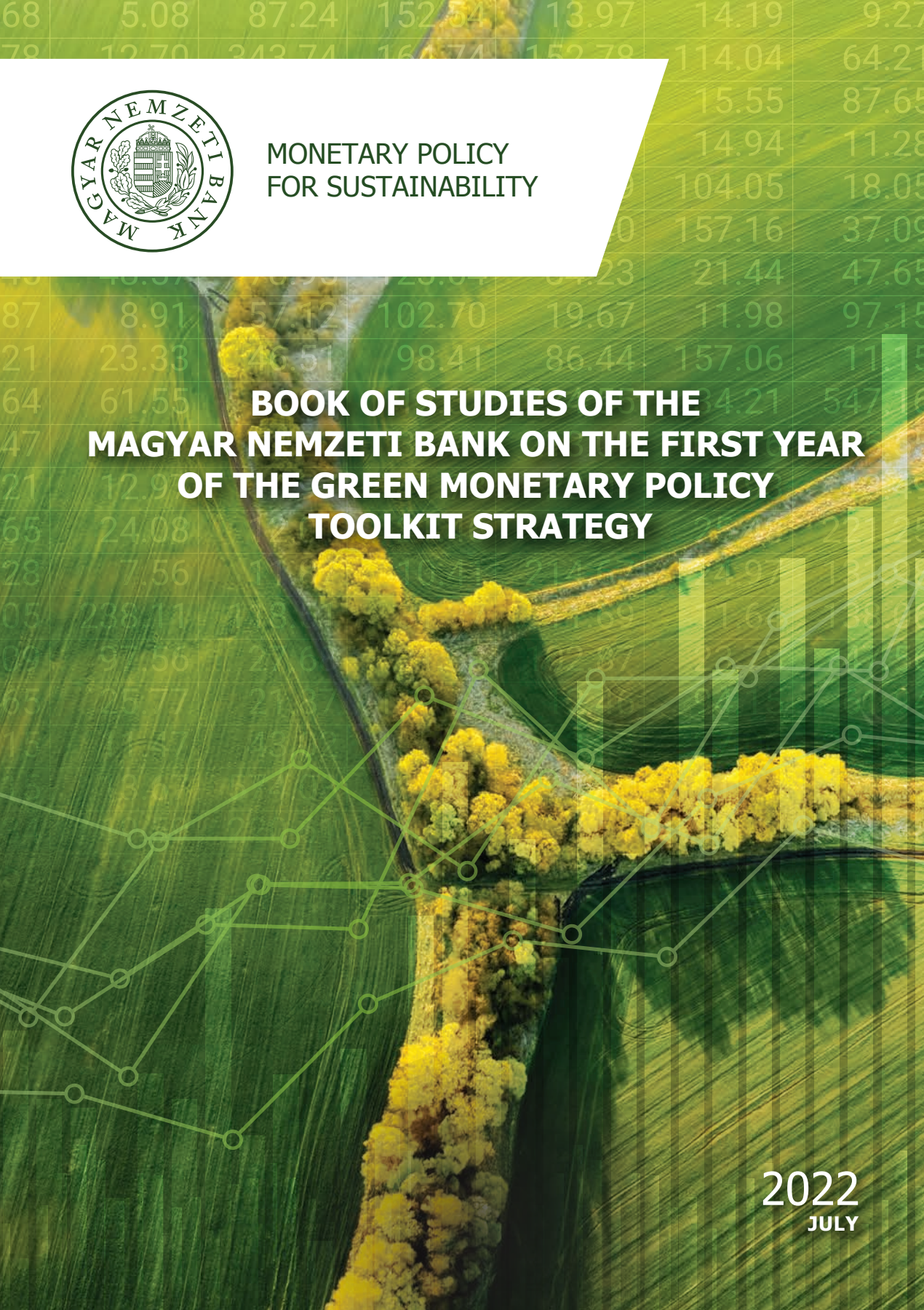

MONETARY POLICY
FOR SUSTAINABILITY

BOOK OF STUDIES OF THE MAGYAR NEMZETI BANK ON THE FIRST YEAR OF THE GREEN MONETARY POLICY TOOLKIT STRATEGY

2022
JULY

Monetary policy for sustainability

Book of studies of the Magyar Nemzeti Bank
on the first year of the green monetary policy toolkit strategy

Editors:
Norbert Kiss-Mihály and Pál Péter Kolozsi

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Editor's foreword

Norbert Kiss-Mihály – Pál Péter Kolozsi

Given the scale and speed of the changes around us and the uncertainty not seen for decades, few people now question that we are at the end of an era and a beginning of a new one. We have to change the patterns we have followed so far, and we have to relate differently to each other and to the world around us. Our future will be knowledge-, value- and culture-based, and the catching-up processes driven by new visions can only be structured around the idea of sustainability (Matolcsy, 2022).

One manifestation of the revolution in thinking already taking place is the emphasis on environmental sustainability, the green turn. It has become clear that it is no longer possible to force growth at the expense of nature *(Virág, 2019)*. As climate change has implications for price stability, financial stability and sustainable catching-up, it is an issue that must be addressed as a priority also by central banks. In this spirit, exactly a year ago, in the summer of 2021, the Magyar Nemzeti Bank (MNB) announced its green monetary policy toolbox strategy, thus confirming that a transformation of the financial system as a whole and a renewal of central bank thinking are essential to achieve our goals, in which sustainability aspects are taken into account in line with their weight and importance, both in terms of monetary policy and financial stability, alongside the primary objective of price stability.

The MNB has committed itself to environmental sustainability in more than just words. We have taken action because we are convinced that we cannot afford to delay the green turn: now is the time to lay the foundations for our future, to take the first decisive steps towards a green and sustainable economic and financial transformation. In addition to our own convictions, our green activism was also strengthened by the fact that, following the decision of the National Assembly in May 2021, the promotion of environmental sustainability was added to the MNB's statutory objectives, in addition to the primary objective of price stability.

As a result, the MNB is now definitely among the world leaders in green central banking. The Hungarian central bank is one of the few central banks that has taken substantial steps towards a green turn, both in the area of micro- and macro-prudential measures and in monetary policy. This is well illustrated by the fact that this spring the MNB was one of the first to prepare its TCFD report *(MNB, 2022)*.

The aim of the report is to identify, measure and transparently publish the climate risks associated with the operational activities and financial instruments of the central bank as widely as possible, thereby providing guidance to less active central banks and financial sector actors.

In this paper, we review the practical steps taken by the MNB since the adoption of the Green Monetary Policy Toolbox strategy to complement monetary policy with green elements. The progress made in green programmes and practices in the international monetary arena will be presented, as well as how the frameworks and standards that form the basis of the green finance system have evolved in recent months. This is followed by an in-depth analysis of the impact of central bank measures on the green segment of the Hungarian government bond, corporate bond and mortgage bond markets and their development, the MNB's measures to stimulate the green housing market, in particular the Green Home Programme, and the addition of green elements to the collateral management system. The gap-filling publications prepared by central bank experts cover the relevant topics in an unprecedented depth in the Hungarian academic world, creating the opportunity for a deeper exploration of green finance and monetary policy, as well as for the possible continuation of research and analysis.

The MNB has been one of the most active central banks in terms of green renewal, and this study proves that our momentum has been maintained and indeed intensified even in the current challenging environment. In particular, the MNB has demonstrated over the past year that it is possible to enforce environmental sustainability considerations without affecting the orientation of monetary policy.

Despite a tightening monetary policy environment over the past year, the MNB has been able to ensure that the monetary policy toolbox best supports the transition towards sustainable growth and catching-up, while keeping the price stability objective as the primary objective. By the summer of 2022, with inflationary pressures also increasing globally, some of our green programmes were suspended particularly due to the priority of the price stability objective; however, our green commitment was not reduced. The elements of our green activity that are not in conflict with our other mandates, in particular the Bank's key objective, remain active and support the achievement of our sustainability objectives, as exemplified by the unchanged green collateral management. And as soon as the macroeconomic environment allows it, the MNB's additional green programmes can shift back into higher gear.

The green turn requires permanent commitment, and the strategic approach and the measures taken show that the MNB is ready to take a long-term stand for environmental sustainability. The programmes and actions presented in this volume are the start of a long journey, so the work will continue and our goals remain unchanged.

We respectfully recommend the studies to all interested parties and wish you a pleasant reading!

Norbert Kiss-Mihály

Pál Péter Kolozsi

Budapest, 6 July 2022

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International developments in green central banking programmes and practices

Péter Aradványi – Flóra Balázs – Balázs Lóránt

In recent years, a clear trend has emerged among central banks on sustainability and climate change. While in the past central banks did not address such issues, there is now a broad consensus that the impact of climate change and the transition to a green economy should be taken into account by central banks. International cooperation has intensified, while the worlds' leading central banks have also taken various steps to address sustainability. In our study, we explore this trend and the green steps taken by the world's leading central banks.

1. Introduction

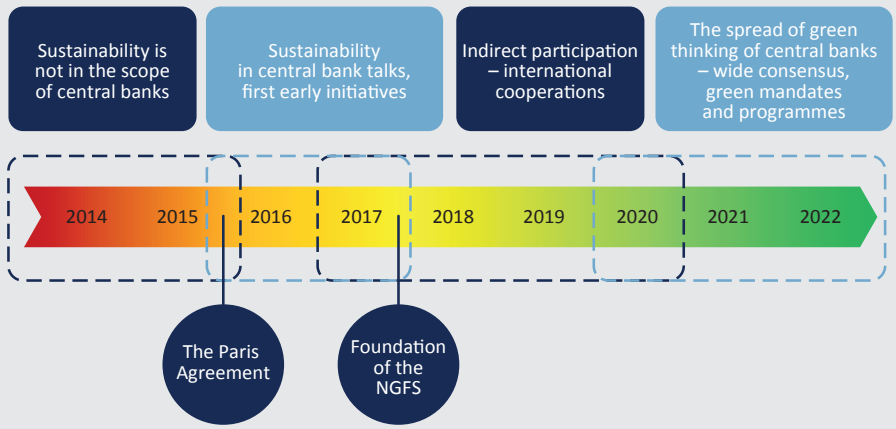
In the past, central banks have typically not paid particular attention to climate change and sustainability, in addition to their traditional objectives. Until the mid/late 2010s, the prevailing view worldwide was the former conventional one that climate change and sustainability were not the responsibility of central banks and that fiscal policy alone was responsible for addressing the problem. Thus, governments have to address these issues. It has been raised in the academic literature on several occasions that central banks should or must address the problems, but many have also argued that central banks should focus only on price stability and, where appropriate, macroeconomic objectives. Thus, in the past, green aspects have typically not been included in the objectives and instruments of central banks or in central bank strategies. For decades, central banks continued to operate in line with past practice, with a relatively narrow focus and general, conventional instruments, and then, in the wake of the global financial crisis of 2008–2009, unconventional instruments were added.

The impacts of climate change and increasingly comprehensive measurements and analyses have also attracted the attention of central banks. In the 2010s, we were already feeling the effects of climate change on our own skin. Temperature records were broken around the world, summers were accompanied by unprecedented heat waves and an increasing number of natural disasters were reported. During this period, already many comprehensive studies were prepared on the subject[1], and the scientific view was increasingly embraced by the public. Central banks have also become increasingly engaged in these issues and, while there are of course

[1] See for example IPCC reports: https://www.ipcc.ch/reports/

still debates about the justification for central bank involvement, by the early 2020s the prevailing view is that central banks do need to address climate change and the transition to a sustainable, circular economy.

Chart 1
The timeline of change in general central bank thinking

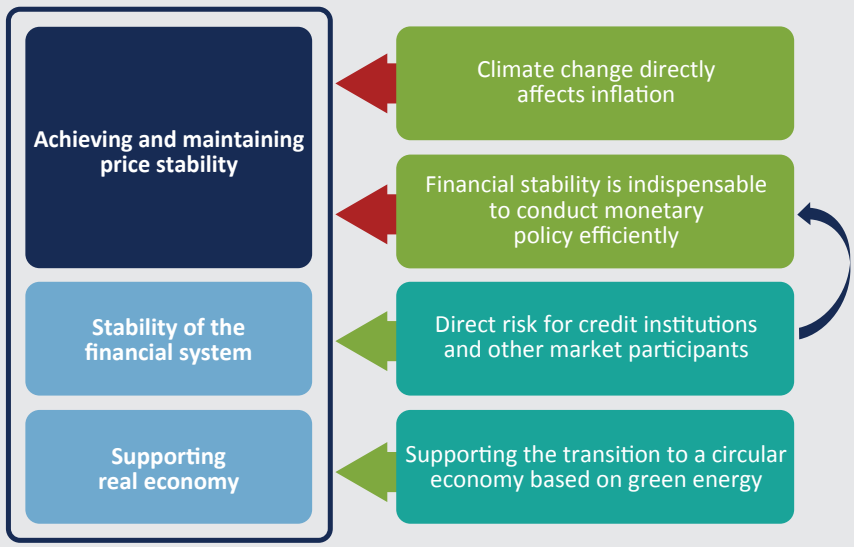


Source: MNB

Climate change affects all traditional central bank objectives, which justifies central bank action. On the one hand, climate change directly affects the primary objective of central banks to achieve and maintain price stability. Natural disasters caused by climate change, such as droughts, heat waves, fires and floods, can destroy part of the crops, production assets or even real estate, which can lead to volatility in the prices of the products concerned. Furthermore, through health impacts such as poorer air quality, less clean drinking water[2], climate change can also affect labour supply, which can also affect inflation. The stability of the financial system, another important objective of central banks, may also be at risk: the materialisation of the physical risks mentioned above may negatively affect this secondary objective of central banks, for example through the increase in non-performing loans, the depreciation of collateral and changes in risk appetite. Financial stability is an indispensable condition for the effective conduct of monetary policy, and thus indirectly affects the primary objective of price stability. Finally, the secondary objectives of many central banks also include some form of support of the real economy, so central bank action to support the transition to a sustainable economic model is also justified.

