GREEN FINANCE REPORT

2023

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Pursuant to Act CXXXIX of 2013 on the Magyar Nemzeti Bank, the primary objective of Hungary's central bank is to achieve and maintain price stability. The MNB supports the stability of the financial intermediary system, enhancing its resilience, ensuring its sustainable contribution to economic growth and, with the tools at its disposal, the Government's policy on economic and environmental sustainability, without compromising its primary objective of achieving and maintaining price stability.

Following the decision of the National Assembly on 28 May 2021, the MNB's mandate was extended to support the government's policy on environmental sustainability, making it the first EU central bank to be granted a green mandate. Environmental sustainability includes mitigation of and adaptation to climate change, sustainable use of water resources, transition to circular economy, prevention and reduction of environmental pollution, and protection and restoration of biodiversity and ecosystems. The main objective of the „Green Finance Report" is to provide a comprehensive annual overview of the Hungarian financial sector's exposure to environmental sustainability risks and the financing actions promoting sustainability, as well as the related sustainability programmes of the Magyar Nemzeti Bank.

The analysis was carried out under the general guidance of Bálint Balogh, Director, under the coordination of the Sustainable Finance Department. Contributors to the analysis were the staff of the Directorate for Sustainable Finance and Supervisory Coordination: Contributors to the analysis were the staff of the Directorate for Sustainable Finance and Supervisory Coordination, Viktória Deák, Norbert Holczinger, Laura Jókuthy, Donát Kim, Márton Kruppa, Balázs Lóránt, Dávid Papp, Szabolcs Párkányi, Vivien Pintér, Eszter Raciborski, Renátó Ritter, Balázs Sárvári, Nóra Szarvas, Nikolett Tőrös-Barczel, Bálint Várgedő and Edina Boros. Other contributors were Nóra Anna Sándor and Patrik Tischler from the International Relations Directorate, Laura Komlóssy from the Credit Incentives Directorate, Ákos Bereczki, Beáta Szabó, Balázs Varga from the Financial System Analysis Directorate, András Sulyok from the Monetary Policy and Money Market Analysis Directorate, Árpád György Mórotz from the Structured Finance Strategy Directorate and Márton Varga from the Monetary Policy Instruments, Foreign Exchange Reserves and Risk Management Directorate. Ravi Menon, President of the Network for Greening the Financial System (NGFS) and Eugene Wong, CEO of the Sustainable Finance Institute Asia, contributed valuable insights to the report. The main content of the publication was approved by the Financial Stability Council. The Report incorporates valuable input from other areas of the MNB, from Csaba Kandrács, Deputy Governor for Supervision of Financial Institutions and Consumer Protection, and from the Financial Stability Council.

The report has been prepared mainly on the basis of data available as of 31 December 2022. The data with divergent frequencies are updated differently, and therefore the horizon of the analysis may also differ in some cases. The printed version has been produced using the solution with the lowest environmental impact realistically achievable. Please print the electronic version only if justified.

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Foreword

The profound transformation our global economy is facing is not without precedent in history. We are now gearing up for a change of the same magnitude as the industrial revolution, which will radically alter almost every aspect of life, just as it did when the steam engine was invented.

What is clearly unprecedented this time is the speed of the transformation. James Watt first submitted his standards in the 1780s, and although his invention led to rapid progress, more than 100 years later coal still accounted for only half of the global energy consumption, with wood, hay, straw and some hydro energy still providing the rest.

The consensus among scientists is that we do not have that much time to transform now. Ideally, we must switch our production and services from coal and other fossil fuels to clean, i.e. carbon-free energy in less than 30 years. And this time, it is not just about adding new technologies to existing ones, but also about replacing them almost entirely.

Decarbonisation, or we might as well call it the sustainability revolution, requires innovations in three areas: technological, legal and financial. The past decades have been shaped by innovations in the first two areas, and as a result, the solutions on which a clean economy can rely are now largely available. These technologies include solar panels, nuclear power plants and electric cars. As for the legal framework, we have also done most of the work: we have a Paris Agreement, a European Green Deal and a Hungarian Climate Change Act, which together set clear targets.

Now it's the turn of the third area, finance. The next decade will be about further developing clean technologies and achieving our sustainability goals – and these will require investments that the financial sector is able to finance.

Last year was a year loaded with crises, which unfortunately have not yet ended in 2023. The war in our neighbourhood, high inflation not seen for decades and a slowing economy pose significant risks that require focused, targeted action. For MNB, tackling inflation remains of course the primary objective, but this does not mean that we have put supporting the sustainability transition on "hold". If the necessary transformation does not take place in time, we can expect consequences that dwarf the current risks.

Moreover, the sustainability transition is a clear necessity for the people living in the Carpathian Basin, as our region is among the most vulnerable to climate change in the EU. However, for Hungary – in terms of our long-term economic prosperity – this is also an excellent opportunity, because the uptake of clean technologies means also new markets. If we can gain a foothold in this area, we could be among the winners of decarbonisation. But if we just go with the flow, or even impede sustainability improvements, we become losers.

The Green Finance Report aims to provide a snapshot of the area of sustainable finance that has a role to play in accelerating the turnaround. An accurate state of play, measuring the data available so far, is essential to plan the direction of further development and analyse the alternatives to achieve it. MNB, which was granted a green mandate in 2021 to support environmental sustainability efforts, is confident that it can contribute to this success. Our aim is to make the current revolution happen faster than the one started by James Watt.

Dr György Matolcsy
Governor of the Magyar Nemzeti Bank

Executive Summary

"Code red for humanity" is the main message of the IPCC 2022 report. With the relaunch of the economy following the COVID crisis in 2020, there were encouraging signs that the global economy was on a more sustainable path, but greenhouse gas emissions bounced back the following year and are seemingly on a steady upward trend. From a sustainability perspective, the 2022 Russia-Ukraine war and the issue of energy security it has brought to the fore show also a mixed picture. The appreciation of energy efficiency and renewable energy sources is overshadowed by the peaking global coal consumption and the rise of liquefied natural gas (LNG), which has a carbon footprint ten times greater than pipeline gas. In addition to the effects of war, we could also experience the consequences of global warming in 2022. While in Europe, the heatwave and drought have caused unprecedented damage, in other parts of the world people have faced the challenges of flooding.

Hungary, like the entire European Union, has set itself one of the most ambitious climate targets in the world. Hungary is one of the few countries where climate neutrality by 2050 has been incorporated in law, and with our emissions reductions over the past three decades, our CO_2-equivalent emissions are lower than the EU average. However, with a 22.8 per cent annual increase in fuel use, we are expected to move away from our 2050 carbon neutrality target in 2022.

Curbing warming requires climate neutrality to be achieved as soon as possible, and this will require structural changes in many industries. Vehicle manufacturing is a key sector for our country's industry, where it is expected that newly manufactured cars will gradually be replaced by electric cars by 2035. Hungary has already been a significant player in the market, which could be further strengthened following recent announcements. In addition to the economic benefits, the overall social balance can be positive if compliance with environmental rules can be fully enforced by the state and our energy and water supplies are not put at risk.

Domestic credit institutions proved resilient in the short term to a carbon price shock in the MNB stress test. After the long-term climate stress test in 2021, the MNB carried out a short-term climate stress test in 2022. Assuming a 100 per cent increase in oil prices in June 2022 for the stress case under review, although the economic downturn was significant, none of the institutions under review experienced liquidity or solvency problems. Regularly updated credit institution carbon risk indicators show that banks' corporate portfolios are facing a relatively stagnant transition risk, while the overall corporate portfolio is growing, leading to an increase in the exposed stock.

Last year, the MNB conducted the first domestic insurance climate stress test and also assessed the climate risk preparedness of insurers. The insurance climate stress test includes an asset-side stress test of Hungarian insurance companies quantifying the risks of the transition to a carbon neutral economy through three climate scenarios. The results show that the impact of the identified transition risks can be managed. In the climate risk survey covering the sector, 60 per cent of respondents identified a climate risk and 41 per cent take it into account when taking risks. Based on the results of the questionnaire and stress test, the MNB plans to take further steps to support the role of insurance companies in the green transition.

In 2022, the volume of green loans increased dynamically. Even in the adverse economic environment, the MNB maintained its green preferential capital requirements programme, which helped banks' green lending. In one-year, green corporate exposures grew by 50 per cent in volume, while total corporate loan portfolio increased by 15.5 per cent. At the same time, the volume of green loans to households has also skyrocketed, reaching nearly HUF 100 billion by the end of 2022. The volume of loans participating in the MNB's green preferential capital requirements programme increased by 88 per cent to HUF 427 billion in one year.

Low-energy housing is becoming increasingly common in the real estate market, while for the commercial property development sector, high energy efficiency is already expected. In Budapest, only a fraction of the buildings in the market for new homes for sale do not use renewable energy. However, given the low number of new buildings, energy modernisation should be encouraged. In the case of commercial real estate, over the last decade and a half, green rating has gradually become a preference and subsequently a requirement in office rental tenders and sales transactions. In addition, having a green rating is usually associated with higher building quality, which is reflected in the value of the property.

Following the success of the Green Home Programme, the renewal of the Certified Consumer-Friendly Housing Loan (CCHL) framework to take into account green consideration will support energy efficiency improvements in the housing stock. In 2022, the Green Home Programme played a prominent role in home lending, helping around 8,600 households to build or buy an energy-efficient home on favourable loans. Once the programme is completed, feedback from banks suggests that the expansion of the CCHL framework could support the uptake of green lending. Under the terms effective from 1 April 2023, consumers with green loan purposes will benefit from substantial discounts by choosing CCHL products.

Among green investments in Hungary, the renewable energy sector is the most important. Within the green preferential capital requirements program, the exposure-based share of loans linked renewable energy reached 72 per cent, despite the diversification of financing targets in the program in 2022. However, a significant achievement is that, thanks to the preferential terms applicable to electromobility, the development of electromobility loan products has started in Hungary.

The evolution of the volume of green capital market products shows a heterogeneous picture. Until the last issuance made under the auspices of the Bond Funding for Growth Scheme, a total of HUF 539 billion of bonds with a nominal value of HUF 539 billion were issued under the scheme, while the issuance of domestic green government securities increased to HUF 1640 billion by the end of 2022. In contrast, the share of ESG funds in Hungary remains low. One reason for this may be that domestic ESG investment funds are still considered a new product, so it takes time for investors to find this type of investment. Partly to facilitate this, the MNB plans to launch the Green Financial Product Finder platform in spring 2023.

The year 2022 marked a milestone in the development of the sustainability disclosure system. In addition to European legislation, the guidelines of international organisations are key to the development of the regulatory environment, and the Magyar Nemzeti Bank supports institutional actors in understanding and applying these guidelines through publications and consultation opportunities. In addition to the regulatory changes affecting the financial sector, it is worth highlighting the adoption of new disclosure rules for companies. With the entry into force of the Corporate Sustainability Reporting Directive on 1 January 2024, the number of companies that will be required to disclose sustainability-related information will increase significantly in the coming years.

In 2023, the MNB intends to issue guidance to supervised institutions on a number of issues. In order to clarify the domestic sustainable financial framework and support the green transition of institutions, the MNB plans to extend its Guide on climate-related and environmental risks for credit institutions to non-bank sectors this year, and to set a minimum standard for the ESG questionnaire on lending. In parallel with these measures, sustainability aspects are becoming increasingly pronounced in the supervisory methodology, and institutions are already seeing the first signs of this in their supervisory audits.

Training human resources who are able and willing to act and committed to fighting against climate change for a more sustainable future, is a priority for the MNB. In 2022, the MNB continued to actively support the dissemination of sustainable financial knowledge through university and adult education programmes under the second pillar of the Green Programme. Researchers' careers are also encouraged by the Green Finance Science Awards and the Green Finance Science Research Initiative, which were presented at the Green Finance Conference in October 2022.

NGFs dashboard

Category	Indicator	Unit	HU last year's value	HU this year's value	EU average	Reference period	Change
Real economy	Share of area under organic farming within the agricultural area	%	5,71	6,03	9,08	2020	▲
	Share of the protected land areas	%	21,00	21,00	18,00	2019	▬
	Internal renewable water resources per capita	m^3/inhab./year	618,18	619,54	3065*	2019	▲
	Share of renewable energy sources in total final energy consumption	%	13,85	14,12	21,78	2021	▲
	Energy intensity of the economy	Oil equivalent (kg)/€ thousand	211,59	205,94	116,93	2021	▲
	Net energy import	%	57,49	56,60	57,50	2020	▲
	Percentage of newly registered plug-in electric vehicles	%	4,60	7,03	19,56	2021	▲
	Recycling rate of municipal waste	%	35,94	33,02	48,70	2021	▼
	Change in greenhouse gas emissions since 1990	%	68,80	68,50	73,80	2019	▲
	CO_2 emissions per unit of production	Thousand tons CO2/ $ million	0,15	0,14	0,13	2019	▲
	Net effective carbon rate	EUR/tCO2e	42,87	45,89	73,49	2021	▲
	EU ETS CO_2 market price	EUR/tCO2e	80,65	86,50	86,50	2022	▲
	Fossil fuel subsidies	GDP %	0,23	0,13	0,35	2021	▲
	Environmental tax revenues	GDP %	2,18	2,01	2,24	2021	▼
	Environmental protection expenditure rate	GDP %	1,90	1,70	2,00	2019	▼
	Environmental Performance Index (EPI)	index	63,70	55,10	62,00	2022	▼
	Adjusted net savings (ANS)	GNI %	15,10	11,20	9,60	2020	▼
	Adjusted national net income (ANNI) growth rate since 2009 - average	%	2,26	2,38	0,81	2020	▲
Risk	Natural resources rents	GDP %	0,32	0,26	0,15	2020	▲
	ND-GAIN vulnerability	index	0,37	0,37	0,34	2020	▬
	ND-GAIN change in vulnerability since 1995	%	-2,65	-2,33	-3,48	2020	▼
	ND-GAIN readiness	index	0,50	0,50	0,61	2020	▬
	ND-GAIN change in readiness since 1995	%	1,10	0,88	17,44	2020	▼
	Ecological deficit (biocapacity – ecological footprint)	Million global hectares / capita	0,95	1,29	2,26	2018	▼
	Ratio of banks with no person or team dedicated to climate risks.	%	36,00	36,00*	n/a	2021	▬
	Proportion of banks that are unable to quantify climate risks.	%	77,00	77,00*	n/a	2021	▬
	Bank Carbon Risk Index (Linear)	%	8,55	9,06	n/a	2022	▼
	Bank Carbon Risk Index (Gompertz)	%	14,31	15,31	n/a	2022	▼

Category	Indicator	Unit	HU last year's value	HU this year's value	EU average	Reference period	Change
Mobilisation	Ratio of green bonds – central government - stock	%	1,90	4,03	n/a	2022	▲
	Ratio of green bonds – central government - 2020	%	1,21	6,16	n/a	2022	▲
	Ratio of green bonds – companies - stock	%	13,53	19,34	n/a	2022	▲
	Ratio of green bonds – companies - 2020	%	10,67	11,53	n/a	2022	▲
	Ratio of green corporate loans (Preferential capital requirements program)	%	2,02	2,62	n/a	2022	▲
	Ratio of energy efficient residential buildings	%	3,17	4,21	n/a	2022	▲
	Green/ESG based investment funds – stock	%	1,79	1,64	n/a	2022	▼
	Insurance sector – ratio of green unit-linked funds	%	8,66	8,79	n/a	2022	▲
	Green/ESG based voluntary pension funds	%	0,29	0,40	n/a	2022	▲
Reporting	Ratio of banks where no information is disclosed on sustanability.	%	45,00	45,00*	n/a	2021	▬
	Ratio of banks where disclosures are fully in line with the TCFD recommendations.	%	0,00	-	n/a	2022	▬
Global Initiatives	Ratio of banks joining global initiatives on sustainability - by number of institutions.	%	45,45	50,00	n/a	2022	▲
	Ratio of banks joining global initiatives on sustainability - by balance sheet of institutions.	%	75,19	84,04	n/a	2022	▲

*The figure shown is the same as in last year's report

1 International developments and domestic sustainability

The events of the past year have shaken up the economy, significantly rewriting future sustainability plans. While the countries of the world were still recovering from the Covid pandemic, Europe found itself in the middle of another crisis. Uncertainties over energy supply have quickly undermined the climate protection efforts that were already in place, undermining the sustainability gains that had already been made. However, there were also lessons to be learned from last year. The loss of confidence in traditional trading partners has prompted European countries to move away from imported energy as much as possible and to rely more on domestically produced, preferably clean, sustainable energy sources. However, the uptake of renewable energy has been rather slow so far, and this needs to be changed in the wake of past events.

The year 2022 was not only about war, but the consequences of global warming were also knocking at the window. While in Europe, the heatwave and drought caused unprecedented damage, in the Eastern parts of the world people faced the challenges of flooding. Although climate protection and sustainability have been gaining increasing prominence in recent years, we may feel that it is stuck at the level of words and has not reached the level of actions. The goals set are ambitious, but the commitments required to achieve them are still not at the right level, and a large-scale event requiring immediate action immediately puts sustainability in a new context, so to speak, moves it down the list of priorities.

1.1 GLOBAL OUTLOOK

"Code red for humanity" – this is the main conclusion of the latest IPCC report, which was finalised in 2022. The study, which summarises the state of scientific knowledge every 6–7 years, written by the UN's Intergovernmental Panel on Climate Change (IPCC),[1] is almost 10,000 pages long. According to a document endorsed by all the world's countries, we have less than 30 years left to limit climate change to a level scientists still consider safe (+1.5°C) and avert a sixth wave of extinctions threatening wildlife.

The consensus among scientists is that to overcome this existential crisis, a global sustainability transition is needed, with a focus on achieving "climate neutrality". In other words, the world's ever increasing greenhouse gas (GHG) emissions should peak as soon as possible and ideally be reduced to near zero by 2050. More precisely, emissions need to shrink to a level that can be balanced by forests or by technologies that will hopefully be developed sooner or later (e.g. engineered CO_2 removal from air (such as direct air capture) or bioenergy combined with CO_2 capture and storage).

This turnaround requires nothing less than the transformation of the world economy. In this context, GDP growth based essentially on fossil energy will be replaced by "green growth" (also known as a decarbonised or possibly low-emission economy) and a circular economy (or at least a more circular economy than the current one) will be created. Stopping deforestation and destruction of ecosystems in general, and reversing the process to enrich nature, is also a crucial part of the sustainability transformation. Opinions are mixed on the extent to which this green turnaround can be achieved in less than 30 years. In any case, there is consensus that the faster the transition, the better our chances of avoiding the worst effects of the sustainability crisis.

There are encouraging signs that the sustainability transition is already underway, but it is clear that the process is far too slow. The increasing number of electric cars on the road, the growing number of solar panels on rooftops and the growing number of restaurants putting plant-based hamburgers on the menu are all reasons for hope. But this is still not enough to peak global GHG emissions, let alone to reduce them. In addition, based on

[1] Sixth Assessment Report — IPCC

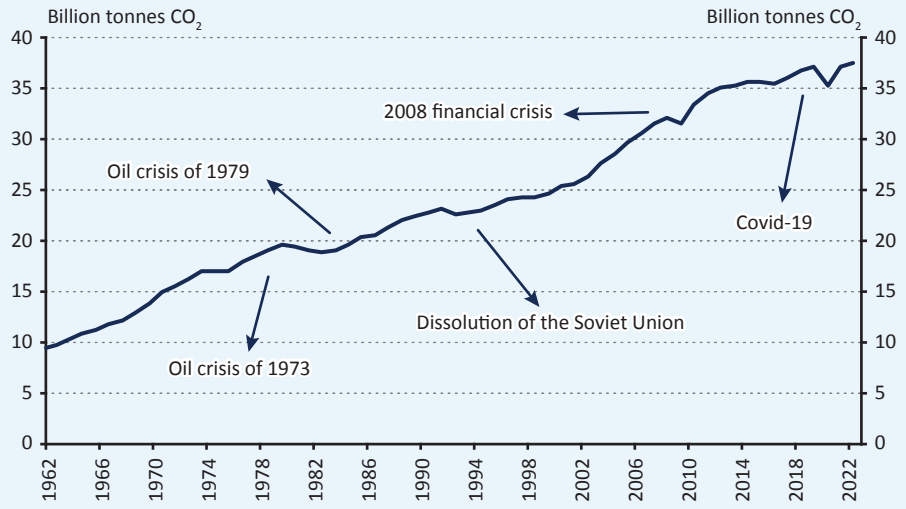
the use of natural resources, the economy is also rather moving away from circularity[2].

Yet as the COVID crisis and recovery from it began in 2020, there was a glimmer of hope that countries around the world would return to economic growth on a more sustainable path than before the pandemic. Many hoped that a new economic era would begin, bringing us closer to our climate and biodiversity goals. This now seems to have been wishful thinking, as the global economy has mostly resumed relying on pre-pandemic industries, building on old habits. As a result of the COVID pandemic and subsequent lockdowns, global CO_2 emissions plunged dramatically in 2020. However, the 5.2 per cent drop was not permanent. As a consequence of the carbon-intensive recovery, emissions bounced back the following year. The rise has continued since then and in 2022 CO_2 emissions rose by 1 per cent to a new all-time high, surpassing pre-COVID levels[3] (Chart 1.1).

While the destruction of nature may well have contributed to the outbreak of the pandemic in 2020, unfortunately the destruction of forests in 2022 has not let up. Global figures are not yet available at the time of writing this report, but last year the Amazon, the world's largest and most naturally diverse tropical forest, saw deforestation on a scale not seen for a decade and a half. During the year, 10,500 km2 of forest was felled,[4] which equals the combined area of Hungary's two counties: that of Bács-Kiskun and Tolna.

The COVID shock has barely faded, but in 2022 the world was already facing another crisis. Not one, but several at the same time: a war not seen in Europe for 70 years, an energy crisis not seen for 50 years and inflation that is breaking decades of records. Because of its complexity, the crisis has earned the name "polycrisis". The individual crisis elements of the polycrisis are apparently different, but their common denominator is that environmental factors, including runaway climate change, have played a prominent role in their development. Climate change most often manifests itself in the form of water crises – too little water or much water. The water crisis has also played a role in disrupting production chains (stalled chip production in drought-stricken Taiwan), the energy crisis (declining hydro power generation in South America due to drought) and the food market crisis (reduced grain production in China due to floods). Although all these events took place in 2021, their real impact was felt in 2022.

Chart 1.1
Global CO_2 emissions from fossil energy sources



Note: This accounts for roughly two-thirds of total GHG emissions.
Source: Global Carbon Project

[2] Circularity-Gap-Report-2022.pdf (circularonline.co.uk)
[3] Carbon Budget (globalcarbonproject.org)
[4] Imazon – Instituto do Homem e Meio Ambiente da Amazônia

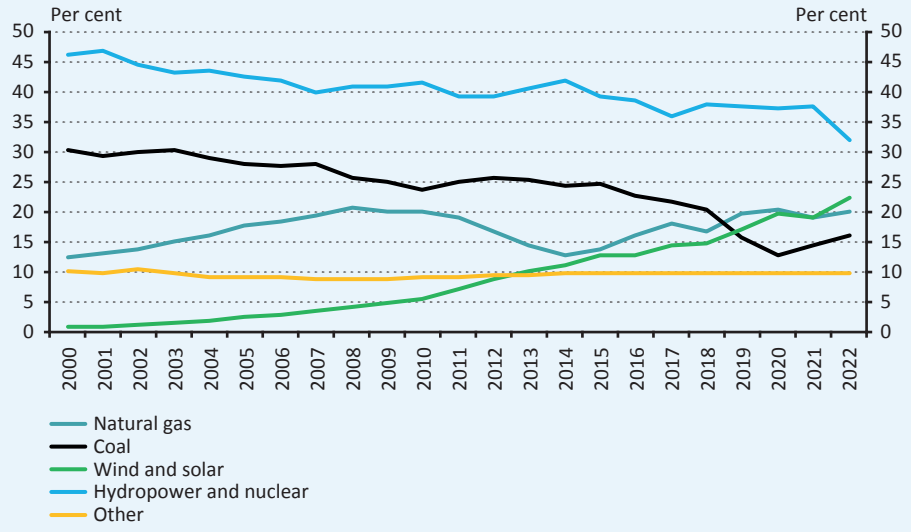
In addition, the year 2022 was not without water crises, with unprecedented disasters on almost every continent. Europe experiences a drought not seen for 500 years[5]. Also due to the lack of rain, China's most important river, the Yangtze, dried up in places[6]. Meanwhile, Death Valley in the US state of Nevada (one of the driest places on Earth) was hit by rainfall of an intensity that occurs only once in every 1,000 years [7]. Yet the most severe impact of all last year was the flooding that hit Pakistan from June to October, which at one point flooded a third of the Asian country. The disaster killed almost 1,800 people and destroyed 1 million homes, forcing 33 million people to leave their homes. Africa was not exempt from natural disasters, either. In the Horn of Africa region, which includes Somalia, Kenya, Ethiopia, 40 million people, including 7.5 million children under five, have been affected by the lack of or very poor rainy season for the fifth year in a row[8].

At this stage, it is too early to judge how events in 2022 will affect the achievement of our climate and biodiversity targets. In any case, it is encouraging news that there has been promising developments in some areas. This time, the crisis may as well have the side effect of accelerating the speed of our sustainability transition and moving our goals closer, not further. One such encouraging sign can be seen in the energy sector.

One of the main consequences of the Russia-Ukraine war and the escalating energy crisis is that energy security has been re-evaluated. On the one hand, the conflict forces energy importing nations to be more energy efficient. And on the other hand, it draws attention to energy sources that improve a country's energy sovereignty such as renewable energy sources. The beneficial effects of energy security on climate protection are most evident in the European Union, which has been hardest hit by the war.

Of all fossil energy sources, natural gas is the most critical for the EU's energy security. It is therefore a welcome development that EU gas consumption in 2022 plummeted by 12 per cent compared to the average for 2019–2021[9] thanks to energy-saving measures, energy efficiency programmes – and milder than usual weather – while the amount of electricity generated by solar panels jumped by 24 per cent [10]. This means that for the first time in 2022, we passed the psychological milestone of wind and solar power exceeding the amount of electricity generated from natural gas (Chart 1.2).

Chart 1.2
Changes in the shares of energy sources in EU electricity production



Source: Ember Climate

[5] GDO-EDODroughtNews202208_Europe.pdf (europa.eu)
[6] China drought causes Yangtze to dry up, sparking shortage of hydropower | China | The Guardian
[7] Record Death Valley flooding 'a once-in-1,000-year event' | California | The Guardian
[8] We Were Warned: Unlearned Lessons of Famine in the Horn of Africa (December 2022) – Somalia | ReliefWeb
[9] European natural gas demand tracker (bruegel.org)
[10] European Electricity Review 2023 | Ember (ember-climate.org)

The energy crisis has had a positive impact also on electrification in the EU. Heat pumps play a key role in the switch from natural gas to electricity-based heating, with the market for heat pumps in the EU growing by a whopping 35 per cent in 2022 compared to the previous year[11]. The years-long rise of electric cars has also received an extra boost. While in 2019, cars without exhausts pipes accounted for only 1.9 per cent of the new car market, in 2021 their market share was 9.1 per cent and in 2022 12.1 per cent[12].

Prioritising energy security is not a clear success story from a climate perspective. The appreciation of domestic energy sources has also meant that coal plants that had been closed for years have reopened in several countries and global consumption of the dirties fossil fuel reached a new historic high, surpassing the former peak in 2014[13]. Another factor hampering the fight against climate change is the boom in liquefied natural gas (LNG) at the expense of pipeline gas. Transportation in the form of LNG is not a good idea from a climate point of view because it has about ten times the carbon footprint of pipeline gas over its entire life cycle[14].

There are several prerequisites for accelerating the transformation, one of which (if not the) most important is probably the "power of money". In addition to energy security considerations, financial interests are the main driver of the positive developments that are already underway in the electricity market and electrification. The cost reductions in these technologies have resulted in new clean technologies being commercially more affordable than their conventional fossil counterparts.

To further increase climate-friendly investments and thus accelerate the sustainability transition, it is essential that everyone is on the same page. It must be clear to investors and governments alike what contributes to the turnaround we are facing and what does not. In recent years, work has begun in many parts of the world to develop guidelines to help achieve clarity. In this context, South Africa, China, Mexico, Sri Lanka, Colombia and many other countries have started to develop so-called sustainability taxonomies. Yet the most detailed, sophisticated classification system of this kind has so far been put on the table by the EU. A constantly growing list of sustainable economic activities.

The most remarkable development for the EU's Green Taxonomy in 2022 was the inclusion of nuclear power and natural gas use, following extensive discussions. One result of this is that such projects can benefit from more favourable loan conditions compared to those not being on the list. Nuclear energy is included on the list because nuclear power plants do not emit CO_2 during their operation and are therefore considered clean. In the case of natural gas, the most compelling argument has been that natural gas-fired power plants can provide the kind of flexibility to the grid that allows it to accommodate even more intermittent renewable electricity capacity The debate over the eligibility of these two technologies for taxonomy is still ongoing. Greenpeace announced that it would sue the European Commission over granting the green seal to nuclear and gas and ask the European Court of Justice to review the decision[15]. The year 2023 will also certainly hold debates when it comes to the assessment of investment activities in the aviation sector [16].

Green taxonomies are means in the sustainable finance toolkit that serve to redirect the trillions of dollars needed for the sustainability transition from the "brown economy" to the green economy. To develop a sustainable economy, companies also need to be clear about the risks that climate change and the biodiversity crisis pose to them and also the risks the companies themselves pose to the environment. With opaque, inconsistent, incomplete data, it is unlikely that business decisions supporting the sustainability transition are taken and business models aligned to it are developed.

The practice of reporting data on companies' non-financial performance has gradually evolved over the past 10 years. It has now become common practice of large companies around the world, that – under pressure from consumers, civil society and regulators – they produce sustainability reports, often including not only environmental but also social and governance information.

In terms of sustainability reporting, 2022 is considered a turning point. In addition to purely voluntary disclosures so far, mandatory disclosures have been gradually introduced since last year, marking the beginning of the era of mandatory disclosure obligations. Here too, the EU (and the UK) leads the way. The system covers

[11] Executive Summary – The Future of Heat Pumps – Analysis – IEA
[12] Fuel types of new cars: battery electric 12.1%, hybrid 22.6% and petrol 36.4% market share full-year 2022 – ACEA – European Automobile Manufacturers' Association
[13] Coal 2022 – Analysis – IEA
[14] Climate change: Hidden emissions in liquid gas imports threaten targets – BBC News
[15] Greenpeace to sue EU over 'green' label for gas and nuclear | Reuters
[16] After energy spat, EU faces row over green rules for aviation | Euronews

financial institutions first, which will be gradually followed by the corporate sector[17]. Once the legislation is fully implemented, by 2027, around 50,000 EU companies, including 1,000–1,500 Hungarian companies[18], will have to produce mandatory, third-party verified sustainability reports[19].

A number of standards and frameworks for the content of disclosures have already been available during the voluntary reporting period. In the era of mandatory disclosures, three main major standards will apply: the EU standard (prepared by EFRAG), the US standard (prepared by the SEC) and the International Standard for Standard Disclosures (ISSB). Details of all three standards are expected to be finalised in 2023. The extent to which they will differ, and how much of a puzzle their application will be for companies with interests in many parts of the world, remains to be seen. One thing is for sure. There will be no shortage of assignments for sustainability finance advisors.

As green taxonomies and disclosure regimes have been fine-tuned, the market for green financial products has evolved in recent years. The most popular instruments in recent years have been green loans and green bonds. In the case of these, the debtor or bond issuer undertakes to finance some kind of sustainability project, typically in the real estate, construction and manufacturing sectors.

The stock of sustainability-related debt has increased year on year. However, the year 2022 has seen a slowdown due to macroeconomic uncertainties and, most importantly, rising interest rates. According to IMF data, USD 1,500 billion in sustainable loans and bonds were disbursed and issued, down 11 per cent compared to 2021. The exceptions within the asset class were sustainability linked bonds/loans. Their issuance increased to USD 600 billion from USD 510 billion[20]. The background to these schemes is that the interest rate on the loan or bond is linked to the fulfilment of a pre-defined sustainability commitment.

Funds covering environmental, social and governance (ESG) issues also closed a bad year. After five successful years, ESG fund performance in 2022 underperformed the S&P 500 stock index, which tracks the share prices of 500 large US-listed companies[21]. This is mainly due to the energy crisis and the resulting rise in energy prices. The crisis has meant record profitability for the fossil fuel industry, and consequently rising share prices. The impact of this has not been felt by ESG funds, which typically avoid such companies. For the time being, it is difficult to assess whether this blip will only bring a temporary or permanent setback to the green finance market. Hopefully, as the polycrisis gradually eases, the upward trend will return.

Green bonds, sustainability reports, taxonomies and sustainable finance in general alone cannot curb accelerating climate change and species extinction. Moreover, the field is still new and at the beginning of its evolutionary path. However, despite a weak year for green bonds and ESG funds, the encouraging developments of recent years suggest that climate change presents new revenue growth and cost reduction opportunities. Tightening rules, expanding databases and the uptake of financial instruments can make a considerable contribution to the sustainability transition we are facing.

