12% for 2019-2020.[36] To illustrate the environmental and sustainability benefits of clean transportation projects, the GHG emission avoidance calculation relied on the methodology applied by the main national railway company. This methodology focused on the projection of the carbon emissions avoided by choosing rail transport over private passenger vehicles. Accordingly, the difference between GHG emissions on a passenger rail journey (in terms of passenger kilometers) instead of a car journey, was determined.[37] The calculation provides the value of saved emissions in CO_2 equivalent (CO_2eq), as a converted indicator of the considered greenhouse gases (CO_2–carbon dioxide, CH_4–methane, N_2O–dinitrogen monoxide). Thus, the final results were summarized in emission savings (in CO_2eq) as a passenger/km comparison of rail travel versus car travel. In calculating the impact of fuels used by rail and cars, the internationally accepted WTW (Well-To-Wheel) methodology was applied, which only takes into consideration the direct GHG emissions of fuel production and vehicle operation.



[35] Data Source: https://www.mavcsoport.hu/sites/default/files/upload/page/denkstatt_szakertoi_velemeny.pdf

[36] The ratio can be explained by the high amount of Eligible Green Expenditures on Hungarian railway network operation for 2019-2020, compared to Green Bond issuances in 2021. The remaining Eligible Green Expenditures for 2019-2020 were already allocated for the issuances in 2020 or remained free to allocate as Green Bond issuances in 2022. The allocation for Reimbursement of Uncovered Costs of Railway Passenger Traffic was proportionally negatively adjusted by the over-allocation of Green Bond issuances in 2020 for other clean transportation categories due to revisions in eligible expenditures (to ensure the overall consistency of eligible expenditures and allocated Green Bond proceeds for 2019).

[37] The emissions are determined as an average of the years 2016-2020.

Methodology for GHG Emission Avoidance in term of Modal Shift for Environmentally Friendly Passenger Vehicles

Regarding tax exemptions for environmentally-friendly vehicles, another approach was used when calculating GHG emissions.[38, 39] Based on the estimation methodology of the MoF, baseline emissions rely on yearly petrol sale data, the number of passenger cars and their mileage in the 2018–2021 period. The emissions were determined according to the European Environmental Agency (EEA) estimation of GHG emissions for electricity production and electric and petrol/diesel consumption. The calculation follows WLTP standards and was based on the number and mileage of environmentally-friendly vehicles.

The impact of the GHG emission tax exemption program was determined by the MoF by the following indicators:

- The number and mileage of environmentally friendly vehicles per year in the 2019-2021 period. The Ministry of Finance estimated the approximate mileage data based on the vehicle's roadworthiness test mileage data.

- The electric mileage ratio for the hybrid vehicles – determined to be equal to the estimated ratio for Germany by the International ICCT (2020).[40]

- GHG emission for electricity production – determined based on the EEA emission report (2022).[41] GHG emission data for 2018 was used for the calculation for 2019 and GHG emission data for 2020 was used for the years 2020-2021.

- Electricity and fuel (petrol, diesel) consumption of environmentally friendly vehicles and internal combustion engine-based vehicles. For environmentally friendly vehicles these values are determined based on WLTP standards. Consumption values for vehicles with internal combustion engines were determined based on petrol sale volumes, mileage, and the number of petrol-based vehicles.[42]

Methodology for Energy Savings and Renewable Energy Production related to the Hungarian Rural Development Program

In 2021, a more sophisticated method was used to calculate the results of the program, therefore all data was recalculated, and the related results were restated. The amount of energy saved and renewable energy produced in all relevant projects is collected by the Hungarian State Treasury via data reporting by the beneficiaries. The projects that are supported by the Hungarian Rural Development Program Focus Area 5B provide information on the annual energy savings achieved and/or energy produced by the investment. The data must be based on appropriate energy calculation (in kWh). To filter out incorrect information, collected data and associated supporting documents (e.g. energy performance certificate, energy bills) are reviewed and validated by spot-checking by third-party professionals. The information collected is used to determine whether the magnitude of energy savings and/or energy produced is consistent with the reported value. If not, either an estimate is made (if the data allow) or the project is removed from the sample. Based on the results, the ratio between reported and actual data is also calculated.

[38] In 2021, the experts of the Ministry of Finance published an analysis of the Hungarian passenger vehicles and their tax treatment: https://ngmszakmaiteruletek.kormany.hu/download/7/f8/c2000/gepjarmu_elemzes_210604.pdf

[39] In 2021, experts at the MoF published an analysis of Hungarian passenger vehicles and their tax treatment: https://ngmszakmaiteruletek.kormany.hu/download/7/f8/c2000/gepjarmu_elemzes_210604.pdf

[40] ICCT White Paper (September, 2020): Real-world usage of plug-in hybrid electric vehicles.