[2] https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

Chart 2
The impacts of climate change on central bank objectives



Source: MNB

The need to finance the transition to a sustainable economy also confirms the appropriateness of central bank action. Tackling climate change will require a lot of investment and capital expenditure in infrastructure and other areas. A precise figure cannot be given due to many uncertainties, but rough estimates have been made in recent years. According to the World Bank, between 2015 and 2030, global infrastructure investment of around USD 90,000 billion would be needed to meet the climate targets[3], while the OECD estimates that around USD 6,900 billion of infrastructure investment is needed annually to meet the Paris Agreement climate targets[4]. All this will have to be financed by someone, and the financial system, and therefore the central banks, will play an increasingly important role in providing the funds.

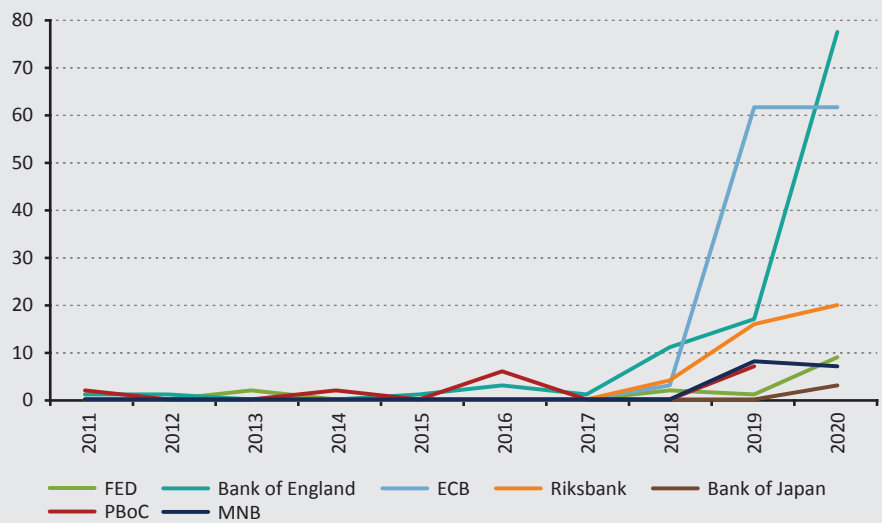
Several cross-border cooperation initiatives have been launched to share knowledge, information and best practices between central banks. The Network for Greening the Financial System (NGFS) plays an important role in the greening of central banks and the spread of green thinking. The NGFS is a group of central banks and financial market supervisors, established in 2017 by 8 central banks and supervisors, whose members voluntarily commit to share best practices and contribute to improving climate risk management and supporting the transition to

[3] https://www.un.org/en/climatechange/raising-ambition/climate-finance
[4] https://www.oecd.org/finance/Sustainable-Infrastructure-Policy-Initiative.pdf

a sustainable economy[5]. On 13 April 2022, the organisation had 114 members and 18 observers. The rapid increase in the number of members well reflects a turn in the central bank's thinking. The Magyar Nemzeti Bank joined the group in January 2019 as the first Central European participant[6].

The trend of integrating sustainability and climate considerations is also visible in the communication of central banks. The heads and experts of the leading central banks have increasingly made statements on green issues and the debate has become increasingly lively in the form of studies and even conferences. The change in communication and the trend is illustrated by the dynamically increasing frequency of the word "climate" in the English-language annual reports of the central banks presented later on and the MNB. (Chart 3).

Chart 3
Occurrence of the word „climate" in the annual reports of various central banks*



Note: the occurrence of the word "climate" in the sustainability sense in the annual English-language reports of the central banks shown. Annual reports cover a calendar year for some central banks and a financial year for others. The wording and scope of the reports can vary widely, and it is not worth comparing central banks. The chart is intended to show the general shift compared to previous years.

Source: Annual reports of each central bank

[5] https://www.ngfs.net/en
[6] https://www.mnb.hu/a-jegybank/informaciok-a-jegybankrol/nemzetkozi-kapcsolatok/network-for-greening-the-financial-system-ngfs

Green considerations can be reflected in many areas of central bank operations. In many countries, the integration of sustainability considerations has started on the regulatory and supervisory side. Several central banks already take sustainability into account in their monetary policy and implement it in their instruments in some way. In addition, several central banks have also started reporting on climate risks. The starting situations, perspectives and implementations are relatively different, but there is already a broad consensus on the justification for central bank involvement. This is well illustrated by the actions of the internationally dominant central banks described in the next chapter.

2. Green actions by globally dominant central banks

2.1. Bank of England

2.1.1. The Bank of England's climate strategy

The objective of the Bank of England's climate strategy is to play a leading role in ensuring that the macroeconomy, the financial system and the Bank of England itself are resilient to the risks of climate change and support the transition to net zero emissions through its actions and operations. As part of its climate strategy, the central bank is working to ensure the resilience of the financial system to climate change, to support the transition of the economy to net-zero emissions, to encourage the regular publication of corporate sustainability reports and to set an example through its own environmentally responsible practices.

Integrating a climate-conscious approach into financial supervision. The Prudential Regulation Authority (PRA) for the first time in 2019 set out its expectations on environmental sustainability for the institutions it supervises. From 2022 onwards, the PRA integrates sustainability guidelines into its supervisory approach and actively monitors their mainstreaming in day-to-day practice.

Encouraging the publication of corporate sustainability reports. In the spirit of leading by example and transparency, the Bank of England has been publishing its own sustainability report since 2019.

Promoting a coordinated international discourse on climate change. The central bank seeks continuous cooperation with the international community and is developing its climate strategy in line with the latest guidelines.[7]

[7] Climate change | Bank of England

2.1.2. Sustainable operation of the central bank

The Bank of England is committed to its own environmentally sustainable operations. In 2016, the central bank set a target to reduce its carbon footprint by 20 per cent by 2020. The bank exceeded its target and reduced its carbon footprint by 33 per cent. The central bank has set a new target in 2019, in line with the Paris Agreement, to reduce its direct (Scope 1, Scope 2) and indirect (Scope 3) greenhouse gas emissions from business trips by 63 per cent between 2016 and 2030[8]. In June 2021, the central bank committed to reducing carbon emissions from its own activities to "net zero" by 2050 at the latest. To improve its environmental performance, the central bank has developed a "Greener Bank" programme, supported by a staff network of more than 150 people. Under the programme, the central bank will reduce the carbon footprint of banknote production, sources its electricity and gas from renewable energy sources, made its buildings more energy efficient, adopted greener business practices (e.g. online meetings) and encourages its employees to use recyclable cups and containers.[9]

2.1.3. Greening the corporate bond purchase programme

The Bank of England aims to reduce the weighted average carbon intensity of its corporate bond portfolio by 25 per cent by 2025 and by 100 per cent by 2050.[10] In March 2021, the UK Chancellor of the Exchequer extended the Bank of England's mandate[11] to include a commitment to support the government's sustainability objectives. In line with its new mandate, the central bank has announced that it will make changes to its GBP 20 billion corporate bond purchase programme for the November 2021 reinvestment. The bank wanted to encourage companies to take decisive steps to make a smooth transition to net-zero emissions by greening the bond programme. Under the original plan, companies would have had to meet sustainability criteria to participate in the "greened" bond purchase programme. Companies engaged in coal mining activities would have been completely excluded from the scheme, while those using thermal coal in their operations would have had to comply with strict standards and requirements on carbon emissions and renewable energy use. Over time, the central bank would have prioritised the bonds of the most environmentally responsible companies, according to its own scoring system, and would have set increasingly high standards as a condition for remaining in the programme. At its rate-setting meeting in February 2022, the Bank of England announced that it would start to reduce the amount of corporate bonds it holds on its balance sheet, making the future of the greening of the bond purchase programme uncertain for the time being.

[8] Bank of England Annual Report and Accounts 1 March 2020-28 February 2021
[9] Corporate responsibility | Bank of England
[10] Greening our Corporate Bond Purchase Scheme (CBPS) | Bank of England
[11] Remit for the Monetary Policy Committee - March 2021 (bankofengland.co.uk)

2.2. Bank of Japan

The Bank of Japan is also taking an active role in the fight against climate change. At its rate-setting meeting in June 2021, the Bank of Japan decided to introduce a new lending facility to mitigate the adverse effects of climate change. With the new facility, the central bank intends to support the private sector's climate protection efforts by providing financial institutions with low-interest funding that they can use to finance investments or loans that finance climate change actions.

In July 2021, the Bank of Japan unveiled the details of the new funding facility[12], which are:

- The new facility **will be available to financial institutions** that can provide evidence of their efforts to combat climate change.
- The funds received under the new facility **can be used to finance green** bonds and loans; **sustainability bonds and loans** with a specific climate target; and to finance the green transition.
- The central bank will provide the funds **against collateral**.
- **Interest** charged on the funds is **0 per cent**.
- The duration of the funding under the programme is **one year**.
- Deposits of financial institutions with the central bank are **exempt from negative interest** up to twice the amount of the funds lent under the loan programme, and the central bank pays 0.2 per cent interest on the funds deposited.[13]

In addition to the introduction of the new facility, the Bank of Japan has also published a detailed climate protection strategy[14], which covers also areas other than monetary policy.

- **With regard to monetary policy, the Bank of Japan seeks to maintain the principle of market neutrality.** The central bank has indicated that it does not intend to intervene at the micro level in resource allocation. It was therefore decided to introduce the new facility under the above conditions.
- **Climate change also has a significant impact on the functioning of the financial system; thus, the central bank has also decided to engage in a detailed dialogue with financial institutions on the financial risks associated with climate change.** The central bank will actively support financial institutions in identifying and managing risks and will encourage financial institutions to conduct scenario analysis to identify risks. To support this, the Bank of Japan is working with the

[12] k210618a.pdf (boj.or.jp)
[13] https://www.boj.or.jp/en/announcements/release_2021/rel210922a.pdf
[14] The Bank of Japan's Strategy on Climate Change (boj.or.jp)

Financial Services Agency to develop an appropriate scenario analysis, taking into account also the work of the NGFS (Network for Greening the Financial System) and other institutions. The central bank will also support these institutions with on-site inspections and remote monitoring.

- **The Bank of Japan will carry out further research on climate change.** The central bank will collect data on climate change and refine its analytical tools to better and more accurately identify climate change risks.
- **As part of international cooperation, the Bank of Japan will work with several central banks to encourage investment in green assets, which will contribute to the development of these markets.**
- **As regards to reserve management,** the central bank will also buy green bonds issued by governments in foreign currencies, following the uptake of green bonds in the global market.

The parameters of the Bank of Japan's programme may change in the future. Depending on the current 0 per cent interest rate on central bank funds and the demand by financial institutions, the scale of the programme could be flexibly adjusted in the future, according to Haruhiko Kuroda, Governor of the Bank of Japan. At the moment, no specific envelope is set, but the central bank will adjust it to the demand. Since the launch of the facility, the central bank has provided 2,000 billion yen (0.4 per cent of GDP) in funding[15].

2.3. European Central Bank

The European Central Bank announced in January 2020 that it will launch a Strategic Framework Review. As part of the review, in addition to the monetary strategy, the definition of price stability and other issues, the role of the central bank in the fight against climate change was also reconsidered. Due to the coronavirus crisis, the results of the strategic review were finalised and published by the ECB in July 2021 instead of the end of 2020 as originally planned.

The ECB had already stressed the importance of climate change before the review, and accordingly established a Climate Change Centre in January 2021. The Centre is responsible for coordinating, shaping and managing the ECB's activities in different areas related to climate change. The aim is to integrate climate change considerations into the daily work of the ECB. The central bank also announced that it will invest part of its own portfolio in the BIS green bond fund in the future. The euro-denominated fund established for central banks invests in renewable energy, energy efficiency and other environmentally friendly projects. The measure complements the ECB's ongoing green bond purchase programme. Green bonds purchased on the secondary market already account for 3.5 per cent of the ECB's

[15] Loan Disbursement under the Funds-Supplying Operations to Support Financing for Climate Change Responses (boj.or.jp)

portfolio[16] (EUR 20.8 billion), and the central bank's priority is to increase this share in the coming years.

From the start of the review, the central bank has stressed that the ECB has already addressed the issue of climate change. However, the review has carefully examined whether the ECB needs to play a greater role in the fight against climate change and, if so, what are the means by which it can do so. Before the review, green investments were already part of the ECB's own portfolio, and their share may be also increased in the future, and green considerations may also be taken into account in the design of the monetary policy portfolio, especially for corporate bonds.