[17] Új közzétételi kötelezettségek várnak a bankokra a környezeti fenntarthatóságról – Portfolio.hu (Banks face new disclosure obligations on environmental sustainability)
[18] Magyar cégek ezreit érinti az új kötelezettség – Érdemes időben felkészülni – Portfolio.hu (Thousands of Hungarian companies will be affected by the new obligation – It is worth preparing in time)
[19] Corporate sustainability reporting (europa.eu)
[20] Climate Finance Monitor Q4 2022.pdf (imfconnect.org)
[21] Big ESG Funds Are Doing Worse Than the S&P 500: Green Insight – Bloomberg

Box 1

Thoughts from Ravi Menon, Chair of the Network for Greening the Financial System (NGFS) on current green finance issues

The role of central bank stress tests

Climate scenario analysis or climate stress tests (CSA/CST) are an important tool for central banks and regulators to identify, assess and address the potential implications of climate change on the macroeconomy and the financial system. The results of climate stress tests can be a valuable input for policies and measures to mitigate climate risks and promote a more sustainable financial system.

As highlighted by a recent NGFS-FSB joint report, such exercises conducted by central banks and supervisors have progressed rapidly over the past few months. Early findings point to a need for methodological improvements. The report also suggested that the direct impact of climate risks was manageable at the aggregate level but were significant in some sectors. Further, interdependencies between risks (within the economy and financial system and across countries) and systemic risk aspects such as indirect exposures, risk transfers, spill overs and feedback loops might be underestimated.

The NGFS is continuing to refine its climate scenarios to remain relevant to our wide range of stakeholders.

Priorities within a possible package of sustainability measures

Credible and comparable data are fundamental for the sustainability agenda, as it allows the measurement and assessment of climate and nature-related risks. Understanding of such risks and opportunities in our transition to a low carbon economy will enable the financing flows necessary to support the transition. Data are key for developing a market for sustainability solutions, formulating appropriate prudential responses to climate risks, and ensuring that greenwashing risks are managed. The NGFS highlights that some good data already exists and should be used even as we strive to improve the quality of existing data and availability of additional data.

Data/information is however only as useful as how the users utilise them. Capacity building is hence the other important limb that should be prioritised along with data initiatives. Training and efforts will need to be well coordinated and refreshed to meet the needs of data users.

Changes in Asian financial markets from a sustainability perspective

Asia is home to some of the world's fastest growing economies. Economic development, urbanisation, and population growth will likely cause a 2.5-fold rise in energy demand by 2050 and a doubling of carbon emissions alongside this growth. An orderly and managed phaseout of Asia's 2,000 coal plants (emitting 4.5Gt of CO2 per year) will be critical in supporting Asia's transition to net zero. Transition finance will hence be particularly important for Asia. Given the region's reliance on coal and natural gas for electricity, a shift from brown to green cannot be made in one leap. Channelling capital to meet Asia's transition needs requires well-designed frameworks for risk-sharing, clear definitions and standards, and credible Paris-aligned pathways backed by comparable data.

1.2 SUSTAINABILITY OF THE HUNGARIAN ECONOMY

The year 2022 served as a stark reminder to Europe, including our country, that climate change is not some distant, uncertain threat. Nature has once again emphasised that this phenomenon, still considered by many to be abstract, is unfolding before our very eyes, and we can experience its effects on our own skin. Although the news this year was dominated by war, skyrocketing energy prices and the economic fallout of the COVID pandemic, global warming left no chance to be forgotten.

For more than half of the year, Hungary and much of the European continent suffered a drought probably not seen since the Battle of Mohács, one of the most frequently

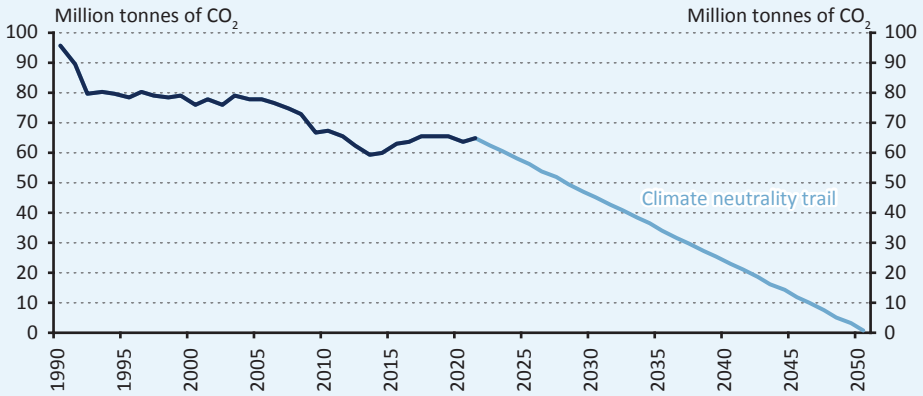
mentioned event in Hungarian history [22]. The drought has mainly hit agriculture: there are several estimates of the domestic crop losses, most of them in the range of HUF 800–1,200 billion[23]. The situation was made worse by the fact that on top of the lack of rain and snow (meteorological drought), water levels of our rivers and lakes were extremely low (hydrological drought), making it difficult to get irrigation water. In August 2022, the water level of the River Tisza fell to its lowest level ever recorded, and Lake Velence, our third largest lake, reached a 73-year low. At the end of June, in some parts of Pest county, water did not flow at all from taps for days, so water restrictions had to be imposed in entire municipalities[24].

Part of the reason for the historic drought was the unprecedented summer heat. Since regular recordings began in 1901, there has not been a summer as hot as the one in 2022. The average temperature for the season was 22.8 degrees Celsius nationally, half a degree above the previous record summer of 2003 and 2 degrees above the 30-year average for 1991-2020. Before the summer of 2022, there have never been a total of five heatwaves (with only brief periods of cooling in between) from the end of June to the end of August[25].

The average temperature for the whole of 2022 was also exceptionally high. In the past 122 years, only two warmer years have been recorded, in 2019 and the record-holder 2018. The Copernicus unit, responsible for the EU's space programme, has direct temperature data across the EU back to 1850. They also confirm that the recent hot years are unprecedented even in the last 170 years. NASA goes much further and estimates, based on indirect data, that in the last more than 120,000 years – i.e. well before the development of human civilisation and agriculture – there have been no years as warm as 2022 and in recent decades in general[26].

We can limit further warming by achieving climate neutrality as soon as possible. This concept – simultaneously reducing GHG emissions and increasing the capacity of forests and other natural (and later possibly engineered) capacities to absorb CO_2 to an equilibrium – is primarily to be understood at the global level. However, the Paris Agreement, which sets out global ambitions, is based on national commitments, therefore it is no coincidence that climate neutrality has also been used as a governmental goal[27]. More than half of the world's countries have now set themselves targets to achieve this climate neutral status, also known as "net zero emissions", by voluntarily set deadlines [28].

Chart 1.3
Change of Hungary's GHG emissions between 1990 and 2021 and path to the 2050 target



Note: without LULUCF sector
Source: Országos Meteorológiai Szolgálat (Hungarian Meteorological Service)

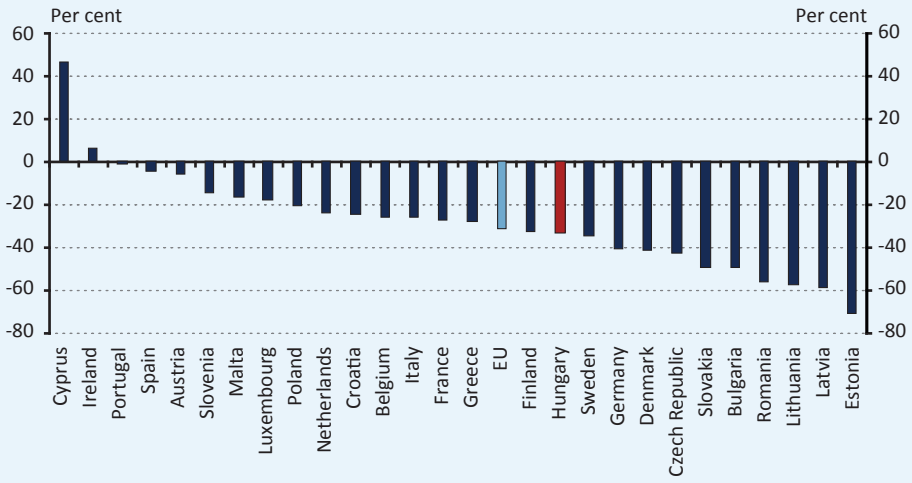
[22] kruppa-marton-varga-viktor-a-mohacsi-csata-ota-nem-latott-rekord-aszaly-az-uj-norma.pdf (mnb.hu)
[23] Az aszálykár nagyrészt a saját hibánk, elherdáljuk kincseinket (The drought damage is largely our own fault. We are squandering our treasures – interview with György Raskó, agricultural economist) – mfor.hu
[24] Vízhiánynapló 2022. június 28. – július 4. | Solymár Online (solymaronline.hu) (Water Scarcity Report, 28 June 2022 – 4 July 2022)
[25] A legmelegebb nyár 1901 óta – előzetes elemzés – Hírek – met.hu (The warmest summer since 1901 – preliminary analysis – News)
[26] Earth is the warmest it's been in about 120,000 years | Mashable
[27] Net zero: the story of the target that will shape our future (climatechangenews.com)
[28] Net zero targets | Climate Action Tracker

In international climate policy, Hungary acts and sets targets as part of the EU, in unity with the EU. The EU's ambition – including that of Hungary – is among the toughest in the world. Hungary, together with the other 26 Member States, has committed to reach the net zero target by 2050 at the latest, becoming the first climate-neutral continent in the world. It is a collective objective, i.e. it is not necessarily required for each Member State to achieve climate neutrality at national level (e.g. Poland does not plan to) as long as other Member States exceed the target (i.e. achieve net negative emissions when CO_2 sequestration exceeds emissions). Hungary is so serious about the 2050 deadline for climate neutrality at national level that it has enshrined it into national law. Apart from us, there are 10 other Member States in the with dedicated climate neutrality goals, but not all of them have made them legally binding[29].

By international standards, not only the EU but also Hungary is relatively well placed on the path to climate neutrality. Hungary's GHG emissions peaked in the 1980s and have gradually declined to levels last seen in the 1960s. According to the latest data from the Hungarian Meteorological Service (OMSZ), it has fallen by 32.4 per cent compared to the 1990, the level most commonly used in international climate policy (Chart 1.3), or by 16.6 per cent compared to the 2005 level often used in the EU. It totalled 64.2 million tonnes in 2021 in CO_2 equivalent (the latest year for which data are available) (this figure does not include the CO_2 absorption of forests). Our emissions reductions over the last three decades have put us in the better half of the EU rankings (Chart 1.4).

All this said, in 2022, we were unfortunately probably not approaching our 2050 target, but rather slightly moving away from it. Preliminary figures are not yet available, but other indicators of the economy suggest this. GDP in 2022 expanded by 4.6 per cent and industrial production increased by 6 per cent. GHG emissions often correlate with these indicators. The rise is also suggested by the fact that, road transport emissions within the largest sector, transport, increased significantly, with petrol sales at petrol stations jumping by 22.8 per cent year-on-year, largely due to the impact of price caps in place for most of the year[30].

Chart 1.4
Changes in GHG emissions 1990-2020



Note: LULUCF sector and aviation sector excluded
Source: EEA

[29] Which countries have a net zero carbon goal? (climatechangenews.com)
[30] Üzemanyag statisztikák – Magyar Ásványolaj Szövetség (petroleum.hu) (Fuel statistics – Hungarian Petroleum Association)

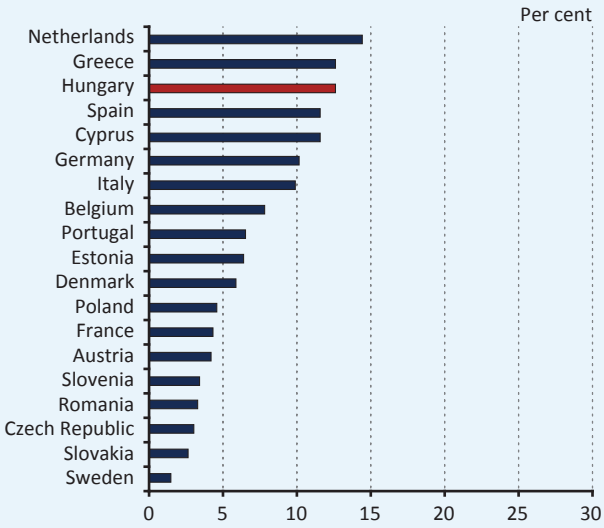
Our GHG emissions had already increased by 2 per cent in 2021 compared to 2020. The increase at that time was linked to the economic rebound after the COVID pandemic. According to the OMSZ, the 7.1 per cent GDP growth in 2021 was not followed by significant GHG growth because coal-based electricity generation fell by almost 20 per cent due to rising emission permit prices and was replaced by electricity generated mostly from natural gas and renewables. Natural gas emits half as much CO_2 per unit of electricity production than coal. And renewable electricity generation emits no CO_2 at all during production.

The likely increase in GHG emissions in 2022 could be dampened by a decline in demand for natural gas as well as electricity. The former fell by 17 per cent and the latter by 2.5 per cent compared to 2021[31]. This is partly the consequence of energy savings driven by soaring energy prices and incentive campaigns, and partly due to a milder-than-usual winter in 2022/2023. We have had the second warmest winter in 122 years[32]. Fortunately, precipitation has also been above average this winter, the ninth rainiest since 1901, which is good news for the agricultural and tourism sectors, which suffered a record drought in 2022.

A positive development is that our electricity consumption fell in 2022. Meanwhile, Hungary's dynamically expanding solar power plants have taken an increasing share of our electricity generation mix. Photovoltaic production increased by 23 per cent in one year and accounted for 4.65 GWh or 13 per cent of the 35.4 GWh of total electricity production in 2022[33]. This places solar panels third in our electricity generation ranking after nuclear and natural gas, ahead of coal, which is the most carbon intensive. Solar parks account for two thirds of solar energy production, while rooftop solar panels for one third.

Our "solar panel boom" is remarkable even at international level. In the European Union, apart from Hungary, only the Netherlands and Greece have a higher share of PV generated electricity in total electricity production[34] (Chart 1.5). The dynamic ramp-up and the high share (over 25 per cent) of solar panels within electricity generation capacity forced the government to impose a temporary grid connection freeze for new solar installations in October[35]. Demand is so high from both households and businesses that it is threatening the stability of the electricity grid. The government announced in January 2023 that it intends to phase out the moratorium on feed-in, depending on the pace of grid development. The target to reach 6,000 MW of photovoltaic capacity by 2030 will likely be met much soones,as 4,000 MW have already been achieved by the end of 2022.

Chart 1.5
Share of solar energy in total electricity generation in 2022



Source: Ember Climate

In 2022, progress was also made in the use of geothermal energy. During the year, the new system in Szeged was supplemented by new heat centres. When the project is completed in 2023, Szeged will become Europe's second largest geothermal city after Reykjavík. In the course of the project, 96 per cent of Szeged's district-heated homes, a total of 27,000 homes, will be converted from natural gas to geothermal heat, which is considered renewable energy, resulting in a 60 per cent reduction of the city's climate footprint[36]. In addition to Szeged, 11 other settlements were heated with geothermal energy at the end of the year, thus reducing our dependence on Russian energy imports and helping us to progress towards our 2050 net zero target.

[31] Energiatakarékossági világnap: a tudatos fogyasztás erősíti az ellátásbiztonságot és Magyarország energiaszuverenitását (kormany.hu) (World Energy Efficiency Day: conscious consumption strengthens the security of supply and Hungary's energy sovereignty)
[32] Második legenyhébb és kilencedik legcsapadékosabb tél – előzetes elemzés – Hírek – met.hu (Second mildest and ninth wettest winter – preliminary analysis – News)
[33] Így termelt áramot Magyarország 2022-ben – Villanyautósok (villanyautosok.hu) (Hungarian electricity generation in 2022)
[34] European Electricity Review 2023 | Ember (ember-climate.org)
[35] BRÉKING – Nincs több szaldós otthoni napelem? – Villanyautósok (villanyautosok.hu) (BREAKING NEWS – No more solar home panels with balance?)
[36] Hot water wells in Hungary fuel switch from Russian gas (france24.com)

However, there is still significant potential in the use of geothermal energy.

The fact that Hungary has not experienced a coal renaissance in 2022 is also a positive development from a climate perspective. After the outbreak of the Russia-Ukraine war, the growing importance of energy security led to an increase in production in coal-fired power plants across Europe, which had been under-utilised for years, and some countries (e.g. Austria) were even considering reopening coal-fired power plants that had been closed. The Hungarian government announced in July 2022 that the units of the Mátra power plant would be reactivated with coal mining to be increased to the maximum extent possible. Despite the plans and announcements, coal-based electricity production stagnated in 2022 (3 GWh) and no new mines have been opened yet.

Growing emphasis on energy security in the wake of the war has also brought energy efficiency into focus. The topic came to the centre of attention in particular when the government in August scrapped part of the cap on household energy bills. It had been in force for 8 years. and the government lowered the cap and set a market price for the part of the annual average electricity and gas consumption that exceeds the average consumption of the population. The decision has boosted the market for air conditioners and building insulation, in addition to residential solar panels, but without a comprehensive public building renovation programme, the acceleration needed for decarbonisation has not yet taken place. According to the Hungarian Energy Efficiency Institute, 100,000 homes would need to be renovated every year in order for all homes to undergo deep energy renovation by 2050. However, only 35,000–40,000 homes were renovated in 2022. More information on Hungary's energy use is available in the Competitiveness Report.

The war and the energy crisis have caused considerable anxiety among those concerned about forests. In times of crisis there is usually an increase in demand for firewood and an increase in illegal logging. In addition, the government softened the rules on logging in August, invoking social considerations, which has provoked strong opposition from professionals[37]. The government finally changed course and amended rules for the second time in two weeks, accommodating most of the nature conservation demands of protesters. Finally, firewood production did not increase considerably in 2022 as a result of higher energy prices, yet high level of wood use for heating remains a problem. The share of firewood in household final energy consumption exceeds 20 per cent, with most of it burned by the poorest[38]. Although firewood is currently considered a renewable energy source under EU legislation, there is increasing pressure on legislators to change this classification for health and nature conservation reasons.

Protecting forests and increasing afforested areas is a priority not only for biodiversity reasons, but also from a climate protection point of view. The good news is that we have managed to further increase our forest area in 2022. From a climate protection perspective, it is important because the more significant the bigger the CO_2 removal capacity, the sooner the country will achieve climate neutrality. Final figures are not yet available because the planting season runs from autumn to spring, but according to data provided by the Ministry of Agriculture, 515,000 hectares were afforested in the 2022 season ending at the end of February 2023. In the previous full season trees were planted on 538,000 hectares and in 2020 on 680,000 hectares. The country's level of forest cover stood at 22.2 per cent at the end of 2021, which according to the government's long-term strategy will increase to 27 per cent by 2050.

The annual addition to CO_2 sequestered through the increase in forestry stocks amounted to 7.2 million tonnes in 2021[39, 40]. This is the second highest in the last 30 years. The only time our forests sequestered more CO_2 than this was in 2020. Over the past decades, the CO_2 sequestration of the LULUCF (Land Use, Land-Use Change and Forestry) sector has typically varied between 2–6 million tonnes. Forestry experts say that the relatively high sequestration levels of recent years are due to the fact that the intensive

[37] Az Ökológiai Kutatóközpont állásfoglalása a „Vészhelyzet alatt a tűzifaigények biztosításához szükséges szabályok módosításáról" című kormányrendeletről – Ökológiai Kutatóközpont (ecolres.hu) (Statement of the Centre of Ecological Research on the Government Decree on the "Amendment of the rules to ensure firewood demand during the energy emergency" – Hungarian Centre of Ecological Research)

[38] A tűzifa-rendelet lassítja az energiaátmenetet és csapdába zárja az energiaszegényeket | Másfélfok (masfelfok.hu) (Firewood regulation slows down the energy transition and traps the poor people)

[39] in jargon, sequestration associated with land use change, LULUCF

[40] Data for 2022 not yet available

afforestation of the 1980s is now having an impact. In addition, during the years of the pandemic, logging declined.

Protecting our existing forests and increasing afforestation is also important because they play a key role in preserving natural diversity. In 2022, the issue of biodiversity made a significant step up the priority ladder for economic and political decision-makers, as – after years of delay – the UN finally reached an international agreement on the issue at the end of 2022. The "Kunming-Montreal Biodiversity Framework Convention", negotiated in Montreal, Canada, with Chinese co-chairmanship, is known as the Paris Agreement of biodiversity[41]. The headline goal of the deal is that governments will increase the current proportion of land and seas under some form of nature protection to around 30 per cent by 2030, from around 15 per cent and 8 per cent respectively. This share is currently more than 20 per cent in Hungary.

Creating an economic understanding of natural diversity is a key issue for improving biodiversity. By putting a monetary value on nature, companies and governments can see the environmental impacts more clearly and can better integrate them into their investment decisions. Recognising this, in September 2022, the MNB, together with the OECD and the European Commission, launched a two-year project to develop a methodology for assessing the financial risks of biodiversity loss[42]. You can read more about this in Chapter 2, Box 2.

Meeting international and domestic sustainability goals requires fundamental changes in most sectors of the economy. One such sector is the automotive industry, where newly produced combustion-engine cars will be gradually replaced by electric (and possibly other clean powertrain) cars by 2035. This transformation poses risks for countries like Hungary, where 300,000 people are employed in the vehicle manufacturing sector, which is a key sector of the national economy. However, if favourable conditions for the production of electric cars can be created, transition risks can be minimised.

Hungary is already a major player in battery production. Following announcements in 2022, one of the biggest battery manufacturing powerhouses in the world. Our operational production capacity at the beginning of 2023 was around 40 GWh, making us already the fourth largest producer of batteries in the world. China's CATL, the world's largest battery company, announced in August 2022 that it will establish a 100 GWh plant in Debrecen with an investment of EUR 7.34 billion, which could be the largest greenfield investment in Hungary's history[43]. In other parts of the country, such as, in addition to the existing plant in Göd, a new unit is starting production which is expected to increase total domestic capacity to 150–200 GWh by 2027–2030. Ramping up production capacity can be economically beneficial. However, it can only be considered a step forward from a sustainability perspective if environmental rules can be fully enforced by the state and the energy and water use of the plants does not jeopardise energy security and the security of our water supply.

Green economic transformation is also a focus for MNB. To support this, the Productivity Report has been published, in which the MNB collected useful and new information on the green economy. The report addresses the most important source of long-term economic growth and catching-up, including a detailed analysis of the ecological efficiency of the domestic economy.

The main development in waste management in 2022 is that Hungary's national oil company Mol Zrt. won a 35-year state concession for the collection of municipal solid waste. Starting from 1 July 2023, the company will collect annually nearly 5 million tonnes of municipal solid waste in Hungary for 35 years, until 2058, and will also ensure its treatment and the implementation of related investments. Hungary ranks well in the EU for the amount of waste it throws away. According to the latest statistics, in 2020, 361 kilograms of waste per capita was generated, the third lowest in the EU and 141 kilograms below the EU average[44]. However, it is possible that a social problem, the burning of waste for heating purposes at home, is underlying the favourable Hungarian figure. This is reflected in the fact that less waste is collected in municipalities during the winter than in summer. Although burning firewood is also a significant air pollutant, burning certain plastic waste releases 100-700 times more and up to a thousand times more toxic so-called polycyclic aromatic hydrocarbons into the air.

[41] RECOMMENDATION ADOPTED BY THE WORKING GROUP ON THE POST-2020 GLOBAL BIODIVERSITY FRAMEWORK (cbd.int)
[42] MNB Zöld program: elindult a biodiverzitás csökkenésével kapcsolatos pénzügyi kockázatokat felmérő projekt (MNB Green Programme: project launched to assess financial risks related to biodiversity loss)
[43] The electric vehicle boom in a quiet Hungarian town | Financial Times (ft.com)
[44] Municipal waste generation up to 505 kg per person – Products Eurostat News – Eurostat (europa.eu)

Overall, achieving climate neutrality, improving biodiversity and making the economy more circular can be understood as a sustainability transition. These short-term milestones are set out in the 17 UN Sustainable Development Goals (SDGs). The goals, and the 169 sub-goals within them (which include not only environmental but also social and economic objectives), cover the period 2016–2030, with the first "mid-term" essentially ending in 2022. Halfway through the cycle, Hungary is doing relatively well on the SDGs by international standards. Jeffrey Sachs, a renowned economics professor, and his team publish a detailed report on progress towards the goals, the Sustainable Development Report. The 2022 report ranked Hungary 21st out of 163 countries. Finland and Scandinavian countries are on top of the list, with the Czech Republic and Poland also ranking high. However, Slovakia, Croatia, Italy, New Zealand and Canada were placed behind us.[45] The MNB is confident that by promoting green finance in Hungary, we can gradually move up the rankings over the coming years.

[45] Sustainable Development Report 2022 – Sustainable Development Report

2 Measuring financial risks and negative environmental externalities from climate change

The monitoring of physical and transition risks arising from climate change is becoming increasingly important in the risk management of financial institutions. For this reason, the MNB also strives to present these risks in a comprehensive way, therefore, in addition to quantifying the risks from GHG-intensive activities, it also places special emphasis on the publication of climate stress tests. Following its long-term climate stress test for banks, published at the end of 2021, it prepared a short-term climate stress test for financial institutions in 2022, where it modelled the probabilities of failure within credit risks, i.e. the focus was on transition risk.

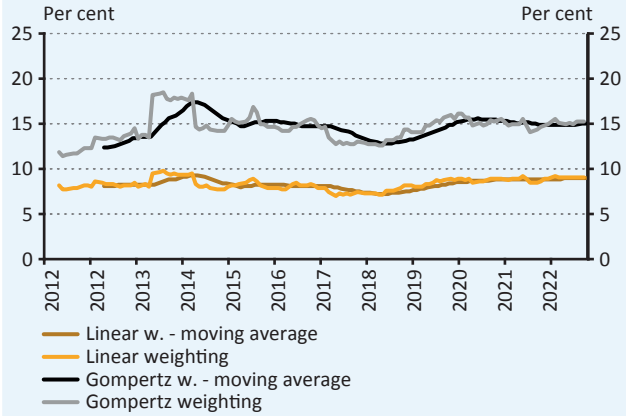
Insurance companies, similar to banks, are exposed to climate change, making it essential for the financial institution to analyse and subsequently manage the risks affecting their assets and liabilities. With this in mind, the MNB carried out a long-term climate stress test for insurers, using three scenarios to illustrate possible changes in the asset side. Looking ahead, the MNB also aims to assess the physical risks affecting the liabilities side of insurers, which will provide a good starting point for further analysis and addressing emerging risks. In addition to the stress tests, the central bank has also aggregated the results of the insurers' climate risk questionnaire, and the MNB plans to use the results to issue a green guideline for insurance companies.

2.1 TRENDS IN THE BANK CARBON RISK INDEX

MNB's Banking Carbon Risk Index **shows stagnating transition climate risks**. The MNB's first indicator capable of tracking climate risks in the banking system showed a steady stagnation for climate risks in 2022. The index captures the risks arising from the GHG intensity of each economic activity based on two logical assumptions. The linear index assumes that the transition climate risks increase in proportion to the GHG intensity, thus the companies potentially most exposed to climate change-related regulatory activities (e.g. carbon taxes) are also the most polluting entities. By contrast, the Gompertz function considers the risks from GHG intensity to be negligible below a certain level, and after a rapid ramp-up it considers the group of companies considered to be large polluters to be equally risky above a critical level, regardless of which of them is the larger polluter. The index looks at the portfolio of credit institutions based on the extent to which they finance polluting activities with their corporate loan portfolio. The index is a measure of the proportion of the total loan portfolio that is considered at risk, which is the potential default rate of a corporate portfolio in the event of the introduction of very strict climate-related regulations. The annual moving average of the index is used to eliminate the possible monthly fluctuations. The results are calculated using GHG intensity data for 2019.

Similar to 2021, the index continued to show stagnation in the first half of 2022, with a slight increase at the end of the year (Chart 2.1). Climate risks for credit institutions have not increased significantly in relative terms over the past year (based on annual moving average). Based on the more stringent Gompertz function, which assumes higher risks, 15.1 per cent of the loan portfolio is considered risky, representing an increase of 0.1 percentage points compared to the end of last year. Based on the more moderate linear assumption, 9.0 per cent of corporate loan portfolios could be affected by transition climate risks, also representing an increase of 0.1 percentage points compared to the previous year-end position.

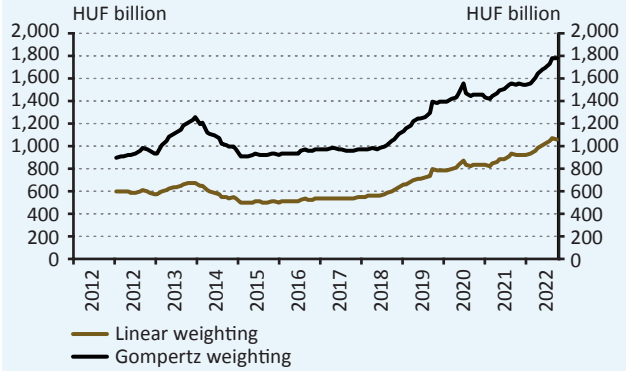
Chart 2.1
Monthly values and annual retrospective moving average of the banking system's BCRI



Source: MNB

Loans financing energy production and agriculture continue to be the most exposed to transition risks. In 2022, among the large polluting sectors, power generation and the chemical industry received more funding, which adjusted the index value upwards, but other, smaller polluting sectors experienced a reduction in risks, resulting in a stagnation of the sectoral index value (Appendices 1 and 2). If we look not at the relative index values, but at the specific loan portfolio concerned, it is already clear that the corporate loan portfolio considered risky is steadily increasing. This is due to the fact that, while financing for high GHG-intensive activities remains stable in relative terms, it is increasing in volume, tracking the steady growth in total corporate loan portfolio. While at the end of 2021, the stock of loans considered to be risky was between HUF 924 billion and HUF 1,560 billion, by 2022 it had risen to between HUF 1,060 billion and HUF 1,773 billion, representing an increase of 13.7–14.7 per cent (based on the moving average of the linear and Gompertz function) (Chart 2.2).

Chart 2.2
Credit portfolio considered risky based on monthly BCRI values



Source: MNB

The value of the index is also affected by changes in GHG intensity. The baseline risk measures are highly dependent on the trend of the annual sectoral GHG intensity data published by Eurostat (2020 data is currently considered the most recent). Last year, the impact of replacing the 2017 data with 2019 data on the index values was shown. Our main finding was that while the values of the linear function are greatly reduced by new, more favourable GHG intensity data of lower value, the Gompertz function shows similar risks even after the values are updated. Replacing the 2019 data with 2020 data did not yield different results. While the linear function reduces the risks even further, thanks to the reduction in GHG intensity values, the Gompertz function fits almost perfectly to the line of the data calculated from the historical data (Appendix 2). The index position according to the Gompertz function for the end of 2022 using both GHG intensity data stands at 15.1 per cent, the difference is negligible. Nevertheless, more consistent use of GHG intensity data to quantify risks will be a priority in the future.

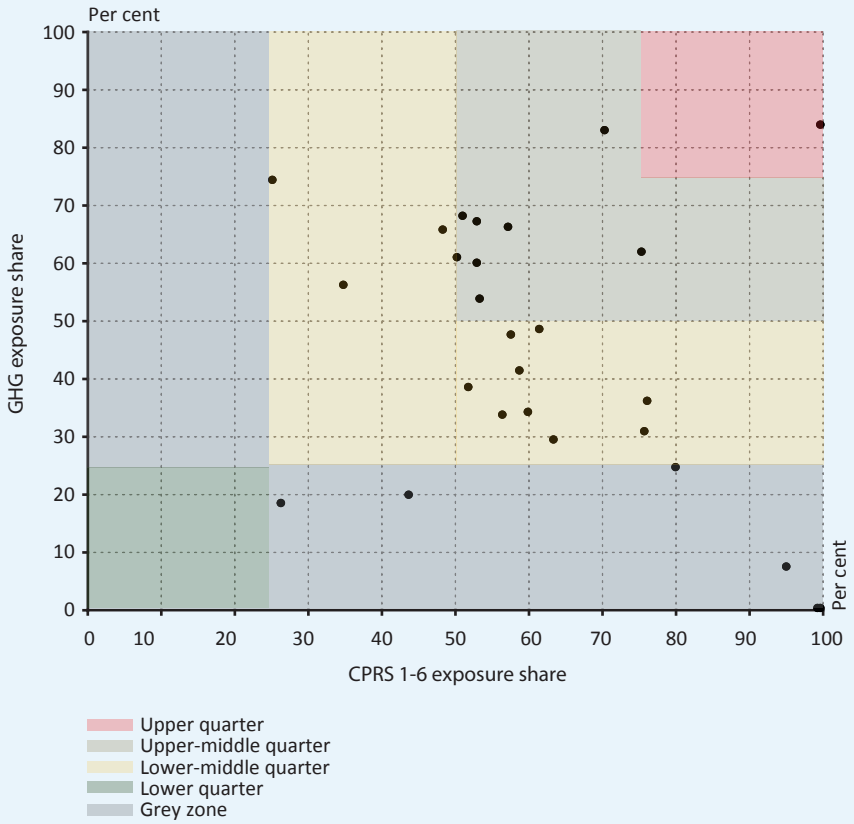
2.2 CLIMATE RISK GRID – A SNAPSHOT OF THE HUNGARIAN BANKING SYSTEM

The Hungarian banking system is considered risky under the climate risk grid. The Climate Risk Grid is the MNB's second easy-to-implement tool for measuring climate risks of adaptation after the BCRI. The climate risk matrix classifies credit institutions into one of the following four groups based on the riskiness of their corporate loan portfolio: (i) upper quarter, (ii) upper-middle quarter, (iii) lower-middle quarter, (iv) lower quarter, and (v) grey zone groups. Institutions in the upper quarter are the group most exposed to transition risks, while those in the lower quarter face negligible transition climate risks. As the name of the group suggests, the riskiness of the members of the grey zone cannot be clearly defined.