[41] Data source: European Environment Agency—GHG emission intensity of electricity generation.

[42] The fuel consumption of vehicles with internal combustion engines was estimated by the MoF to be around 8.1 liters per 100km, based on petrol consumption in Hungary and the number of vehicles running on petrol. This methodology resulted in 190g/km CO_2 emissions for petrol cars. This "baseline" indicator, used to determine the GHG emission reduction from the tax exemption offered by the MoF, is relatively high compared to other approaches, as the methodology includes all internal combustion vehicles in Hungary with an average age of 15 years.

The ratio for the energy savings projects is 43%, while for the renewable energy production projects this ratio is 48% over the entire period of the program. The data that is presented in the Integrated Report is also proportionated with the percentage of national funding received from the proceeds of the Green Bond.

The supported investments have continuous effects, since energy savings and renewable energy production are also realized after in the years after the project's implementation. Therefore, in the Integrated Report only the annual additional energy savings and energy production are shown, which are the result of the new investments.

Alignment with the Sustainable Development Goals

The Sustainable Development Goals (SDGs) are a set of 17 interlinked global goals related to environmental, social, and economic topics. The SDGs were set up in 2015 by the United Nations General Assembly and are intended to be achieved by 2030. Green bond financing can contribute to the mitigation of climate change damage and the amelioration of social challenges globally. Therefore, it can also contribute to the fulfillment of the SDGs.

The allocated Green Bond Proceeds are deemed to contribute in particular to the progress towards the UN Sustainable Development Goals #6 on Clean Water and Sanitation, #7 on Affordable and Clean Energy, #9 on Industry, innovation, and infrastructure, #11 on Sustainable Cities and Communities, #13 on Climate Action and #15 on Life on Land.

All of the projects financed by our Green Bonds are reviewed individually to ensure contribution to the SDGs and its respective sub-targets. The Integrated Report may consider alongside other papers, ICMA's document on "Green, Social and Sustainability Bonds: A High-Level Mapping to the Sustainable Development Goals".

Contribution of the Green Sectors to the EU Taxonomy Environmental Objectives

With the official publication of the Delegated Act on for the first environmental objectives, climate change mitigation and adaptation, under the EU Taxonomy, green financing now for the first time has an uniform set of screening criteria set by a regulating body. There are still parts that are due to be finalised (e.g. the delegated act on the four non-climate objectives), but we are closely monitoring the development and the practical application of the EU Taxonomy.

As a first step the contribution of the 6 green sectors to the EU Taxonomy environmental objectives was assed. The assessment is based on the comparison and mapping between the main programs of our 6 green sectors to the description of the economic activities that can be found in the Annexes of the EU Taxonomy Climate Delegated Act for climate change mitigation and adaptation. Some of the main programs cannot be mapped to an activity in the EU Taxonomy, as some activities are not yet covered by the Taxonomy or some categories which are traditionally included in Green Bonds may not be associated with a specific economic activity.

An in depth assessment of considering the Substantial Contribution Criteria of the EU Taxonomy's environmental objectives, as well as the Do No Significant Harm Criteria and the Minimum Social Safeguards, is planned to be conducted during the update of the Green Bond Framework. The update is due until May 2023 (i.e. when the Second Party Opinion regarding issuance of Green Bonds under the current framework will expire).

VI.3. Appendix 3 – Key Figures

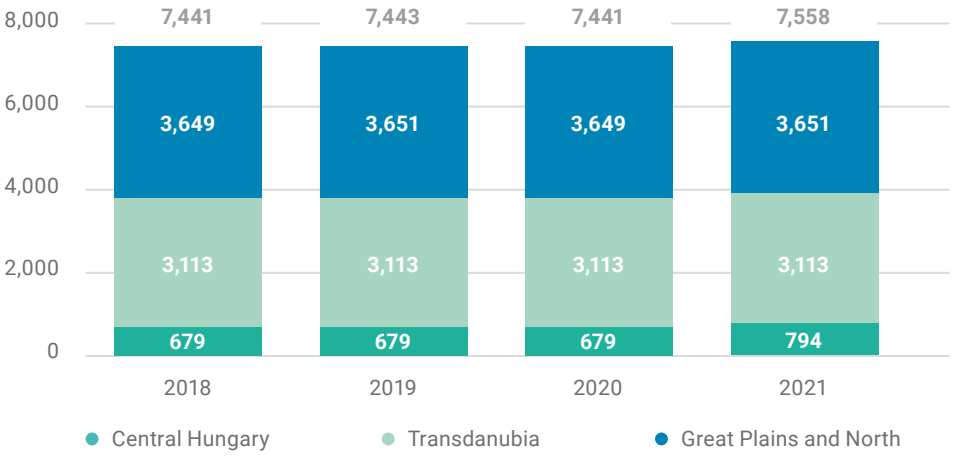


Figure 24: Length of Railway Lines by Greater Regions in Hungary (km). Source: KSH