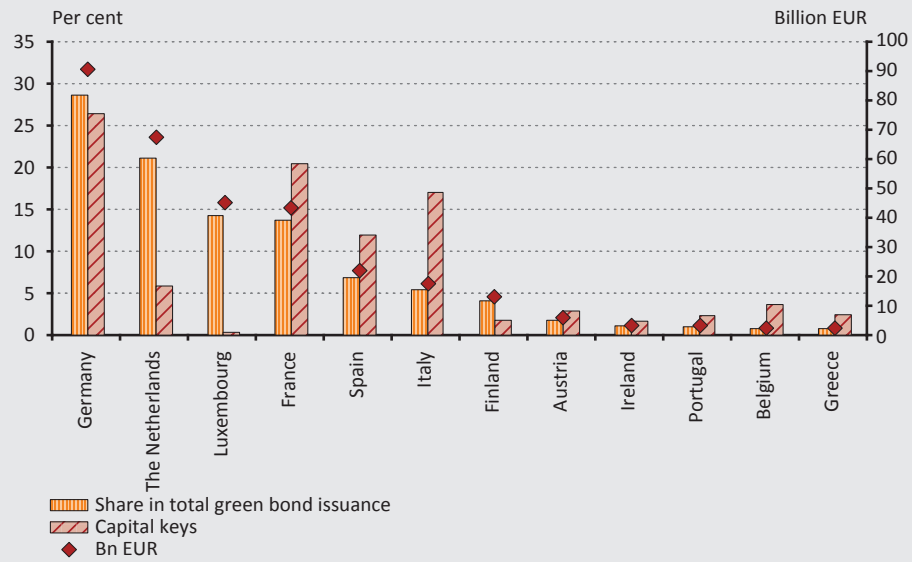
Drawing on the results of the Strategic Framework Review, the ECB recognised that climate change has a significant impact on price stability and adopted an ambitious climate action plan to address this[17]. In this context, the ECB will continue to consider, how to integrate climate considerations into the monetary policy framework and will also enhance analytical capacity in macro modelling by taking into account the impact of climate change. The ECB also takes climate considerations into account in its risk assessment, hedging framework and corporate bond purchases. In the area of analytics, it will develop new indicators on a pilot basis to monitor the ecological footprint, green assets and physical risk exposure of financial institutions. Following the review, asset purchase and acceptance as collateral for private sector securities will require companies to meet certain sustainability criteria, resulting in a treatment different from other assets. In the context of risk assessment, the ECB will conduct climate stress tests from 2022 onwards to assess the Eurosystem's exposure to climate risks. The ECB will also take into account the risks arising from climate change when assessing collateral. Finally, in its corporate bond purchases, the central bank will reallocate purchases by taking into account climate protection criteria. The ECB will implement the new action plan in parallel with EU climate action.

The ECB has already purchased green bonds in the past. Green investments have already been part of the central bank's portfolio, and their share may be increased in the future, and green considerations may also be taken into account in the design of the monetary policy portfolio, especially in the case of corporate bonds. According to ECB President Christine Lagarde, climate change is not negligible from a monetary policy perspective either, as it affects inflation, emissions, monetary transmission and long-term interest rates[18]. In a parliamentary hearing, she mentioned the ECB's decision of 22 September 2020 to accept as collateral, from 1 January 2021, bonds whose coupon is linked to sustainability performance.

[16] ECB to invest in Bank for International Settlements' green bond fund (europa.eu)
[17] ECB presents action plan to include climate change considerations in its monetary policy strategy (europa.eu)
[18] Climate change and central banking (europa.eu)

Green bond issuance in the euro area has grown dynamically in recent years. The universe of green bonds the ECB can acquire has been growing steadily since 2015, quadrupling by 2018[19]. The euro area green bond market is highly concentrated in terms of the issuing country, with Germany and the Netherlands accounting for more than half of total green bond issuance (Chart 4).

Chart 4
Trend in ECB green bond purchases relative to capital keys



Note: Lithuania, Slovakia, Latvia, Slovenia, Cyprus, Malta and Estonia are not included in the chart as they do not yet have significant green bond issuance

Source: Bloomberg

Given the concentration of issues, the ECB makes purchases at a different rate from the one set by the capital keys.

Several ECB policymakers share the view that the central bank may in future disregard the principle of market neutrality when buying corporate bonds. This would be done to offset the underpricing of climate risks in financial markets. According to Christine Lagarde, the central bank must intervene because financial markets are not adequately assessing the risks associated with climate change on their own[20]. The ECB President pointed out that no decision had been taken on the matter, but that central banks should ask themselves whether they are taking excessive risks by trusting markets to price climate risks well.

[19] Purchases of green bonds under the Eurosystem's asset purchase programme (europa.eu)
[20] Climate change and central banking (europa.eu)

According to Luis de Guindos, Vice-President of the ECB, the issue of climate change is not negligible from a financial stability perspective either. As early as spring 2021, the ECB Vice-President stated that the central bank is already closely monitoring the impact of climate change from a financial stability perspective[21]. They are also working on a method that allows stress testing the risks associated with climate change. He also said that environmental sustainability offers a new opportunity to channel investment into Europe. In this context, he added that a possible "green QE", i.e. a green asset purchase programme, is not excluded.

2.4. Federal Reserve

For the time being, the Fed is dealing with climate risks on a more theoretical level, without introducing direct instruments. The Federal Reserve (Fed), the central bank of the United States, can be considered quite conservative in terms of green central banking. Among the most globally relevant central banks, they are considered late responders, as they started to address climate change later and their involvement is still mainly limited to analysis and studies. However, there has been a shift also in their thinking. In December 2020, the Fed also joined the above-mentioned Network for Greening the Financial System, contributing to central bank coordination and knowledge sharing[22].

The Fed examines climate risks from a financial stability and supervisory perspective. In its monetary policy, the Fed does not take green actions, and considers climate risks to be a supervisory, prudential issue. Thus, these are the areas in the US Federal Reserve that have begun to examine the risks and possible negative effects of climate change and to prepare analyses. They invest in data and modelling tools to support this research. In line with this, the Federal Reserve has also set up two important committees in 2021.

The Supervision Climate Committee examines climate risks at microprudential level. The aim of the Supervision Climate Committee (SCC), established in 2021, is to identify and assess the financial risks arising from climate change and to develop a programme to ensure the safety and resilience of supervised institutions to these risks. Microprudential factors are discussed in the Supervision and Regulation Report.

The Financial Stability Climate Committee examines climate risks at macroprudential level. Also established in 2021, the Financial Stability Climate Committee (FSCC) aims to identify and assess the macro-financial risks of climate change. The FSCC is therefore concerned with the financial stability implications and the mapping of complex relationships present in the financial system. Macro-

[21] Shining a light on climate risks: the ECB's economy-wide climate stress test (europa.eu)
[22] https://www.federalreserve.gov/newsevents/pressreleases/bcreg20201215a.htm

prudential factors are examined in the context of the Financial Stability Report and wider negative effects, for example those on households, are also studied. FSCC works closely with other areas, including the SCC, international coordination, research and data areas.[23]

2.5. People's Bank of China

China and the Chinese central bank are making serious efforts to green finance. The People's Bank of China (PBoC), China's central bank, is at the forefront of green issues. It is not only a member of the NGFS group, founded in 2017 and mentioned several times before, but was also among the 8 founders of the organisation.[24] They have already taken a number of specific measures to promote green finance and are working closely with other Chinese organisations to this end.

The PBoC has established a green finance strategy based on 5 pillars. China's central bank presented its Green Finance Strategy in early 2021, which will help the central bank achieve the green finance reform and development goals of the government's 14th Five-Year Plan and support China's goal of peaking its emissions by 2030 and reaching net zero by 2060. The 5 pillars of the Green Finance Strategy are:

1) Green taxonomies and standards

2) Disclosure requirements and financial supervision

3) Incentive and restrictive mechanisms

4) Innovation in green financial products and market systems

5) International cooperation[25]

The PBoC assesses the performance of financial institutions with regard to their green bonds. With effect from 1 July 2021, the People's Bank of China has begun evaluating the green bond holdings of its 24 largest banks, including the largest state-owned banks. The valuations analyse the share of green bonds in total assets and the annual change in the total value of green bonds held. The PBoC has been assessing the green financial performance of major financial institutions since 2018, but previously this only covered green loans. Furthermore, the proportions of green bonds in default and non-performing green loans within green assets are also assessed. Evaluations are carried out on a quarterly basis, using 80 per cent quantitative and 20 per cent qualitative indicators.[26]

[23] https://www.federalreserve.gov/newsevents/speech/brainard20210323a.htm
[24] https://www.banque-france.fr/en/communique-de-presse/joint-statement-founding-members-central-banks-and-supervisors-network-greening-financial-system-one
[25] https://greencentralbanking.com/2021/02/11/pboc-outlines-green-finance-strategy/
[26] https://greencentralbanking.com/2021/06/15/pboc-grade-financial-institutions-green-bonds/

In 2016, guidelines for a green financial system were issued. As early as 2016, the Guidelines for Establishing the Green Financial System, a set of guidelines to establish and promote a green financial system, channel private capital into the green economy and signal to markets, were published in collaboration between the PBoC and 6 other government agencies. The Guidelines for Establishing the Green Financial System included a number of measures to support green investments, such as interest rate subsidies for green loans or a national green development fund. The promotion of green insurance was also set as a target.[27]

Under the leadership of the PBoC, the Chinese Green Bond Standard was established. The study on international standards presents the Green Bond Endorsed Project Catalogue, which defines the projects and activities that can be financed by Chinese green bonds. This list has been developed under the leadership of the People's Bank of China, with input from other relevant organisations.

China's central bank has issued guidelines for financial institutions on environmental disclosures. In 2020, China's central bank published the Environmental Disclosure Guideline for Financial Institutions, which requires financial institutions to follow a "comply or explain" approach. In other words, they must either comply with the guidelines or, if they do not comply with the guidelines, they must explain why they do not comply with the guidelines. To support environmental reporting, mandatory disclosures were introduced from 2022, following the pilot period.[28]

The PBoC has also created a green refinancing loan facility. The Carbon Emission Reduction Facility (CERF) is a structural monetary policy instrument that aims to mobilise capital to reduce carbon emissions and support green objectives, including for example clean energy and environmental protection. With the facility, the Chinese central bank will provide low-cost funding for financial institutions that provide carbon reduction loans near the loan prime rate (LPR – benchmark interest rate) of the same maturity. For eligible loans, the PBoC provides funding up to 60 per cent of the loan amount at a rate of 1.75 per cent. To ensure consistency with the targets, the PBoC expects financial institutions to regularly disclose information on their use of loans and emissions reductions. This information must be verified by a third party. It is important to stress that the facility only applies to newly disbursed loans. By March 2022, CNY 230.8 billion in loans had been disbursed to financial

[27] https://www.un-page.org/people%E2%80%99s-bank-china-issued-%E2%80%9Cguidelines-establishing-green-financial-system%E2%80%9D#:~:text=The%20Guidelines%20stress%20that%20the,restricting%20investment%20in%20polluting%20sectors.

[28] https://www.greenfinanceplatform.org/sites/default/files/learning-resources/action//China%20-%20Environmental%20Disclosure%20in%20the%20Banking%20Sector%20of%20China_Practices%20and%20Experience.pdf

institutions with PBoC support, resulting in a reduction of 47.86 million tonnes of CO2 equivalent emissions. [29]

PBoC also promotes the clean use of carbon. The Chinese central bank also supports the clean and efficient use of carbon with a special loan facility. Lending for this purpose has reached CNY 13.4 billion by March 2022.

As a result of central bank programmes, green finance is growing dynamically. At the end of 2021, outstanding green loans denominated in renminbi and foreign currencies reached CNY 15.9 billion, showing a 33 per cent y/y growth. In 2021, domestic green bond issuance exceeded CNY 600 billion, with an annual growth rate of 180 per cent. The green bond stock thus reached CNY 1.1 billion, and according to the statistics, the issuance cost was lower for 77 per cent of the green bonds issued in 2021 compared to conventional bonds. Thus in these cases the greenium applied.[30]

2.6. Riksbank

Riksbank was one of the first central banks to apply sustainability criteria in its operations. Sweden is typically at the forefront of sustainability, so it is no surprise that its central bank, the Riksbank, is also focusing strongly on the green transition. The Riksbank, which has also been a member of the NGFS since the end of 2018[31], has already taken a number of steps in green central banking.

The Riksbank published its sustainability strategy in 2020. The Sustainability Strategy, published in December 2020, is based on 6 principles, which are briefly:

1) The starting point for the Riksbank's work is the UN 2030 Agenda, which sets out 17 sustainable development goals.

2) The Riksbank must analyse developments in the field of climate change and sustainability in order to understand how the whole economy is affected and to carry out its tasks accordingly.

3) The Riksbank seeks international cooperation to promote sustainability and reduce climate change risks.

4) Climate policy should be led by the Parliament and the Government, and the Riksbank must contribute to this with the means at its disposal within its mandate. However, the most effective tools fall under the remit of other areas.

[29] http://www.pbc.gov.cn/en/3688110/3688172/4157443/4385345/index.html
[30] http://www.pbc.gov.cn/en/3688006/3995557/4508973/index.html
[31] https://www.riksbank.se/en-gb/press-and-published/notices-and-press-releases/notices/2018/riksbank-new-member-of-international-network-for-climate-and-financial-systems/

5) The Riksbank is obliged to conduct its operations efficiently and with prudent use of public funds. It has to manage the risks it faces, part of which is related to sustainability.