The location of institutions on the Climate Risk Grid reflects the results of two different analysis tools, where each point represents one institution. One methodology used by Battiston et al. (2017)[46] assesses the loan portfolio of credit institutions based on the classification of Climate Policy Relevant Sectors (CPRS). The CPRS is capable of classifying the exposures of a debtor company into groups affected or not affected by climate change policies based on the main activity of the debtor company. The first six of the nine groups established are considered to be at risk due to climate change and these are: (1) fossil fuel, (2) utilites, (3) energy intensive, (4) buildings, (5) transportation, (6) agriculture. The X-axis in Chart 2.3 shows the percentage of the total corporate loan portfolio that falls into one of the 1–6 CPRS categories that can be considered risky. The other analysis tool, similar to the BCRI, sorts companies into pollution groups based on the GHG intensity of the debtor's activity. Six pollution groups were established based on the GHG intensity of economic activities: (i) very low, (ii) low, (iii) medium, (iv) medium/high, (v) high and (vi) very high. The Y-axis in Chart 2.3 shows the percentage of the portfolio of each credit institution that is exposed to companies in the high pollution category (medium/high, high, very high). The two instruments thus result in two values per institution, which determine their position in the grid.

49 per cent of credit institutions fall into the upper-middle quarter of risk. Looking at the distribution of credit institutions by balance sheet size, although the proportion of very risky institutions in Hungary is negligible, below 1 per cent, 91 per cent of the sector falls into the next two risk categories, with 49 per cent in the upper-middle quarter and 42 per cent in the lower-middle quarter. Eight per cent of institutions fall into the grey zone, with none in the lower quarter.

Chart 2.3
Climate risk gris of the Hungarian banking system



Source: MNB

[46] Battiston, S. – Mandel, A. – Monasterolo, I. – Schütze, F. – Visentin, G. (2017): A climate stress-test of the financial system. Nature Climate Change, 7(4): 283–288. https://doi.org/10.1038/nclimate3255

2.3 SHORT-TERM CLIMATE STRESS TEST

Examining the impact of climate change on the financial system has become a new challenge for central banks, supervisory authorities and market participants in recent years. Climate risk stress tests, as forward-looking risk measurement tools, have again come into focus, as methodologies based on historical data alone are limited in their applicability. The high-profile role of stress testing is reflected in the fact that it is also a high priority in the TCFD recommendations[47]. After the **long-run stress test in 2021**, the MNB conducted its exercise focusing on short-term transition risks in 2022.

Short-term exercises can be useful to identify institution-specific transition risks as part of overall micro-prudential supervision. They can also provide market participants with guidance on how to manage their climate risks. Long-term stress tests, on the other hand, are better suited to complex, strategic decisions and cost-benefit analyses, as well as to assessing the sustainability of financial institutions' business models. Long-term analyses have the unquestionable advantage of being able to adequately address the physical risks of climate change, which are only expected to manifest themselves in the longer term. The advantage of short-term exercises is the more robust results due to less uncertainty in the time horizon and fewer modelling assumptions. Thus, the two approaches are complementary rather than mutually exclusive.

In the analysis, the MNB quantified the impact of a carbon price shock on the credit risk of companies in different sectors, including the probability of bankruptcy. Carbon pricing is considered by policymakers to be one of the most effective and widespread tools to reduce carbon emissions[48]. In the European Union, for example, carbon pricing has been implemented through the Emission Trading System (ETS) trading mechanism. In addition to the ETS, many EU countries (e.g. Sweden, Austria) are planning to reduce greenhouse gas emissions through a carbon tax.

The primary objective of the exercise is to identify risky sectors of the real economy, risky individual loan transactions and banks with significant exposure to them. The exercise does not aim to carry out cost-benefit analyses, as due to the nature of climate change, this can only be done through long-term analyses. Studies of this kind in Hungary conclude that the transition represents an opportunity rather than a welfare loss for the domestic economy[49]. The introduction of carbon pricing tested in the scenario would not only lead to cost shocks, but also to fiscal revenues that could significantly reduce macroeconomic losses in the short term.[50] However, due to the risk focus of the exercise, these effects have not been taken into account in the analysis, as their impact may be limited in a disorderly transition scenario. In addition to climate change, high energy prices in the second half of 2022 also give relevance to the scenario under consideration. Both the transition to a low-carbon economy and increased fossil fuel prices are having a negative impact on similar activities. However, the focus is on examining the transition risks.

The stress test methodology consists of a combination of a macro-economic, a sectoral and a credit risk model. The details of the methodology can be found in a paper published in the Hitelintézeti Szemle (Financial and Economic Review). For preparing the macroeconomic scenario used for the analysis, the MNB used the Polaris model, a tool based on an econometric methodology. The macroeconomic shock effect is then spread across sectors using a sectoral model. The model diffuses the primary shocks proportional to the carbon emission intensity of each sector using a sectoral matrix based on input-output tables of sectors. Finally, it calibrates the magnitude of the sector-specific probabilities of default using the corporate PD model also used in the MNB's stress tests. The basis for the exercise is provided by the supervisory stress testing framework, which allows the shocks tested in the scenario to be quantified for the entire bank income statement.

[47] TCFD (2017): Task Force on Climate-related Financial Disclosures: The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities.
[48] Nordhaus, W.D. (1993): Rolling the 'DICE': an optimal transition path for controlling greenhouse gases
[49] Cambridge Econometrics (2021): Impacts of climate change scenarios on the Hungarian economy
[50] IMF (2022): Near-Term Macroeconomic Impact of Decarbonization Policies

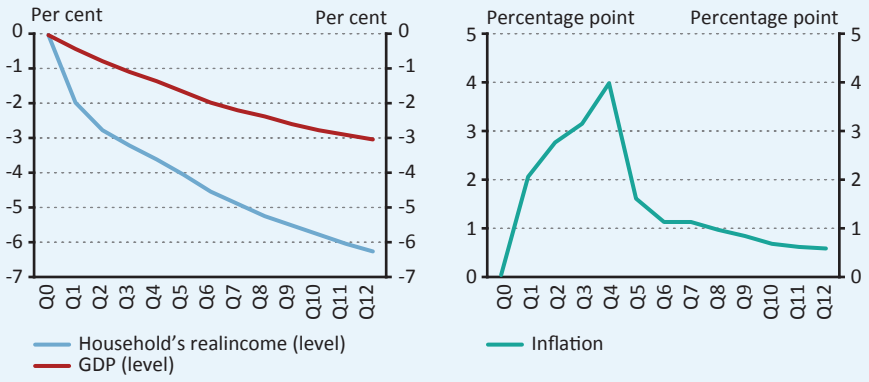
The analysis models the main financial indicators of seven major Hungarian banks over a two-year time horizon. The reference date for the exercise was the end of June 2022. The scope of the data used is primarily aggregated sectoral or bank loan information. On the one hand, it is based on Eurostat's sectoral GHG emission intensity[51], and on the other hand on the input-output tables, which implies the interconnectedness of sectors. In addition, knowledge of the full bank exposure data required to use the stress testing framework. In the exercise, special attention is given to transactions identified as green exposures with low transition risks. These include transactions participating in the MNB's green preferential capital requirements programme and loans to companies participating in renewable energy tenders.

In the Polaris macroeconomic model, the carbon price increase tested in the scenario can be simulated by increasing the world oil price. In the case of Hungary, the carbon price increase has a similar effect as the increase in the input cost of fossil fuels, as Hungary is a net energy importer, with 87 per cent of oil consumption coming from imports[52]. Oil prices increase by 100 per cent in the scenario and then stabilise at that level. This corresponds to a carbon price rise of around EUR 230/CO2 tonnes. Using the econometric model, the impact of energy price increases can be determined for a wide range of macroeconomic indicators. Given that the Hungarian economy has been hit by a number of shocks since the reference period (end of 2022 Q2), it is worth focusing on the differences between the baseline and the stress scenario.

In the stress scenario, economic indicators show a significant deterioration over the entire time horizon: GDP level is three per cent below the baseline by the end of the time horizon (Chart 2.4). For inflation, the difference in the annual indicator is four percentage points in the fourth quarter of the scenario. Thereafter, the difference gradually starts to decrease due to base effects. Higher inflation reduces the purchasing power of the disposable income of households, leading to lower household consumption.

The severity of the scenario may be informed by the modelled value of the probabilities of corporate default. The results suggest that under the stress scenario, the overall probability of corporate defaults is significantly higher and banks would suffer increased loan losses. In the first year of the time horizon, this effect does not materialise due to the empirical characteristic of corporate loans that adverse economic conditions are reflected in defaults only with a lag of several quarters. The scenario-implied increases in the probability of default (dPD) relative to the baseline starting from the second year of the time horizon are shown in Chart 2.5. The chart shows that higher probabilities of default are mainly due to lower household income.

Chart 2.4
Transition risks' impact on macroeconomic variables



Note: Difference to baseline; in case of GDP and household's real-income indicators are percentage difference (in level), while for yearly inflation it is percentage point difference

Source: MNB

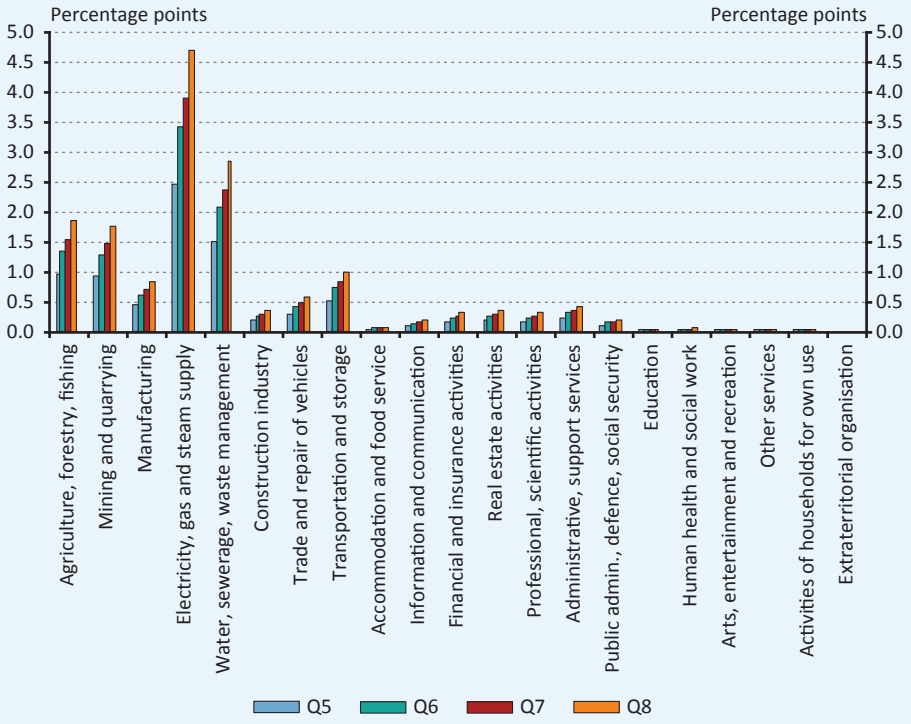
[51] Eurostat (2022b): Air emissions intensities by NACE Rev. 2 activity
[52] Eurostat (2022a): Energy imports dependency

Depending on the scale of the financial shock affecting the economy as a whole, the risk of a single sector in the event of a carbon price rise can vary significantly. Different economic activities have drastically different carbon footprints and energy intensities. According to the results of the MNB's sector-level modelling, the electricity and gas supply sectors, as well as the mining and utilities sectors, are the main sectors affected in the scenario (Chart 2.6). Service-related activities, on the other hand, are subject to only minor shocks.

Chart 2.5
The impact of transition risks on corporate loans' probability of default

Note: Percentage point difference relative to the baseline
Source: MNB

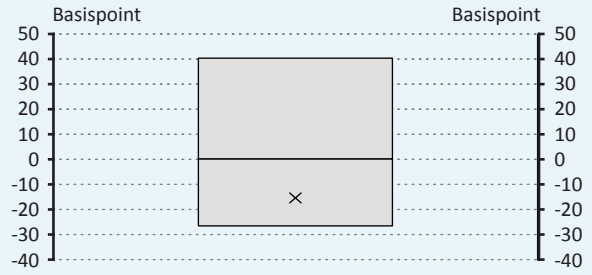
Chart 2.6
Corporate loans' additional probability of default by sector



Note: Percentage point difference relative to the baseline
Source: MNB

The consequences of transition risk can vary significantly across the banking sector. While for the majority of credit institutions, the sectoral heterogeneity of transition risks slightly reduces their cost of risk – compared to a shock of similar severity affecting all sectors – the losses of some institutions are significantly higher. This difference is due to the dissimilarity in the exposure of institutions across sectors. (Chart 2.7). The difference can improve the risk profile of a credit institution if it funds fewer-than-average risky sectors and more less exposed sectors. The risk profile of individual institutions varies significantly, but the results of the exercise suggest that the transition risks are not dramatically concentrated in the balance sheet of any single credit institution. However, more research is needed on this issue, as the results discussed here refer only to the corporate loan portfolio and are mainly based on aggregate sectoral data.

Chart 2.7
The impact of sectoral risk differences on average PD of banks' portfolios



Note: Minimum and maximum values are indicated by the box, median by X

Source: MNB

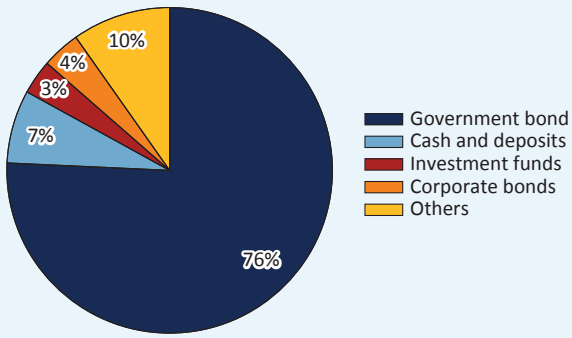
2.4 ASSET-SIDE CLIMATE STRESS TEST OF THE HUNGARIAN INSURANCE SECTOR

After the long-term bank climate stress test published by the MNB at the end of 2021, the objective was to create a long-term insurer climate stress test. Similar to the banking sector, insurance companies face both physical and transition risks, and resilience will be key in the future. Physical risks are the result of global warming, while transition risks arise from the transition to a carbon-neutral economy. While the latter has an impact on the insurance asset side by negatively affecting the prices of securities held, the physical risks mainly affect the liabilities side adversely. Insurance events of increased frequency or severity may even make it impossible for insurers to offer insurance without higher losses, thus in extreme cases they will not provide protection against certain types of claims, increasing the proportion of people without insurance cover (protection gap). It is therefore the responsibility of insurers to close or reduce the "protection gap", which is currently already of high in value. A study from 2022[53] highlighted that only 23 per cent of the insurance events recorded in Europe over the past 40 years due to extreme weather events and associated with climate change were insured. The real estate and agriculture sectors are particularly important in this context.

The MNB's insurer climate stress test includes an asset-side stress test of Hungarian insurance companies, quantifying the risks of the transition to a carbon neutral economy. Because of the asset-side approach, we need to distinguish between assets that can be associated with unit-linked and non-unit-linked insurance, depending on who bears primarily the risk of the price changes of the securities. Given that the risk is essentially borne by the client for unit-linked investments, only non-unit-linked assets are stressed.

The vast majority of non-unit-linked assets are made up of government securities and cash and deposits (Chart 2.8). This includes own funds, cover for non-life insurance reserves and life insurance reserves (excluding unit-linked reserves). The sensitivity of government securities to climate change is different from that of equities or corporate bonds, as the CO_2 emissions approach is not applicable in all cases. Therefore, the most obvious solution here is to estimate the yield curve, which is the one that most influences the change in bond prices.

Chart 2.8
Non-unit-linked asset decomposition 2022 Q4

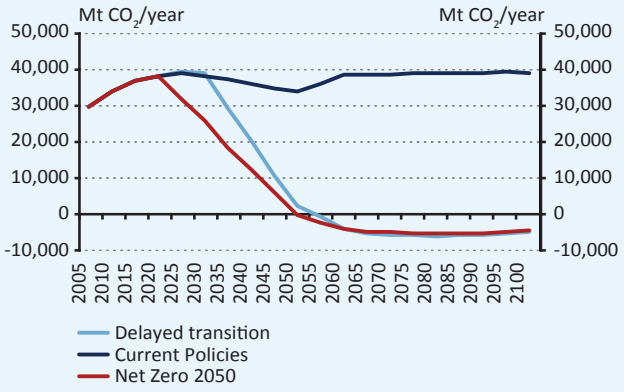


Source: MNB

[53] Economic losses from climate-related extremes in Europe (europa.eu)

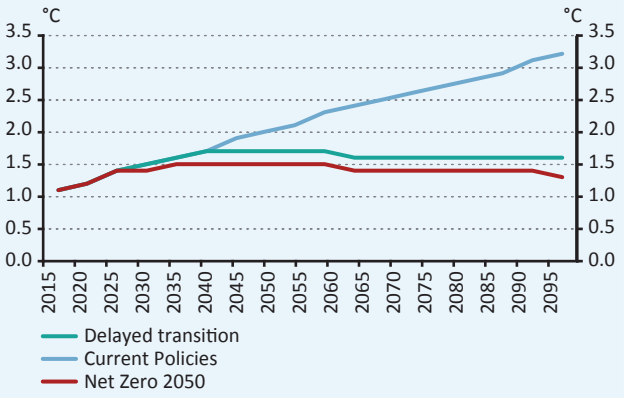
The aim of the stress test is to illustrate the impact of transition risks on the asset side through three climate scenarios. For this purpose, the study uses scenarios developed by the NGFS[54] (Network for Greening the Financial System), which provide predictions for different macroeconomic variables with a 2050 outlook. The three scenarios chosen are the failed transition, where no new climate policies are introduced in addition to the existing ones, the orderly transition, where the goal is to achieve net-zero emissions by 2050, and the disorderly transition, which is characterised by delay, i.e. stringent measures to achieve a zero-emission economy are introduced only 10 years later (in 2030). Accordingly, the scenarios include different CO_2 emission paths (Chart 2.9) and temperature change values in relation to industrialisation (Chart 2.10).

Chart 2.9
CO_2 emissions in different scenarios



Source: NGFS (2022)

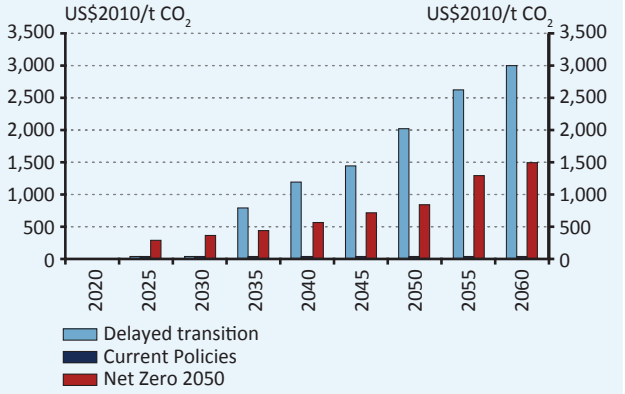
Chart 2.10
Temperature change in different scenarios



Source: NGFS (2022)

In the NGFS scenarios, the transition risk is represented by the introduction of the carbon tax. This puts companies with high fossil energy needs at a disadvantage and could devalue their securities. As mentioned above, the level of carbon prices varies between scenarios, as illustrated in Chart 2.11. In the case of a disorderly transition (delayed transition), due to the delay and in order to reach the emissions target, regulation or the market requires more drastic pricing, while in the case of an orderly transition (Net Zero 2050), early action leads to a gradual increase in carbon prices, keeping them at a lower level overall.

Chart 2.11
Evolution of carbon prices in the scenarios

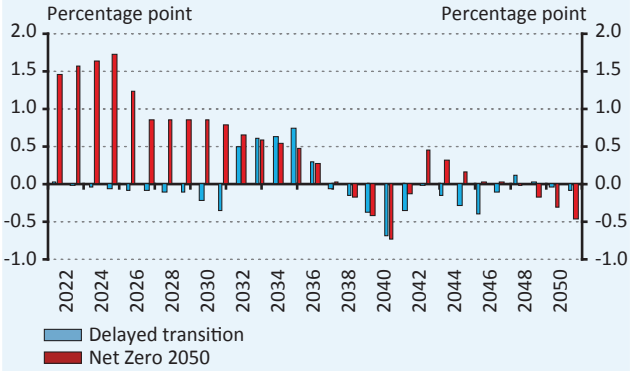


Source: NGFS (2022)

In the insurer climate stress test, the study examined changes in the government securities portfolio along three scenarios. The change in government securities prices is due to a shift in the yield curve, so the difference between scenarios is the change in yield curves. The introduction of the carbon tax will have a major impact on the price of fossil fuels (oil, gas, coal), which will also be reflected in inflation, and therefore the study used two reference points to define the points on the yield curve, the inflation rate estimated by the NGFS (Chart 2.12) and the long interest rate (Chart 2.13). Using these two points, and by proportioning them, further points on the yield curves can be identified, from which the discount factors up to 2050 can be derived.

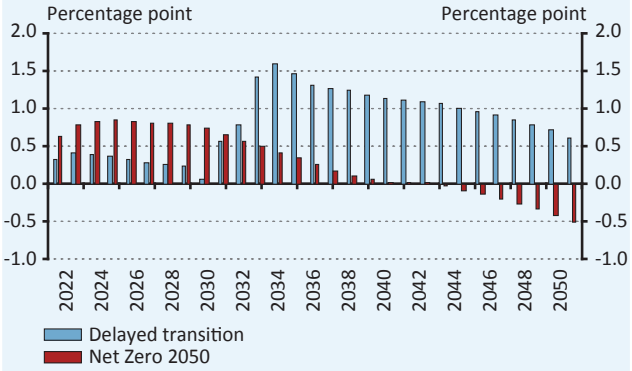
[54] NGFS Scenarios Portal

Chart 2.12
Change in inflation compared to the failed scenario



Source: NGFS (2021)

Chart 2.13
Change in the long rate compared to the failed transition

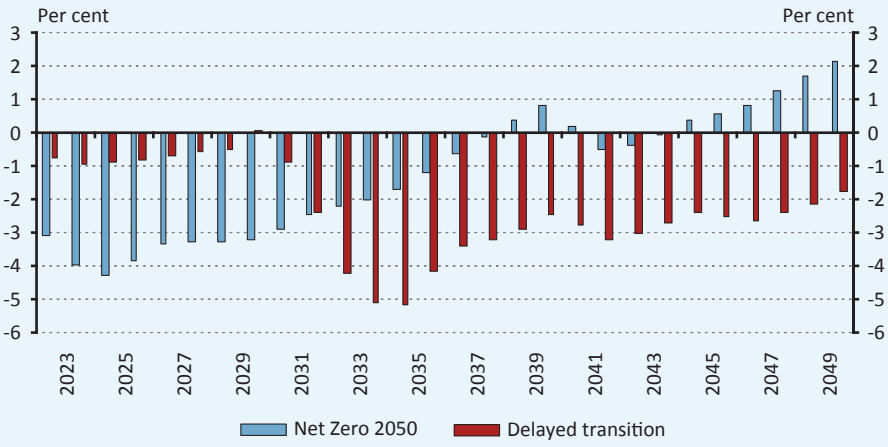


Source: NGFS (2021)

When choosing the right model, different asset classes should be taken into account. The discounted cash flow method was the most appropriate choice for evaluating bonds and thus determining the value of the government securities portfolio, because it well captures the bond price movements caused by yield curve shifts. The portfolio is valued and managed up to 2050 in a way that its average duration does not change during this period. The asset allocation takes place once a year in order to keep the average time to maturity the same as in the initial period. The results show that although there is a transition risk for the asset side of domestic insurers, this effect can be managed using existing risk management methodologies (Chart 2.14).

In the long run, the value of the government securities portfolio will be highest in the case of an orderly transition. As shown in Chart 2.14, the portfolio value in the first 20 years of the orderly transition (Net Zero 2050) is below that of the failed scenario. The turning point comes only after 2040, but after that the asset value in this scenario will be the highest. In contrast, the delayed transition (disorderly transition) cannot exceed the portfolio value seen in the failed transition even in 2050 due to the 10-year delay. The lesson to be drawn is that early action is likely to pay off in the long run, even if it comes at a cost in the short term. At this point, the task of domestic insurers is to support the economic transition to net-zero emissions as far as possible. The study has only modelled asset-side exposures, therefore the next step for the MNB is to assess the physical risks, i.e. stressing the liabilities side. To underpin this, the central bank assessed the climate-related preparedness of Hungarian insurance companies through an insurance climate risk questionnaire.

Chart 2.14
Asset value evolution compared to the failed scenario (Current policies scenario)



Source: MNB

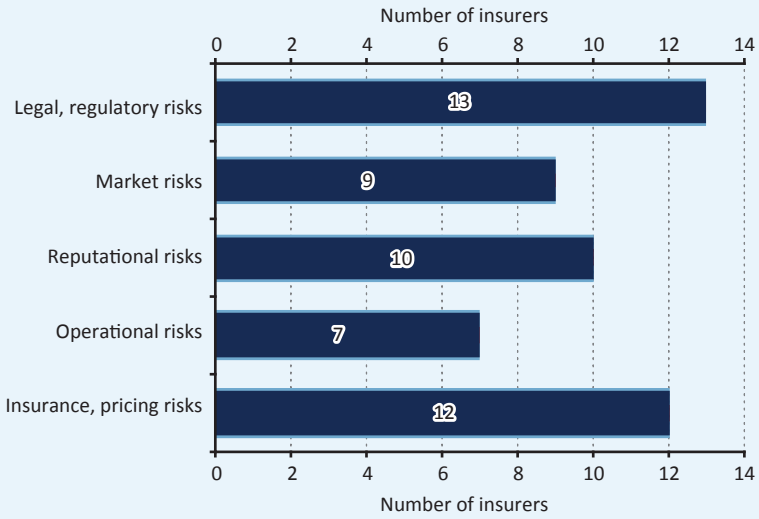
2.5 INSURER CLIMATE RISK QUESTIONNAIRE

Insurers have a key role to play in the transition to a low-carbon and sustainable economy. Given that, in addition to their insurance products, they also provide investment opportunities and, as institutional investors, are also involved in channelling financial resources, their importance is unquestionable. As Inger Andersen, Executive Director of the UN Environment Programme, put it in her 2022 speech[55]:

„The insurance industry serves as society's early warning system and risk manager by understanding, reducing, pricing and carrying risk. And the insurance industry and wider financial sector have the power and responsibility to drive progress towards a net-zero economy and a sustainable future."

Supervisory guidance is essential in an ever-tightening legal environment. Recognising the potential risks of climate change and the need to quantify them accurately, the European Commission, in cooperation with the European Insurance and Occupational Pensions Authority (EIOPA), has made or announced a number of changes to the supervisory framework to integrate sustainability risks into the operation of insurance companies. In September 2021, the European Commission published a proposal to amend the Solvency II Directive[56], which aims, inter alia, to channel more funds to support the European Green Deal[57]. The proposal outlines ways to encourage insurers to make a greater contribution to the long-term greening of the European economy. Accordingly, EIOPA will assess whether prudential rules could be revised to consider the expected lower level of long-term risks of certain types of sustainable assets. However, insurers are already required to integrate sustainability considerations into an increasing number of their processes, for example, insurers' Own Risk and Solvency Assessments (ORSAs) will have to address climate change-related environmental risks relevant to the insurer from spring this year. Based on an update to the Insurance Distribution Directive (IDD) last year, from August 2022, institutions offering insurance-based investment products have been also required to integrate the customer's sustainability preferences in the suitability assessment, meaning that the investment product offered to the customer must reflect the positive environmental performance that the potential customer expects from their investment.

Chart 2.15
If you have identified climate change risks within your business planning time horizon, what risks have you identified?



Source: MNB

[55] Sustainable insurance in a time of planetary crisis (unep.org)
[56] EUR-Lex – 32009L0138 – EN – EUR-Lex (europa.eu)
[57] A European Green Deal (europa.eu)

The central bank also wants to support domestic insurers to prepare for the changing expectations. In line with the objectives of the MNB's supervisory Green Programme, it would promote environmental awareness, and thereby raise awareness of climate risks and improve resilience to the associated physical and transition risks. In order to achieve all these objectives, the MNB plans to publish guidelines for insurers in Hungary, similar to the Guide on climate-related and environmental risks for Credit Institutions issued in 2021 and updated in 2022[58]. In this document, the MNB, as the supervisory authority, intends to set out expectations and identify good practices on climate-related and environmental risks and their management in the activities of insurers. In addition to contributing to a predictable and uniform application of the law, the formulation of the MNB's expectations and recommendations will also help to provide domestic insurers with the necessary guidance to comply with the expected legislative changes.

In order to provide a truly useful guide for insurers, the MNB first had to assess the level of preparedness of the sector. For this purpose, the MNB carried out a questionnaire survey among domestic insurers, in which all Solvency II institutions (22) participated. Among other things, the questionnaire sought answers to questions such as:

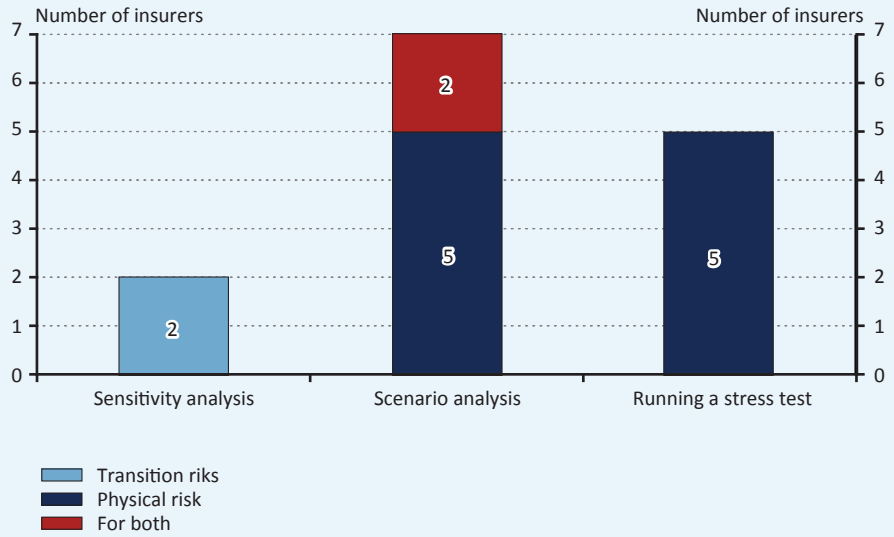
- how well are the actors in the insurance sector currently able to identify, assess and manage climate and environmental risks;
- and are sustainability considerations reflected in product development and customer information?

By examining the aggregate responses, we can get a more accurate picture of the level of preparedness of the domestic insurance sector and the areas that pose challenges and obstacles that are often encountered.

The majority of responding insurers (60 per cent) identified climate change risks within their business planning time horizon. One of the reasons for this is that, depending on the business activity, many respondents consider these risks to be material only in the longer term (respondents do not consider these risks to be material at all in the life insurance segment). As shown in Chart 2.15, there are a number of ways in which climate risks can manifest themselves even in the medium term, but the importance of legal, regulatory and insurance risks stand out among the responses.

These risk categories have understandably been the focus of attention. The physical risks of climate change

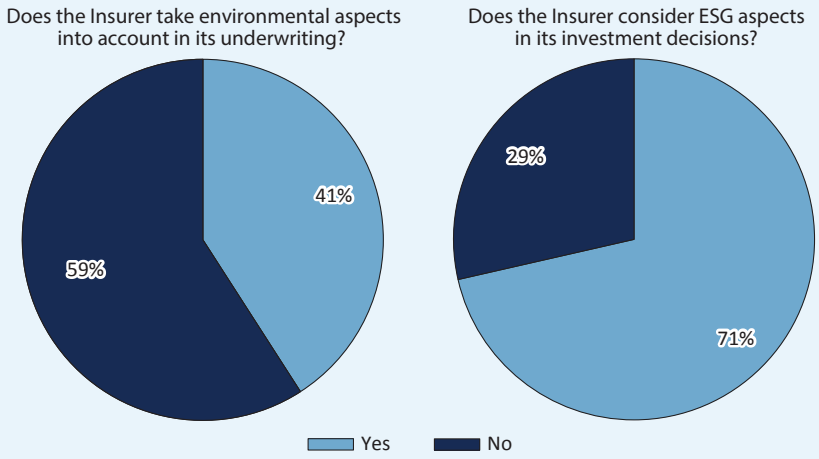
Chart 2.16
Does the Insurer use the following tools to assess climate and environmental risks?



Source: MNB

[58] 10-2022-zold-ajanlas.pdf (mnb.hu)

Chart 2.17
Green risk awareness



Source: MNB

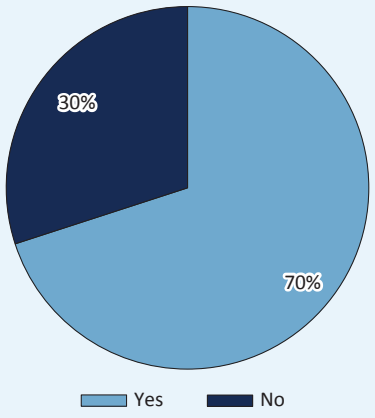
could have a major impact on the pricing risks of products, while transition risks could materialise mainly as legal and regulatory risks. However, the majority of insurers do not yet have the necessary analytical tools and methodologies to quantify and assess these risks (Chart 2.16).