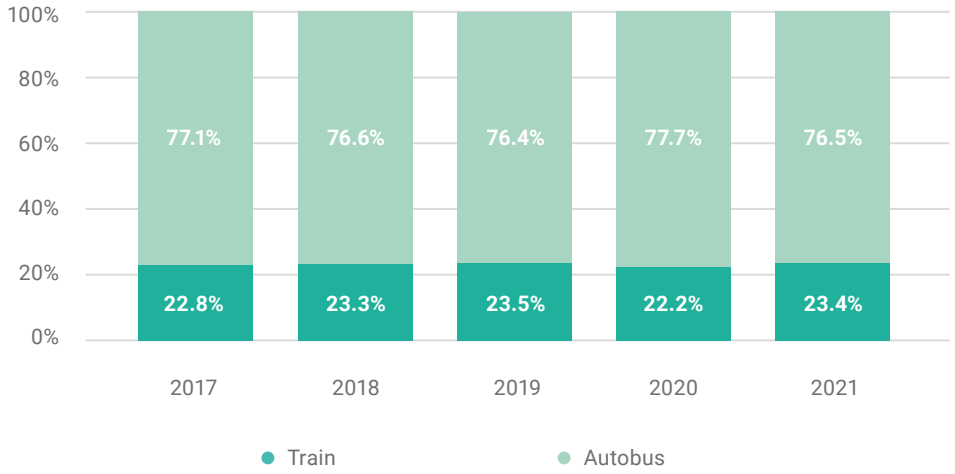


Figure 25: National Interurban Passenger Transport by Mode (Passengers Carried). Source: KSH

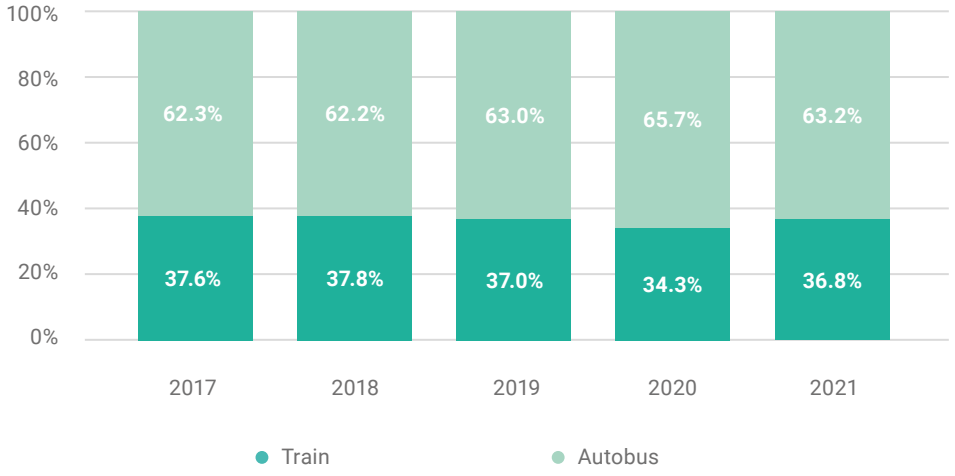


Figure 26: National Interurban Passenger Transport by Mode (Passenger-kilometers). Source: KSH

Air pollutants	Emissions (thousand tons)		
	2018	2019	2020 /Latest available data/
SO_x	0.0020	0.0020	0.0019
NO_x	2.2203	1.9836	1.6937
PM_{10}	0.0522	0.0474	0.0408
$PM_{2,5}$	0.0485	0.0436	0.0374

Table 17: The Emission of Certain Air Pollutants and Particulate Matter Arising from Railways Transportation. Source: EEA

VI.4. Appendix 4 – Summary of Results

The results of eligible green projects, their main input and output, and impact indicators between 2019-2021 are summarized in the following tables. The impact indicators can be linked to the Green Bonds issued in 2021 as per their share in the total issuance (by the total amount of proceeds). Therefore, the contribution ratio of the Domestic Green Bond is 66.403% and 33.597% for the Panda Green Bond.