6) The central bank will apply sustainability criteria in the management of foreign exchange reserves. The Riksbank's Financial Risk and Investment Policy describes how this will be implemented.[32]

The Riksbank has published its Climate Report in 2021. One of the key messages of the Climate Report presented by the Swedish central bank in December 2021 is that climate change impacts all parts of society and that the responsibility lies primarily with politicians. Climate change could also affect the Riksbank's mandate. In line with the strategy, they underline the need to take account of climate change and help the transition towards a sustainable economy.[33]

The Swedish central bank applies sustainability criteria also in its portfolio management. Since 2019, the Riksbank must take into account also sustainability aspects (the GHG impact of assets) when managing foreign exchange reserves, not only the risks and returns. In addition to the foreign exchange reserve, green considerations are also applied to the portfolio of assets denominated in Swedish krona built up using monetary policy instruments. From January 2021, norm-based negative screening has been applied, which means that only bonds issued by companies that meet international sustainability norms and standards will be purchased.[34] And from 2021, the Riksbank started to measure and report the carbon footprint of its corporate bond portfolio, in line with the recommendations of international organisations.[35]

[32] https://www.riksbank.se/globalassets/media/riksbanken/hallbarhetsstrategi/engelska/sustainability-strategy-for-the-riksbank.pdf
[33] https://www.riksbank.se/en-gb/about-the-riksbank/the-riksbanks-work-on-sustainability/climate-report/2021/the-riksbanks-climate-report-december-2021/
[34] https://www.riksbank.se/globalassets/media/rapporter/arsredovisning/engelska/annual-report-2021.pdf
[35] https://www.riksbank.se/en-gb/about-the-riksbank/the-riksbanks-work-on-sustainability/asset-management-and-sustainability/

Chart 5
Summary table of central banks' measures

Central bank measure	Central bank						
	Bank of England	Bank of Japan	European Central Bank	Federal Reserve	Magyar Nemzeti Bank	People's Bank of China	Riksbank
Sustainability/climate strategy and/or programme	✔	✔	✔		✔	✔	✔
Green credit incentive facility		✔			✔	✔	
Green asset purchase, green portfolio management	✔		✔		✔		✔
Micro- and macro-prudential measures	✔		✔	✔	✔	✔	
TCFD report or other environmental report	✔				✔		✔

Summary

A clear greening trend can be observed in the functioning of central banks. In the past, central banks did not specifically address sustainability issues, but since the second half and end of the 2010s, the impacts of climate change and increasingly comprehensive measurements and analyses have attracted the attention of central banks too. A growing number of central banks have started to recognise that climate change will affect their mandate, their funding role and their operations. As a result, an increasing number of central banks started to work on and communicate green issues, and several important collaborations were initiated. Some central banks engaged very early in this process, others reacted more distantly and later, but there is now a broad consensus on the importance and justification for taking sustainability into account.

The integration of sustainability and climate considerations into central bank operations can take a variety of forms and tools. Many of the leading central banks have developed a green strategy, and some central banks have set up sub-organisations within their organisation to better support mainstreaming sustainability considerations. Some central banks have developed and introduced monetary policy instruments such as refinancing loans. Various supervisory measures and the greening of portfolio and reserve management are also common.

Looking to the future, green considerations may continue to gain ground. Green strategies and communications of leading central banks suggest that this green trend could continue in the future. The programmes presented can be continued, developed and complemented, and even further actions can be expected. There could be increasingly extensive cooperation between central banks and at global level between central banks, governments, companies and households. Climate change is a shared problem and can only be solved together.

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Green bond standards as a basis for sustainable financing

Balázs Lóránt – Dániel Szabadkai

Climate change is one of the most important issues of our time, which calls for environmental awareness and responsibility also in the financial sphere, both at individual and community level. In terms of finance, one of the most obvious actions is to use the available resources to finance environmentally sustainable economic activities. However, to achieve this, it is necessary to develop rules that ensure in a transparent and verifiable manner that the structure of the underlying financial products is aligned with sustainability objectives. These rules include the green bond standards being the focus of this paper. The standards currently available and those in the process of being developed take very different approaches, with some standards relying primarily on responsible behaviour and self-regulation by the market players, while others use mandatory rules and seek to establish institutionalised controls on compliance. The green bond market is still very young and evolving, and in the frame of it a trend towards tightening and standardisation of regulation is observed. The ongoing evolution of green bond standards will, in our view, certainly promote the transition to sustainable finance and provide a solid basis for the emerging framework for sustainable finance.

1. The first green bond issuances and the development of green bond standards

The launch of the green bond market dates back to 2007. This is when the European Investment Bank (EIB) issued its Climate Awareness Bond[1]. It was the first bond whose proceeds could be used exclusively for renewable energy and energy efficiency projects. In 2008, this was followed by the World Bank's first green bond, the "World Bank Green Bond", the proceeds of which were used exclusively to finance projects to combat climate change[2]. The literature refers to these issuances as the pioneers of the green bond market.

The issuances were a breakthrough, as even before the issuances there was a real market demand for investment opportunities that took into account climate protection considerations. In late 2007, representatives of Swedish pension funds

[1] Climate Awareness Bonds https://www.eib.org/en/investor-relations/cab/index.htm
[2] 10 Years of Green Bonds: Creating the Blueprint for Sustainability Across Capital Markets https://www.worldbank.org/en/news/immersive-story/2019/03/18/10-years-of-green-bonds-creating-the-blueprint-for-sustainability-across-capital-markets

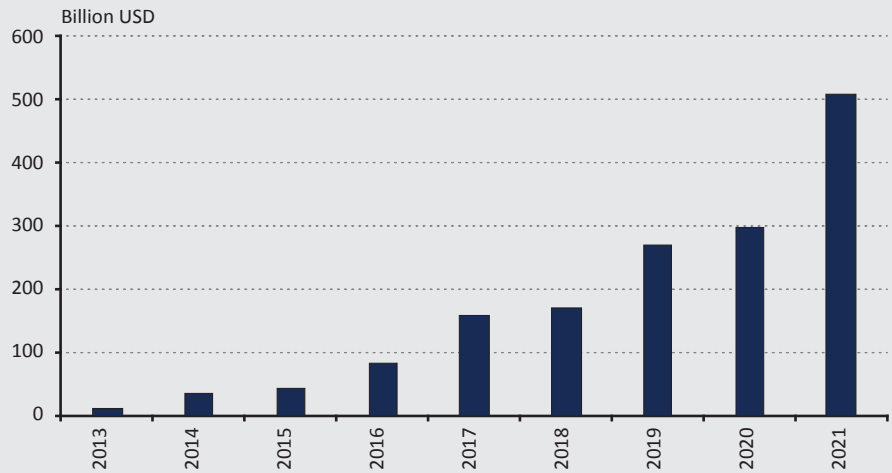
made calls to the World Bank to ask how they could find climate-friendly investment opportunities. The phone call triggered a process that included identifying environmental projects and contacting expert organisations, which ultimately led to the bond issuance. The link between the phone call and the issuance is illustrated by the fact that the World Bank's first green bond was denominated in Swedish krona.

The pioneering character of the first green bonds – beyond the creation of a market – is most pronounced in terms of the quality of the issuances. The proceeds from the EIB's climate awareness bond issuance were managed separately for each project and the EIB disclosed a report on the use of the proceeds each year. The World Bank's first issuance has been externally reviewed by the Centre for International Climate and Environmental Research (CICERO), which has considerable expertise in climate protection, providing assurance that the environmental objectives of the issuance are appropriate and feasible. Later, these schemes formed the core of the rules governing green bond standards, making it difficult to imagine a green bond issuance in the current market environment without an external reviewer's opinion or annual reporting obligations.

After the first issuances, the market started to develop dynamically. At first, supranational institutions and sovereign issuers dominated the market, but in the early 2010s financial institutions, corporate sector players and municipalities also entered the market. Although the market has developed, investor confidence has been low due to a lack of uniform regulation, and investors had to face high due diligence costs if they entered the market at all.

It has become necessary to draft a set of rules specialised for the issuance of green bonds. The Climate Bonds Initiative (CBI) published the first version of the Climate Bonds Standard (CBS) in November 2011 as the first set of rules for green bond issuance to be applied voluntarily, but it did not become widespread in the market, so their first certification was not issued until October 2014. The breakthrough came in the form of the Green Bond Principles (GBP), a set of principles for green bond issuance, drawn up by market participants under the auspices of the International Capital Market Association (ICMA) and also applied on a voluntary basis. Following the development of the Green Bond Principles, investor confidence in issuers that voluntarily adopt one of the rule schemes has started to increase, leading to a significant increase in the number and volume of issuances. While in 2013 total green bond issuance amounted to USD 11 billion, in 2015 the volume of issuances reached USD 42 billion.

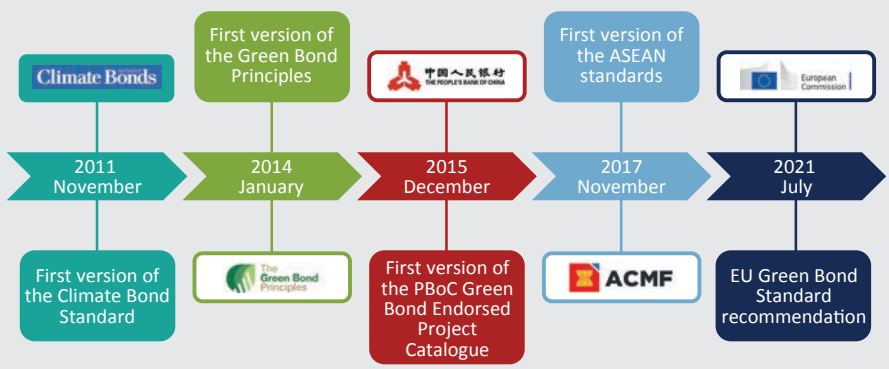
Chart 1
Value of global green bond issuance



Source: CBI

Standards in terms of specialisation and tightening have not kept pace with the surge in issuances. In this respect, several countries and regions have started to develop their own definitions and standards, taking into account country- and region-specific characteristics. This was the start of the development of green bond regulation in China in 2015, in particular in terms of defining eligible instruments, and the development of the ASEAN standard in South East Asia in 2017, which was created to expand economic cooperation in the region to green finance.

Chart 2
Timeline



Source: MNB

It has become questionable whether voluntary standards can ensure a green transition. Given the scale of growth, there have been increasing calls recently suggesting that voluntary rules are no longer able to ensure sufficient transparency and comparability of individual issuances due to the size of the market, which risks making some bonds green in their name only.[3] The concerns about the current state of the market are well illustrated by the fact that more than 14 years after the first green bond was issued, there is still no common definition of a green bond. The European Commission has developed *inter alia* in response to these concerns the draft European Green Bond Standard (EU GBS), which is currently being finalised under the EU's ordinary legislative procedure. Although the final version is not yet available at the time of writing this paper[4], we believe that the EU GBS will represent a major step forward in terms of standardisation and transparency in the European green bond market and could also have a significant impact on the global green bond market.

In our paper we look at the most important and widely used standards and related developments. In view of the above, in this paper we consider it important to present the ICMA - Green Bond Principles and the CBI - Climate Bonds Standard as the most widely used standards in today's market, as well as the European Green Bond Standard rules as the next possible milestone for the green bond market, followed by the ASEAN Standard and the Chinese efforts as national and regional green bond standards.

Box 1
Brief information on the standard-setting organisations

International Capital Market Association (ICMA) – ICMA, the International Capital Market Association, was founded in February 1969 by the major participants in the Eurobond market in Zurich, under the name Association of International Bond Dealers. The organisation initially developed rules and recommendations for international securities market trading and settlement, and later engaged in stock exchange activities. In 2005, it merged with the International Primary Market Association, which changed its name to the International Capital Market Association after the merger.

[3] The European Central Bank, for example, in its Opinion on the "Proposal for a Regulation on European Green Bonds" (5 November 2021), describes the green bond market as follows: "The green bond market currently suffers from several shortcomings. In particular, existing industry standards for green bond labels rely on definitions of underlying green projects that are not sufficiently standardised, rigorous or comprehensive. This lack of reliable, comparable and verified sustainability information undermines the credibility of the green bond market and potentially its capacity to foster the transition to a greener economy, and thus dampens demand due to greenwashing concerns and possible reputational risks for issuers and investors."
[4] The paper includes information available up to 31 May 2022.

In November 2013, the World Bank held a symposium with market participants to share knowledge on green bonds. As a result of the symposium, in January 2014, a consortium of investment banks[5] created the first version of the Green Bond Principles. It was considered necessary to appoint an independent organisation, which would act as a secretariat, taking care of administrative tasks, liaising with issuers and investors and updating the principles as necessary. This is how the ICMA came into the picture in April 2014, and since then it has greatly deepened its green focus and continues to carry out its duties in relation to the Green Bond Principles.

Climate Bonds Initiative (CBI) – The Climate Bonds Initiative (CBI) is a non-profit organisation set up in Copenhagen in 2009 at the UN Framework Convention on Climate Change conference (COP 15). At the time of its founding, the organisation had only one volunteer employee, the future president, Sean Kidney. One year after its creation, in December 2010, the CBI announced the launch of a publication, entitled Climate Bonds Standard, containing voluntary rules for the issuance of green bonds. The first version of the Climate Bonds Standard was finally published in November 2011, but market application of the standard only started in 2014. After 2014, the issuance of Certified Climate Bonds started to grow dynamically, with a cumulative amount of over USD 50 billion in 2018 and USD 210 billion in 2021.[6]

Since the creation of the Climate Bonds Standard, the Climate Bonds Initiative has continuously updated the definitions and expanded the sector eligibility criteria for eligible instruments, making the rules of the standard more stringent and specialised. The current version 3.0 also complies with the rules set out in the first draft of the European Green Bond Standard, published in 2019, according to the Climate Bonds Initiative.

European Union – The European Union has made protecting the environment and climate a priority, with the aim of reducing greenhouse gas emissions in the EU by at least 55% by 2030 compared to 1990 levels and reaching net zero emissions by 2050.

ASEAN – Association of Southeast Asian Nations is a regional organisation based on intergovernmental cooperation between ten Southeast Asian states. It aims to promote political, economic, military, educational and cultural cooperation between the countries of the region. It was created on 8 August 1967 by five Southeast Asian countries (Indonesia, Malaysia, the Philippines, Singapore and Thailand) when their foreign ministers signed a document in Bangkok declaring the establishment of

[5] The members of the association were the following investment banks: Bank of America Merrill Lynch, Citi, Crédit Agricole Corporate and Investment Bank, JPMorgan Chase, BNP Paribas, Daiwa, Deutsche Bank, Goldman Sachs, HSBC, Mizuho Securities, Morgan Stanley, Rabobank, SEB.