41 per cent of domestic insurers already take some level of environmental considerations into account in their underwriting (Chart 2.17). However, the significant majority (71 per cent) of institutions are already integrating ESG considerations into their investment decisions. 55 per cent of the institutions surveyed have already set up a dedicated unit or working group to manage sustainability and climate change-related risks, or have appointed a dedicated person in charge, or have involved an external expert. It is also worth noting that domestic insurers are typically sensitive to regulatory changes developed at EU level in relation to sustainable finance, with 90 per cent of respondents actively following them and most of them identifying specific tasks stemming from them.

The significant majority of insurers also consider sustainability aspects in their product development (Chart 2.18). This suggests that insurers are also looking for business opportunities in the sustainable economic paradigm shift. In this context, respondents emphasised sectors linked to energy innovation, such as motor and home insurance, where sustainability aspects are well understood and of high importance.

The challenges insurance companies are facing thus far are already demanding a major effort. However, timely and effective responses to sustainability challenges can also be seen as a business opportunity. Business practices and products that also take sustainability into account can also contribute to diversifying and broadening the customer base by attracting more conscious customers. And assessing and integrating climate change-related risks will help insurers to achieve more effective long-term risk management by helping organisations to gain a more accurate, detailed picture of their own operations and risk profile. However, what is a good practice today may become an essential element of any business strategy tomorrow, as profitable operations will only be achieved over time by integrating sustainability and climate risks. Against this background, the MNB places particular emphasis on ensuring that the institutions under its supervision learn and apply risk integration methodologies and practices as soon as possible, along with the necessary guidance.

Chart 2.18
Does the insurer take sustainability into account in product development?



Source: MNB

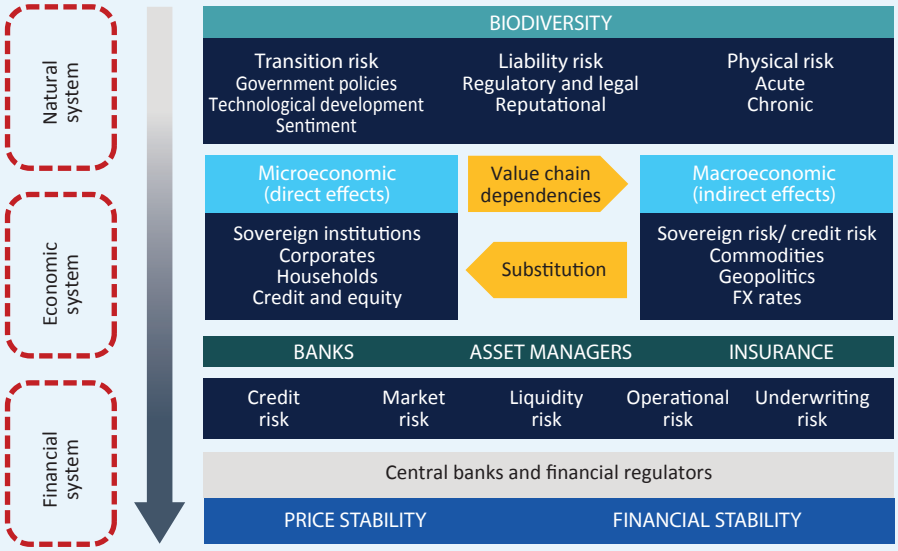
Box 2
MNB and OECD joint project to assess financial risks stemming from biodiversity-related losses

Accelerating biodiversity loss poses a major risk to the economy and the financial sector. However, measuring these impacts is much more complex than measuring the risks arising from climate change. Measuring the temperature or the concentration of a pollutant in the air is a relatively easy task, while measuring, for example, an insect population that is constantly changing in time and space is much more difficult. Little (but expanding) knowledge is currently available to the financial sector on the risks of biodiversity loss worldwide. This leads to inaccurate pricing in markets, inappropriate allocation of capital, and overall increased exposure to these risks, with resulting losses that threaten social welfare. Therefore, policymakers, financial supervisors and central banks need to assess the impacts and vulnerabilities associated with these risks and possible ways to address them more thoroughly than today.

In September 2022, the MNB launched a research-methodology project to assess the financial risks stemming from biodiversity-related losses as part of its Green Programme. It also focuses on developing financial supervision methodologies to address these risks. The cooperation, which is planned to last for around two years, is funded by the European Union through the Technical Support Instrument (TSI), with the OECD participating as an implementation advisory partner in the implementation process in cooperation with the European Commission's Directorate General for Structural Reforms (DG Reform).

Under the project, a supervisory framework for assessing biodiversity-related financial risks will be developed. Including the transmission channels of physical and transition risks, which contributes to raising the awareness of the MNB and banks operating in Hungary by understanding the exposures to and impacts of these risks. The kick-off event of the project was held on 6 September 2022 in the building of the MNB Supervisory Centre and Money Museum, with representatives of ministries, the Hungarian Academy of Sciences, commercial banks, NGOs, DG REFORM, the OECD and the MNB. The project is scheduled to be completed in June 2024.

Chart 2.19
Transmission channels of biodiversity risks



Source: OECD[60]

[59] OECD (2023), „Assessing biodiversity-related Financial Risks: Navigating the landscape of existing approaches", Environment Policy Paper, OECD Publishing, Paris. https://www.oecd-ilibrary.org/docserver/d52137a5-en.pdf?expires=1688485232&id=id&accname=ocid56004653&checksum=2AA613FABB54B4867EF6C61CD9CA3393

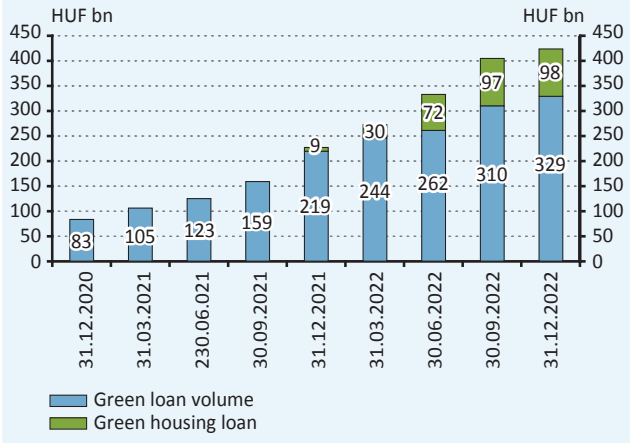
3 Green financing

The rise of green financial products is driven by several social, economic and market processes. The regulatory ambition is clear, with the EU aiming to reduce greenhouse gas emissions to less than half of 1990 levels by 2030 and to achieve climate neutrality by 2050. A major contribution to protecting our environment can be made by spreading green financial awareness and greening investments financed by capital markets. The engagement of monetary regulators is based on the recognition that longer-term, balanced economic growth, and the low and stable inflation it supports, can only be realised by achieving a sustainable growth path. Issuers are incentivized by the spread of environmental awareness and the recent intensification of efficiency efforts.

Over the past year, the volume of green products has shown a high degree of heterogeneity. One reason for this is that the MNB continues to support the development of the green bond and credit market through its green corporate, municipal and retail preferential capital requirements programmes, while green capital market products (equities, mutual funds and asset funds) have mostly lost value in nominal terms due to the adverse market environment. The share of ESG funds in the total portfolio in Hungary remains low by European standards. The positive expansion seen in the previous two years has also faded and stagnation has characterised the market. Although the volume of bank ESG funds has increased compared to the previous year, their share has decreased. For insurers, the opposite was the case, with the share of ESG asset funds increasing even as net asset value decreased.

As the global green market has developed and the product range has broadened, so has the need for stricter regulation emerged. The development of appropriate regulation will provide transparency for market participants, which in turn will require the harmonisation of green frameworks. The regulatory framework is designed to ensure that both investors and issuers have the same understanding of what a green product is, avoiding the risk of greenwashing.

Chart 3.1
Evolution of the green loan portfolio of credit institutions participating in the Programme



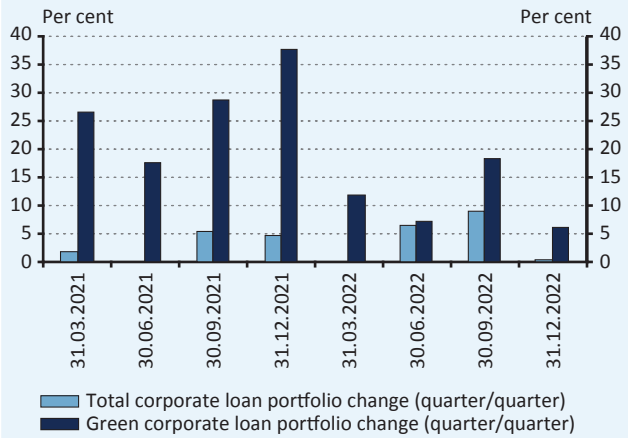
Source: MNB

3.1 GREEN LENDING TRENDS IN THE BANKING SECTOR

The purpose of the MNB's Green Preferential Capital Requirement Programme is to green banks' portfolios, i.e. to reduce their exposure to climate risks. The programme provides a preferential capital requirement for exposures that are considered green for institutions that commit to reporting. The preference is available for corporate and municipal loans and bonds. In 2022, as in previous years, the stock of green corporate exposures continued to grow dynamically. In 2022 Q4, the stock participating in the programme amounted to HUF 328.7 billion, representing an increase of more than HUF 100 billion compared to the same quarter of the previous year. An important development is that green housing loan portfolio has also started to grow dynamically during 2022, approaching HUF 98 billion gross by the end of the year (Chart 3.1).

The growth of green corporate loan portfolio is also significant because it far outpaces the growth of the overall corporate credit portfolio (Chart 3.2). In one year, green corporate exposures grew by 50 per cent in volume, while total corporate loan portfolio could increase only by 15.5 per cent. Overall, green loans accounted for 2.62 per cent of total corporate loans outstanding at the end of 2022, representing a 0.6 percentage point gain in one year.

Chart 3.2
Development of the volume in the preferential capital requirements programme for green corporate and municipal financing and of the total corporate loan portfolio

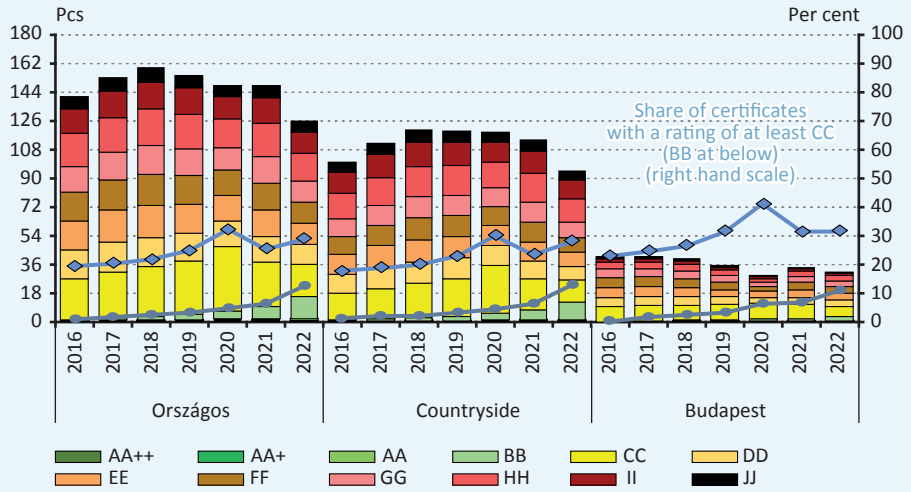


Source: MNB

3.1.1 Energy efficiency in the Hungarian real estate and credit market

Low-energy housing is becoming increasingly common on the real estate market. However, the energy efficiency of residential property remains low on average. Compared to the previous year, the share of energy performance certificates issued for residential and accommodation buildings that meet the near-zero energy demand requirement (hereinafter referred to as the NZE requirement), i.e. are rated BB or above, increased considerably from 6.4 to 12.4 per cent in 2022 (Chart 3.3). This proportion rose slightly higher to 12.9 per cent in municipalities outside of Budapest, but only to 10.8 per cent in Budapest. There are two reasons for the increase in the share of NZE-compliant certificates in the housing market. On the one hand, in 2022, the number of newly built dwellings could increase slightly compared to the previous year, with energy efficiency considerations becoming increasingly important. On the other hand, in 2022, the number of transactions in the second-hand housing market decreased significantly, and with it also the number of certificates issued with a lower rating. The poor energy efficiency in Hungary is well illustrated by the fact that in 2022 the number of buildings falling into the poor category was still high, with 29.8 per cent of certificates issued in the three worst categories.

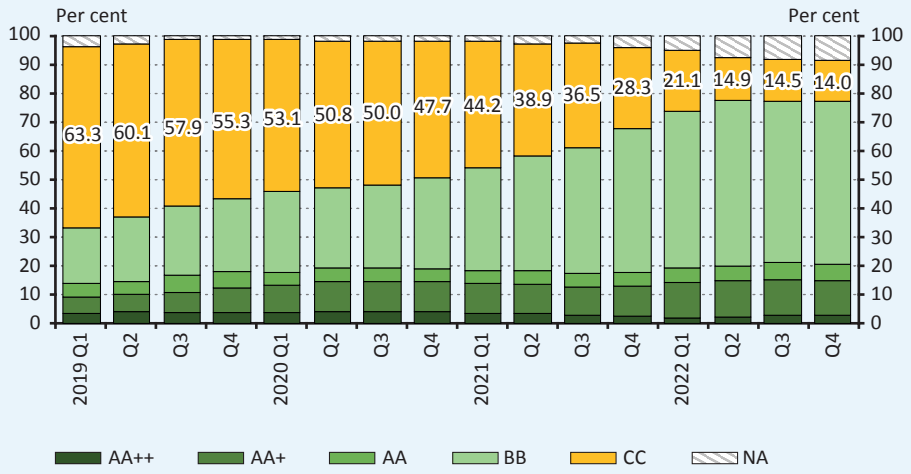
Chart 3.3
Number of energy performance certificates issued for residential and accommodation buildings (used and new) by category and by Budapest and rural areas



Note: For multi-family dwellings, a separate energy certificate is issued for each dwelling. The data include certificates issued before the occupancy permit for newly built properties and certificates issued upon the sale of second-hand dwellings.

Forrás: https://entan.e-epites.hu

Chart 3.4
Distribution of flats in new condominium projects under sale in Budapest by estimated energy rating



Note: Based on 4-flat or larger condominiums. Estimated energy efficiency classifications: where the energy efficiency is unknown, we used category BB for renewable energy, and category CC for all other.

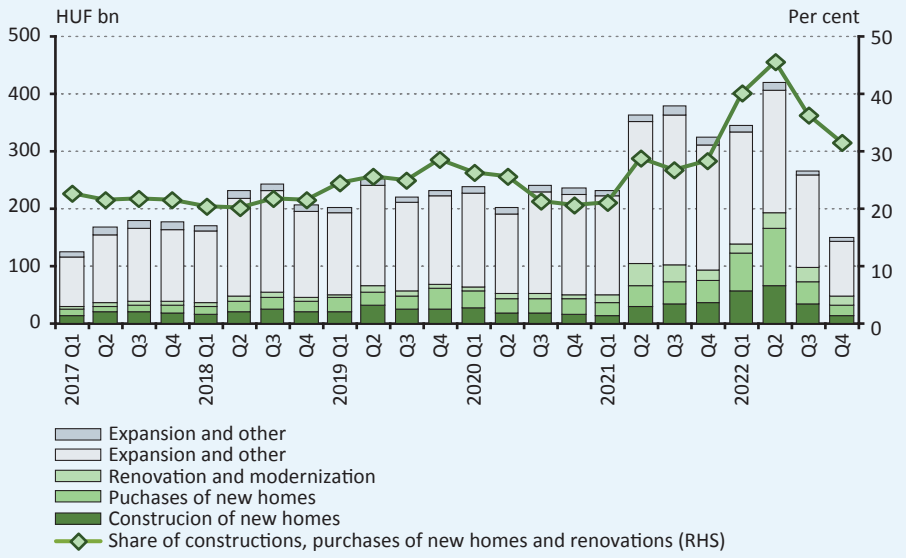
Source: ELTINGA – Housing report, MNB calculations

In Budapest, only a fraction of the buildings in the market for new homes for sale do not use renewable energy. In Hungary, requirements for the energy performance of buildings are regulated by decree[60]. After the original entry into force on 1 January 2021 was postponed several times, under the current rules, from 1 July 2024 the energy compliance requirements for new buildings will be tightened, so instead of CC, i.e. modern, only residential buildings with an energy rating of at least BB, i.e. meeting the NZE requirements, will be eligible for a permit for occupancy. Despite the successive postponements of the introduction of stricter regulations, the "green" transition is clearly visible in the new condominium market in Budapest. According to MNB estimates, 77.4 per cent of new condominium apartments for sale in Budapest reached the NZE requirement in 2022 Q4. This ratio was 67.7 per cent at the end of 2021 and only 50.5 per cent at the end of 2020 (Chart 3.4).

With the phasing out of the FGS GHP and the rise in the interest rate environment, the volume of loans for new housing decreased significantly. The HUF 149 billion stock of housing loans disbursed in 2022 Q4 was 54 per cent lower than in the same period of the previous year, but also down 44 per cent from 2022 Q3. The high base caused by the kick-off of the FGS Green Home Programme, as well as the rising interest rate environment and the declining number of housing market transactions, played a major role in this. Nearly three quarters of housing loans originated in 2022 Q4 were taken out for the purchase of a second-hand dwelling. With the phasing out of the FGS Green Home Programme, the proportion of loans taken out to construct or purchase a new home fell to 21 per cent by the end of 2022 from levels of between 40 and 50 per cent in the spring months, but this remains higher than in previous years (Chart 3.5). The share of loans for renovation and modernisation increased by 6 percentage points in one year to 11 per cent, due to a larger decline in the volume of housing loans for other purposes in 2022. This was also helped by loans linked to home renovation support, in which residential investment aimed at energy improvements to counter rising overheads may have played a role. By December 2022, banks had signed a total of HUF 85 billion worth of interest-subsidised home renovation mortgage loans linked to the home renovation support phased out in December 2022, which accounted for 47 per cent of the renovation home loans disbursed during this period.

[60] TNM Decree No 7/2006 (V. 24.) on the specifications of the energy performance of buildings

Chart 3.5
Distribution of new housing loans by loan purpose



Source: MNB

Box 3
Green turn in the domestic housing market – results of the FGS Green Home Programme

In its green toolkit strategy, the Magyar Nemzeti Bank (MNB) set itself the objective of supporting sustainable economic transformation. There is also a focus on increasing the climate-awareness of the financial system to achieve climate goals. The energy efficiency of the residential real estate stock, which accounts for a third of primary energy consumption in Hungary, is low and there is significant room for modernisation. In the autumn of 2021, the MNB launched the FGS Green Home Programme (GHP), as part of the Funding for Growth Scheme, with a budget of HUF 200 billion.[61]

In spring 2022, nearly 90 per cent of the loan volume issued for purchase and construction of new dwellings was already linked to the GHP (Chart 3.6). In response for the strong household demand for green loans, the Monetary Council increased the overall amount of the programme by HUF 100 billion to HUF 300 billion at its meeting on 5 April 2022, while tightening the energy requirements[62].[63] As a result of the strong demand for the programme, the increased allocated amount of the GHP – taking into account the loan requests received – was essentially exhausted by the end of spring 2022, therefore only a small part of the related contracting was postponed to 2022 Q3.[64]

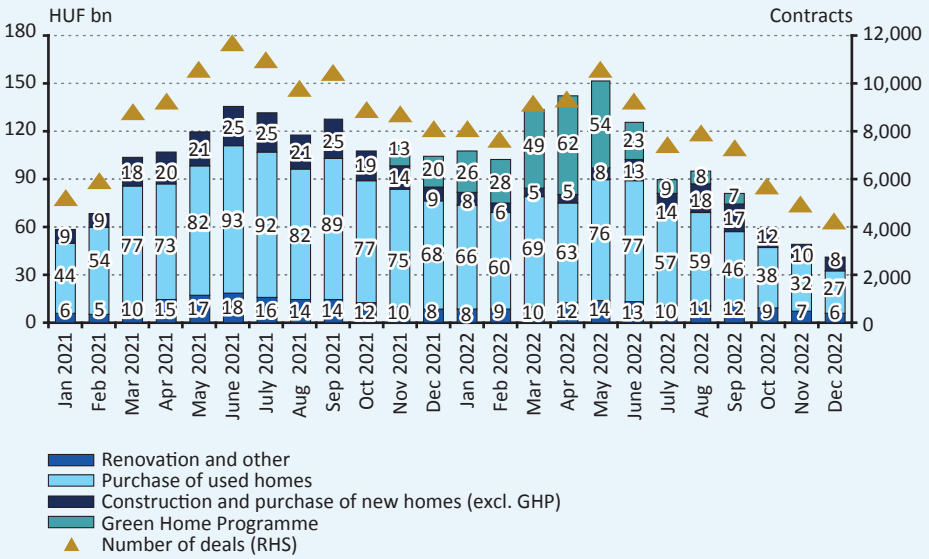
[61] Laura Komlóssy – Sándor Winkler (2022): A zöld lakáshitel-piac ösztönzése: az NHP Zöld Otthon Program (Promoting a green home loan market: the FGS Green Home Programme), In: Norbert Kiss-Mihály and Pál Kolozsi (eds.): Monetáris politika a fenntarthatóság jegyében (Monetary policy for sustainability) – A book of studies by the Magyar Nemzeti Bank on the first year of the green monetary policy toolkit, Magyar Nemzeti Bank, 2022

[62] In addition to the unchanged requirement for category BB, the upper limit for the primary energy use of a property has been reduced from 90 kWh/m^2/year as set at the start of the scheme to 80 kWh/m^2/year.

[63] MNB (2022): Szigorúbb feltételek mellett folytatódnak az MNB zöld lakáshitel-piacot támogató programjai (MNB's programmes to support the green housing loan market will continue under stricter conditions), MNB press release, 5 April 2022, Downloaded: 09/02/2023

[64] Credit institutions had the option to conclude loan contracts until the end of September 2022.

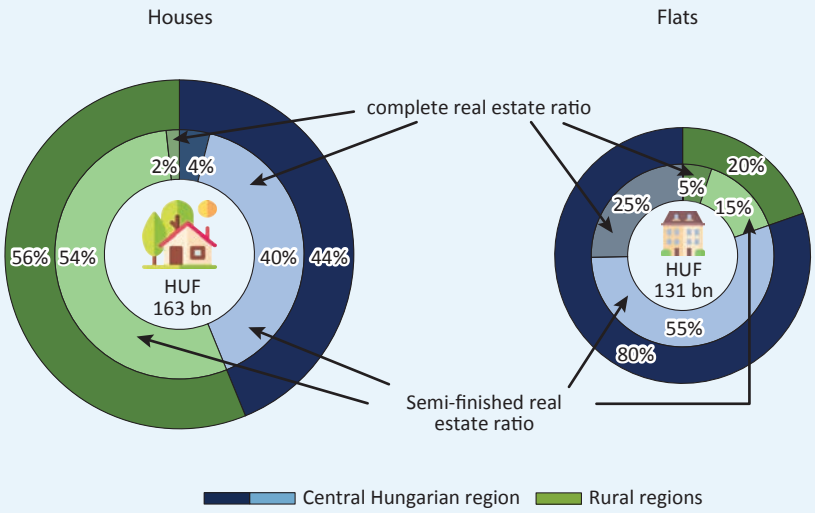
Chart 3.6
New housing loans to households in the credit institution sector



Source: MNB

The Green Home Programme has been closed with almost full utilisation. Households have taken out around 54 per cent of the contracted volume under the programme, totalling HUF 163 billion so far for the construction or purchase of houses (including family houses, semi-detached houses, terraced houses) (Chart 3.7). The average loan amount for house-type properties was HUF 35 million.

Chart 3.7
Distribution of the contracted volume under GHP by property type, stage of completion and region

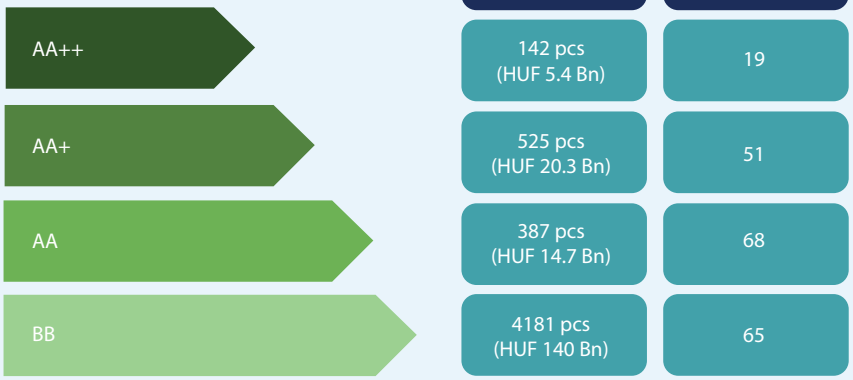


Note: In the house category, the detached house and semi-detached/terraced house were identified. The other type of real estate was not categorized.

Source: MNB

As regards energy efficiency, a significant part of the real estates financed under the GHP outperformed the maximum 90 kWh/m2/year, from 19 April 2022 modified to maximum 80 kWh/m2/year required in the programme. The energy rating of almost 60 per cent of the properties financed so far is already known, of which 80 per cent have an energy rating of BB and 20 per cent have an energy rating more favourable than BB (Chart 3.8). The programme has played a prominent role in home lending in recent months, helping around 8,600 households to build or buy an energy-efficient home on favourable loans.

Chart 3.8
Distribution by energy class of properties financed under the GHP

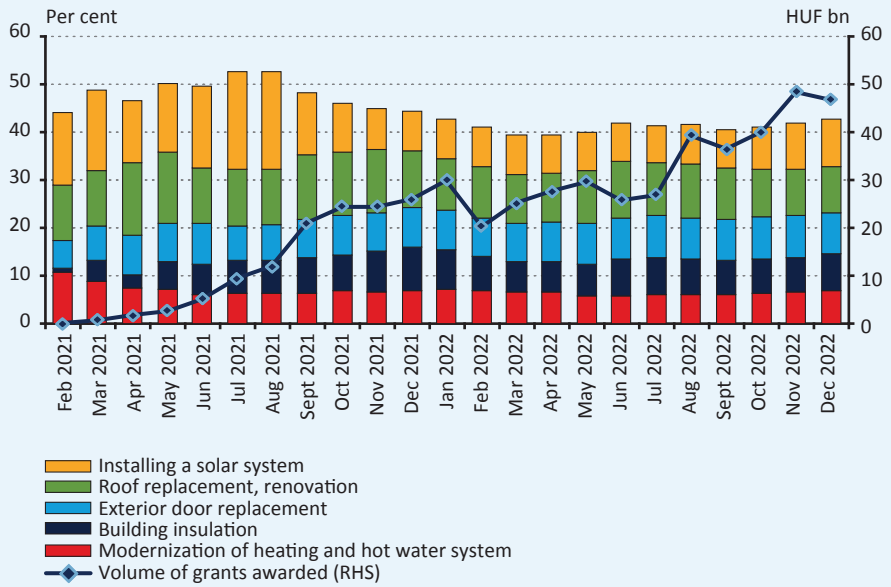


Note: Banks only need to report the energy rating of the property after the completion of the energy certification of the property.
Source: MNB

With the phasing out of the home renovation support, there is currently no state support for energy improvements available to a wide range of the population. But this would still be necessary in the current economic circumstances. The total amount of non-refundable grants under the home renovation support scheme introduced from February 2021 amounted to HUF 523 billion up to December 2022, of which HUF 135 billion was granted in 2022 Q4. 42 per cent of the grants awarded in the fourth quarter were used for renovation purposes to improve the energy efficiency of the property. The highest proportion (9.8 per cent) was awarded for the renovation and replacement of roofs. In second place, and with a slightly increasing share in the last months of the year, was the installation of a solar system providing a renewable energy source, which accounted for 9.5 per cent of the quarterly grant volume. However, at the start of the support, this renovation objective represented a considerably higher share, with one in five grants awarded for solar panel installation in the summer of 2021. Façade insulation and replacement of external windows to reduce the heat transmission coefficient (U-value) of buildings are also popular renovation purposes, accounting for between 7.4 and 8.7 per cent of public subsidy on average, while modernisation of heating and hot water systems accounted for 6.6 per cent of subsidies (Chart 3.9). With the phasing out of the home renovation support at the end of December 2022, the state incentive for energy modernisation of residential properties, which was available to a wide range of the population, has been discontinued. To ensure a stable and high quality housing supply in the long term, the Magyar Nemzeti Bank proposes in its Sustainable Balance and Convergence – 144 steps publication [65] – in addition to the construction of an adequate number of new energy-efficient dwellings – to launch renovation subsidies for family houses and condominiums, which can only be granted if energy efficiency is improved.

[65] Magyar Nemzeti Bank: Fenntartható egyensúly és felzárkózás 144 pontja (Sustainable Balance and Convergence – 144 steps), May 2022 Link: https://www.mnb.hu/letoltes/fenntarthato-egyensuly-es-felzarkozas-144-javaslat-20220519.pdf

Chart 3.9
Utilization rate of home renovation subsidy by energy purposes and the volume of grants awarded



Note: Based on the amount of grants awarded in the supporting documents.
Source: Hungarian State Treasury

Box 4
Renewing the Certified Consumer-Friendly Housing Loan framework from green aspects

The Certified Consumer-Friendly Housing Loan (CCHL) certification was introduced by the MNB in June 2017 to enhance the comparability of housing loans. It also sought to stimulate market competition and the spread of fixed-interest products. Housing loans with the CCHL trademark must have transparent terms and conditions, be easy and quick to take out, have predictable repayments: they must be repayable only in annuities, have a fixed interest rate for at least 5 years or until the end of the term, and the interest rate spread over the reference rate must not exceed 3.5 percentage points. The disbursement and early repayment fees for CCHL schemes are lower than the statutory ceilings, and the administrative timeframes for processing housing loans are also maximised. Through the Comparison site for certified products operated by the MNB, consumers can easily and transparently find out about available CCHL offers.

Certified housing loans have become the dominant product in the market since their introduction. The market share of CCHL products in new disbursements has been stable at around 70 per cent in recent years. By the end of 2022, lenders had granted 190,000 certified housing loans worth nearly HUF 2,700 billion. After the introduction of the certification, the interest rate spread on fixed-rate mortgages fell by about 1 percentage point, affecting a wide range of consumers, and the interest rate spread disadvantage of these schemes compared to floating-rate loans disappeared. With the spread of CCHL loans, interest rate fixing has become commonplace in the housing loan market; by the end of 2018, floating-rate mortgage lending had virtually ceased.

Since the introduction of the certification framework, the MNB has continuously monitored the development of retail lending. Following a series of previous amendments, certified housing loans will be upgraded this year to support climate change objectives. Bank green funding could play a key role in greening the economy: their uptake could help to increase the low energy efficiency of the domestic housing stock, the sustainability of energy supply and, based on the so-called green hypothesis, due to their potentially lower credit risk, maintain financial stability. In view of this, from 1 April 2023, for specific green loan purposes under CCHL funding at preferential terms will be available, which could play a significant role in the uptake of green credit products.

By choosing CCHL products for green loan purposes, consumers benefit from substantial discounts. As a general rule, lenders will be obliged to cover the cost of the Authentic Energy Performance Certificate once, and in the case of green loan purposes, they will also be able to offer an interest rate reduction on the initial interest. In line with the MNB's Preferential Capital Requirements Programme, for the following green loan purposes, as defined in the Call for Tenders, no disbursement fee, nor any fee or other cost related to the verification of the green loan purpose, may be charged:

- the construction or purchase of a new dwelling, the purchase of a construction plot for the construction of a new dwelling, provided that the primary energy demand is 80 kWh/m²/year or less and the energy quality class is "BB" or better; or
- renovation of a second-hand dwelling that results in an energy performance rating of "BB" or above and the overall energy performance of the renovated dwelling does not exceed 80 kWh/m²/year; or the renovation has resulted in a reduction of primary energy demand of at least 30 per cent; or
- the purchase of a second-hand residential building which will be renovated after the conclusion of the loan agreement in accordance with the previous section; or
- the implementation of one or more of the modernisation measures specified in the Call for Tenders on any residential building.

Feedback from banks suggests that the expansion of the CCHL framework could support the uptake of green lending. The MNB carried out a questionnaire survey to assess the green lending plans of banks disbursing CCHL products. Respondent institutions account for nearly 90 per cent of total housing loan disbursements. Based on experience so far, there is still limited client interest in specifically green loan purposes, but the majority of banks are already actively engaged in green loan schemes. Green CCHL product would be provided mainly for the construction or purchase of a new dwelling/house, with an interest rate reduction of 0.25–0.5 percentage points if the green loan purpose is met. By 2024, banks expect dedicated green products to have a market share of around 10-15 per cent of total housing loan originations, while banks planning to offer green CCHL loans estimate the expected share of green products in CCHL lending at around 30 per cent. Banks that do not yet market a dedicated green loan product have justified this on the grounds of excessive complexity and difficulty of monitoring, and find standard loans also suitable for achieving loan purposes. In the future, therefore, uniform green definitions and frameworks supported by regulation could play an important role in supporting the uptake of such loans.