Clean Transportation	Allocated amount with respect to the 2021 Green Bond issuance[43]		Passenger-kilometers and passengers		Total length of reconstructed or upgraded railway, metro, or tram lines	Number of upgraded key railway infrastructure elements	Total length of electrified railway lines	Total GHG emissions	Total GHG emissions avoided	Number of new environmentally friendly trains, carriages, vehicles deployed
	2019	2020	2019–2021							
	HUF (bn)	HUF (bn)	Passenger kilometers (million km)	Number of passengers (million)	km	Number of up-graded bridges, crossings	km	tCO_2eq	tCO_2eq	pcs
Reimbursement of the operation of the railway network	45.515	0.574						811,863	285,733	
Reimbursement of uncovered costs of railway passenger traffic	78.959	0.951	17,837	351.4						
Modernization of rail transportation	1.446	0.033			0.8	6				
Electrification of railway lines	0.000	0.006					101.3			
Rolling stock development	2.168	0.114								66
Tax exemptions of environmentally-friendly vehicles	1.471	0.017						119,891	107,956	24,675
Modernization of urban public transport	4.159	0.118			1.6					57

Table 18: Cumulative results of Eligible Green Projects - Clean Transportation.

[43] Due to repayments and revisions, the allocated amounts in 2019 have been recalculated and adjusted this year. Therefore, the allocated amounts may not be reconciled at project level with the data from the previous reporting. However, data at green sector level can be reconciled.

Land Use and Living Natural Resources	Allocated Amount		Habitats of community interest with an improving conservation status		Species of community interest with an improving conservation status		Number of supported projects and measures	Number of persons reached
	2019	2020	2019–2021					
	HUF (bn)	HUF (bn)	proportion (%)	pcs	proportion (%)	pcs	pcs	per capita
Nature protection and biodiversity	1.969	0.039	25	11	12	25	52	
Education and awareness-raising	0.455	0.005						14,153
Sustainable agriculture	3.637	0.104					107,416	
Others (remediation, environmental projects)	0.000	0.002					45	

Table 19: Cumulative results of Eligible Green Projects - Land Use and Living Natural Resources

Waste and Water Management	Allocated Amount		Households connected to the drinking water system	Households connected to the sewage system	Length of sewage system per kilometers of the drinking water system	Number of supported projects
	2019	2020	2019–2021			
	HUF (bn)	HUF (bn)	proportion (%)	proportion (%)	meters	pcs
State reconstruction fund for water utilities	0.727	0.008	94.9	82.8	780	
Subvention for waste separation and reutilization as energy resource	0.068	0.002				3
Supporting waste management tasks	0.352	0.000				19
Others (monitoring, remediation, efficient water use in agriculture)	0.102	0.005				2 remediation; 676 agricultural

Table 20: Cumulative results of Eligible Green Projects - Waste and Water Management

Renewable Energy	Allocated Amount		Annual electricity generation			Total installed renewable energy capacity	Total GHG emissions avoided	Number of beneficiaries
	2019	2020	2019	2020	2021	2019–2021		
	HUF (bn)	HUF (bn)	MWh			MW	tCO_2eq	pcs
Subsidized loan for renewable energy use in buildings	0.000	0.001	296.13	708.39	354.67	0.8	1,195.080	41
Subsidized loan for increase energy efficiency and renewable energy use in residential buildings	1.717	0.010	4,429	4,061	665	7.0	3,815.000	2,477

Table 21: Cumulative results of Eligible Green Projects - Renewable Energy

Adaptation	Allocated Amount		Number of supported projects and developments
	2019	2020	2019–2021
	HUF (bn)	HUF (bn)	pcs
Development of monitoring stations for the implementation of the Water Framework Directive	0.187	0.002	11
Water management developments for sustainability	2.576	0.065	3
Hungarian Meteorological Service	0.825	0.003	9

Table 22: Cumulative results of Eligible Green Projects - Adaptation

Energy Efficiency	Allocated Amount		Total energy savings	Total energy production from renewable energy sources	Total GHG emissions avoided	Number of beneficiaries	Number of improvements
	2019	2020	2019–2021				
	HUF (bn)	HUF (bn)	MWh	MWh	tCO_2eq	pcs	pcs
Energy Efficiency Grant Scheme		0.009	0.25			41	
Tax allowance for energy efficiency improvement	2.459	0.041	186,607		46,465	1,670	1,563
Investment expenditures for agriculture	0.530	0.011	40,694	58,064		1,274	

Table 23: Cumulative results of Eligible Green Projects - Energy Efficiency


2021