[6] Certified Green Issuance Reaches $200bn - Expansion of Climate Bonds Standard in 2022 – Basic Chemicals, Cement, Steel in pipeline https://www.climatebonds.net/2022/01/certified-green-issuance-reaches-200bn-expansion-climate-bonds-standard-2022

the alliance and the aims of their cooperation.[7] In the 1980s and 1990s, five more members joined – Brunei (1984), Vietnam (1995), Laos (1997), Myanmar (1997) and Cambodia (1999) – to the organisation thus the number of member countries reached 10.[8] The taxonomy and standards presented later were developed by the ASEAN Capital Markets Forum (ACMF), a collaboration of ASEAN capital market regulators established in 2004 to develop a deep, liquid and integrated regional capital market.

People's Bank of China (PBOC) – The central bank of the People's Republic of China, established on 1 December 1948. China plans to reach peak carbon dioxide emissions before 2030 and carbon neutrality before 2060.[9] To promote this, the PBOC intends to develop its green finance standards framework, strengthen its regulation on the disclosure of environmental information by financial institutions, develop a green finance incentive scheme, expand the market for green financial products and deepen international cooperation in this area.[10]

2. ICMA – Green Bond Principles

2.1. Green Bond Principles (2021)[11]

2.1.1. Principles in general

By setting out the principles of green bond issuance, the Green Bond Principles provide a sort of framework for issuance, which is filled with content by issuers. Since its first edition in 2014, the Green Bond Principles have undergone several additions, with the last edition published in 2021. The principles call for the greatest possible transparency and the widest possible publication of the necessary information. This framework consists of four pillars, which serve as a benchmark for the use of the proceeds and the preparation of the related information. In addition to the pillars, the 2021 version also includes two recommendations on the preparation of a framework necessary for issuance and the use of an external reviewers.

The ICMA has built up a deep information base on green bond issuance, primarily with a view to establishing best market practices. The organisation's recommendations are not limited to the Green Bond Principles, as there are also a number of guidelines for issuers and external reviewers to ensure that individual issuances are as consistent, comparable and transparent as possible.

[7] The Founding of ASEAN https://asean.org/about-asean/the-founding-of-asean/
[8] ASEAN Member States https://asean.org/about-asean/member-states/
[9] Asztalra csapott a kínai elnök: sürgősen el kell érni a klímavédelmi célokat (Chinese President slammed on the table: climate targets urgently needed) https://www.portfolio.hu/uzlet/20220126/asztalra-csapott-a-kinai-elnok-surgosen-el-kell-erni-a-klimavedelmi-celokat-523183 [in Hungarian]
[10] Chen Yulu: Green Finance's "Three Functions" and "Five Pillars" for Realizing "30-60 Goals" http://www.pbc.gov.cn/en/3688110/3688175/4205055/index.html
[11] ICMA (2021). ICMA Green Bond Principles 2021 https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Green-Bond-Principles-June-2021-140621.pdf

2.1.2. Definition of a green bond

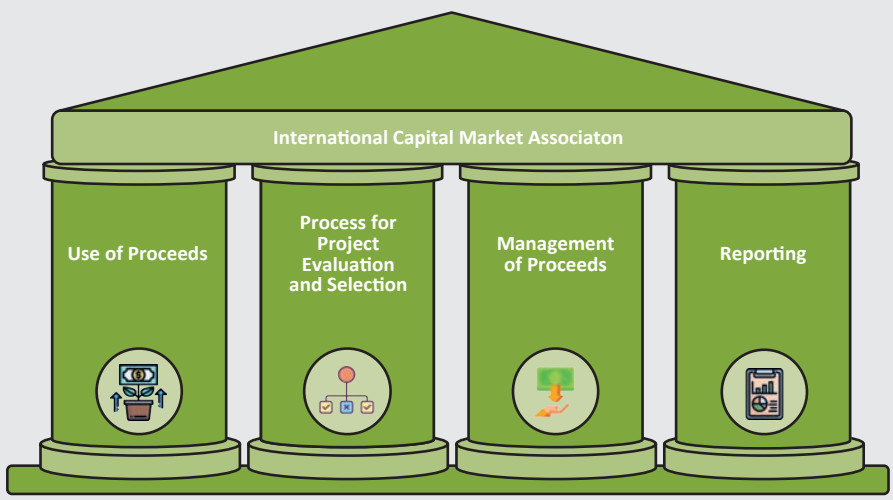
In order to standardise the green bond market and to clarify definitions, the Green Bond Principles provides a definition of a green bond. By definition, a green bond is a bond instrument whose entire proceeds are used exclusively to finance or refinance, in full or in part, new or existing eligible projects and which are issued in accordance with the four pillars of the Green Bond Principles.

The wording allows for a wide range of possibilities to conform to the definition. If we consider the four main principles set out by the Green Bond Principles as pillars, then the green bond definition is the cornerstone. The essence lies in the definition itself, which allows the market to further develop. As the Green Bond Principles are primarily recommendations, a very broad spectrum of bond issuances can be considered green by definition.

2.7.3. Pillars of the Green Bond Principles

According to the Green Bond Principles, there are four criteria that must be met in order to qualify as a green bond. The four criteria cover the following areas: (1) the proper use of proceeds, (2) the process of evaluating and selecting eligible projects, (3) the management of proceeds, and (4) reporting.

Chart 3
Pillars of Green Bond Principles



Source: ICMA, MNB

1. The proper use of proceeds. This means that the revenue from the issuance of the bond, i.e. the proceeds, can only be used to finance projects that are deemed eligible and whose environmental benefits are clearly evident from the bond documentation. The Green Bond Principles do not have their own taxonomy of eligible projects, but they do list the types of eligible assets, leaving issuers with a fairly wide room for manoeuvre in determining which projects are eligible. The types of eligible instruments are: renewable energy, energy efficiency, pollution prevention and control, environmentally sustainable management of living natural resources and land use, terrestrial and aquatic biodiversity, clean transportation, sustainable water and wastewater management, climate change adaptation, circular economy adapted products, production technologies and processes and green buildings.

It is important to note that the list of eligible projects does not reflect any order of priority, nor is it intended to be taxative. The Green Bond Principles emphasize that they do not intend to take a position on which technologies or standards are considered to be the most environmentally beneficial, but point out that there are several national and international taxonomies that define which projects and assets are considered green and eligible from an investor perspective. The above statement shows that, although the Green Bond Principles do not seek to define the range of eligible instruments, they do seek to encourage issuers to adopt best market practices.

2. The process of evaluating and selecting eligible projects. This pillar is designed to ensure that individual projects go through an evaluation and selection process that is sufficiently documented and public to allow investors to obtain sufficient information. Issuers should inform investors about the environmental objectives of each project and the administrative elements of the assessment and selection process, which should show how the issuer aligns each supported project with its environmental objectives and how it manages the environmental and social risks associated with the project. The Green Bond Principles also encourage issuers to disclose information on the assessment and selection process in line with the issuer's overall strategy, and to disclose the compliance of individual projects with formal or market-based taxonomies.

3. Management of Proceeds. In accordance with this criterion, the issuer must keep the proceeds from the issuance of the bond, or an equivalent amount, in a separate sub-account or clearly segregated from other assets. In many cases, the proceeds are not used in one lump sum or immediately, so the issuer must be transparent about the unused proceeds. The issuer may manage the proceeds on a bond-by-bond basis or as a portfolio. In addition to the above, the Green Bond Principles encourage issuers to be as transparent as possible in their revenue management

and, where appropriate, to use the services of an external party, such as an auditor, to provide the most transparent view of the management of proceeds.

4. Reporting. Every year until the maturity of the bond issued, issuers must disclose a report on the allocation of the proceeds received. With regard to the level of detail in the report, the Green Bond Principles prefer the most detailed disclosure possible, including project-by-project environmental impacts described by qualitative and quantitative indicators, but also consider it acceptable for the issuer to disclose general allocation information for the portfolio, given the large number of projects. As regards qualitative and quantitative performance indicators for environmental impacts, the Green Bond Principles also recommend the disclosure of underlying assumptions, estimates and calculations.

The ICMA published its harmonised framework for impact reports in June 2021[12]. It outlines the main principles to be taken into account for each eligible project type and the main indicators to be defined in order to make the impact report as transparent as possible. In the spirit of harmonisation, the Green Bond Principles explicitly recommend that issuers prepare their impact reports in accordance with the harmonised framework, using the template published therein.

2.1.4. Key recommendations

The main recommendation of the Green Bond Principles is for issuers to establish a green bond framework. The purpose of the Green Bond Framework is for issuers to set out in this document how the bond they issue (or the bond programme under which it is issued) meets the four pillars of the Green Bond Principles. The Green Bond Principles recommend that the framework be disclosed in a form and location that is easily accessible to investors at any time.

The other main recommendation proposes the appointment of an external reviewer as a quasi-third party to ensure that the issuance complies with the four pillars of the Green Bond Principles. The ICMA's Guidelines for External Reviewers[13] set out in detail the best market practices for the granting of external reviews. The Green Bond Principles encourage issuers to disclose the external review issued by the external review provider on their website and encourage external reviewer to disclose as much information as possible about themselves, the scope of their expertise and the areas covered by the review. It is important to note that neither the Green Bond Principles nor the guidelines published by the ICMA contain any

[12] Handbook – Harmonised Framework for Impact Reporting https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Handbook-Harmonised-Framework-for-Impact-Reporting-June-2021-100621.pdf

[13] Guidelines for External Reviewers https://www.icmagroup.org/assets/documents/Sustainable-finance/Guidelines-for-GreenSocialSustainability-and-Sustainability-Linked-Bonds-External-Reviews-February-2021-170221.pdf

mandatory requirements regarding the identity of the external reviewer[14] or the content of the external review.

2.2. Other standards published by ICMA

In addition to the Green Bond Principles, the ICMA has also defined other principles. These all set rules for bond issuances whose proceeds are intended to address an environmental or social problem.

The proceeds of the Social Bond Principles (SBP) can be used to address the social problems of specific target groups. Its set of rules, consisting of four criteria and two recommendations, is identical to the Green Bond Principles. The target groups identified may include the poor, refugees, the unemployed or other disadvantaged groups. Social problems can include, for example, ensuring adequate and sustainable food supply, affordable housing and infrastructure, or reducing unemployment.

The Sustainability-Linked Bond Principles (SLBP) set out the guidelines for bond issuances whose financial characteristics depend on the issuer's achievement of a pre-defined environmental, social or governance (ESG) objective set out in the bond documentation. Most often, the issuer will commit to higher interest payments if it fails to meet pre-defined environmental targets. The achievement of objectives is measured in pre-defined Key Performance Indicators (KPIs). The Sustainability Bond Principles require the definition of KPIs and sustainability performance targets related to benchmarking, a description of the financial characteristics of the bond, at least annual reporting on the results achieved and the involvement of an external reviewer.

Last but not least, the Sustainability Bond Guidelines (SBG) should be mentioned, which apply to bonds that achieve both sustainability and social objectives. For these bonds, the ICMA refers back to the principles set out for green bonds and social bonds, and provides guidance on the definition of sustainable bonds due to the difficulty of delimitation.

2.3. Summary

The Green Bond Principles were developed by market participants, for market participants, at a time when the green bond market was in great need of defining the rules for green bond issuance. Since the rules are only set at a principled level, their retention does not mean that the green compliance of issuances is unquestionable. In addition to adherence to the principles, the Green Bond Principles leave it up to the issuer to decide whether to take into account the best

[14] It should be noted that the ICMA has published a list of review providers that have voluntarily agreed that their external review will be in line with the guidelines for external review providers.

market practices set out in the ICMA's guidelines and, thereby, how strict it wishes to be in setting its own rules. Considering the margin of manoeuvre given to issuers and the high degree of self-determination that they can retain, it is not surprising that the Green Bond Principles are currently the most widely used market standard in the world.

Under the Green Bond Principles, it is up to investors to judge the green qualities of individual bonds. It is important to note that it has a positive impact on investor confidence and hence demand for a given issuance if the issuer is transparent and committed to environmental objectives, however, it should also be taken into account that it is difficult for investors to credibly monitor green quality and to apply any sanctions in case of a reduction in green quality or loss of green credentials.

3. CBI – Climate Bonds Standard

3.1. Climate Bonds Standard (Version 3.0)[15]

3.1.1. The standard in general

The third version of the Climate Bonds Standard was published in December 2019. As three key features of the standard, the Climate Bonds Initiative highlights that it ensures full compliance with the rules of the Green Bond Principles and Green Loan Principles[16], establishes best practices in internal control, monitoring, reporting and verification, and provides financing for instruments that are aligned with the Paris Climate Agreement.[17]

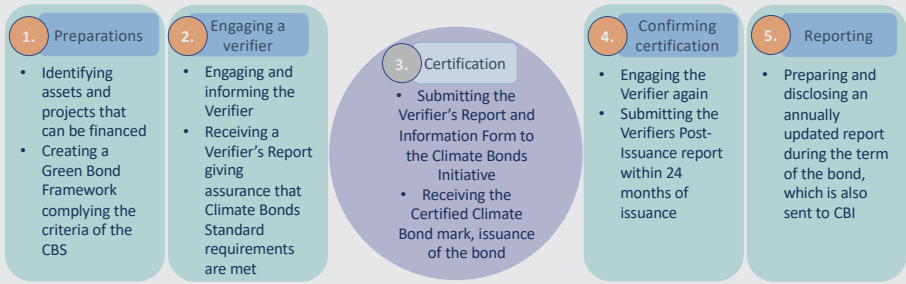
One of the key features of the Climate Bonds Standard is that the Climate Bonds Initiative acts as a quasi-authority to monitor compliance with the mandatory rules set out in the Standard. The Climate Bonds Standard sets out the rules for both the pre-issuance and post-issuance processes, whose compliance is monitored by the Climate Bonds Initiative, namely by deciding at the end of the process whether to issue a Climate Bonds Standard Certification. Although the Climate Bonds Standard, similarly to the Green Bond Principles, is a market standard based on voluntary submission by the issuer, it is considered more stringent, as it sets binding rules and compliance is monitored by the organisation that developed the Standard.