Banks' plan for the distribution of green housing loans

	Bank responses
Currently distributes dedicated green loan	4/7
Plans to distribute green loans within the CCFHL qualification	3/7
Most common loan purpose for CCFHL	buying a new apartment/house
Would provide a green interest rate reduction	5/7
Rate of interest reduction	0.25–0.5 percentage point
Expected share of dedicated green products in the bank's total housing loan disbursement by 2024	~ 10–15 per cent
Expected ratio of dedicated green products within the bank's total housing loan portfolio by 2024	~ 30 per cent

High level energy efficiency is already a requirement for commercial property developments. Commercial properties to be completed from 1 July 2024 will also have to comply with the NZE requirement. Despite the delay in regulation, commercial property developments currently under construction will already meet this standard, and all modern office buildings in Budapest (new build or renovated) completed in 2022 had an energy rating of at least BB, as market demand already requires this.

Over the past decade and a half, having a green rating has gradually become an advantage in office rental tenders and sales transactions, and eventually a requirement for certain types of tenants and investors, and is now a general market requirement also in Hungary. In Budapest, the modern office stock amounted to 4.25 million square metres at the end of 2022, 52 per cent of which (2.2 million square metres) had BREEAM, DGNB, LEED or WELL certification (Chart 3.10). The share of green office space is highest in the submarkets Váci út office corridor, Central Buda and Central Pest (56 to 73 per cent). In recent years, there was a large volume of new completions in these submarkets. 88 per cent of green office spaces in Budapest has one of the higher, greener categories (BREEAM Outstanding, Excellent or Very Good, or LEED Platinum or Gold) on the rating scales. Based on the developments under construction, in the next eighteen to twenty-four months 320,000 square metres of new office space will be completed in Budapest, which may lift the ratio of green office spaces close to 60 per cent. This tendency is also encouraged by the MNB's Green Corporate Preferential Capital Requirements Programme, which supports the development of green buildings from the financing side.

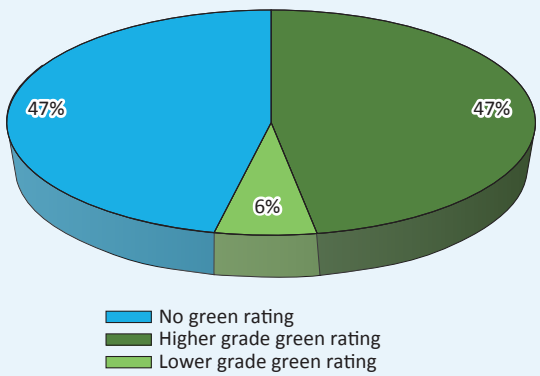
Having a green rating is usually associated with higher building quality, which is reflected in the value of the property. Although a wide range of property characteristics affect rent levels, CBRE estimates that the Budapest office market offers a green premium of around 9–10 per cent in rents, compared to the European average of 6 per cent.[66]

3.1.2 Renewable energy production in lending

The key to reaching the 2050 climate neutrality target is the energy sector, this sector will require the highest amount of new investments and mobilisation of green funds. In recent years, a number of sustainability strategies, regulations and directives have been adopted in the European Union and in Hungary, several incorporate the objectives of clean, affordable energy supply and energy independence[67].

The share of renewables in the sector increased dynamically in 2022, with solar energy as the main source of growth. The launch of the Mandatory Feed-in Scheme (KÁT) and the Renewable Energy Support Scheme (METÁR) provided a solid basis for promoting renewable energy investments, but the geopolitical and energy market changes of 2022 have also boosted free market solar investments. Installed renewable capacities increased by

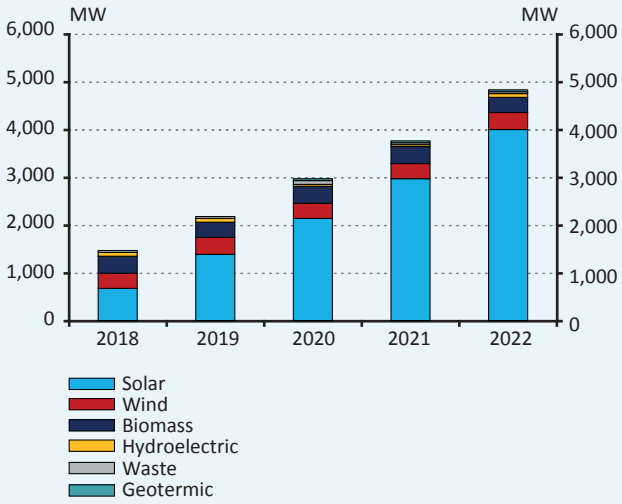
Chart 3.10
Composition of the modern office stock in Budapest according to green rating



Note: Green office stock includes modern office buildings in Budapest with BREEAM DGNB, LEED or WELL certification.

Source: CBRE, HuGBC

Chart 3.11
Installed renewable energy capacity in the electricity sector in Hungary



Source: MAVIR

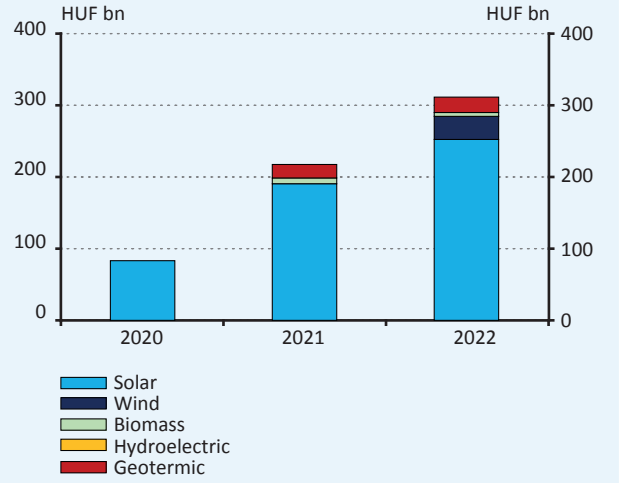
[66] CBRE Research Hungary, Market Outlook 2023. Available at https://insights.cbrehungary.hu/market_outlook_2023

[67] Bálint, M – Jókuthy, L – Pintér, V A – Sándor, N. A. (2022): Garanciák szerepe a zöld gazdasági átállásban – nemzetközi körkép (The role of guarantees in the green economy transition – international overview)

28 per cent in 2022, with total renewable capacity reaching 4,786 MW (Chart 3.11). The dynamic growth was driven by solar power plants investments, with 406 MW of new installations in small-scale household rooftop power plants (HMKE) increasing their total capacity to 1125 MW, and 696 MW of new investments in utility-scale photovoltaic power plants (>50 kW), bringing total installed capacity to 2525 MW. This means that renewable technologies are playing an increasing role in the Hungarian energy mix: the share of solar energy increased to 9.6 per cent, bringing the share of renewable energy production to 17.3 per cent.[68]

The volume of green investment lending in Hungary can be well estimated on the basis of the data provided by credit institutions under the MNB corporate and municipality preferential capital requirements programme. The exposure-based share of investments in the renewable energy sector still reached 93.9 per cent, despite the diversification of financing objectives in the programme in 2022, while the share of renewables in total (corporate and retail) green loans under the preferential capital requirements programme fell to three quarters. The evolution of the exposures eligible for the capital relief is shown in Chart 3.12, which clearly shows that green lending in the renewable energy sector, especially in the solar power sector, has reached a high level of activity. In 2022, the volume of loans for solar power plants with preferential capital requirement increased by a further HUF 60 billion (32 per cent), making it the leading segment in the Hungarian market with a total of HUF 248 billion of exposure with a capital relief. The second largest slice of local renewable energy production was built up in geothermal power generation, with HUF 21 billion exposure benefiting from the capital relief. As a result of foreign subsidiary bank lending, the share of loans for other renewable power plants is also increasing, such as wind power (HUF 33 billion) and biomass-fired power plants (HUF 4 billion). Overall, the volume of green loans financing renewable energy increased by 43 per cent, which is below the doubling growth rate in 2021, but the volume of growth is almost equally to that of in 2022 (HUF 93 billion).

Chart 3.12
Gross bank loans with green capital relief for corporates and municipalities in the renewable energy sector



Source: MNB

Investments in renewable energy generation are also included in the Green Preferential Capital Requirement Programme for Housing. Exposure for the installation of solar panels, solar collectors, wind turbines and heat pumps are eligible for the capital relief if the conditions are met. Institutions have not yet made use of the Green Preferential Capital Requirement Programme for Housing to finance such equipment as these investments were typically funded by the Home Renovation Support and Loan Programme, RRF subsidies and households own equity.

3.1.3 Promoting the sustainability of electromobility

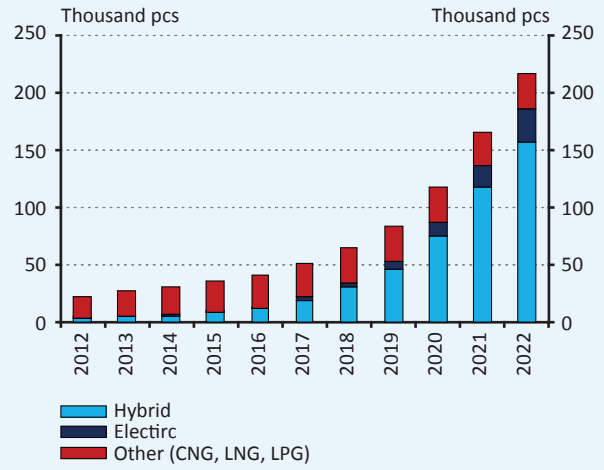
Electromobility ("e-mobility") has received particular attention in the last year due to fuel supply uncertainties. Increased fuel prices have strengthened the price advantage of charging electric cars and plug-in hybrids (especially for home charging combined with solar panels), which compensates for the higher purchase price costs, making investments in electric and plug-in hybrid vehicles increasingly profitable.

The number of electric cars increased dynamically throughout Europe and in Hungary last year. According to the Ministry of Energy[69], 63,597 Hungarian cars had green license plates at the end of 2022, representing a three-and-a-half-fold increase compared to the beginning of 2020 (Chart 3.13). Between 2021 and 2022, the number of hybrid cars[70] doubled and by the end of 2022 the number of hybrid cars had already exceeded 150,000 vehicles, which is significant even in the regional context, with only Austria exceeding the Hungarian figure in a comparison of 5 countries (Table 3.1). The increase in the number of purely electric cars is even more impressive is, which has

[68] Source: MAVIR
[69] https://kormany.hu/hirek/sosem-latott-mertekben-gyarapodott-tavaly-a-hazai-klimabarat-jarmuallomany
[70] green license plates other hybrids

tripled in the last two years to nearly 30,000 at the end of 2022. The energy policy crisis of 2022 has brought the benefits of electric drives into focus and accelerated the uptake of passenger cars with alternative powertrains. In 2022, more than 13,000 pure electric cars were registered in Hungary, more than double of the 5,000 vehicles registered in previous years. This increased the share of electric cars in the passenger car portfolio from 0. 2 per cent to 0. 5 per cent, and the share of hybrid cars from 1. 2 per cent to 2. 9 per cent. Due to the surge in both categories, we are approaching the EU average of 0.8 per cent for electric cars and 2.7 per cent for hybrids. Table 3.1 also illustrates the shift also in the figures for the European Union: Between 2021 and 2022, the share of electric cars quadrupled and the share of hybrids tripled, driven mainly by growth in Austria and Hungary.

Chart 3.13
Number of alternative passenger cars in use in Hungary (2012-2022)



Source: HCSO

In addition to the passenger car market, there has also been significant development in the commercial vehicle segment. Despite this, Hungarian electrification is still below the EU average. Electrification is negligible in the segment of buses used for public transport and trucks, which are typically used for long-distance journeys.

The vast majority of buses and coaches used in the European Union still operate with diesel engines. 94 per cent of buses in use are diesel, 4 per cent are gas-powered and only 3 per cent are hybrid or electric. Despite significant support for the electrification of public transport buses in Hungary under the Green Bus Programme, the share of diesel fuelled buses is still 97 per cent, while the share of electric and hybrid buses is only 1 per cent. One of the most serious obstacles to the electrification of public transport is the significant investment required for its development, which, in addition to vehicle procurement, also requires the construction of the necessary charging network, which in turn requires a long-term concept for electromobility and significant funding.

The electrification of long-distance freight transport faces technological barriers. No viable solution exists at present for the efficient operation of alternative propulsion technologies for long-distance and heavy goods transport. Accordingly, the share of diesel trucks in the European Union and in Hungary is close to 100%.

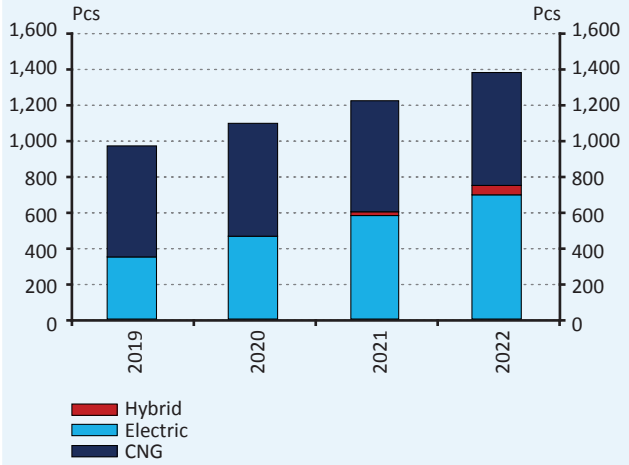
However, the segment of vans has seen positive changes in recent years (Chart 3.14). This development mainly reflects financial considerations: in the mid-2010s, the companies concerned were still trying to make their operations more economical by purchasing gas-powered vehicles, but from 2016 onwards, also the electrification of the light commercial fleets has gradually started. This is

Table 3.1
Share of passenger cars in use by propulsion technology (2021)

Country	Petrol	Diesel	Electrical	Hybrid	CNG/LNG/LPG
Hungary	**64.2%**	**31.6%**	**0.5%**	**2.9%**	0.8%
Austria	42.8%	52.9%	1.5%	2.7%	0.1%
Czech Republic	57.9%	39.7%	0.1%	0.2%	2.1%
Slovenia	46.8%	50.6%	0.5%	1.4%	0.8%
Romania	48.7%	49.5%	0.2%	1.1%	0.5%
EU	**51.1%**	**41.9%**	**0.8%**	**2.7%**	3.5%

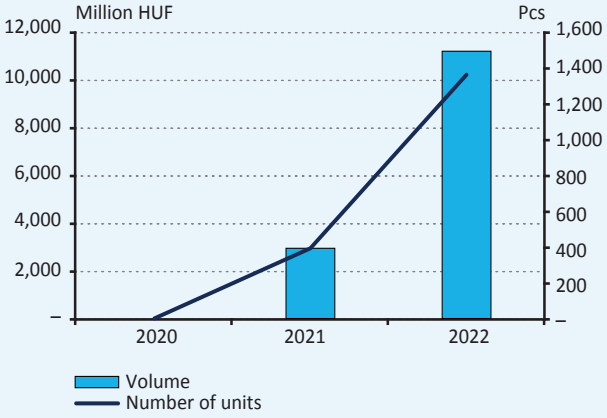
Source: Eurostat, European Alternative Fuels Observatory (EFAO), European Automobile Manufacturers Association (ACEA)

Chart 3.14
Number of alternative fuel vans in use in Hungary (2019-2022)



Source: European Alternative Fuels Observatory (EAFO)

Chart 3.15
Gross bank loan portfolio with the preferential capital requirements programme in the electromobility sector



Source: MNB

due, inter alia, to the corporate income tax relief for energy efficiency investments introduced in 2017, the electric car subsidy tenders announced several times in recent years, and the improving financial returns from the charging option combined with solar power plant installation. These favourable changes mean that the Hungarian light commercial vehicle fleet is approaching the levels seen in the European Union, and the impact of the energy crisis on fuel prices should give a further boost to growth.

Electromobility is also a priority area for the EU's climate targets. From 2035, only fully electric passenger cars are planned to be allowed on EU roads. In addition, EU regulations related to the sustainability of the financial intermediary system, such as the Taxonomy Regulation, the SFDR Regulation and the new CRR rules on ESG disclosures[71], promote the funding of electromobility.

The favourable financing of electromobility is also encouraged by the green preferential capital requirements for corporates and municipalities introduced by the MNB (Chart 3.15). In 2021, it was extended to loan and lease exposures financing electromobility. By the end of 2022, the new incentive has already been used for more than HUF 11 billion worth of bank exposures, covering the financing of a total of 1,368 pure electric cars. This volume represents around 10 per cent of the electric passenger car fleet registered in Hungary in 2022. The exposures are built up in the corporate and SME client segments, with the borrowers' activities spread across a diverse range of industrial segments. Due to the preferential capital requirements, the development of electromobility loan products has started in Hungary: in 2022, K&H Bank developed a corporate electric car leasing product, which encourages companies to electrify their company car fleets through favourable pricing.

3.2 GREEN CAPITAL MARKET

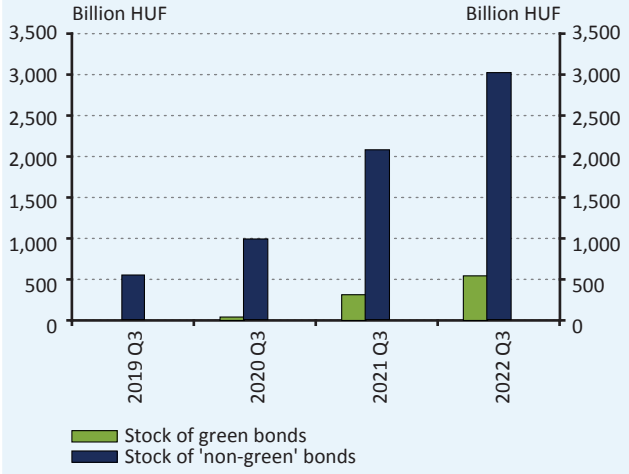
3.2.1 Green corporate bond market

The green bond market has also made significant advances in Hungary. Green bonds are debt instruments whose issuers ringfence the proceeds of the issuance for green purposes, in line with international standards. The property development company CPI Magyarország Kft. raised HUF 30 billion at face value for the development of highly energy efficient buildings that use a high portion of renewable energy.[72] This has since been followed by additional certified issuances, meaning that the green bond market has started to grow dynamically (Chart 3.16). Until the last issuance under the auspices of the Bond Funding for Growth Scheme (BGS), 20 issuers' green bonds at were placed on the market under the programme, at face value

[71] Regulation (EU) No 575/2013 of the European Parliament and of the Council on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 ("CRR")

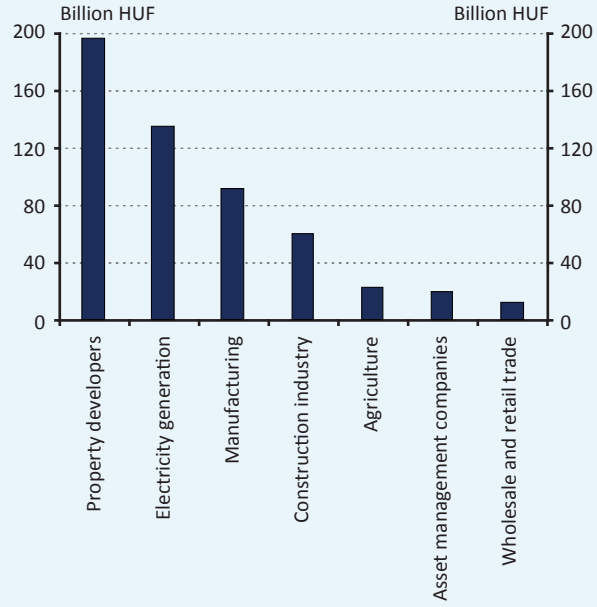
[72] At international level, the first green bonds were issued in 2007 by the European Investment Bank and the World Bank. The dynamic growth since then is well illustrated by the fact that to date, according to CBI data, more than USD 2.1 trillion worth of green bonds have been issued globally at an accelerating pace: by value, more than 20 per cent of green issuance took place in 2022 (Climate Bonds Initiative | Mobilizing debt capital markets for climate change solutions)

Chart 3.16
Changes in the stock of green bonds and other non-financial corporate bonds



Source: MNB

Chart 3.17
Stock of green bonds by economic sector, at face value, October 2022



Source: MNB

HUF 539 billion. This represented around 19 per cent of the bond issuance supported by the BGS. Currently, green bonds account for 15 per cent of outstanding domestic non-financial corporate bonds.

The sectoral distribution of green bond issuance presents a heterogeneous picture. Issuers have raised funds primarily to finance investment projects to improve energy efficiency. The largest domestic green bond issuers by value are commercial real estate developers, followed by renewable energy and manufacturing companies (Chart 3.17). Green bond issuers annually publish so-called allocation reports on the use of proceeds. Based on the reports available up to 30 June 2022, there is heterogeneity in issuers' fund utilisation levels of. In some industries, the resources have already been fully allocated (e.g. paper production, FMCG sector), while in other industries the use of funds has been less advanced (construction). Amongst the fund allocation purposes, contribution to the UN's Affordable and Clean Energy sustainability goal was the most often listed objective; whilst among the International Capital Markets Association's Green Bond Standard project categories, Energy Efficiency, Green Buildings and Renewable Energy were dominant. Investments financed in whole or in part by green bond issuance were typically the installation of solar panels, the construction of low environmental impact logistics parks, electric car charging stations, the installation of energy efficient paper manufacturing machines, the construction of an ecological waste board production plant and modernisation of factories.

There may be a shortage of funding to achieve carbon neutrality. One way to fill the financing gap is to support the Hungarian corporate bond market by maximising the share of issuances that support sustainability. Regulators can play a role in facilitating this, either through direct bond purchases[73] or alternative means. One such financial incentive is the MNB's preferential capital requirements programme, which was introduced in 2020 and is still running. The Green Bond Issuance Guide [74] provides technical support for the development of issuance frameworks.

A fundamental pillar for the deepening of the corporate green bond market is that credit instruments may be distinguished according to their green credentials. For the development of a stable green bond market that reaches its growth potential, it is essential to deepen and maintain confidence in the green bonds issued. This is possible by certifying issuances – by giving them a credible green rating, accepted by the investor market.

[73] One example is the Riksbank's corporate bond purchase programme, which assesses the issuer against sustainability standards. See: https://www.riksbank.se/en-gb/monetary-policy/monetary-policy-instruments/purchases-of-corporate-bonds/
[74] https://www.mnb.hu/letoltes/mnb-zold-kotveny-utmutato.pdf

The first green bonds were issued by the European Investment Bank (EIB) and the World Bank in 2007. These issuances laid the foundations of today's certification standards in a transparent framework[75]. A common rating framework that is easy for investors to understand is a prerequisite for improvement. The heterogeneity of ratings poorly serves the long-term interests of the market, as it may hinder the achievement of market potential and climate objectives. The MNB values the strict regulation of ratings as the cornerstone of long-term stability. It promotes the highest possible degree of credibility to enable the green bond market to reach its growth potential. While compliance with stricter regulation is costlier and a more complex task for issuers, the market may reward this with lower returns as a result of greater credibility.

Box 5
Briefly about green bond reports

In the context of green bonds, investors and regulators have a legitimate expectation that the green objectives set out at the time of issuance of the securities are actually met by the issuer. This means using the money raised properly and achieving the intended environmental impact. In the case of green bonds, these are presented in the green bond reports, which are also of particular importance for transparency. If the issuing companies fail to meet their promises made at the time of issuance, they engage in "greenwashing", i.e. labelling their securities as sustainable while failing to meet their green objectives. The publication of green bond reports therefore provides a degree of assurance to stakeholders that the respective issuer is not greenwashing and is acting correctly.

There are two main types of green bond reports, complementing each other. The first is the Allocation Report, which shows how the funds involved have been used, i.e. how much money has been allocated, for what purposes, to what projects. Around 90 per cent of the green government bonds discussed in the Green Finance Report, for example, financed clean transport. The other pillar of the green bond reports is the green bond impact report, which shows the environmental impact of the green projects financed. These typically quantify energy saved and GHG emissions avoided.[76]

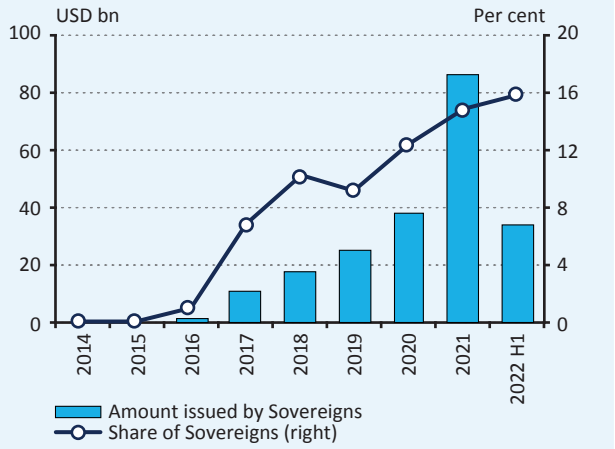
There are three major internationally recognised standards for green bonds. These are the Green Bond Principles published by the International Capital Market Association, the Climate Bond Initiative Climate Bond Standard and the European Union's planned green bond standard, the EU Green Bond Standard. All of these require the publication of allocation and impact reports. The standards build on each other to some extent, but they differ on a number of aspects, such as verification requirements. It is also important to point out that other, mainly local standards already exist, but these three standards are recognised and significant on international level.

[75] This included setting transparent objectives for use (the World Bank gave the issuance an external green peer review), segregated resource management and ensuring traceability of the use of resources (the EIB published an annual report on use).
[76] For more details on green bond reporting, see: https://hitelintezetiszemle.mnb.hu/letoltes/hsz-21-4-e2-manasses-paulik-tapaszti.pdf

3.2.2 Green Government Bonds

States are an increasingly important player on the issuer side of the green bond market. According to the Climate Bonds Initiative, in 2021, sovereigns issued USD 86 billion in green bonds, accounting for nearly 15 per cent of total green bond issuance, while in the first half of 2022, the figure was 15.9 per cent, compared to less than 1 per cent in 2016 (Chart 3.18). However, the share of conventional government securities issued by sovereigns within conventional bonds is higher, and although the trend is improving, their relative position remains low[77]. In addition, sovereigns have also entered the younger social and sustainable bond market, with an additional USD 10 billion and USD 13 billion issued in 2021 respectively.

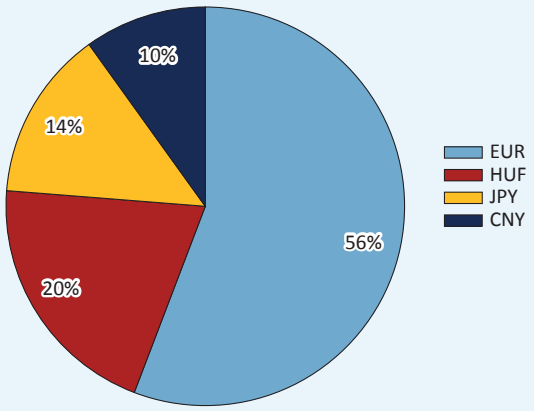
Chart 3.18
Development of the volume of green bonds issued by sovereigns and their share in total annual green bond issuance



Source: Climate Bonds Initiative

Hungary published its Green Bond Framework[78] in May 2020, under which HUF 1640 billion of green bonds have been issued until the end of 2022. In 2022, in addition to the continuation of the 2051/G issuances, the 10-year 2032/G forint series was also regularly included in the auctions of the Government Debt Management Agency (hereinafter: ÁKK), and there were green bond issuances in all three former foreign currencies (EUR, JPY and CNY) targeting international investors. Most of the stock issued from 2020 to the end of 2022 was denominated in foreign currency (with more than half in euro), while forint issuances accounted for 20 per cent of the stock. (Chart 3.19). The share of green government bonds in total government securities holdings in Hungary was 3.8 per cent at the end of 2022, with only Ireland (4.55 per cent) and the Netherlands (4.14 per cent) achieving a higher share in Europe[79]. However, the share of Hungarian green government bonds is still much lower than the 15 per cent share of green bonds issued by domestic non-financial corporations in their total bond issuance.

Chart 3.19
Breakdown by currency of green bond issues by end-2022

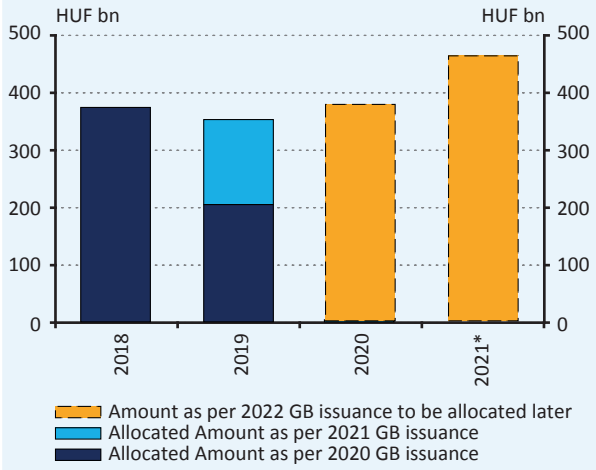


Source: Government Debt Management Agency (ÁKK), own calculation

The funds raised from the green bond issuance in 2020 and 2021 were mainly used to finance green expenditures incurred in 2018 and 2019. The budget can refinance the majority of 2020 expenditure and subsequent expenditure from green bond issuances in 2022 and thereafter. Under the Green Bond Framework, the funds raised from the issuance of Green Bonds can be allocated to green budget lines, so-called Eligible Green Expenditures, incurred in the current year and the previous two years, which have not been financed by other dedicated sources (e.g. EU subsidies). According to the Integrated Report 2021[80], almost all of the HUF 151 billion issued in 2021 (HUF 149 billion) refinanced the remaining Eligible Green Expenditure from 2019 not covered by the allocation of 2020 green bond issuance, and only HUF 2 billion was allocated to 2020 expenditure (Chart 3.20). According to our calculations, the unallocated amount of more than HUF 900 billion raised from the 2022 green bond issuance is expected to cover the planned HUF 838 billion of remaining Eligible Green Expenditure of 2020 and the total Eligible Green Expenditure of 2021, with an additional HUF 90 billion available for allocation for the 2022 expenditure.

[77] According to BIS data, the share of government securities in the outstanding stock of debt securities at the end of 2021 is 36 per cent (based on data for countries accounting for 52 per cent of global GDP)
[78] ÁKK (2020): Hungary Green Bond Framework
[79] Based on data from Bloomberg and calculated on the basis of data from the Government Debt Management Agency (ÁKK) for the Hungarian ratio
[80] Integrated Report on the Allocation and Environmental Impact of Hungary's Green Bond Proceeds, 2021

Chart 3.20
Allocation of proceeds from Green Bonds issued in 2020 and 2021 to Eligible Green Expenditures by the year incurred



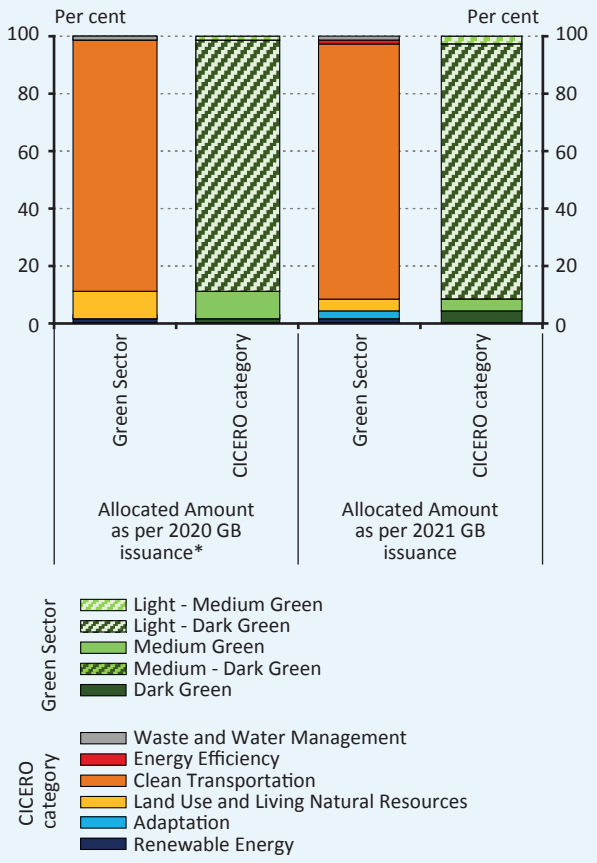
**plan*

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

89 per cent (HUF 136 billion) of the amount raised from green bond issuance in 2021 was allocated to expenditure on Clean Transportation. Based on the 2021 Integrated Report, similar to the 2020 allocation[81], also in 2021 green bonds refinanced mainly expenditure related to Clean Transportation among the six Green Sectors (Chart 3.21). Out of the HUF 136 billion allocated to this category, HUF 130 billion was allocated to rail transport, including to a larger extent the reimbursement of operating and personnel costs, and to a lesser extent to the modernisation, electrification of rail transport and the purchase of rolling stock. Another more than HUF 4 billion of the 2021 green issuance was allocated to the modernisation of urban public transport (Budapest and Pécs). In addition to Clean Transportation, the remainder of the processed were allocated to expenditure on Land Use and Living Natural Resources, Adaptation, Energy Efficiency, Renewable Energy, and Waste and Water management. Between 2019 and 2021, 445 kilotonnes of carbon dioxide equivalent greenhouse gas emissions was avoided through the funds raised from green bonds, which means avoiding 2.9 kilotonnes of emissions for every billion forints raised from green bonds. Out of the total avoided carbon dioxide equivalent greenhouse gas emissions, 286 kilotonnes were related to rail transport, which on average represents 12 per cent of the emissions avoided due to rail transport.

The 2021 Integrated Report has also been examined by CICERO, the green rating agency. According to its assessment, the Report is in line with the Green Bond Framework and international standards[82]. CICERO classified each project into three rating categories[83], but within the Green Sectors, individual projects could receive different ratings. As in the 2020 assessment[84], Clean Transportation projects, which accounted for the largest share, were mostly rated Medium and Dark Green, but there were also some projects with a Light Green rating. According to the 2021 assessment, projects related to Adaptation and Renewable Energy were rated Dark Green.