[15] Climate Bonds Standard Version 3.0 https://www.climatebonds.net/files/files/climate-bonds-standard-v3-20191210.pdf

[16] The Green Loan Principles are a set of recommendations established by the Loan Market Association, which set out the principles for green loans. The pillars of the Green Loan Principles and the Green Bond Principles are identical, so the use of the „green" label is subject to basically the same conditions.

[17] The Paris Agreement on Climate Change is an agreement under the United Nations Framework Convention on Climate Change (UNFCCC), which aims to: a) Keep the global average temperature increase to well below 2°C above pre-industrial levels; b) Increase the capacity to adapt to the adverse effects of climate change; c) Ensure consistent financial flows to move towards low greenhouse gas emission and climate resilient development options.

Chart 4
Climate Bonds Standard - the issuance process



Source: CBI, MNB

In addition to the above summary, two other important factors need to be highlighted. One is that the Climate Bonds Standard makes it mandatory to use an external reviewer registered by the Climate Bonds Initiative, both in the pre- and post-issuance process. Second, the Climate Bonds Initiative has established the Climate Bonds Taxonomy[18] and the Sector Eligibility Criteria, which define in detail the categories of eligible instruments and projects by sector, in each case linking compliance to science-based quantitative and qualitative criteria. These solutions enhance the transparency of the issuance, contribute to the credibility of the process and thereby increase investor confidence.

3.1.2. Definitions of a green bond and a climate bond

The green bond definition refers back to the Green Bond Principles definition of a green bond. According to this, those bonds can be considered green, whose entire proceeds are used exclusively to finance or refinance, in full or in part, new or existing eligible projects and which are issued in accordance with the four pillars of the Green Bond Principles.

However, the green bond definition is only a sort of starting point, as the standard focuses on the concept of a Certified Climate Bond. A certified climate bond is a green bond that has been certified by the Climate Bonds Standard Board for compliance with the Climate Bonds Standard.

[18] Climate Bonds Taxonomy https://www.climatebonds.net/files/files/Taxonomy/CBI_Taxonomy_Tables-08A%20%281%29.pdf

3.1.3. Conditions and procedure for obtaining a pre-issuance certificate

As a zero-step, the issuer must identify the assets and projects for the financing of which it wishes to issue a climate bond, and then set up a green bond framework. The Green Bond Framework should both declare the intention to comply with the Climate Bonds Standard and define how the issuance will meet the requirements of the Climate Bonds Standard. The requirements are the same as the pillars of the Green Bond Principles, but this time we are talking about binding rules instead of recommendations.

1. The requirement of the proper use of proceeds. The issuer must define the range of eligible assets and projects and prepare documentation on them that it can continuously update and keep up to date throughout the term of the bond. The face value of the bond issued must not exceed the exposure planned to be allocated to eligible assets and projects. As a rule, a project can only be financed by one bond. An exception to this rule is if the different parts of the project are financed by different bonds, which can be properly separated.

The Climate Bonds Initiative has established the aforementioned taxonomy and sector eligibility criteria to ensure a clear identification of eligible assets and projects. The taxonomy acts as a kind of initial filter that aims to define a threshold or ratio for each sustainability-related sector, below which an instrument or project may not be considered eligible. The sector eligibility criteria serve as a second filter by setting specific eligibility criteria for each sustainability-related sector. Certain specific criteria refer to metrics or performance indicators, while others refer to the intrinsic characteristics of the assets.[19] To sum up, an asset or project can be considered eligible if it meets the taxonomy and sector eligibility criteria.

2. The process of evaluating and selecting assets projects. The evaluation and selection process must be maintained and documented by the issuer throughout the term of the bond. The description of the process should include statements detailing the climate objectives to be achieved through the bond issuance, a description of the issuer's sustainability strategy and an illustration of the alignment of the bond issuance with the strategy. In addition, the issuer should provide details of the reasons for the bond issuance, the process for determining the adequacy of the assets and projects and the main findings of the process.

[19] Example: In the case of buildings, the taxonomy specifies that an investment in a residential property is considered an eligible asset if the property is in the top 15% of the region in terms of energy efficiency. Because of the definition in the taxonomy, it can be seen that the criteria also need to be specified also for the individual geographical regions. Among the sector eligibility criteria, based on the criteria published for Hungary residential properties with an energy performance certificate issued after 1 January 2016 and with a primary energy demand below the threshold established for the middle of the bond's duration will be considered eligible assets. The threshold rate starts from 118 kwh/m^2a in 2020 and decreases to 0 kwh/m^2a in 2050. Based on this, residential property projects financed with the proceeds of a 10-year bond issued in 2020 are therefore considered eligible if the primary energy demand of the property is less than the 2025 value, i.e. about 98 kwh/m^2a.

3. Requirements related to the management of proceeds. Management of the proceeds must be documented by the issuer and presented to the external reviewer. This documentation should include the rules for the tracking of proceeds, which may be done through the management in a separate sub-account or by other appropriate means. In addition, the issuer must define how unused proceeds are to be managed and a process for earmarking proceeds for specific assets and projects, with the aim of ensuring that the amounts spent on each project are sufficiently quantifiable.

4. Pre-issuance reporting rules. To this end, the issuer must disclose, before or at the latest concurrently with the issuance, a green bond framework setting out its own rules for the use of proceeds, the selection of assets and projects and the management of proceeds, as set out above.

Once the green bond framework is in place, the next step is to inform the Climate Bonds Initiative secretariat of the issuance. In the first round of information, an information sheet is filled in, containing basic information on the issuance, and the main purpose of submitting it is to inform the Climate Bonds Initiative of the intention to issue.

The issuer must subsequently engage an external verifier, registered by the Climate Bonds Initiative. The external verifier undertakes to assess the compliance of the framework with the Climate Bonds Standard and the sector eligibility requirements of the assets and projects deemed eligible. The external verifier will include its findings in an external rating (Verifiers Report) in accordance with the Guidelines for External Verifiers[20] published by the Climate Bonds Initiative.

Once the external verification is obtained, the issuer can apply for certification from the Climate Bonds Standard Board. To do this, the information sheet, the green bond framework, the Verifiers Report and the Certification Agreement must be submitted to them. If the Climate Bonds Standard Board deems the documents to be appropriate, it will declare in a statement that the issuer is eligible to use the Certified Climate Bond certificate for the issuance in question.

A pre-issuance certification can be used for a maximum of two years after issuance. Namely, in the two years following the issuance, the issuer must also apply for a post-issuance certification, for which it must meet the conditions laid down for the post-issuance period. It should be noted that if the issuer withdraws from the issuance or in the meantime the Climate Bonds Standard Board becomes aware that the issuance does not comply with the pre-issuance conditions, the issuer may no longer use the certification in these cases.

[20] Guidance for Verifiers – Version 2.0 https://www.climatebonds.net/files/files/2021-06-17_cbs-guidance-for-verifiers-v2_%28AUP-removed%29.pdf

3.1.4. Conditions and procedure for obtaining and maintaining a post-issuance certificate

Obtaining a post-issuance certification can be understood as a (self-)verification process. The process leading to a pre-issuance certification can be seen as the issuer promising to use the proceeds of its bond issuance to achieve environmental goals, and the external verifier certifies that the promises are feasible. However, after the issuance, the Climate Bonds Initiative would like to make sure that the issuer has delivered on its promises. The issuer will then have to update its framework and request the external verifier again to verify that the funds received have been used as promised. The conditions for obtaining a post-issuance certification are the following.

1. In the area of the use of proceeds, the issuer must certify that the proceeds have indeed been used for eligible assets and projects. The issuer must allocate the proceeds within two years of issuance, failing which it must describe in the allocation report the envisaged use of the proceeds. The issuer has the possibility to identify new eligible assets and projects in sectors previously already identified after the issuance. If it is intended to support assets and projects in sectors not previously covered by the relevant issue, an external verifier will be required for these assets and projects to demonstrate compliance with the sector eligibility criteria.

2. Expectations for the process of evaluating and selecting assets and projects remain unchanged compared to pre-issuance requirements. The issuer is required to continue to maintain and properly document the process, so there are no additional requirements for these conditions in the Climate Bonds Standard.

3. In addition to the documentation of proceeds spent on assets and projects, the Climate Bonds Standard also regulates the management of unspent proceeds. Under the rules, the issuer may hold unused resources in temporary investment vehicles that are classified as cash or cash equivalents or that do not finance projects involving greenhouse gas emissions that are contrary to the bond's objectives. In addition, they can also repay unused revolving-type debts, provided that the amount can be re-drawn after repayment.

4. Every year during the term of the bond, the issuer is required to prepare an Update Report, which must be sent to the Climate Bonds Standard Board and, as a rule, made available to the public. The updated report consists of, or can consist of, three parts. The first part is the Allocation Report, which must include a statement of compliance with the Climate Bonds Standard, a statement of environmental objectives and a list of eligible assets and projects, with an indication of the amounts spent on each asset and project, expressed also as a percentage or estimated percentage compared to the total amount raised, and the geographical location of each asset and project. The second part is the Eligibility Report, in

which the issuer must declare that the assets and projects deemed eligible continue to meet the taxonomy and sector eligibility criteria set out in the Climate Bonds Standard, including compliance with the environmental characteristics and performance indicators set out in the sector eligibility criteria. The third part is the Impact Report, which is not a mandatory element, however the Climate Bonds Standard recommends that an Impact Report be prepared as part of the update report. The impact report, if prepared by the issuer, should include the expected results and impacts of the assets and projects considered eligible[21], as well as the qualitative and quantitative performance indicators used to determine them and the calculation methods.

The Climate Bonds Initiative decides whether the above requirements are met and thus whether the post-issuance certification is issued. To obtain a post-issuance certification, the issuer must complete the information sheet with the updated data and, if necessary, update the green bond framework. Subsequently, the external verifier commissioned in the pre-issuance phase must assess whether the issuer has fulfilled the conditions for obtaining the post-issuance certification and must again summarise its findings in the Verifiers Report. The documents generated must be submitted to the Climate Bonds Standard Board, which will decide whether to issue a post-issuance certificate after examining the documents. If the external verifier or the Climate Bonds Standard Board determines that the issue does not comply with the Climate Bonds Standard, the certificate can no longer be used in respect of the issuance.

It is important to note that, the Climate Bonds Initiative process does not end with the issuance of a post-issuance certificate. In fact, in order to maintain the certificate, the issuer has to prepare an updated report every year that meets the above criteria and send it to the Climate Bonds Standard Board. In addition, the Climate Bonds Standard Board may request information on the bond from the issuer at any time during the use of the certificate. If it is found that the bond does not comply with the Climate Bonds Standard, the Climate Bonds Standard Board may, as a condition for maintaining the certificate, at any time request the issuer to have a new Verifiers Report completed for the bond by a new external verifier.

The Certified Climate Bond certificate can be lost if the issuance does not meet the requirements. If the Climate Bonds Standard Board withdraws the certificate for any reason, the issuer may no longer use it. In addition, the issuer must inform the bondholders of the loss of the certificate and make every effort to ensure that the bond is no longer listed anywhere as a Climate Bonds Standard-compliant instrument.

[21] Results may include, for example, the number of electric cars produced during the project. And the impact of the project can be measured, for example, in the amount of greenhouse gas emissions avoided.

3.2. Summary

The Climate Bonds Standard is considered the most stringent of the market standards currently in use. The strictness of the Climate Bonds Standard is not only that it sets mandatory conditions for obtaining a certificate, but also that it has developed rules for the procedure leading to obtaining and maintaining a certificate, including the possibility of losing it. Detailed rules will significantly increase transparency and the traceability of the liability-to-asset link to ensure a high green quality, and the regulatory nature of the Climate Bonds Initiative will provide investors with a high level of protection against the risk of abuse of green credentials.

Due to the strictness of the rules, the Climate Bonds Standard is less widely used in the market than the Green Bond Principles. Compliance with the Climate Bonds Standard entails significantly more administration and costs than compliance with the Green Bond Principles. For this reason, the majority of issuers are opting for the simpler and cheaper route, and the market in its current state is not forcing issuers to change this trend.

4. the European Green Bond Standard

4.1. The process of developing the European Green Bond Standard

The European Commission published the European Green Deal[22] on 11 December 2019. The agreement sets out an action plan to turn climate and environmental challenges into inclusive opportunities across all policy areas and thereby make the EU economy sustainable. The European Union has recognised its responsibility to address the challenges of climate and the environment and has identified them as the most important challenges of the present generation. The European Green Deal aims to achieve net zero greenhouse gas emissions by 2050, decoupling economic growth from resource use and ensuring that neither individuals nor regions lose out from this transformation.

The European Green Deal has identified the need to ensure green investment and green financing among its policies. To achieve this, it considered necessary firstly, to adopt a taxonomy of sustainable economic activities and to revise the directive on the disclosure of non-financial information to make climate and environmental data public, secondly, to label retail investment products and to develop an EU green bond standard, and thirdly, to integrate climate and environmental risks into the financial system. Based on the European Green Deal, the development of an EU green bond standard is primarily needed to facilitate the identification and credibility of environmentally sustainable investments. The European Commission

[22] European Green Deal https://eur-lex.europa.eu/legal-content/HU/TXT/HTML/?uri=CELEX:52019DC0640&-from=EN

formally announced the development of an EU green bond standard in the Investment Plan for the European Green Deal[23], published on 14 January 2020.