Chart 3.21
Allocation of 2020 and 2021 green bond issuance amounts and CICERO rating categories



**Dividing the Allocated Amount to 2019 Eligible Green Expenditures to Green Sectors by using ratios*

Source: Green Bond Allocation Report 2020; External Review of 2020 Green Bond Allocation Reporting; Integrated Report on the Allocation and Environmental Impact of Hungary's Green Bond Proceeds 2021; External Review of Integrated Green Bond Report 2021; own calculations.

[81] Green Bond Allocation Report 2020
[82] External Review of Integrated Green Bond Report 2021
[83] CICERO classifies projects reviewed into three rating categories based on their contribution to a low-carbon and climate-resilient future. Categories range from dark green to light green, with dark green being the strongest category.
[84] External Review of 2020 Green Bond Allocation Reporting

The greenium, or yield advantage, of European green government bonds is small but detectable, if there is a conventional bond with the same maturity. In a study by Bruegel in September 2022[85], the greenium of green bonds issued by EU Member States was determined by matching a green bond with a conventional bond from the same issuer, denominated in the same currency, and with the same maturity, and examining the difference in yields to maturity over a time series. In seven Member States (Austria, Belgium, Denmark, France the Netherlands, Germany, and Spain), green and conventional bonds with exactly the same maturity were found. For all 10 green bonds, the greenium was significant, with an average value across countries in a wide range between 3 (Denmark) and 16 basis points (Spain), i.e. they traded at yields that were that much lower. It should be noted that no clear trend in the evolution of greenium over time has been identified, but high volatility has been found in some countries. For those Member States where no conventional bond was issued with the same maturity as the green bond, a "synthetic" bond was constructed by interpolating the conventional yield curve and examining the yield spread against it. Using this less precise method, the calculated greeniums were not significant, including Hungarian green bonds.

3.2.3 Green mortgage bond issuances

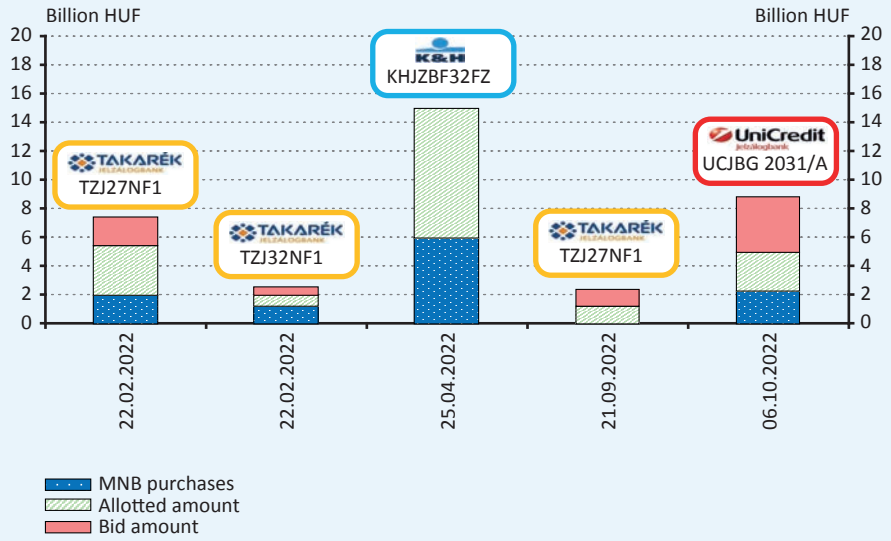
In recent years, green mortgage bonds have become an important element of the market for environmentally sustainable financial instruments both in Hungary and on the international markets. By issuing these securities, the mortgage banks undertake to hold green mortgages, i.e. mortgages covered by energy-efficient real estate, in the loan portfolio covering the mortgage bonds for the entire term of the bond, at least equal to the amount of funds raised by the issue. The higher quality collateral of mortgage bonds means a safer form of investment for bondholders, which is also in line with growing social and economic policy expectations for environmental sustainability. Higher demand for securities could encourage banks to prioritise green mortgages, which could translate into lower credit risks for these loans and could result in a reduction of loan interest rates through the more favourable refinancing rates.

The MNB supported the laying of the foundations for the domestic green mortgage bond market through a targeted monetary policy instrument. The MNB launched the Green Mortgage Bond Purchase Programme in August 2021 with the aim of promoting the emergence of a domestic green mortgage bond market and thereby supporting the uptake of energy-efficiency-focused mortgage lending practices. The instrument was developed in the framework of the Bank's Green Monetary Policy Toolkit Strategy, which was announced by the MNB following the decision of the Monetary Council on 6 July 2021. The published strategy document (Sustainability and central bank policy – Green aspects of the Magyar Nemzeti Bank's monetary policy toolkit) is a framework for the long-term operation of the green monetary policy instruments of the MNB, which shows how environmental sustainability can be reflected in the MNB's monetary policy instruments.

Under the Green Mortgage Bond Purchase Programme, the MNB purchased mortgage bonds that comply with the two most commonly used international green bond standards. The MNB also required that compliance with the standards must be verified by an external, independent party authorised and approved by the MNB prior to issuance, and that a post-issuance report on the main characteristics of the bond and its environmental impact be published annually. Under the Green Mortgage Bond Purchase Programme – following five issuances in total of HUF 133.6 billion in 2021 – three primary market issuances totalling HUF 22.4 billion took place by the end of April 2022. In the three auctions (up until 25 April 2022), the MNB's purchases amounted to HUF 9.2 billion, while securities worth an additional HUF 1.2 billion were purchased on the secondary market (Chart 3.22). This increased the total amount purchased by the central bank since the start of the programme to HUF 61 billion.

[85] Bruegel: Greeniums in Sovereign Bond Markets

Chart 3.22
Green mortgage bond issues and central bank purchases (2022)



Source: MNB

In line with the MNB's change in monetary policy stance, the Green Mortgage Bond Purchase Programme was suspended in spring 2022. The objectives set have been achieved through the programme, while the other instruments of the central bank continue to support the development of the green mortgage bond market. At the Monetary Council meeting on 5 April 2022, the Green Mortgage Bond Purchase Programme was reviewed. According to the MNB's assessment, the central bank instrument has successfully met its initial objectives and laid the foundations for a new market segment. Under the programme, all five Hungarian mortgage banks successfully entered the green bond market, with total issuance reaching HUF 156 billion. At the same time, and taking into account current monetary policy considerations, the Monetary Council decided to suspend the programme, with the exception of the issuances already under way. Thereafter, in line with the monetary policy stance, the MNB only provided the Mortgage Bond Rollover Facility for market participants, which allowed for the partial renewal of maturing mortgage bonds. The aim of the renewal facility is to ensure the stability of the mortgage bond market by allowing the central bank to make purchases up to 50 per cent of the amount of mortgage bonds it holds that mature within six months. The uptake of green mortgage bonds and the development of market transparency is also supported by the preferential treatment of green liabilities provided by the Mortgage Funding Adequacy Ratio (MFAR), the central bank's collateral management practices and a transparency report supplemented by green aspects.

In 2022, issuance continued even after the central bank's purchase programme. Following the suspension of the Green Mortgage Bond Purchase Programme, mortgage banks issued a total of HUF 6.2 billion of green mortgage bonds in three auctions, raising the nominal value of green mortgage bonds to over HUF 162 billion. In one of the three auctions, the MNB submitted bids under the Mortgage Bond Renewal Facility for a nominal amount of HUF 2.3 billion. Taking into account mortgage bonds without a green rating, the share of green mortgage bonds in the entire Hungarian market rose to 8 per cent.

According to impact assessment reports by four mortgage banks, refinancing green mortgages has avoided the emission of around 28,000 tonnes of carbon dioxide. Mortgage banks that issued green mortgage bonds during 2021 have published their impact reports for the first time. The quantification of positive environmental impacts is based on similar, but not always identical principles in the published documents. To do this, issuers first estimate the energy demand of the properties underlying the refinanced green mortgages, which can be done using available data on own loan portfolios or by applying the minimum threshold for the energy performance of the properties set by the green bond standard. The basis for the energy savings achieved is the difference between the energy demand of the green properties and the reference portfolio chosen. The latter can be the estimated energy demand of the total loan portfolio refinanced by the mortgage bank or the average energy demand of the national real estate portfolio.

Based on the four reports available, refinancing green mortgages has avoided around 28,000 tonnes of carbon dioxide emissions on an annual basis. The mortgage banks relied on their own capacities, external consultants and the guidelines of the applicable green bond standard to prepare the reports and related calculations. One of the tasks for the next period will be the methodological alignment of impact reports, which will also require the consolidation of market practices based on a common basis.

3.2.4 Equity market and stock exchange

Unlike loans and bonds, shares are considered green if the core business of the company is environmentally sustainable. Most often, shares of companies operating in certain green industries (e.g., "cleantech") and shares of issuers included in some kind of sustainability stock index are considered green shares. However, it is important to underline that there is no universally accepted definition of greenness. There are many different assessments and methodologies used to evaluate companies. In addition, most of the time they do not provide a binary assessment of whether a company is green or not, but typically use a scale to assess performance.

The Budapest Stock Exchange (BSE) is committed to promoting sustainable goals. BSE has been a member of the international Sustainable Stock Exchanges (SSE) initiative since 2019. Sustainable Stock Exchanges has more than 130 members worldwide, including the world's largest stock exchanges such as the New York Stock Exchange and the London Stock Exchange.[86]

A key focus at BSE is on strengthening the sustainability information and the information flow. In spring 2021, BSE published its ESG Reporting Guidelines[87]. The aim of the Guidelines is to help issuers listed on BSE to gain a basic understanding of the ESG approach, the importance of ESG reporting, the key terms, actors and processes, and the way forward to a sound and balanced reporting regime. In the Guidelines, the BSE makes recommendations on the content, format and frequency of the reports and gives advice on the use of international standards. BSE divided its recommendations into entry, intermediate and advanced levels. The way forward in this area is to promote ESG certification of issuers.

In recent years, several green bonds have been listed on the Budapest Stock Exchange. In 2020, the first domestic green bond was issued and the domestic green capital market has been dominated by bonds ever since. The majority of green bonds were listed on the BSE, as both the Bond Funding for Growth Programme and the Green Mortgage Bond Purchase Programme of the Magyar Nemzeti Bank required participating companies to list their securities on the stock exchange.

Due to the increasing demand, Hungarian sustainability indices and ETFs may also be introduced in the future. ETFs, or Exchange Traded Funds, have become increasingly popular around the world in recent years, partly because they offer diversification even with smaller investments. ETFs can track many different instruments, such as futures, indices or entire industries. As sustainability has come into focus in recent years, many ESG, climate, thematic and similar indices and ETFs tracking their performance have appeared on the global market. Although such indices and ETFs do not yet exist in the Hungarian market, given the global demand, a sustainability or ESG-themed Hungarian index and ETFs might be created in the future. However, it is important to mention that ETFs tracking non-Hungarian ESG indices are already available on the BSE market, such as the MSCI USA Socially Responsible UCITS ETF (USD).

3.2.5 Investment funds, closed-end venture capital and private equity funds

Globally, ESG and sustainable mutual funds continue to show a strong growth, but their relative share has changed significantly. Almost two years have passed since the implementation of the EU's regulation on sustainability-related disclosures in the financial services sector (SFDR) [88], which covers also green investment funds, but the commitment of investment funds to sustainability has undergone a significant transformation. The Green Finance Report 2022 reported that the EU Regulation on sustainability disclosure has solved the problem of identifying and typifying investment funds. This means that European investment funds can be understood within three broad (but not strict) frameworks, as a reminder:

1) traditional investment funds that do not have a sustainability objective

[86] https://sseinitiative.org/members/
[87] https://www.bet.hu/Kibocsatok/Ajanlasok-kibocsatoknak/bet-esg-/esg-guide
[88] Az Európai Parlament és a Tanács (EU) 2019/2088 rendelete (2019. november 27.) a pénzügyi szolgáltatási ágazatban a fenntarthatósággal kapcsolatos közzétételekről https://eur-lex.europa.eu/legal-content/HU/TXT/?uri=CELEX%3A02019R2088-20200712

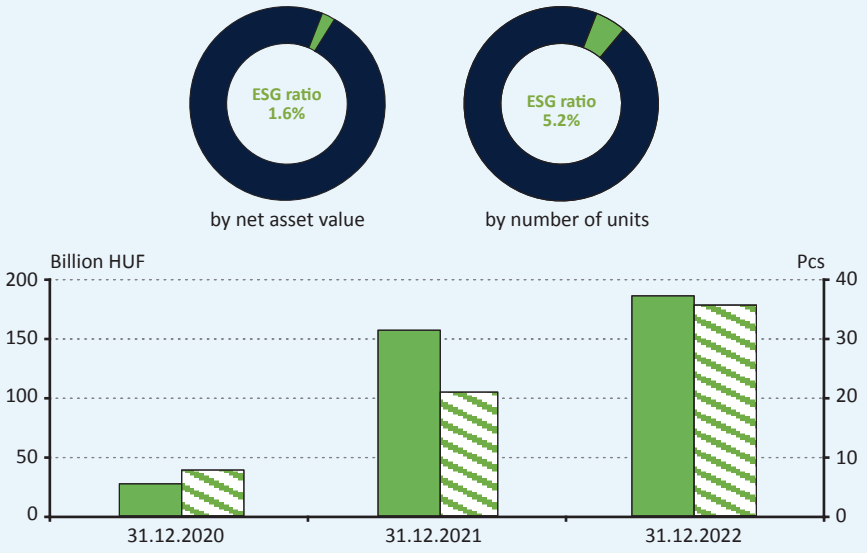
2) ESG investment funds that aim to promote environmental and social characteristics (“light green”)

3) sustainable investment funds that contribute to a social or environmental objective (“dark green”).

In the EU, the share of investment funds with a sustainability objective increased by 7.3 per cent compared to the previous period. Overall, the net asset value of these funds increased to EUR 4,600 billion. However, as indicated at the beginning of this chapter, the share of ESG and sustainable funds has changed significantly. According to an analysis by Morningstar (2023)[89], 307 investment funds, also referred to as “dark green”, were reclassified to “light green” in the last quarter of 2022, resulting in a “transfer” of EUR 175 billion of assets, meaning that 40 per cent of “dark green” funds have moved away from a stronger commitment to sustainability. Clearly, the background to the problem is the next section of the legislation mentioned above. The SFDR is a multi-level disclosure regulation, the next level of which sets additional requirements for the disclosure of information by investment funds (see in more detail in chapter 4.3). The new requirements will require financial market participants to disclose more rigorous but much clearer information, which could help reduce the risk of greenwashing. In other words, the current trend is not necessarily a problem, as the reallocation of financial products caused by the second level of regulation can be seen as a sort of sorting out, creating a clearer picture of the sustainability of investment funds. At the same time, it is important to note that the rigour of the new requirements, combined with a lack of raw data, can be a barrier, even if the commitment from the institutions is given. The latter may be addressed by the pace of further regulatory development in the coming years, but there may also be a strong focus on data providers in the market sector.

In international comparison, the share of ESG investment funds in Hungary remains low. The aggregate net asset value of these funds represents 1.6 per cent of the total market (HUF 11,431 billion), with a slight decrease compared to the previous year. A moderate but steady increase is shown by the fact that, compared to 2021, the amount of assets managed in domestic ESG fund portfolios rose from HUF 158 billion to HUF 188 billion by the end of 2022. Overall, however, the growth in the net asset value of ESG funds has not kept pace with the growth in assets managed by investment funds. One reason for this may be that domestic ESG investment funds are still considered a new product, so it takes time for investors to find this type of investment, that is, to enter a mature stage. In terms of the number of funds, however, the growth is visible: out of around 700 domestic investment funds, 36 now take ESG aspects into account, representing 5.2 per cent. The increase in the stock is thus dynamic, and the increase in asset value is expected to follow with a time lag (Chart 3.23).

Chart 3.23
Share of domestic ESG funds by net asset value and by number of units



Note: The columns on the left take the values of the left axis, while the columns on the right take the values of the right axis.
Source: MNB

[89] SFDR Article 8 and Article 9 Funds: Q4 2022 in Review, 2023 https://www.morningstar.com/en-uk/lp/sfdr-article8-article9

Another milestone was the launch in autumn 2022 of the first sustainable investment fund in Hungary to go beyond the ESG approach. A detailed description of the sustainability strategies most commonly used by ESG funds traded in Hungary is provided in the Green Financial Report 2022[90]. However, funds engaged in sustainable investing often use thematic and impact investing. The former means investing in companies whose activities cover a specific area of sustainable development (e.g. entities carrying out various activities related to sustainable water management), while the latter can be understood as investments in companies that have a positive impact on the environment and society through their activities (e.g. increasing renewable energy). These strategies can, of course, be complemented – in Hungary they are typically complemented – by additional investment policies (e.g. exclusion policies), which can provide further assurance on the sustainability of the fund. The main difference, however, is that while "light green" funds can make sustainable investments, although they do not aim to do so, dark green funds can only make sustainable investments.

There were no major changes in the market for sustainable closed-end venture capital and private equity funds compared to the previous period. In Hungary, venture capital funds that aim to provide capital to national start-ups or growing companies that typically apply a business model based on environmental sustainability and a circular economy, typically in the field of water management, waste management and circular production technologies and renewable energy, can be identified as green. According to the statistical reports of the Hungarian Venture Capital and Private Equity Association, the amount of new investments in the Energy and Environment sector in 2022 by venture capital and private equity funds (already launched or preparing to launch) was HUF 275 million[91].

Box 6
MNB Green Financial Product Finder

The European Union is making more and more ambitious commitments in the fight against climate change and biodiversity loss. The transition to a climate-neutral economy will also require significant private investment. Consequently, the spread and widespread use of sustainable, green financial products by the general public is necessary, contributing to the fight against climate change and to sustainable economic growth. To support these efforts and promote financial and sustainability education of the general public, the MNB plans to launch a Green Financial Product Finder platform in spring 2023. The primary focus of the Product Finder is on investment products, green investment funds, green asset funds underlying life insurance policies and green voluntary pension fund products. In the next phase of development, the range of green products could be further expanded. With the development of this platform, the MNB supports transparency, comparability, public awareness and, through this, product innovation.

The green definition is based on the EU SFDR Regulation, which is applicable from March 2021. The Regulation sets out the obligation for financial service providers to provide information on the environmental and social impacts of their investments. The product finder includes products with an ESG approach (Article 8 SFDR) and products targeting sustainability (Article 9 SFDR) under the Regulation, the share of which is expected to increase further as the market develops. However, compared to other EU countries, Hungary is lagging behind in terms of both penetration and awareness of these products. With the creation of the website, the MNB will provide a single place to collect and compare credible, reliable and user-friendly information on domestic green financial products available to the public, as well as to access information on green finance and increase demand for green financial products. For financial institutions, being on the platform also has marketing benefits, as they have the opportunity to attract new clients, the actual sales process can take place on the institutions' websites and in their branches, while they act as partners in the transfer of green financial knowledge.

[90] Zöld pénzügyi jelentés, 2022 https://www.mnb.hu/letoltes/zold-penzugyi-jelentes-2022.pdf
[91] Magyar Kockázati és Magántőke Egyesület, Statisztikák, 2022 https://www.hvca.hu/statisztikak/

In each of the three product categories, in addition to the basic information, financial and sustainability information for the product category will also be displayed on the website. Financial information includes, for example, risk-return ratios, recommended investment time horizon, retrospective returns, total cost indicators. Sustainability information such as the "light green" or "dark green" nature of the product, different sustainability investment strategies, proportion of investments promoting sustainable, non-sustainable and environmental/social characteristics, proportion of planned and actual compliance with EU Taxonomy, investments representing the largest proportion of the financial product's investments, information on the consideration of the principal adverse impacts of investment decisions on sustainability factors. Sustainability information will also include a graphical illustration of the facts and targets of the sustainability performance indicators (KPIs) targeted by the financial product, as well as links to detailed information documents on the products.

The website will also include a list of financial institutions, the conditions and benefits of registering for the Product Finder and other relevant information, as well as a FAQ section.

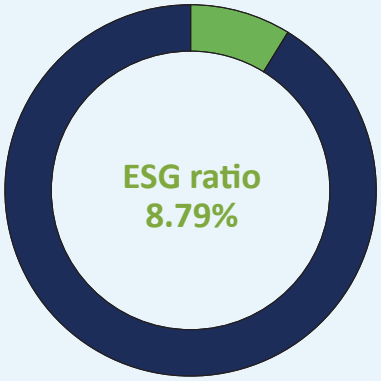
3.2.6 Unit-linked insurance and fund portfolios

The rise of green asset funds is also evident in the insurance industry. In Hungary, the popularity of unit-linked life insurance policies is uninterrupted. For these products, clients have the possibility to choose the asset fund that suits them best, thereby expressing their sustainability preferences. At this point, it is up to insurers to meet these needs by offering their clients a sufficiently broad sustainability spectrum.

The SFDR regulation, which entered into force in March 2021, helps to define the extent to which investment products are sustainable. This allows investors to distinguish between companies that only aim to promote environmental and/or social characteristics (Article 8 of the SFDR) and those that have committed to making an actual contribution to a specific sustainability objective (Article 9 of the SFDR).[92]

The number of asset funds that were considered sustainable according to the SFDR classification in the Hungarian insurance market in 2022 Q4 was 73. This represents an increase of 23.7 per cent in one year. However, beyond the number of units, the net asset value of these assets is even more informative, which was HUF 132 billion, below the HUF 136 billion recorded last year. Given that the number of asset funds has not fallen, indeed has increased significantly, the fall is due to a nominal fall in asset value. Over the past year, it has not been possible to achieve outstanding returns in equity markets, which is equally true for sustainable and traditional assets. Nothing shows this better than the fact that, although the aggregate net asset value has decreased for sustainable asset funds, the ESG ratio within total unit-linked asset funds has increased, albeit only minimally. The share of SFDR Article 8 and 9 funds reached 8.79 per cent, an increase of 0.13 percentage points compared to 2021 Q4 (Chart 3.24). Overall, there was no significant growth in ESG asset funds in the insurance market in 2022, in contrast to 2021.

Chart 3.24
Share of domestic green asset funds by net asset value in 2022



Source: MNB

No breakthrough took place in the pension fund market either. Similar to last year, there is still only one portfolio that can be considered an ESG fund, with a net asset value of almost HUF 7.4 billion. The increase in asset value has had a positive impact on the ratio of assets to total assets (4.55 per cent, 3.4 per cent at the end of 2021) of the given fund, but the ratio to the total pension fund portfolio is negligible, at just 0.4 per cent.

[92] hsz-21-4-t4-deak-toros-barczel-holczinger-szebeledi.pdf (mnb.hu)

4 Domestic regulations and expected changes

With the expansion of the types and volumes of sustainable financial instruments, the need for a transparent and comprehensive regulatory regime for both investors and issuers has emerged. The regulatory framework issued in previous years provided a good starting point, but its expansion was inevitable as new issues requiring clarification or addition arose during its application. For this reason, international organisations have an important role to play in the sustainability transition in a number of ways. On the one hand, by virtue of their legislative nature, they can enforce the rules they want and oblige market participants to comply with them. They can also make recommendations that, while not legally binding but rather examples to follow, provide guidance and act as a map through the maze of sustainability. Last but not least, they produce analyses and publications to support institutional actors in better and deeper understanding.

The Magyar Nemzeti Bank has a strong commitment to sustainability, and in 2021 the National Assembly granted the central bank a green mandate, under which the MNB supports the government's policy on environmental sustainability. The Magyar Nemzeti Bank also supports institutional actors in understanding and applying the legislation, facilitating their work through brochures, publications and even consultation opportunities.

4.1 DEVELOPMENT OF INTERNATIONAL ORGANISATIONS

The European Central Bank has deepened its climate commitment to the transition to a carbon-neutral economy with new measures in 2022. In this context, the Governing Council of the ECB introduced climate-related disclosure requirements in its corporate bond portfolio and collateral framework in October 2022. The ECB aims to reduce the environmental impact of its bond holdings by increasing the proportion of bonds issued by companies with better climate performance in its portfolio and reducing the proportion of assets issued by companies with poorer climate performance.[93] According to the ECB, the first report on the carbon neutralisation of its bond holdings will be published in 2023 Q1. Through these measures, the ECB limits the proportion of assets issued by polluting firms and used as collateral for borrowing from the euro area. For collateral disclosure, it only accepts marketable assets from companies and borrowers that comply with the Corporate Sustainability Reporting Directive (CSRD).[94] Other international examples of central bank measures related to sustainability are shown in Table 4.1.

Membership of the Network for Greening the Financial System (NGFS), established in 2017, continued to grow in 2022: In February 2023[95], having already 121 members and 19 observers,[96] perfectly reflects the commitment of central banks and regulatory authorities to sustainability.

The NGFS published its objectives for the period 2022–2024 in May 2022. The plans include, inter alia, (1) supervisory practices for taking climate risks into account; (2) planning and analysis of climate scenarios; (3) the impacts of climate change on monetary policy; (4) support for the transition to a carbon-free economy and (5) nature-related financial risks and training.[97] Last year, the network contributed to a better understanding and management of climate change and the associated data gaps, as well as climate risks, through a series of publications. It has also developed climate change scenarios for central banks and supervisory authorities and published a paper on the relationship between central bank operations, in particular lending, and climate change.[98]

In February 2023, the NGFS published on its website an online questionnaire accessible to all. The aim is to improve

[93] ECB takes further steps to incorporate climate change into its monetary policy operations (europa.eu) and Letter from the ECB President to Irene Tinagli, ECON Chair, on progress on climate-related action plan (europa.eu)
[94] In the first stage, the ECB will only apply the collateral constraint to debt instruments issued by non-financial corporations. However, it is planned to include additional asset classes under the limit system in the future. The measure is expected to enter into force before the end of 2024.
[95] As at 18 February 2023.
[96] Membership | Banque de France (ngfs.net)
[97] NGFS publishes its 2022-2024 work program | Banque de France
[98] NGFS publications | Banque de France

climate scenarios, to explore the views of organisations using these scenarios and to broaden the feedback loop.[99]

In 2022, the Financial Stability Board continued to play a key role in examining the impact of climate risks on financial stability. The TCFD Working Group, set up by the organisation in 2015, published its TCFD Status Report in October 2022, which shows that the proportion of companies disclosing information on climate change and climate risks has steadily increased, but that further action is needed to increase transparency. According to the report, in the financial year 2021, 80 per cent of companies disclosed their climate risks along at least one of the 11 TCFD recommendations; only 4 per cent of companies reported on all recommendations. The October 2022 report also revealed that the proportion of disclosures has increased in all regions over the past three years. Europe continues to lead the way with 60 per cent, while the Asia Pacific region accounts for 36 per cent and North America for 29 per cent.[100]

The Financial Stability Board published two reports in the autumn to support its analysis of climate risks: the *"Final report on supervisory and regulatory approaches to climate-related risks"* helps supervisory and regulatory authorities to develop approaches to monitor, manage and mitigate inter-sectoral and systemic risks from climate change; and the *"Progress report on climate-related disclosures"* reviews disclosure practices over the past year.[101]

As a leading multilateral financial institution, the International Monetary Fund (IMF) aims to contribute to reducing emissions by publishing a range of guidelines and technical papers (such as setting a minimum level of international carbon tax for the most polluting companies[102]), to increasing the resilience of the financial sector to climate risks and to the transition to a carbon neutral economy. In line with this, in 2022 the IMF published new guidelines for national governments on greening Public Financial Management (PFM) practices.[103]

In autumn 2022, IMF Managing Director Kristalina Georgieva announced the launch of the first long-term financial fund for climate protection, the Resilience and Sustainability Trust (RST). The fund will invest more than USD 45 billion to increase resilience to climate shocks and promote sustainable growth in low-income countries most affected by climatic shocks.[104] The RST complements the IMF's existing lending instruments by providing long-term, affordable financing to address environmental challenges.[105]

The OECD's most significant climate change initiative was the establishment of the Inclusive Forum on Carbon Mitigation Approaches (IFCMA). In addition, as in recent years, it has supported global action and thinking on climate protection through a series of publications and events throughout 2022. The main objective of the programme is to optimise global efforts to reduce emissions through data and knowledge sharing. The Forum provides a unique opportunity for representatives from both developed and developing countries to discuss and harmonise national climate policies for more effective global emissions reduction.[106]

Finance Initiative of UN Environment Programme (UNEP FI[107]) has seen an active year. Its membership has now grown to 450 members, and it continued to support sustainable finance initiatives and work with financial sector actors in a number of areas during 2022. In 2022, UNEP FI also helped financial sector actors address climate risks through the Task Force on Climate-Related Financial Disclosures (TCFD) Programme, which 38 banks joined last year. The programme encouraged institutions to map and disclose their climate risks through various frameworks and guidelines.[108] In addition, UNEP FI and the European Banking Federation have published a report to assist in the application of the EU taxonomy in practice.[109] It also established a banking working group to support members' transition to a circular economy.

[99] NGFS seeks public feedback on climate scenarios | Banque de France
[100] 2022 TCFD Status Report: Task Force on Climate-related Financial Disclosures – Financial Stability Board (fsb.org)
[101] FSB publishes recommendations for supervisory and regulatory approaches to climate-related risks and calls for continued progress on disclosures – Financial Stability Board
[102] Proposal for an International Carbon Price Floor Among Large Emitters (imf.org)
[103] New IMF Guidance on Green PFM
[104] IMF Managing Director Kristalina Georgieva Announces Operationalization of the Resilience and Sustainability Trust (RST) to Help Vulnerable Countries Meet Long-Term Challenges
[105] Getting Back on Track to Net Zero: Three Critical Priorities for COP27 (imf.org) and A New Trust to Help Countries Build Resilience and Sustainability (imf.org)
[106] New OECD Forum to help optimise global emissions reductions through data sharing, mutual learning and dialogue – OECD and OECD Secretary-General Report to G20 Leaders on the Establishment of the Inclusive Forum on Carbon Mitigation Approaches, Indonesia, November 2022
[107] 2022: a year of milestones on the road to implementing sustainable finance – United Nations Environment – Finance Initiative (unepfi.org)
[108] TCFD – Task Force on Climate-related Financial Disclosures – United Nations Environment – Finance Initiative (unepfi.org)
[109] Practical approaches to applying the EU Taxonomy to bank lending – United Nations Environment – Finance Initiative (unepfi.org)

Since its adoption in 2019, 316 banks from 80 countries have signed the UN Principles for Responsible Banking (PRB). These institutions hold approximately 49 per cent of the world's total banking assets, amounting to USD 89.5 trillion.[110] To support this initiative, UNEP FI launched in October 2022 an online interactive training programme called PRB Academy, aimed at training banking sector actors and assisting them in the practical application of responsible banking principles.

The number of the members in the Net-Zero Banking Alliance (NZBA), an alliance supporting the carbon-neutral transition, also grew significantly last year. Established in 2021, the NZBA has tripled in just one year and now has 125 members, holding 41 per cent of the world's banking assets (USD 73 trillion).[111]

Box 7
Sustainability support measures of the People's Bank of China (PBoC)

China, like many countries around the world, has set itself the goal of greening the financial system and the transition to carbon neutrality, in which the Chinese central bank has played a leading role in recent years. The PBoC's sustainable initiatives are grouped around five pillars: (1) the development of green financial standards; (2) green financial disclosure and supervision; (3) the development of various incentive policies; (4) the launch of green financial products and the promotion of markets; and (5) the promotion of international cooperation on green issues. While most central banks have focused primarily on mapping climate risks, managing these risks and pushing for disclosures in the recent past, the PBoC has used lending as a key instrument in decarbonisation efforts. In November 2021, the PBoC launched the Carbon Emissions Reduction Facility (CERF), a refinancing programme that allows banks to refinance 60 per cent of their borrowed capital from the PBoC at an interest rate of 1.75 per cent.[112] The Facility supports mainly projects related to clean energy, energy saving and environmental protection.[113] By July 2022, the central bank had already provided more than USD 31 billion in loans to banks, which is estimated to have reduced carbon emissions by around 60 million tonnes, or 0.6 per cent of total Chinese emissions.[114] The PBoC announced in the summer of 2022 that it will allow two foreign banks (Deutsche Bank and Société Generale) to participate in the CERF. The central bank's move also shows that China treats both domestic and international institutions as equal partners, and that it envisages a green transition truly through international cooperation.[115] Given the success of CERF, it was announced in January 2023 that the Facility will continue to operate until the end of 2024.[116]

The PBoC also conducted a climate stress test in the second half of 2021, the results of which were published in February 2022. Twenty-one commercial banks and two development banks were included in the study and the impact of costs associated with carbon emissions on asset quality and capital adequacy was examined. The results revealed that if companies active in the thermal energy, steel and cement sectors do not make the necessary efforts to transition to low-carbon operations, their ability to repay could be significantly reduced.[117]

The PBoC also introduced a measure in the summer of 2021 called the Green Finance Evaluation Plan, which entered into force in July 2021. The primary objective of the measure is to assess 24 major Chinese banks, including state-owned banks, on the basis of their green bond holdings. The People's Bank of China has been monitoring the green financing of institutions since 2018, but so far only loans have been subject to the measure.[118] According to Climate Bonds, China issued the most green bonds in the first half of 2022, with USD 48.2 billion, accounting for 22 per cent of total global green bond issuance. China was followed by Germany with USD 28 billion.[119]

[110] Signatories – United Nations Environment – Finance Initiative (unepfi.org)
[111] Members – United Nations Environment – Finance Initiative (unepfi.org)
[112] China's central bank is leading the way with bold green finance policies | IEEFA
[113] For PBoC's new green lending tool, transparency and verification are key – Green Central Banking
[114] PBoC has delivered US$31bn in green finance support, says governor – Green Central Banking
[115] Two Foreign Banks Added to the List of Financial Institutions Eligible for CERF (pbc.gov.cn)
[116] China Central Bank Extends Use of Tools to Promote Green Lending – Bloomberg
[117] PBoC warns of defaults following climate stress test – Green Central Banking
[118] PBoC to grade financial institutions on green bonds – Green Central Banking
[119] Green bonds up 25% in 2nd quarter after volatile start to 2022 | Climate Bonds Initiative

Table 4.1
Examples of the main sustainability-related actions of central banks from 2022, based on specific criteri[a120]

Central bank	Macro- and micro-prudential system	Sustainability components in the central bank portfolio	Conference	Stress tests121	Publication	Establishing an organisational unit / working group	Disclosure/ TCFD	ESG
Austria			*Conference on financing the green transition*	Yes	Report on Financial Stability			
Belgium		Reducing the carbon footprint		Yes	*Financial impact of the green transition*; *Sustainable Finance*	Climate risk hub		*ESG considerations in the portfolio*
Brazil	Climate change risks			Yes	*Report on Financial Stability*		Quantitative reporting by banks	
China	Refinancing Programme CERF	Green Bond Projects Catalogue		*Yes*			Climate risk disclosure	
Croatia	Questionnaire survey on climate risks	Climate strategy plan	*Risk management workshop*		In the Report on Financial Stability			Joined the NGFS
Denmark	*Climate exposure management in the banking sector*		Disclosure of climate issues		*Green assets*; *Greening the housing market*			
ECB	*Manage risks from climate change*	*Disclosure requirements*	ECB/ESRB joint conference	*Yes*	*ECB publications*; *Climate-related indicators*	ECB climate change centre		
England	Manual for climate risk management	Greening the corporate bond purchase scheme	*Climate conference*	*Yes*	CBPS greeningClimate change		*3. TCFD report*	
Estonia		Sustainable principles				Climate Change Coordination Hub	TCFD report	Counselling
France	*Assessment of risks to the French financial system*	*Sustainable investment Joining the UN Principles for Responsible Investment (PRI) Initiative*	*Climate change conferences*		*Climate change publication*	*Climate change centre*	*Joining the CDP*	

[120] The list is not exhaustive, some of the priority actions are listed. Compared to last year's Green Financial Report, the new content is in italics.
[121] Reported stress tests are also included in the list.