On 6 July 2021 the European Commission published its proposal for a regulation on European Green Bonds (Proposal). The rules set out in the Proposal are binding but apply on a voluntary basis, i.e. they only apply to issuers and issues that wish to use the European Green Bond designation. The Proposal lays down fairly strict rules, as it is designed to enhance the credibility of the sustainable investment market. According to the Explanatory Memorandum to the Proposal, the Commission has identified the following problems in the green bond market: *"Because of the widespread use of proprietary market frameworks for green bonds, and despite the fact that some of these frameworks are commonly accepted as setting a standard, it can be costly and difficult for investors to determine the positive environmental impact of bond-based investments and compare different green bonds on the market. For issuers, the lack of common definitions of environmentally sustainable economic activities creates uncertainty about which economic activities can be considered to be legitimately green. In such conditions, issuers may face reputational risks from potential accusations of greenwashing, especially in transitional sectors. In addition, the fragmentation of practices in the area of external review can create additional costs for them. These obstacles may affect the profitability of projects with substantial climate and environmental impact, thereby reducing the supply of such investment opportunities and impeding the achievement of the Union's environmental goals."*[24]

The European Green Bond Regulation had not yet entered into force at the time of this paper. The regulation is adopted under the ordinary legislative procedure, whereby the European Commission initiates legislation by issuing a proposal and the European Parliament and the Council of the European Union then decide whether to adopt it. The ordinary legislative procedure allows for several readings, both in the European Parliament and in the Council of the European Union. At the time of writing this paper, the Proposal is undergoing its first reading in the European Parliament, where the Committee on Economic and Monetary Affairs has been designated as the competent committee. On 16 May 2022, the Committee on Economic and Monetary Affairs adopted its report containing the amendments to the proposal (Report) and decided to open inter-institutional consultation with a view to establishing a common position of the legislative institutions.

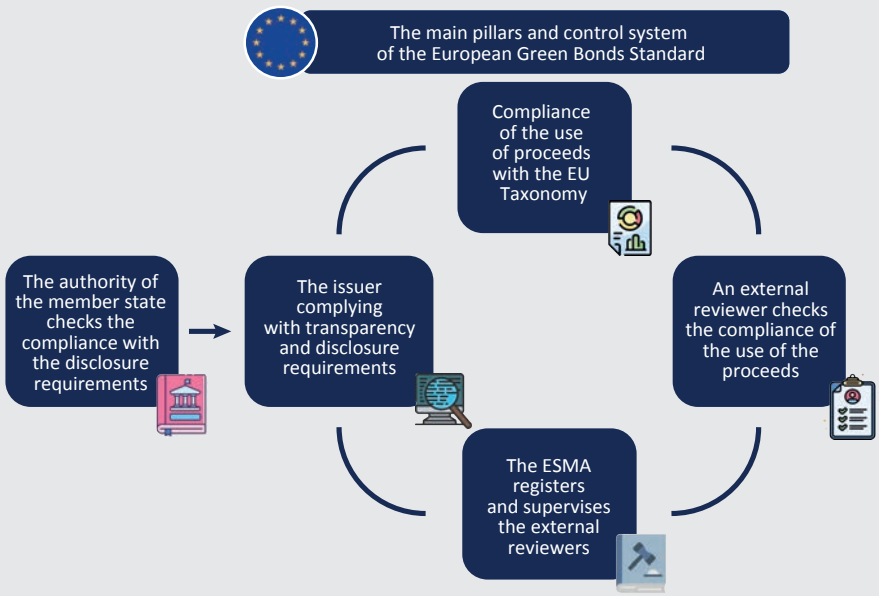
[23] The European Green Deal Investment Plan https://eur-lex.europa.eu/legal-content/HU/TXT/HTML/?uri=CELEX:52020DC0021&from=EN

[24] Proposal for a regulation on European green bonds https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0391&from=EN

4.2. Proposal of the European Commission for a European Green Bond

The Proposal makes the use of the European Green Bond designation subject to four mandatory criteria. The requirements include the use of the proceeds of the bond issuance in accordance with the EU Taxonomy Regulation[25], compliance with transparency requirements relating to the issuance, the appointment of an external reviewer and the registration of the external reviewer with ESMA (European Securities and Markets Authority).[26]

Chart 5
Main criteria and verification system for the European Green Bond Standard under the Proposal



Source: MNB

1. Compliance of the use of proceeds with the taxonomy. The EU Taxonomy Regulation is used to determine whether an economic activity can be considered environmentally sustainable. The regulation sets six environmental objectives: mitigation of climate change; adaptation to climate change; sustainable use and protection of water and marine resources; transition to a circular economy; prevention and reduction of pollution; and protection and restoration of biodiversity

[25] 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 https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32020R0852&from=EN
[26] European green bonds: A standard for Europe, open to the world https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698870/EPRS_BRI(2022)698870_EN.pdf

and ecosystems. Economic activities are considered to be environmentally sustainable if they contribute significantly to the achievement of one of the environmental objectives without significantly compromising the achievement of another environmental objective and are consistent with minimum human rights and social safeguards. The European Commission, with the assistance of the Sustainable Finance Platform established under the Regulation as a permanent expert group, develops delegated acts setting out the technical criteria for the assessment of specific economic activities.[27]

The requirement of compliance with the taxonomy ensures that only economic activities with a lasting positive impact on the environment are financed from the proceeds of European Green Bonds. Proceeds may therefore be used only to finance the purchase of fixed assets, capital expenditure, operating costs or financial assets financing them that meet or will meet the requirements of the taxonomy within a predetermined period of time. In the latter case, the issuer must establish a plan for taxonomy compliance, in which it must specify the activities and expenditures necessary to achieve the compliance of the economic activity with the taxonomy within the specified period. The specified period may be 5 or, in exceptional cases, 10 years from the date of issuance of the bond. It should be noted that, in view of the evolution of technologies, a review of the legislation may be necessary over time. In this respect, the Proposal stipulates that the use of the proceeds of the bond issuance will be subject to the technical criteria applicable at the time of issuance, with any changes to the technical criteria being applied in any event 5 years after the entry into force.

2. To ensure transparency and proper information for investors, the Proposal sets out standardised disclosure requirements[28]. Under the Proposal, the issuer must complete a standardised factsheet for the bond it intends to issue, in which it must present a plan for the use of the proceeds. The factsheet must be approved by an external reviewer meeting the requirements of the Proposal and the issuer must then disclose both the factsheet and the external pre-issuance review document

[27] The technical assessment criteria define the metrics along which an economic activity contributes to the achievement of an environmental objective and along which that economic activity does not harm other environmental objectives (called the DNSH criteria). Take the example of economic activity for the construction of a new building. This economic activity is considered to make a significant contribution to climate change mitigation if the primary energy demand determining the energy efficiency of the property developed is at least by 10% lower than the threshold for near-zero energy buildings (currently 100 kwh/m^{2}a in Hungary). However, care should also be taken to ensure that the economic activity does not compromise other environmental objectives, such as the sustainable use and protection of water and marine resources, for example, the water flow rate of bathroom taps and kitchen taps in the new building should not exceed 6 litres/minute; the water flow rate of showers should not exceed 8 litres/minute; the total flush water volume of toilets should not exceed 6 litres and the average flush water volume should not exceed 3.5 litres. In addition, harm to other environmental objectives must also be considered, such as the adequacy of building elements or the recyclability of non-hazardous construction waste. The example shows that compliance with taxonomy is based on quite detailed and strict rules.

[28] The annexes to the Proposal include the template, the allocation report, the impact report and the model documents setting out the formal requirements for external reviews, the use of which is mandatory.

on its website. Each year after the issuance, the issuer must disclose an allocation report on the use of the proceeds of the bond. The allocation report prepared after the total proceeds have been used must be approved by an external reviewer meeting the requirements of the Proposal[29]. The issuer must disclose the allocation reports and the post-issuance external review document for the last allocation report on its website. The issuer is required to prepare an impact report after the use of all proceeds, but still before the maturity of the bond, in which the issuer describes the environmental impact of the bond, with a detailed description of the metrics, methodologies and assumptions used to assess the environmental impact.

3. The issuer must engage an external reviewer to verify the truthfulness, reliability and authenticity of the information disclosed in relation to the issuance. The task of the external reviewer is to assess the compliance with the taxonomy of the issuance, both before and after it. The external review documentation should contain relevant information on the issuance, including the methodologies and key assumptions used in the external review. The external reviewer has the possibility to give a positive or negative opinion on the issuance. In the case of a negative opinion, the designation „European Green Bond" cannot be used for the issuance in question. Under the Proposal, the key decision on the assessment of issuances is therefore in the hands of the external reviewer, for which additional safeguards are needed to ensure that the external reviewer's process is appropriate. It should be noted that under the Proposal, neither the competent authority of the Member State supervising the disclosure nor the ESMA supervising the external reviewers will be entitled to impose sanctions in case the external reviewer delivers a positive opinion despite the lack of compliance with the taxonomy.[30]

Compliance by issuers with their disclosure obligations is supervised by the competent authorities of the Member States[31]. The competent authorities may carry out investigations or require issuers to provide documents and information. In the event of non-compliance with the obligations imposed on issuers, they can suspend the issuance of European Green Bonds for up to 10 working days, ban the advertising of European Green Bonds for up to 10 working days and make public the fact of the breach. In addition to the above, the Proposal gives Member States the power to grant additional sanctioning powers to the competent authority to ensure that issuers comply with their obligations. In this context and under the Proposal, the competent authorities may decide to impose administrative fines

[29] Where the issuer is a financial undertaking that finances a portfolio of financial instruments consisting of several European Green Bond proceeds, all allocation reports shall be subject to post-issuance external review.

[30] Green Bonds: An assessment of the proposed EU Green Bonds Standard and its potential to prevent greenwashing https://www.europarl.europa.eu/RegData/etudes/STUD/2022/703359/IPOL_STU(2022)703359_EN.pdf

[31] In Hungary, the competent authority in accordance with Article 31 of Regulation (EU) 2017/1129 (Prospectus Regulation) is the Magyar Nemzeti Bank.

of up to EUR 500,000 on legal persons and EUR 50,000 on natural persons, but Member States may also provide for more severe administrative fines under the Proposal. Member States must ensure that there is a right of appeal to the courts against the decision of the competent authority. The competent authority must inform the ESMA annually of the administrative measures and sanctions applied.

4. The Proposal gives ESMA general powers for the registration and ongoing supervision of external reviewers[32]. Registration is subject to an application, which must be accompanied by all the information necessary to demonstrate that the entity applying for registration has appropriate corporate governance arrangements in place, that its senior management has a good reputation, sufficient expertise and experience, and that the number, skills and experience of the staff directly involved in the review are adequate. The external reviewer must maintain compliance with the above after registration. If ESMA finds that an entity does not meet the requirements, it may decide to reject the application for registration or, after registration, to withdraw it. As a supervisory authority, the ESMA may request information, conduct general and on-the-spot investigations and, where these reveal an infringement, take supervisory action. In doing so, it may withdraw the registration of the external reviewer, temporarily prohibit the external reviewer from carrying out its activities, impose a fine or periodic penalty payment and issue a notice of the fact of the infringement. The ESMA may apply each supervisory measure also collectively. The external reviewer may appeal against a decision of ESMA imposing a fine or periodic penalty payment to the Court of Justice of the European Union.

4.3. Amendments proposed by the European Parliament's Committee on Economic and Monetary Affairs

On 16 May 2022, the European Parliament's Committee on Economic and Monetary Affairs adopted the Report containing its proposals for amendments[33]**.** The aim of the Report is on the one hand to further unify the green bond market, so that certain rules would apply not only to European green bonds, but also to all bonds marketed as environmentally sustainable in the European Union[34] and

[32] The Proposal establishes a three-stage revision system involving national authorities and the ESMA. In the first step, an external reviewer assesses whether the issuance meets the conditions of the European Green Bond Standard, in the second step, the national authority checks that the issuer has disclosed the documentation related to the issuance in accordance with the requirements, and in the third step, ESMA checks the proper functioning of the external reviewers.

[33] Report on the proposal for a regulation of the European Parliament and of the Council on European green bonds https://www.europarl.europa.eu/doceo/document/A-9-2022-0156_EN.pdf

[34] The concept of bonds marketed as environmentally sustainable in the European Union includes all bonds where the issuer has committed to use the proceeds of the issuance for activities that pursue environmental objectives, including bonds issued under the Green Bond Principles or the Climate Bonds Standard.

to all sustainability-linked bond [35]. On the other hand, the Report aims to further tighten the rules on the European Green Bond as a means of curbing the abuse of green credentials.

The amendments set out in the Report are designed to promote consistency and transparency. The Report sets out disclosure rules for bonds marketed as environmentally sustainable and sustainability-linked bonds in the European Union and extends to them the rules on the appointment and supervision of the external reviewer applicable to European Green Bonds. Under the disclosure rules, issuers of bonds marketed as environmentally sustainable in the European Union and sustainability-linked bonds must disclose the due diligence processes and rules they apply to eliminate any factors in their operations that could have a negative impact on sustainability. A further obligation is that the issuer of a bond marketed in the EU as environmentally sustainable must disclose, prior to the issuance, inter alia, the environmental objectives of the bond, how the proceeds of the bond issuance will be used and the extent to which this will comply with the EU Taxonomy Regulation, and the issuer must report annually on the achievement of the environmental objectives after the issuance. The information disclosed prior to the issuance and the information set out in the annual report must be certified by an external reviewer registered under the European Green Bond rules.

The rules on the European Green Bond have also been tightened. To demonstrate commitment to the climate targets, the issuer of a European Green Bond must prepare a transition plan that sets out how the issuer will achieve climate neutrality by 2050 at the latest. The transition plan must be approved by an external auditor. In addition, as a result of the Report, issuers will have civil liability for the use of proceeds in compliance with the EU taxonomy. In this context, Member States are obliged to ensure that their legal systems allow investors to pursue claims for damages against parties causing it.