Table 4.1
Examples of the main sustainability-related actions of central banks from 2022, based on specific criteri[a120]

Central bank	Macro- and micro-prudential system	Sustainability components in the central bank portfolio	Conference	Stress tests121	Publication	Establishing an organisational unit / working group	Disclosure/ TCFD	ESG
Greece			Climate change conference		Economic Bulletin (Issue 55)	Sustainability Centre		
Hungary	Recommendation	Green bond-portfolio	Green finance conference	Yes	Green finance report	Directorate for Sustainable Finance	TCFD report	
Ireland	Consultation	Associated with the BIS green bond investment fund	Climate Forum		Sustainable finance and the asset management sector	Organisational unit		Circular
Italy		Sustainable investments	Workshop		Sustainable investments	Climate Change Hub and Climate Committee		Investigating regulation
Japan	Loan Scheme	Developing a climate strategy		Yes	Physical risks	Climate Change Coordination Hub	TCFD report	Questionnaire
Korea		Negative screening: system	Annual Conference		Climate change report	Climate Change Response Task Force		ESG focus in the portfolio
Latvia	Roadmap for a sustainable financial sector	Sustainable strategy	Sustainability and money	Yes	Report on Financial Stability			
Lithuania	Green strategy 2023–2025	Sustainable investment principles	Green Conference		Financial risk assessment	Climate change centre	CO2 Footprint Report	
Luxembourg		Sustainable Corporate strategy			Long-term sustainability	Green Commission	Portfolio climate risks	
Malaysia	Climate data catalog		Climate change conference	Yes	Climate Risk Analysis	Joint Committee on Climate Change (JC3)	TCFD application guide	
Mexico			CEMLA-UNEP FI Climate change conference	Yes	Climate and environmental risks and opportunities	Organisational unit within the central bank	TCFD Consortium	

Table 4.1
Examples of the main sustainability-related actions of central banks from 2022, based on specific criteri[a120]

Central bank	Macro- and micro-prudential system	Sustainability components in the central bank portfolio	Conference	Stress tests121	Publication	Establishing an organisational unit / working group	Disclosure/ TCFD	ESG
Netherlands	*Guide to managing climate and environmental risks*	Sustainable Finance Strategy 2021-2025	*Biodiversity Conference*		*Monetizing the environmental externalities*; *Sustainable lending*; *The carbon footprint of bitcoin*	Sustainable Finance Office	*Harmonisation of disclosure*	
Portugal		Associated with the BIS green bond investment fund	*Webinar*		Sustainability Report			*Publication*
Russia	Easing the capital requirement	Climate strategy		Yes	*Climate risks*	Sustainability Working Group		*ESG recommendation* and *rating*
Singapore	*„Transformation Map 2025"*	Green Investments Programme (GIP)	*TFNZ Conference*	Yes	*Sustainability and Financial reports*	*Sustainable group*	*Climate reporting*	*ESG Impact Hub* and *ESGenome*
Spain	Supervisory requirements	Associated with the BIS green bond investment fund			Climate change monitoring	Working Group		
Sweden		*Carbon footprint consideration*	*Climate change conference*	*Yes*	*Climate change report*			
United Arab Emirates	*Sustainable Finance Statement*	Sustainability aspects in the portfolio		*Yes*	Annual Report	Sustainable Finance Working Group		ESG supervision
United States	*Climate Change in a Micro- and Macroprudential Context*		*Climate change and Macroeconomics*; *Environmental Economics and policy*	*Yes*	*Climate-related Financial Risks*; *Climate Change and Adaptation in Global Supply-Chain Network*	*Committee on Climate Risk*		*Risk management proposal*

Source: own edit based on information from central banks and international organisations

4.2 NGFS RECOMMENDATIONS AND RELATED MEASURES BY THE MNB

The MNB's actions are in line with the recommendations of the NGFS, one of the main international organisations promoting the greening of central banks. International best practice in the area of green financial regulation can be found in the proposals and recommendations of the NGFS's call for action[122] to green the financial system (already explained in section 4.1). When introducing its measures, the MNB has tailored its programmes to take these into account, and the MNB measures corresponding to the recommendations are shown in the Table 4.2.

Over the past year, the MNB has used short-term exercises to gain a more detailed picture of the climate risks of supervised credit institutions. In addition to the already published long-term climate risk exercise, the MNB's set of supervisory instruments has been extended with a short-term methodology capable of modelling the entire balance sheet of institutions. This allows the risks and their capital implications arising from the transition to be monitored at the institutional level. In order to make this knowledge as widely available as possible, details of the methodology have been also

Table 4.2
NGFS proposals for action and related MNB measures

#	Proposal	MNB measures
1	Integrating climate change-related risks into macro- and micro-prudential supervision	Conducting a long-term climate stress test for the domestic banking sector
		Climate risk stress test of insurers' assets
		Update of the MNB Guide on climate-related and environmental risks, setting specific deadlines for credit institutions to meet supervisory expectations
		Analysis of climate risk preparedness in the insurance sector
		Conducting an analysis of the entire Hungarian banking sector in the context of compliance with the MNB Guide on climate-related and environmental risks
		Conducting an analysis based on a comparison of banks' exposures to transition risks and individual preparedness levels
		Extension of the preferential green capital requirement programme
2	Integrating sustainability elements into the management of the central bank's own portfolios	Construction of a dedicated green portfolio
3	Overcoming data gaps	Expecting the reporting of green data as part of green preferential capital requirement programmes.
4	Developing awareness and relevant knowledge and encouraging technical assistance and knowledge sharing	Publication of the methodology for long- and short-term climate stress tests
		Supporting signature of the UN Principles for Responsible Banking
		Continuation of university education and research programs, banking and capital market courses
		Publication of a green financial reports, articles and studies
		Organisation of international green conference
		As part of the MNB Guide on climate-related and environmental risks, preparation of a collection of resources on data and methodologies for Hungarian credit institutions.
5	Achieving sound disclosures on climate change-related and environmental risks that are in line with the international approach	Publication of the MNB's climate-related financial disclosure (TCFD report)
		Issuance of the MNB Guide on climate-related and environmental risks with a chapter formulating disclosure requirements
		Supporting disclosure obligations under the SFDR by means of a management circular
6	Supporting the development of a taxonomy	Simplified application of EU green taxonomy under preferential capital requirement programmes

[122] NGFS (2019): A call for action Climate change as a source of financial risk

published[123] – among many other relevant green finance studies – in the December 2022 issue of the Financial and Economic Review. Thus, overall, the analysis is closely linked to both points 1 and 4 of the NGFS (Table 4.2). The results of the exercise are presented in section 2.3.

The MNB updated its Guide on climate-related and environmental risks on credit institutions' environmental risk management systems in August 2022. In the update, the MNB has added deadlines to the expectations already set. The central bank expects domestic credit institutions and branches to meet the requirements in several stages, with the aim of transitioning to green operation by 2025, i.e. to identify, measure, manage, monitor and disclose climate change-related environmental risks. The deadlines were set on the basis of the analysis of compliance with the Guide on climate-related and environmental risks covering the entire Hungarian banking sector, which was carried out in the first half of 2022. For more information on the updated Guide, see section 4.4.

In 2022, the MNB has placed a particular emphasis on supporting, in addition to credit institutions, the insurers' sustainability efforts and analysing their climate risks. In this context, the MNB carried out an analysis of the climate risk preparedness of the insurance sector. The questionnaire-based data collection focused on the identification and management of risks, sustainability aspects of the institutions' operations and sustainability-related products, and information to clients. The detailed results of the analysis are presented in section 2.5. To gain a deeper understanding of the climate change-related risks of the domestic insurance sector, the MNB has prepared an asset-side climate stress test for insurers. The methodology and results of the long-term exercise are presented in section 2.4.

4.3 INTERNATIONAL DEVELOPMENTS IN 2022

EU taxonomy is one of the three components of the first Action Plan on Financing Sustainable Growth announced by the European Commission (hereinafter: Commission) in 2018. The underlying Regulation (EU) 2020/852 of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (hereinafter: 'Taxonomy Regulation')[124] was adopted by the European Parliament and the Council on 18 June 2020. The developments in 2022 were as follows:

– The provisions of Article 27(2)(a) of the Taxonomy Regulation shall apply from 1 January 2022 in respect of economic activities that make a significant contribution to climate change mitigation and adaptation.

– The Commission Delegated Regulations (including the EU Taxonomy Climate Delegated Act[125] and the Disclosures Delegated Act[126]), which facilitate the application of the Taxonomy Regulation, entered into force in December 2021 and apply from 1 January 2022. The Taxonomy Climate Delegated Act summarises the technical screening criteria for economic activities that contribute significantly to climate change mitigation and adaptation. The Disclosures Delegated Act sets out the content of the disclosures under Article 8 of the Taxonomy Regulation for non-financial corporations and financial corporations.

– The Platform on Sustainable Finance published its report on social taxonomy in February 2022.[127]

– In March 2022, the Platform submitted its report with recommendations on technical screening criteria for the four remaining environmental objectives of the EU taxonomy[128].

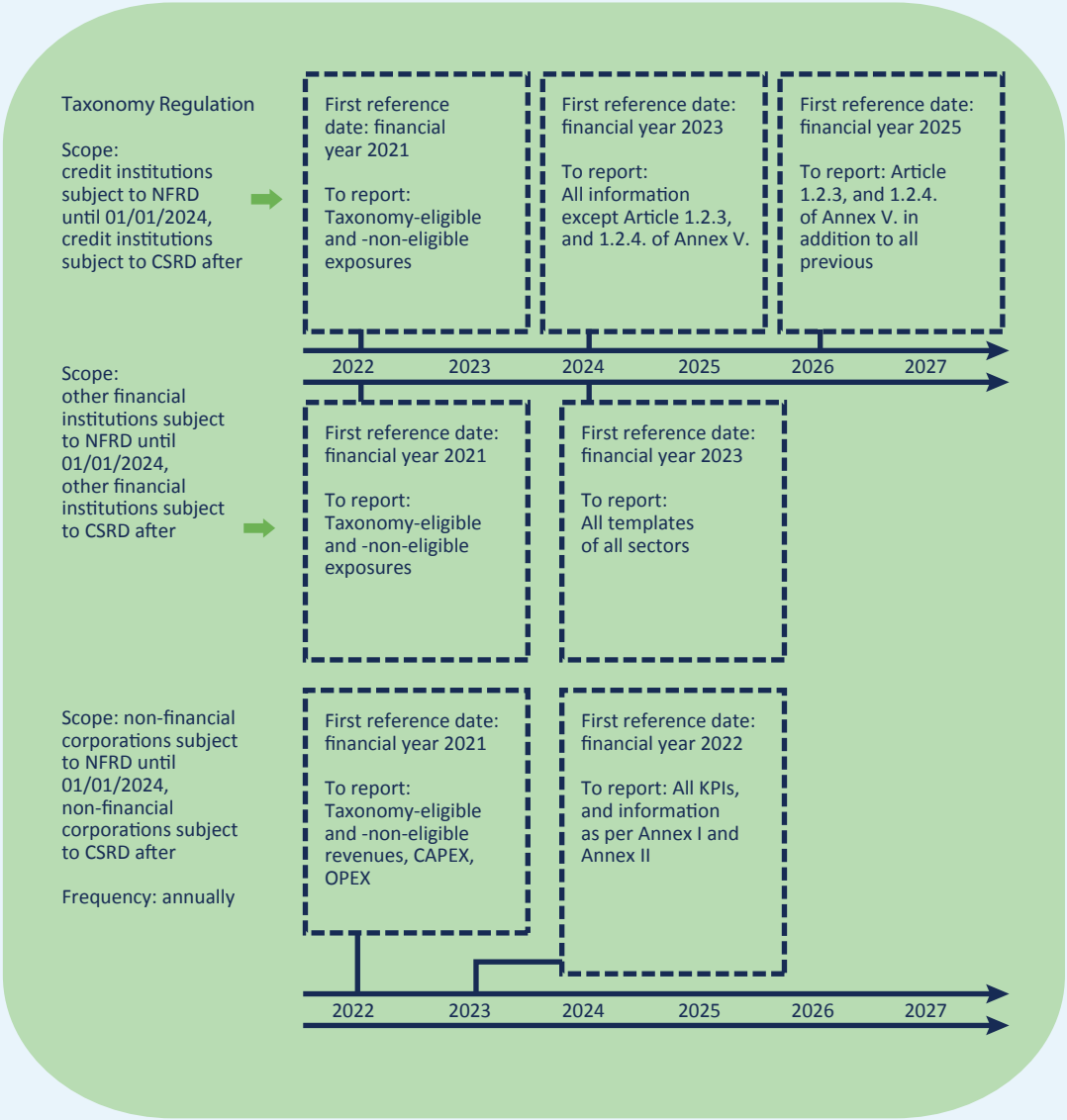
– In the same month, the Platform also submitted an extended taxonomy report on options supporting a sustainable transition[129]. As a result of the European

[123] Várgedő (2022): Klímakockázati stressteszt: a karbonár-sokk csődvalószínűségre kifejtett hatása a magyar bankrendszerben (Climate Stress Test: The Impact of Carbon Price Shock on the Probability of Default in the Hungarian Banking System)
[124] Regulation (EU) 2020/852 of the European Parliament and of the Council
[125] Commission Delegated Regulation (EU) 2021/2139
[126] Commission Delegated Regulation (EU) 2021/2178
[127] Final Report on Social Taxonomy
[128] Methodological report of the Platform on Sustainable Finance Technical Working Group
[129] Final Report on Taxonomy extension options supporting a sustainable transition

Parliament's vote in July 2022, a regulation complementing the EU Taxonomy Climate Delegated Act (hereafter: Complementary Climate Delegated Act)[130] entered into force on 1 January 2023. The Complementary Delegated Act ensures that certain investments in natural gas and nuclear energy needed to transform energy supply are included in the taxonomy as transitional activities under strict conditions, recognising these technologies as stages in the transition to renewable resources.

– In October 2022, the Platform submitted to the Commission its Final Report on Minimum Safeguards[131] in the context of Articles 3 and 18 of the Taxonomy Regulation; and as part of the Taxonomy Regulation, its recommendations on data and their usability[132]. These recommendations have been ranked as high, medium and low priority based on the urgency to address them in order to support compliance with sustainable finance reporting obligations.

Chart 4.1
Sustainability disclosures under Taxonomy Regulation



Source: MNB

[130] EU Taxonomy: Complementary Climate Delegated Act to accelerate decarbonisation
[131] Final Report on Minimum Safeguards
[132] Recommendations of the Platform on Sustainable Finance on Data and Usability

– For its March 2022 report, the Platform submitted a supplementary document[133] to the Commission, providing recommendations and criteria on the methodology for the framework of supporting activities, recommendations to be taken into account in the Commission's further work on EU taxonomy and additional technical screening criteria developed since March.

The year 2022 also represented a milestone in the development of the disclosure regulation. Significant changes were made to the Regulation (EU) 2019/2088 of the European Parliament and of the Council on sustainability-related disclosures in the financial services sector (hereinafter: 'SFDR')[134], This Regulation applies to financial firms from March 2021 and aims to increase transparency on the sustainability characteristics of financial products and reduce the risk of greenwashing. The regulation has a number of stages, as a consequence of which undertakings providing services in the financial services sector (financial market participants and financial advisors) had to comply with the basic pre-contractual disclosure requirements set out in the regulation as early as 2021. In addition, as of 1 January 2022, the additional provisions of the SFDR have become applicable, which also lead to the requirements under Articles 5 and 6 of the Taxonomy Regulation (Charts 4.1 and 4.2)

– An important milestone was the promulgation of the Commission Delegated Regulation 2022/1288 (hereinafter: SFDR RTS) on 6 April 2022[135], which will facilitate the application of the SFDR Regulation (specifying the details of the content, methodology and presentation of disclosures), as the RTS completes the legislative package.

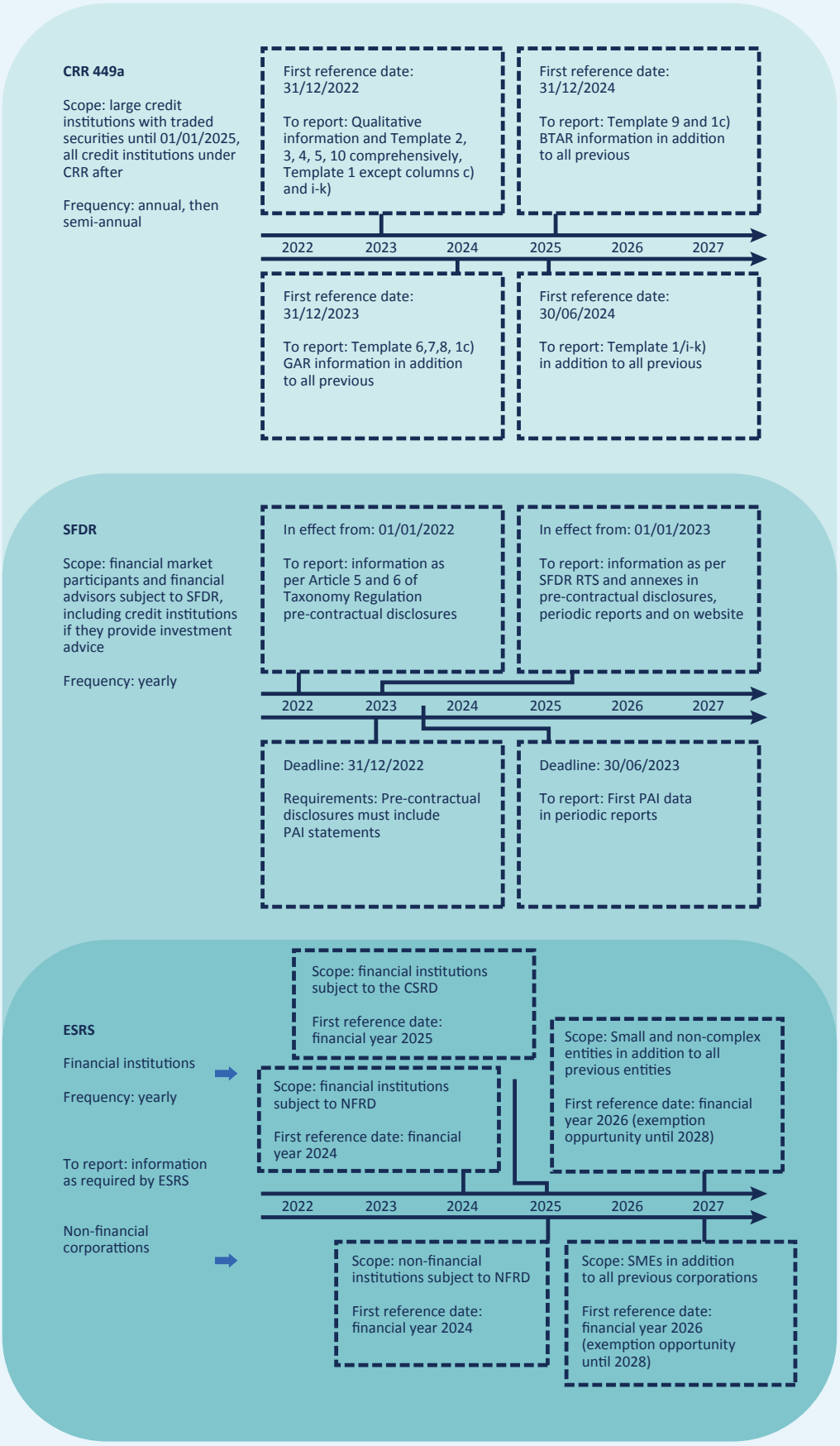
– But the work on the SFDR RTS does not end there. Following the publication of the SFDR RTS, the European Supervisory Authorities received a letter from the European Commission[136] requesting them to review certain parts of the already adopted SFDR RTS, such as the indicators for adverse impacts and the disclosure requirements for financial products. The new mandate was obtained because, inter alia, the definition and calculation method of the published indicators have not been developed, thus the uniform application cannot be ensured. In addition, there is also a need to expand the disclosure requirements to create greater transparency. The review of the complementary regulation is expected to be completed in October 2023.

The complexity of the regulation is also reflected in the fact that during this period, a number of documents have been published by the European Supervisory Authorities to help understanding. On 2 June 2022, a clarification statement[137] was issued on the SFDR RTS, while on 17 November 2022, a Q&A[138] document was released.

There are also other EU laws on sustainability disclosures by credit institutions. Pursuant to Article 449a of Regulation of the European Parliament and of the Council on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 (hereinafter: CRR)[139] large institutions that issue securities traded in a Member State's regulated market according to Article 4(1), subparagraph 21 of the Directive 2014/65/EU shall disclose to the public information on the environmental, social and governance risks, including inter alia physical and transition risks, as set out in the report referred to in Article 98(8)[140] of Directive 2013/36/EU (hereinafter CRD), from June 2022, annually for the first year and every six months thereafter. The implementing technical standards laying down detailed rules on disclosure under Article 449a of the CRR[141] – the rules setting out the uniform form and content of ESG risk disclosures – were published on 19 December 2022 and entered into force on 8 January 2023. The new provisions add ESG risks to the implementing technical standards on disclosure by institutions of the information referred to in Titles II and III of Part Eight of the CRR.

[133] Supplementary of the Platform on Sustainable Finance Technical Working Group: Methodology and Technical Screening Criteria
[134] Regulation (EU) 2019/2088 of the European Parliament and of the Council
[135] Commission Delegated Regulation (EU) 2022/1288
[136] Amendments to regulatory technical standards under the Sustainable Finance Disclosure Regulation 2019/2088
[137] Clarifications on the ESAs' draft RTS under SFDR
[138] Questions and answers (Q&A) on the SFDR Delegated Regulation (Commission Delegated Regulation (EU) 2022/1288)
[139] Regulation (EU) No 575/2013 of the European Parliament and of the Council
[140] Directive 2013/36/EU of the European Parliament and of the Council
[141] Commission Delegated Regulation (EU) 2022/2453
Recommendation No 10/2022. (VIII. 2.) of the Magyar Nemzeti Bank on climate-related and environmental risks and the integration of environmental sustainability considerations into the activities of credit institutions

Chart 4.2
Sustainability disclosures under further EU legislations



Source: MNB

4.4 NATIONAL DEVELOPMENTS IN 2022

The MNB issued an updated version of the Recommendation on climate-related and environmental risks in August 2022[142] The Guide sets out the MNB's expectations regarding the identification, measurement, management, control and disclosure of climate-related and environmental risks and the integration of environmental sustainability aspects in the business activities of credit institutions. The MNB guide on climate-related and environmental risks sets out expectations in four dimensions of credit institutions' operations: strategy and business planning, corporate governance, risk management (including credit risk, operational risk, market and liquidity risk, as well as sensitivity, scenario analysis and stress testing) and, in line with the international regulatory process, disclosure requirements.

Also in August 2022, the MNB published its revised recommendation on internal defence lines and the governance and control functions of financial institutions[143]**.** In the new MNB Recommendation, the requirement to take into account environmental, social and operational risk factors has been added to the criteria to be taken into account in the framework of risk-taking expectations.

To encourage the uptake of green lending in Hungary, the MNB maintained its green preferential capital requirement programmes in 2022. The Magyar Nemzeti Bank launched its green preferential capital requirement programmes for banks concerning certain 'green' exposures from the beginning of 2021. Credit institutions participating in the scheme can apply two types of preferential capital requirements: the green preferential capital requirements for corporates and municipalities[144] and the green preferential capital requirements for housing financing[145]. By international standards, this instrument puts the MNB at the forefront of green finance, as it is the first and only central bank/supervisory authority to support the green transition also through bank capital regulation. The results of the green preferential capital requirement programme are presented in section 3.1.

Two further regulations transposing EU directives were issued during 2022 in the area of sustainability regulation of the financial intermediary system:

– In order to regulate the production of sustainable financial products and the process of advising on these products, the GFM Decree No 13/2022 (XI. 11.) amending NGM Decree No 16/2017 (VI. 30.) on the product approval process applicable by investment firms amended with effect from 22 November 2022 the NGM Decree No 16/2017 (VI. 30.) on the product approval process applicable by investment firms, as a domestic transposition of EU Directive 2021/1269.

– Government Decree 274/2022 (VII. 29.) amending certain government decrees concerning the financial intermediary system amended with effect 30 July 2022 Government Decree 79/2014 (III. 14.) on the organisational, conflicts of interest, business conduct and risk management requirements concerning UCITS managers, as a domestic transposition of EU Directive 2021/1270.

4.5 EXPECTED CHANGES TO GREEN LEGISLATION, RECOMMENDATIONS AND DATA REPORTING

The two-year mandate of the EU Platform on Sustainable Finance expired in October 2022. The platform, with a renewed composition, has been working from February 2023 on the further development of the taxonomy, in line with the topics of the reports submitted in 2022: (i) technical screening criteria, (ii) advice on regulatory review, (iii) advice on extending taxonomy to significantly adverse and low impact activities, (iv) advice on social objectives, (v) criteria on data availability and usability, (vi) monitoring of capital flows into sustainable investments. The Taxonomy Regulation is in fact a living document that will be continuously improved to increase coverage[146] and update the criteria. In the evolution of the Taxonomy

[142] Recommendation No 12/2022. (VIII. 11.) of the Magyar Nemzeti Bank on internal defence lines and the governance and control functions of financial institutions
Information on the supplement of Green Preferential Capital Requirements for Corporates and Municipalities
[143] Information on the amended terms of the Green Preferential Capital Requirement Programme for Housing
[144] The EU Taxonomy covers around 40 per cent of listed companies established in the EU, in sectors that are responsible for nearly 80 per cent of Europe's direct greenhouse gas emissions, but the share of economic activity covered by the EU Taxonomy could potentially range from 1 to 5 per cent.
[145] Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) No 575/2013 as regards requirements for credit risk, credit valuation adjustment risk, operational risk, market risk and the output floor
[146] Proposal for a Directive of the European Parliament and of the Council amending Directive 2013/36/EU as regards supervisory powers, sanctions, third-country branches, and environmental, social and governance risks, and amending Directive 2014/59/EU

Regulation, we can expect the expansion of the scope of activities, the fine-tuning of the technical screening criteria, the triennial review of the transitional activities, and the increasing transparency of non-green activities.

In 2022, green financial regulation took a big step forward with the SFDR Regulation. It is now up to the institutions subject to it to apply it. Financial market participants and financial advisors must comply with the SFDR RTS from 1 January 2023. The regulatory technical standards require much more specific disclosures, notably on the content and presentation of information on the principle of no significant harm, on the content, methodology and presentation of information on sustainability indicators and on adverse impacts on sustainability, and last but not least on the ratio of environmental and social characteristics and sustainable investment objectives. The SFDR RTS covers not only pre-contractual disclosures, but also website disclosures and periodic reports. In the latter case, the parties concerned must report in the periodic report by 30 June 2023 on their adverse impacts on sustainability factors along the indicators defined in the SFDR RTS. In applying the legislation, account should also be taken of the previously mentioned Regulation supplementing the EU Taxonomy Climate Delegated Act, which also entailed an amendment to the SFDR RTS, whereby certain investments in natural gas and nuclear energy that serve a sustainable transition will also be subject to disclosure requirements.

More legislative changes are expected in the process of implementing the EU Sustainable Finance Strategy. The European Commission published its package of proposals on banking rules on 27 October 2021, which, once adopted, will result in significant changes to the CRR[147] and the CRD[148]. In particular, Article 13(1)(2) CRR extends the disclosure of sustainability information to large subsidiary banks. Once adopted, the amendments are expected to apply from 2025.

The number of companies required to publish sustainability information will increase in the coming years. The rules introduced by the Non-Financial Reporting Directive (NFRD[149]) will remain in force until the entry into force of the Corporate Sustainability Reporting Directive (CSRD[150]) on 1 January 2024. The NFRD's reporting rules apply to large companies of public interest with 500 employees, which in the European Union means around 11,700 large companies and groups of companies, including listed companies, banks, insurance companies and other companies listed as public-interest entities by national authorities. Pursuant to Section 95/C(1) of Act C of 2000 on Accounting (hereinafter: Accounting Act) large companies are required to report at least on environmental, social and employment issues, respect for human rights, the fight against corruption and bribery, and the diversity of corporate boards (in terms of age, gender, education and professional background), covering the following areas: business model; policies (including due diligence procedures); results of policies; risks and risk management; and key performance indicators for the business. In addition, the Taxonomy Regulation[151] and the related Commission Delegated Regulation[152] on disclosures also set out key performance indicators for the companies concerned, which are to be fully disclosed by non-financial companies for the first time in their 2023 non-financial reports for 2022 (Taxonomy-aligned and eligible turnover, CAPEX, OPEX. The financial companies concerned will face a different schedule, with the first disclosure of Taxonomy-aligned and eligible key performance indicators in their 2024 non-financial reports for 2023 but will have to report on their eligible and non-eligible activities from 2022.

With the entry into force of the CSRD Directive on 1 January 2024, the requirements imposed by the NFRD will be overwritten. This sets new expectations for sustainability reporting. These are replaced by the new rules on disclosure obligations in the CSRD Directive, known as sustainability reporting. The aim of the regulation is to enable the assessment of the operation of undertakings from a sustainability perspective, thus revealing risks that have not been identified so far. The CSRD extends the scope of those subject to the NFRD to cover all undertakings that meet at least two of the three criteria referred to in Article 3(4) and (7) of the NFRD: (i) its annual turnover exceeds

147 Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups

148 Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting

149 Regulation (EU) 2020/852 of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088

150 Commission Delegated Regulation (EU) 2021/2178 of 6 July 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by specifying the content and presentation of information to be disclosed by undertakings subject to Articles 19a or 29a of Directive 2013/34/EU concerning environmentally sustainable economic activities, and specifying the methodology to comply with that disclosure obligation

151 First Set of draft ESRS published by EFRAG in November 2022

152 More about this in section 1.2.d

EUR 40 million, (ii) its balance sheet total exceeds EUR 20 million, (iii) its number of employees exceeds 250. It is important to note that the new criteria remove the previous requirement of at least 500 employees. At EU level, around 50,000 companies will be affected. In order to standardise sustainability reporting, companies concerned will be required to prepare data for the 2024 financial year in their 2025 annual reports in accordance with the European Sustainability Reporting Standards (ESRS[153]), with guidance to be developed by the European Financial Reporting Advisory Group (EFRAG).

Legislative changes at national level are still expected as a result of the implementation of the provisions of the EU directives to be adopted. Due to the implementation of the CSRD, the Accounting Act (by the end of June 2024 at the latest); in case of the adoption of the amendment to the CRD, the Credit Institutions Act; due to the implementation of the amendment to the Solvency II Directive[154], the Insurance Act may need to be amended. The European Green Bond Regulation (not yet promulgated) is directly applicable and therefore does not need to be implemented by Member States, but may require amendments to national legislation in order to implement it.

4.6 EXPECTED MNB MEASURES IN 2023

The MNB will review its ongoing programmes in 2023, with a particular focus on the possibility of extending the green corporate, municipal and retail preferential capital requirements programmes. In recent years, the Magyar Nemzeti Bank has launched several new programmes related to domestic sustainability. On the one hand, this required a lot of creativity and a proactive approach, resulting in spectacular and numerous new solutions. At the same time, operating and developing these programmes ties up a lot of capacity, as their fine tuning is essential, especially in the turbulent macroeconomic environment of recent years. As the green transition is a capital-intensive process in which a stable and predictable regulatory environment is essential for investors, the MNB intends primarily to review its existing programmes in order to meet green financing needs. An integral part of this will be to review the possibility of extending the current green corporate, municipal and retail preferential capital requirements programmes.

The MNB plans to provide additional guidance to institutions subject to supervision. Innovative thinking is necessary for green finance, but it is also essential to define the framework. To this end, the MNB has issued a number of sustainability-oriented supervisory regulatory tools for institutions subject to supervision, which it intends to continue in 2023. As part of this, the MNB plans, inter alia, to extend the Guide on climate-related and environmental risks for credit institutions to the non-banking sector.

Later this year, the MNB intends to issue a minimum standard for the ESG questionnaire on lending. ESG (environmental, social, governance) risks refer to risks related to non-financial indicators that have a significant impact on the performance of companies and hence their viability. In recent times, it has become clear that these risks are becoming more material in the assessment of the solvency of companies and in the risk management practices of banks. In line with this, credit institutions have also started to develop their own questionnaires for their corporate clients. Different approaches can, however, impose a significant administrative burden on companies that fill in the questionnaire, which could be greatly reduced by supervisory guidance on the minimum content of the questionnaire. This move would also contribute to prudent lending. In addition to the questionnaire, the MNB will also examine the feasibility of centralising the responses to the questionnaire and compiling them in a database.

Sustainability issues are becoming increasingly prominent in the supervisory methodology. The MNB has made many achievements in the area of sustainable finance. For further progress, it is necessary to integrate sustainability aspects into standard supervisory activities, which will indirectly support the green transformation of the domestic financial sector. The first signs of this can already be felt in the institutions, as the issue is becoming more and more apparent in the course of audit inspections. This is well illustrated by the comprehensive reviews of credit institutions, whereby the MNB has started monitoring compliance with the Guide on climate-related and environmental risks from 2023. The materials currently being developed by the ESAs could also support the development of the supervisory methodology.

The MNB also plans to take measures to reduce data and information gaps: intends to publish national green

[153] A longer version of the summary below can be found in the December 2022 issue of the Financial and Economic Review: Balázs Sárvári: A zöld pénzügyi kapacitásfejlesztés trendjei és dilemmái (Trends and Dilemmas in Green Financial Capacity Development) Financial and Economic Review, Vol. 21. Issue 4, December 2022, pp. 207–218 Available at: https://hitelintezetiszemle.mnb.hu/letoltes/hsz-21-4-szc1-sarvari.pdf

[154] Lee, J.W. (2020): Green Finance and Sustainable Development Goals: The Case of China. Journal of Asian Finance, Economics and Business, 7(7): 577–586. https://doi.org/10.13106/jafeb.2020.vol7.no7.577ster

finance data on a quarterly basis from autumn 2023. The lack of data on sustainable finance is also a challenge internationally. Without data, there are obstacles not only in modelling, but also in everyday cases such as benchmarking. Recognising this problem, the MNB has already produced a number of publications, but the data assets generated by the data reporting will allow for a wider and more regular publication in 2023. The quarterly publication planned from autumn 2023 will also be an important milestone for institutions, as it will allow them to regularly measure their environmental performance and to integrate sustainability aspects, even on a quantitative basis, into the performance assessment of their senior management. Another positive outcome is that the growing volume of regular green finance data will also help academics and students in higher education in their research on the subject.

In addition to regular education, the central bank also promotes the spread of green financial products through conferences and knowledge sharing. This autumn, the MNB will once again organise its Green Finance Conference, which has become almost a tradition, where the greenest financial actors will be rewarded and green academic research awards will be open for applications. The detailed programme and related calls will be published on the MNB website.

5 Academic aspects of green finance

In the face of climate change, the economy is no longer sustainable in its current structure, and its transformation is timely and necessary, but this change has physical and, even more so, human prerequisites. The technology to produce clean energy, or the means to reduce carbon dioxide emissions from industry, cannot come about without human skills or creativity. For this very reason, training human resources who are able and willing to act, and committed to fighting against climate change for a more sustainable future, is a priority for the MNB. Therefore, the second pillar of the MNB's Green Programme includes an active engagement in education and support for research that can promote the green transition. Its educational activities are not limited to universities, of course, and it also provides expert support on green finance also in other adult education programmes. The promotion of research careers also takes place at several levels. In 2022, the MNB continued to reward researchers who have contributed to scientific research on sustainability through their achievements or the innovation of their methodology. In addition, the MNB also encourages university students to carry out research of an academic standard and recognises their achievements. The importance of these education and research activities is already enhanced by the great demand for sustainability experts today. Filling this gap will take years, so the sooner the better strategy is appropriate not only for the transition to a carbon-neutral economy, but also for education.

5.1 GREEN FINANCIAL CAPACITY BUILDING[155]

As a young and dynamically developing field, one of the main challenges of green finance is the lack of expertise. In practice, this means that neither market and government institutions, nor households have sufficient knowledge and experience on sustainability to effectively mainstream green objectives in their decisions. The 4 main areas of capacity shortage:

1. *Methodological challenges.* In the case of projects with an environmental focus, carrying out cost-benefit analyses is a methodological challenge, while the uptake of green financial products would require moving beyond this dichotomy. Detailed knowledge of green financial products and the willingness to carry out the related environmental measurements is common in only a few financial institutions.

2. *Financial innovation.* In order to develop green financial products and analyse the impact of new initiatives, securities and fund managers, as well as banks and insurers, need a significant pool of experts.

3. *Government strategy-framing.* The financial system alone is not enough for a green transition of the economy. Government economic policy and the preparedness of central and local structures are all essential to launch programmes that are environmentally and financially adequate and well adapted to local conditions.

4. *Transparency.* Until we are unable to classify individual economic activities by a generally accepted classification into sustainability-promoting or sustainability-threatening clusters, there is a risk of profiteering by greenwashing and of deception[156]. This can lead to misallocation of capital and reduce confidence in green financial solutions. Developing and harmonising such standards at national and international level cannot be without expert capacity.

To address these challenges, green finance capacity building can only be successful if it can align the preferences of a wide range of economic actors. The development of decision-making and decision preparatory levels, as well as the development of methodologies and procedures suitable for analysing environmental risks, outlines a whole

[155] Horváth Levente – Lehmann Kristóf (2021): Central Bank Activities Supporting Education and Research in Eurasia. In: Patai, Mihály – Horváth, Marcell (eds.): Age of Eurasia – Future directions of knowledge, technology, money and sustainable geoeconomics. Magyar Nemzeti Bank, Budapest, pp. 429–455.

[156] Lee, J.W. (2020): Green Finance and Sustainable Development Goals: The Case of China. Journal of Asian Finance, Economics and Business, 7(7): 577–586. https://doi.org/10.13106/jafeb.2020.vol7.no7.577ster

institutional network, as decision-making takes place simultaneously at different levels of government, the banking sector and the real economy, and financial institutions and academia are all key players in the development of methodologies. In the following, we will look at the key players in capacity building, as shown in Chart 5.1, and their responsibilities and opportunities in this area.

Chart 5.1
Key players in green finance capacity building

Source: MNB

1. *Central and local governments* have a strong influence on green finance capacity building at the level of strategy-framing and the regulatory environment, through developing policies and regulation and by supporting various collaborations. The way in which the government gets engaged in international negotiations and provides incentives to different organisations is of particular importance. Its engagement is also relevant for the accreditation of the different levels of education in general, for the definition of curricula and objectives, in particular because education must be adapted to the specific characteristics of each country (e.g. environmental risks, industrial structure, existing building stock, etc.).

2. *Institutions with monetary and supervisory roles* also have an orienting power through strategic guidelines, new protocols and data reporting procedures[157]. In relation to the opportunities associated with them, the activities of the Magyar Nemzeti Bank are described in detail below.

3. *Financial institutions* still have insufficient numbers of green financial advisors to develop new financial products and measurement methodologies.

4. Considerations of how to protect firms from environmental impacts and turn opportunities to their advantage are also increasingly important in the in-house training structures of the *real sector*. At the corporate governance level (business planning, strategy-framing), sustainability and green finance expertise will also be appreciated.

5. *As training centres and research workshops*, private companies and NGOs, in addition to academic actors, can also add significant value to capacity building, as they can all be involved in the delivery of courses, training, workshops, curriculum development and research. Developing capacity at academic level is an extremely long process. Dedicated people in each department have to study green finance for many years in order to build up sufficient green finance academic capacity and develop a standardised curriculum in a country.

Recognising the challenges and good practices emerging globally, several institutions in Hungary are already training green finance experts. The strategic question is what kind of capacity building plan can serve Hungary's interests and the domestic green finance sector. For such a plan to be successful, it is essential to clarify, inter alia, whose responsibility it is to develop the plan, in what areas (from municipalities to insurers), in what numbers and with what exact skills will be needed, and what international standards should be followed in the process. This cooperation should combine government perspectives, central bank and supervisory approaches, the preferences of real economy and financial market participants, and the achievements of science and economics.

The MNB considers it to be its responsibility to contribute to overcoming these capacity gaps and thus to help the development of green finance in the country. This commitment is embodied in the MNB's green finance education activities, green research workshops, recognition of and support for academic work, and general information for households. To this end, the MNB has launched the Family Green Finance initiative, which shows how to make environmentally conscious choices by linking them to everyday life situations. This effort is also supported by the Green Financial Product Finder service, discussed in Box 6, which also provides accessible information on domestic green financial products to help sell these products and increase the knowledge of retail clients.

[157] Sterner, T. – Damon, M. – Köhlin, G. – Visser, M. (2012): Capacity Building to Deal ith Climate Challenges Today and in the Future. The Journal of Environment & Development, 21(1): 71–75. https://doi.org/10.1177/1070496511435672

Box 8
Eugene Wong*: Green financial capacity building – reach the most people the fastest

Capacity building is a key priority. If financial service providers, users, intermediaries and market regulators are not properly educated, aware and able to act, the gap between the need for capital and the availability of capital could be fatal. While capacity building is key to the success of sustainable finance, there are challenges that need to be addressed:

1. Identifying capacity deficit

2. Filling the capacity gap (what, how, who)

3. Financing capacity building

It is important to identify the capacity gap and its size. A coordinated effort is needed across the financial sector and the real economy to build capacity that connects the entire value chain. In the past, some have argued that capacity building has focused too much on technical aspects. However, this changed as significant attention was paid to financial aspects. A well-coordinated assessment is needed to develop a holistic capacity building strategy and plan. It is important to highlight that in the context of capacity gaps, the strategic aspects of the business, the roles of leaders and management also need to be discussed.

Filling capacity gaps requires planning and commitment – as resources are scarce, overlaps and duplication should be avoided. Furthermore, capacity gaps in different areas need to be bridged smoothly. However, this is much easier said than done. Governments, policymakers and regulators, international organisations, industry, multilateral development banks, academia and civil society organisations need to cooperate to stimulate capacity building and optimise the use of resources.

The question *"what"* refers to the topics and areas to be covered. Here it is crucial to build the right knowledge and skills. However, there is a need to prioritise the areas where capacity building is most urgent.

The *"how"* is actually about the channels of implementation. They must match intentions and needs. Education (e.g. workshops, conferences, classroom education), publications, discussions and less formal exchanges are the most typical delivery channels.

Finally, an important question is who will finance capacity building. The only correct answer is everyone. Capacity building is a shared responsibility and different parties can contribute to it in different ways. Some can provide the funding needed for capacity building, while others can provide the related support materials and experts. What is certain is that capacity building has a positive impact on the whole ecosystem.

* Chief Executive Officer of Sustainable Finance Institute Asia

5.2 MNB'S GREEN FINANCIAL EDUCATION ACTIVITIES

Key objective of the central bank's educational activities is to provide green finance courses in line with the training profile of the partner institutions. Assessing the financial and economic risks arising from climate change requires an interdisciplinary approach, and the main objective of these educational collaborations is to bridge different disciplines, in particular economics and engineering. It is important to keep in mind that there is a growing demand in the labour market for experts with green finance skills. To this end, the MNB pays particular attention under its Green Programme to fostering a green mindset in young people's financial literacy, not only by transferring knowledge on sustainable finance, but also by promoting an environmental and lifestyle education. The MNB's active academic partners include the Budapest University of Technology and Economics (BME), the John von Neumann University (NJU), the University of Szeged (SZTE), the Budapest Metropolitan University (METU), the University of Debrecen (DE), the University of Pécs (PTE) and the Budapest Institute of Banking (BIB). In addition to MNB experts, the courses are delivered by each university's own lecturers and other internationally renowned experts.

In the framework of the MNB-BME Green Finance Cooperation, the Green Finance and Accounting Workshop was established in the academic year 2021/2022 with the involvement of the Tibor Liska College. Participants explored new green finance trends, approaches and practices through case studies in a practice-oriented way. In 2022, in cooperation with BME lecturers, MNB experts continued to prepare BME students for their URS (Undergraduate Research Society) theses by providing dual topic guidance. Also in the framework of the cooperation between MNB and BME, the "Bank to the Future" Design Sprint competition was announced for the third time in March 2022. As part of the idea competition, teams of 3–4 BME students had to add green finance and sustainability features to a fictitious commercial bank's mobile banking application.

The NJE Faculty of Economics also launched a course on sustainability. Starting in the spring semester of the 2020/2021 academic year, students can take two courses that build on each other, focusing on synergies that can be developed in the context of sustainability and an applied science approach. After successfully completing the foundation course Sustainable Finance, students can expand their knowledge in the small group workshop course Sustainable Finance Projects. A Green Finance course was also added to the course offerings of the MNB Institute's Master of International Economics and Business in the final semester. In 2022, the MNB, in cooperation with the Neumann János University, announced a study competition on the critical analysis of the MNB's initiative, the Green Financial Product Finder, with the aim of incorporating creative student solutions as professional proposals into the development of the product finder. Namely, an important mission of the Product Finder is to make information on domestic green financial products available and comparable for the general public, while at the same time contributing to the expansion of green financial literacy among the general public.

The cooperation with the Research Centre of the Faculty of Economics of the University of Szeged and the Institute of Finance and International Economics focuses on the economics approach to sustainability. The Green Corporate Finance course, announced for the autumn semester of the 2020/2021 academic year, has been relaunched for the autumn semester of the 2021/2022 academic year in a new form, under the name Introduction to Sustainable Finance.

In cooperation with the MNB, students could apply for further specialised training at METU. A two-semester advanced training program, the Financial Regulatory and Supervisory Expert, has been launched in September 2022 as correspondence course. This training, which deals with specific issues of supervision of financial institutions, also covers green finance.

The Future of Sustainable Economics course launched at the DE is the result of collaboration between several disciplines. With more than 10 experts, the programme focuses on the ecological framework for sustainable growth and economic growth, demographic and labour market trends, and sustainability issues in the financial system, taxation and investment. Mandatory literature for the course includes the book A jövő fenntartható közgazdaságtana (Sustainable economics of the future), the fifth volume in the Magyar Nemzeti Bank's series of textbooks.

In the autumn of 2021, the MNB entered into an educational relationship with the Institute of Finance and Accounting at the Faculty of Economics of the University of Pécs, and within it with the Simonyi Business and Economic Development Centre. As part of the World of Practice guest lecture series, an introductory lecture on sustainable and green finance was given by MNB experts in the Master of Finance course Investment Decisions, a full-time course in Hungarian.

BIB's banking and finance training is targeted at experts with solid work experience. For them, the Qualified Green Finance Specialist and ESG Consultancy courses are still available, providing a great opportunity for professionals interested in sustainability to further develop their knowledge.

The MNB's subsidiary responsible for digital education, MNB-EduLab, launched a free educational website called Beconomist in March 2022. The tutorial videos available on the platform cover current economic, financial and business topics using clear and plain language, presented by the country's leading economists and professionals. There are currently two training videos on green finance (in Hungarian) available on the platform: "ESG investments – How to reconcile sustainability and the financial bottom line approach?", and „Green Finance – Financial instruments to promote sustainability goals".

5.3 THE MNB'S GREEN FINANCIAL RESEARCH SUPPORT ACTIVITIES

The MNB intends to actively contribute to the academic study of sustainability issues. Environmental sustainability, the behaviour of economic actors and the living conditions available to future generations are a decision network in which the role of the financial system and the central bank is a key factor. This recognition encourages the MNB to support research of academic quality and to recognise ground-breaking research results. In the context of the former, it operates a research workshop primarily with the Budapest University of Technology and Economics (BME) and has a cooperation agreement with the University of Szeged (SZTE). The MNB seeks to develop cooperation that contributes to the development of the relevant field, increases Hungary's competitiveness, and has the overall potential to improve living conditions and make the economy more sustainable. The utilisation of the expected results thus has both indirect and direct impacts.

5.3.1 University research collaborations

The research portfolio, supported by the MNB and implemented in cooperation with BME, focuses on practice-oriented research thanks to the university's network of engineering contacts. In this workshop, scientific background work is carried out with the direct aim of deepening the understanding and development of economic aspects. Below are some of the strategic priorities of the Green Finance and Green Economy Workshop for 2021/2022.

- *Establishment and operation of the MNB Solar Energy Forum in cooperation with the Zero Carbon Centre.* The Solar Energy Forum was a series of five workshops for energy sector players and professionals from the domestic banking sector with a significant interest in financing solar energy use. In the workshops, participants discussed current financing and regulatory issues affecting the development of the industry, emerging risks and international best practices.

- *Energy efficient mobility – Autonomous vehicles and transport.* With the Green Wheel app, one of the results of the BME-MNB collaboration, it is easy to compare conventional and electric cars. The app also allows the user to select the powertrain and specific vehicle type that best suits their travel habits. The calculator can even tell how much money can be saved with different car use patterns.

- *Smartmap of Hungary – Spatial integration of economic, social and technological data.* The aim of the project was to integrate the data from different sources that can be associated with the geographical space in Hungary and linked to a time series into a single data system in order to provide data layers suitable for the compilation of different analyses (e.g. energy, urban, regional, water, transport, socio-political).

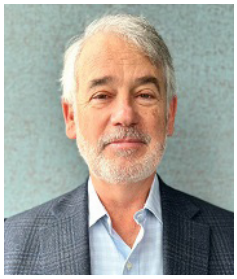
In the 2022/2023 period, the focus is on, inter alia, exploring domestic energy supply and the use of renewable energy, as well as exploring the possibilities of resilient water management.

The MNB signed a cooperation agreement with the University of Szeged in 2021, which also provides opportunities for joint research projects. This agreement stipulates that the MNB and the Research Centre of the Faculty of Economics of the University of Szeged will also cooperate in the preparation of jointly publishable studies, primarily on the role of sustainability ratings, the role of ESG data in auditing, and the impact of green finance in the energy sector and industrial production. A particular value

of the cooperation with SZTE is the active relationship with other university groups, foreign institutions and researchers, including universities in Vojvodina and Transylvania.

5.3.2 Scientific awards and research funding

The MNB established the Green Finance Science Awards and the Green Finance Research Initiative to promote environmental sustainability. The central bank aims to show its appreciation for Hungarian and non-Hungarian professionals who excel in green finance research. As part of the initiative, the MNB has launched 2 award categories and a call for research grants in 2022. The decision to award the prizes was always preceded by careful professional processes. The decision to award the International Green Financial Lifetime Achievement Award was taken by the Governor of the MNB after a professional preparation. In the other categories, the Green Finance Academic Council (composed of academics and individual members of the Monetary Council) decided on the awarding of the prizes following an open nomination and the submission of a research plan. The award ceremony took place during the MNB Green Finance Conference.



Last year, the Lifetime Achievement Award went to Sean Kidney, co-founding CEO of the Climate Bonds Initiative and Professor at the Centre for Sustainable Finance at SOAS University of London. The International Green Finance Lifetime Achievement Award is open to a non-Hungarian professional who has contributed to the development of the scientific study and implementation of green finance in sustainable management through internationally relevant, globally significant and pioneering research. Sean Kidney is a member of several green finance councils and committees internationally, such as the EU Technical Expert Group, the People's Bank of China Green Finance Task Force, the High-Level Expert Group on Sustainable Finance of the European Commission. He previously also served as an advisor to the UN Secretary-General. In 2016, Environmental Finance magazine named him Personality of the Year.

László Vértesy was awarded the Green Finance Science Talent Award 2022 for his outstanding research work. The award is presented to an outstanding green finance researcher of Hungarian nationality under the age of 41, based on their publication activity in recent years. László Vértesy, habilitated associate professor at the BME's Finance Department. Research interests: financial law, sustainability, circular economy. His publications are published in prestigious journals (e.g. SSRN Electronic Journal, Magyar Tudomány) and with renowned co-authors.

The research team led by Dr Anett Parádi-Dolgos won the Green Finance Research Initiative Award for the first time (in 2021). To be eligible to apply for the Green Finance Research Initiative, applicants had to submit a research proposal with a current research programme of high scientific quality in the field of green finance. The research team's research on the topic of green finance solutions adaptable to the challenges of Hungarian agriculture aims to have a direct and significant impact on the domestic economy and banking system in terms of sustainability. Other members of the research team are: Prof. Dr Sándor Kerekes, Dr Arnold Csonka, Dr Tibor Bareith and László Vancsura. The researchers have since completed the implementation of the research plan. For a brief summary of their study, see Box 9.

In the second call of the research initiative, four research projects were awarded and the first prize was awarded to the research team of the Circular Economy Analysis and Knowledge Centre (CCE) of the Hungarian University of Agricultural and Life Sciences (MATE). Their research plan was developed on the financial preparedness of agri-food companies for climate stress. Members of the research team are: Dr Tamás Havady, Dr habil. László Vértesy, Boglárka Bozóki, Kitti Annamária Bognár.

Áron Horváth and his research team were awarded the second place in the Green Finance Scientific Research Initiative for their research plan on the statistical analysis of the relationship between building energy data and house prices in Hungary. According to the research plan, a new database will be used to look at the relationship between the price of housing and its energy characteristics. Other members of the research team are: Mónika Bene, Antal Ertl, Áron Horváth, Gergely Mónus, Zoltán Sápi, Gáborné Székely.

The third place went to Antal Ferenc Kovács, researcher at the John Von Neumann University. In their research, they drafted a feasibility study for the creation of a corporate portfolio (National Natural Asset Management Group).

Elvira Böcskei, Head of the Department of Finance, Associate Professor at BME, and her research team won the Special Prize of the Green Finance Scientific Research Initiative competition with her research plan for a more

competitive and sustainable real estate sector. The research team aims to identify companies with similar or different characteristics to those involved in the green bond issuance. Other members of the research team are: Dr Emese Molnár Ilyésné (BME, Faculty of Economics, Finance Department), Prof. Dr Veronika Fenyves (University of Debrecen, Faculty of Economics, Institute of Accounting and Finance), Prof. Dr Zoltán Bács (University of Debrecen, Faculty of Economics, Institute of Accounting and Finance).

Box 9
Green finance solutions adaptable to the challenges of Hungarian agriculture – Opportunities in the pig sector

Perception of green financial instruments in the pig sector

The MNB considered it important that the research of Anett Parádi-Dolgos' research group, the winner of the 2021 Research Initiative, was implemented, as it provided an additional perspective on the sustainability issues of the domestic economy and banking system. The main findings of the study are reported by the researchers below.

Given its specificities and social importance, the agricultural sector could be a priority area for the use of green financial instruments. Within this, the often criticised and blamed pig sector, which is often seen as responsible in terms of environmental pressures, has a number of improvement areas relevant also from a sustainability point of view. Given its strong market exposure and environmental risks, the development of the sector requires essentially complex financing programmes. These must be aligned with profitability expectations and address social, economic and environmental risks. Think of individual feeding systems, manure management and use, or even investments in alternative energy production.

From a funding and policy perspective, the question arises whether financing schemes targeting green objectives can be applied in the pig sector, given its importance and challenges? Do sustainability expectations help to improve competitiveness? Are producers motivated to change?

The answers were provided by the results of a Q-method survey covering agricultural finance, the circular economy and green finance.

Experts from four areas were involved in the research. Researchers from academia, agricultural finance experts from the financial sector, decision-makers from pig farmers who are members of a producer group, managers from a large meat company as well as central and regional managers from the national breeders' association were involved in the Q-method survey.

The results show that green financing is a new and unfamiliar area for actors in the sector. Most of them are uncertain, and some of them are pessimistic, about the extent to which green financing instruments can contribute to the development and competitiveness of the sector. In their opinion, investments to promote sustainability in the sector require public engagement and the provision of hybrid preferential schemes with subsidies. In addition to direct support, indirect instruments can also help to achieve green objectives. The success of a sector-specific green finance programme also requires the use of fiscal policy instruments.

The failures of international examples have shown that financial products with green commitments should be more attractive than subsidised and market-based products. The benefits of green finance schemes need to be made clear to stakeholders and thereby increase commitment to sustainability goals. From a marketing communication perspective, the emphasis on macroeconomic and risk management benefits (e.g. GDP impact) is less motivating for sector actors (including financial intermediaries) than the benefits at the individual and company level. At sectoral level, green finance should be integrated into development concepts as a supportive instrument. This can help increase the competitiveness and profitability of small and medium-sized enterprises.

Main acronyms and abbreviations

BCRI – Bank Carbon Risk Index

COP27 – UN Climate Change Conference

CPRS – Climate Policy Relevant Sectors

CRD – Capital requirements directive

CRR – Capital Requirements Regulation

ECB – European Central Bank

UN – United Nations Organisation

ESG – Environment, Social and Governance

FSB – Financial Stability Board IMF – International Monetary Fund

NFRD – Non-Financial Reporting Directive

NGFS – Network for Greening the Financial System

BGS – Bond Funding for Growth Scheme

OECD – Organisation for Economic Co-operation and Development

SFDR – Sustainable Finance Disclosures Regulation

TCFD – Task Force on Climate-related Financial Disclosures

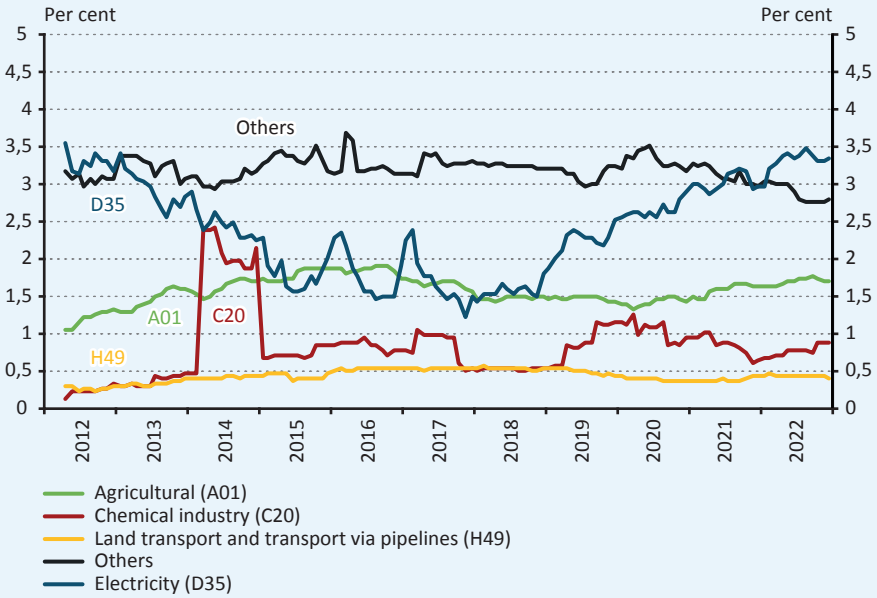
UNEP FI – Finance Initiative of UN Environment Programme

GHG – Greenhouse gas

GHP – Green Home Programme

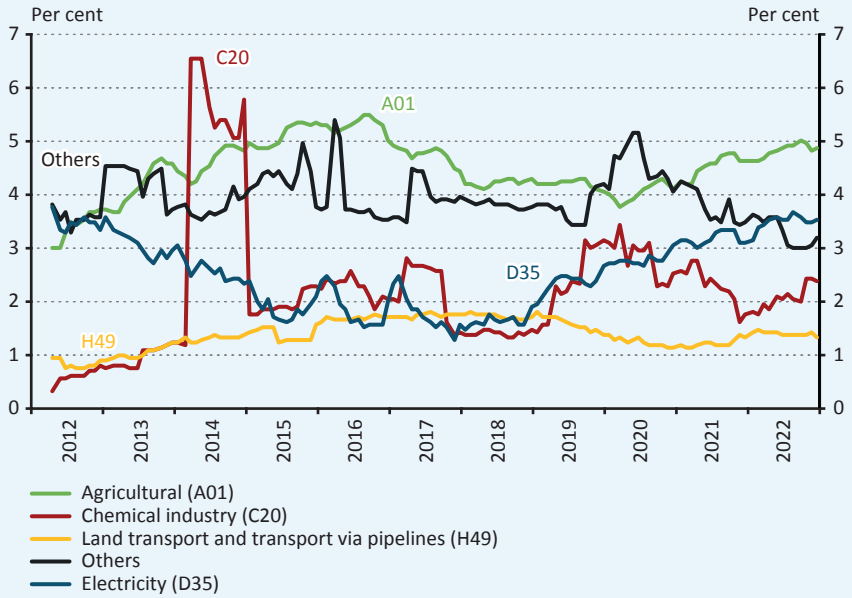
Appendix

Appendix No 1
Monthly sectoral BCRI values (Linear weighting)



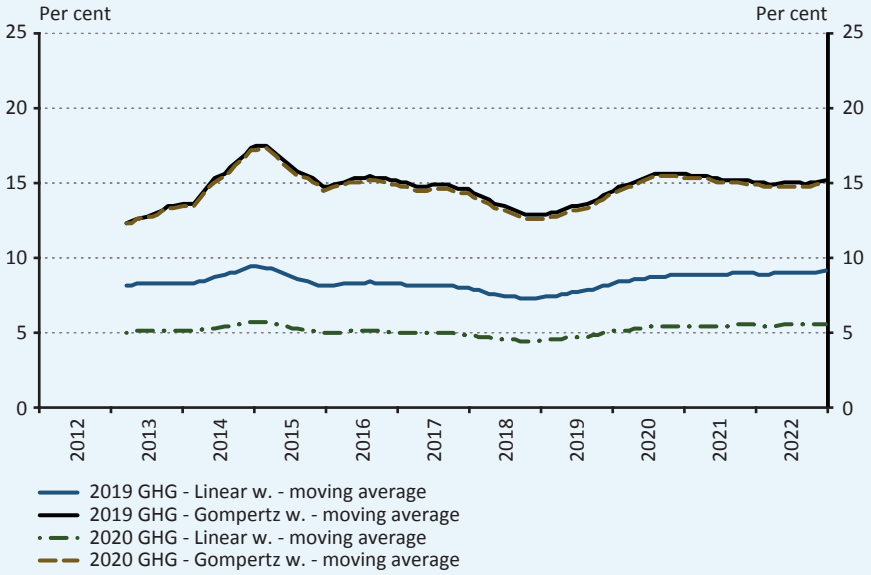
Source: MNB

Appendix No 2
Monthly sectoral BCRI values (Gompertz weighting)



Source: MNB

Appendix No 3
Banking system BCRI annual retrospective moving average – with GHG intensity data for 2019 and 2020



Source: MNB

Mária Telkes – The Sun Queen

(1900 – 1995)

Little known in her native Hungary, she is called the ‘Sun Queen’ in the United States of America, where she spent most of her life. Perhaps her best-known patent is the first ‘solar house’ with a solar heating system.

Mária Telkes was born on 12 December 1900 in Budapest. His father was Aladár Telkes, a bank director. She was the eldest of eight siblings. After graduating in mathematics and physics, she worked as an assistant to Professor István Ribáry and obtained her PhD. In 1924, the family was visited by her uncle, Ernő Ludwig, who was the Hungarian consul in Cleveland. This encounter brought a turning point in the life of Mária Telkes, who moved to America at her uncle’s invitation. She began her career in 1925 in the research laboratory of the Cleveland Institute of Biophysics. At the institute, they studied the radiation of brain cells. Mária Telkes built an electric camera to measure the infrared radiation of brain cells.

In 1939 she moved to Boston, where she continued her career as a teacher and researcher at the Massachusetts Institute of Technology (MIT). She focused mainly on researching the potential of solar energy. She joined the Solar Energy Research Project with the design of the Dover Sun House funded by the American industrialist Godfrey Lowell Cabot. Six experimental solar houses were built with the 650,000 dollars donated by Cabot. Mária Telkes became the head of the research group in 1940. She is credited with the discovery of a chemical process to store solar energy.

Mária Telkes has filed several patents for the use of solar energy. Her most successful invention was a solar-powered seawater desalination system for the US military. The patent was followed by mass production: in the Second World War, every pilot was equipped with the life-saving device she had developed.

She also designed a solar-powered meat fryer, which became particularly popular in India, where the number of hours of sunshine is high. Again, the success of the invention was guaranteed by the simple operating principle and the low price of the device.

She published more than 100 scientific papers, had 39 patents linked to her name (the last one registered at the age of 90), and received 12 international awards (including that of the US Office of Scientific Research and Development). She also worked as a university lecturer and later as a consultant to large corporations, and was involved in several government-funded naval and space research programmes. Since the oil crisis of the 1970s, the importance of her solar energy research has only increased.

She returned to Hungary in 1995. She died in Budapest in the same year, aged 95. She received a posthumous award: Together with physicist Dennis Gabor, she was inducted into the National Inventors Hall of Fame in 2012.

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