In the area of control, Member State authorities have been given additional powers. The Report gives the Member State's authority the right to ban an issuance for non-compliance with the disclosure rules, and in the case of repeated non-compliance, to ban an issuer from issuing European Green Bonds for up to 1 year. As the rules on external review have been extended to include bonds marketed as environmentally sustainable and sustainability-linked bonds in the European Union, the Member State's authority's powers of control are also extended to these bonds. If the issuers of such bonds do not comply with the relevant disclosure rules, the

[35] The Report draws on the concept introduced by the ICMA to define sustainability-linked bonds, with the difference that the ICMA defines sustainability-linked bonds as bonds aimed at pursuing environmental, social and corporate governance objectives, whereas based on the Report, the scope of the Regulation can only cover sustainability-linked bonds aimed at achieving environmental objectives.

Member State' authority may disclose the breach or require the issuer to disclose information about the breach.

The Report envisages the possibility of mandatory application of the European Green Bond Standard in the medium term. Two years after the entry into force of the Regulation, and every three years thereafter, the European Commission is required to prepare an impact assessment report for the Parliament and the Council, in which they may propose to make the application of the Regulation mandatory.

4.4. Summary

Drafting of the European Green Bond Standard is a major milestone in the life of the green bond market. If the standard is adopted and published, it will be the first set of rules on green bonds to be introduced as a legal act. This approach alone strengthens the credibility of the green bond market, as non-compliance can be interpreted as a breach of law, while in the case of the other standards it can only be interpreted as a breach of contract.

The European Green Bond Standard is expected to set the most stringent requirements for the issuance of green bonds. The EU legislator considers that achieving the objectives set out in the European Green Deal requires the development of a standard that ensures that issuers use the funds raised from bond issues to finance assets and projects that are considered sustainable according to the current state of science. In order to achieve this, the legislator expects a high level of transparency and aims to establish a significantly stricter supervisory regime than the currently available market standards, including through the incorporation of a number of filters, including ESMA's supervisory powers, to ensure that proceeds are properly used and that investors are credibly informed.

5. ASEAN standards

5.1. Bond standards

The ASEAN standards are based on the ICMA standards. The ASEAN standards were developed by the ASEAN Capital Markets Forum (ACMF), which brings together capital market regulators from the 10 ASEAN countries and has the primary task of integrating the region's capital markets and strengthening cooperation. In response to the growing demand for sustainability-oriented investment opportunities, and highlighting the strong exposure of ASEAN countries to climate change, the ACMF has created the ASEAN Green Bond Standards (AGBS), the ASEAN Social Bond Standards (ASBS) and the ASEAN Sustainability Bond Standards (ASUS), in order, on the model of the previously described Green Bond Principles, Social Bond Principles

and Sustainability Bond Guidelines.[36] The 4 main components of the standards are thus similar to the ICMA standards previously discussed:

- The proper use of proceeds
- The process for evaluating and selecting eligible projects
- Management of proceeds
- Reporting

ASEAN standards aim to enhance transparency, consistency and uniformity. The standards will also contribute to the development of new asset classes, reduce due diligence costs and help investors in their decision-making. The ASEAN standards also set out additional criteria to the ICMA's broader guidelines.

The ASEAN Green Bond Standards were issued in November 2017 and revised in 2018. In the case of green bonds, even before the ASEAN Taxonomy, the proceeds from the issuance of green bonds were used to finance projects such as renewable energy, energy efficiency, pollution prevention and control, clean transport, adaptation to climate change or the construction of green buildings. However, fossil energy projects have been excluded from the eligible activities. In addition to adhering to the recommendations of the Green Bond Principles, it is expected that the issuer of the green bond or the issuance must be geographically or economically linked to the region, so that the issuer must be based in one of the ASEAN countries or the project to be financed must be linked to one of the ASEAN countries, in addition to the mandatory requirement that the issuance must take place in an ASEAN country. During the term of the bond, the issuer must disclose the necessary information on its website. Issuers are required to report at least annually, but a reporting period more frequent than once a year is recommended. Both qualitative and quantitative indicators and metrics are recommended in the report. External review is voluntary, but the reviewer is expected to have relevant expertise and experience, and the review must be available on a public website.[37]

Also in November 2017, ASEAN's standard for social projects, the ASEAN Social Bond Standards were published. In the case of social bonds, the proceeds of the issuance are typically used to finance social projects such as affordable housing and infrastructure, access to basic services, job creation or food safety. However, activities that have a negative social impact, such as projects involving alcohol, tobacco, gambling and weapons, are not eligible. ASEAN social bonds are subject

[36] Development of a Sustainable Asset Class in ASEAN: Fact Sheet https://www.theacmf.org/images/downloads/pdf/Development%20of%20Sustainable%20Asset%20Class%20in%20ASEAN%20%20Factsheet.pdf
[37] ACMF: ASEAN Green Bond Standards https://www.theacmf.org/images/downloads/pdf/AGBS2018.pdf

to the same technical criteria as green bond standards, for example in terms of the issuer, issuance, use of proceeds, reporting and external review.[38]

The ASEAN Sustainability Bond Standards are simply a combination of green and social bond standards. The sustainability bond standards have been defined in a very simple way. An ASEAN Sustainability Bond issuer must comply with both the ASEAN Green Bond Standards and the ASEAN Social Bond Standards. And of course, the proceeds should not be used to finance any project excluded by the standard.

5.2. Taxonomy

The ASEAN taxonomy was published in 2021. In November 2021, the ASEAN Taxonomy Board (ATB) published the first version of the ASEAN Taxonomy for Sustainable Finance (ASEAN Taxonomy). The taxonomy serves as a reference point for channelling capital and finance to make the region systemic and sustainable. The taxonomy also serves as a common language for ASEAN member countries with different regulations, helping to coordinate the green labelling of economic activities and financial instruments.[39]

The ASEAN taxonomy is defined along 5 principles. Firstly, the taxonomy will be the overarching guidance for Member States, which will provide a common language and complement national sustainability initiatives. Secondly, the taxonomy takes into account other widely used taxonomies and helps the transition to a sustainable economy for ASEAN member countries. Thirdly, the taxonomy should be inclusive and beneficial to all Member States. Fourthly, it should provide a credible framework, including definitions, and should be based on science where possible. Finally, the taxonomy should be consistent with the measures already taken by the capital markets, banking and insurance sectors.

The taxonomy of ASEAN is a two-tier system. The first level of the taxonomy, the Foundation Framework (FF), is a pillar that allows for the qualitative assessment of economic activities, while the second pillar, the Plus Standard (PS), is quantitative, using metrics and thresholds to define eligible green activities. The Foundation Framework includes 4 environmental objectives and 2 core criteria. The Plus Standard provides further guidance and sets out activity-level criteria.

The taxonomy identifies 4 environmental objectives. In alignment with the Paris Climate Goals, the ASEAN taxonomy identifies 4 environmental targets, as shown in the following chart.

[38] ACMF: ASEAN Social Bond Standards https://www.theacmf.org/images/downloads/pdf/ASBS2018.pdf
[39] ASEAN Sectoral Bodies Release ASEAN Taxonomy for Sustainable Finance – Version 1 https://asean.org/asean-sectoral-bodies-release-asean-taxonomy-for-sustainable-finance-version-1/

Chart 6
4 environmental goals of the ASEAN taxonomy

Source: Based on ACMF ASEAN taxonomy, own edit.

As part of the Foundation Framework, 2 additional criteria have been defined. As mentioned earlier, in addition to the 4 environmental objectives, 2 criteria have been defined in the taxonomy as part of the Foundation Framework. One such criterion is Do No Significant Harm (DNSH), which, similar to the definition used in the EU Taxonomy, means that an activity that meets one of the objectives must not harm the other objectives. Another such criterion is that activities should be assessed at the outset to eliminate or minimise risks and impacts.

Certain sectors are prioritised as defined in the Plus Standard. For the exact classification of activities, the ASEAN taxonomy uses the International Standard Industrial Classification (ISIC) system, as it is compatible with the classification systems of ASEAN countries. Among the sectors, 6 so-called focus sectors were prioritised based on gross value added and greenhouse gas emissions. These 6 sectors account for 55 percent of gross value added and 85 percent of greenhouse gas emissions in ASEAN countries. These 6 sectors were also ranked with different weightings, as follows:

1. Agriculture, forestry and fishing

2. Manufacturing

3. Electricity, gas, steam and air conditioning

4. Transportation and storage

5. Construction and real estate activities

6. Water supply, sewerage collection and treatment, waste management and remediation activities

At both levels of taxonomy, grouping is based on 3 colours. These colours are green, amber and red. In the first version of the taxonomy, only the first of the 4 environmental objectives, climate change mitigation, was presented as part of the

colour classification. Additional environmental objectives will be presented in later versions. For the first purpose, an activity that clearly contributes to mitigating climate change is considered green. Amber, which contributes to decarbonisation and although it causes some environmental damage, it is being addressed in some form. Red, which does not contribute to mitigation or does not meet the basic criteria.[40]

5.3. Summary

The ASEAN standard is therefore a regional standard that aims to strengthen transparency and uniformity and to encourage investment. ASEAN is drawing on the ICMA guidelines and is complementing them with additional criteria for sustainability and green development in the region. The regional character is very strong, the aim is to ensure cooperation between ASEAN countries and their markets. The ASEAN standard does not aim at strict rules, but rather builds on the minimum conditions that ensured the encouragement of green investments and capital expenditure in the early stages of market development, while the development of the ASEAN taxonomy is already pointing towards a gradual tightening of rules.

The ASEAN's green initiatives have many similarities with EU measures. As discussed above, the ASEAN Green Bond Standards explicitly and the European Green Bond Standard implicitly draws on the ICMA guidelines, and on the other hand there is a large overlap between the taxonomies in terms of environmental objectives and the application of the "do no significant harm" criterion[41].

6. Chinese green bond guidelines

The Chinese green bond standards are aimed at the Chinese economy, taking into account local specificities, and are not international standards. It is important to note at the very beginning that, unlike the international standards mentioned earlier, the Chinese regulations were primarily drafted by taking into account domestic specificities, they were created by Chinese organisations and their aim is to finance domestic green projects and the green transformation of China's economy.

[40] ASEAN Taxonomy for Sustainable Finance https://www.theacmf.org/images/downloads/pdf/ASEAN-Taxonomy.pdf

[41] The Report of the European Parliament's Committee on Economic and Monetary Affairs regarding the European Green Bond Standard allows for the adoption of taxonomies that are compatible with the EU Taxonomy. On the basis of the adoption, the proceeds of European Green Bonds will also be used to finance projects in the country of the adopted taxonomy that are aligned with the taxonomy. Initiatives such as overlap between taxonomies and alignment with taxonomies could be a significant step forward in global standardisation efforts.

There are 3 guidelines for issuing Chinese green bonds, depending on the issuer. Green bonds issued by financial institutions have to comply with the Green Bond Endorsed Project Catalogue established by the People's Bank of China (PBOC) with the help of the People's Bank of China and other organisations. Corporate Green Bonds and unlisted corporate Green Bonds in general must comply with the provisions of the National Development and Reform Commission (NDRC) Green Bond Guidelines. Finally, listed companies' green bonds and asset-backed green securities must comply with the China Securities Regulatory Commission (CSRC) Guidelines for Supporting Green Bond Development.[42]

In 2015, the first version of the Green Bond Endorsed Project Catalogue was published, which defines the range of green projects that financial companies can finance with green bonds issued. The Catalogue highlights that due to environmental challenges there is a need to green the Chinese Economy and make it sustainable. The financial system plays a key role in resource allocation, industrial restructuring and the transition to a green economy. Previously, there were no criteria or possible funding objectives to discourage investment. The Catalogue aimed to address this by identifying green objectives that can be financed, supporting green projects and the uptake of green bonds. The Catalogue prioritises green projects with a direct impact. Potential green projects are grouped into 6 categories: energy saving, pollution prevention and control, resource conservation and recycling, clean transport, clean energy, ecological protection and adaptation to climate change. At the same time, projects such as clean use of carbon were also accepted in the 2015 catalogue.[43]

In 2021, a new Green Bond Endorsed Project Catalogue was published under the leadership of the PBoC. In the latest detailed Catalogue, which entered into force on 1 July 2021, the 6 main categories have also changed, the main categories being:

1. Energy saving and environmental protection – This includes the production of energy-efficient equipment, building materials, waste water treatment, recycling and pollution prevention and treatment of all kinds.

2. Cleaner production industries – For example, improving the energy efficiency of agricultural and industrial production companies, reducing their emissions and managing these materials.

3. Clean energy industry – This category includes all renewable energy projects, such as wind, solar and hydro projects – setting up power plants, manufacturing

[42] Chinese domestic Green Bond Channel https://www.bourse.lu/chinese-domestic-green-bond-channel
[43] China Green Bond Endorsed Project Catalogue (2015 Edition) http://www.greenfinance.org.cn/displaynews.php?cid=79&id=468

products. In the clean energy category, clean nuclear energy projects can also be financed with green bonds.

4. Ecological and environmental sector – This category typically includes projects aimed at environmentally friendly agriculture, the protection and appropriate use of forests and the conservation of wildlife.

5. Sustainable infrastructure development – Infrastructure projects eligible for funding include urban heating and energy system improvements, green residential and commercial real estate, and land, water and air transport projects.

6. Green services – Green services is perhaps the most interesting category that is a new category in the catalogue. This includes green consultancy, assessment services, green audit services, management services, project evaluations and certifications.[44]

It is important to note that this Catalogue no longer includes coal and other fossil fuels among the projects that can be financed with green bond proceeds.[45]

In addition to the projects that are eligible for funding, other proposals and expectations are also set out. In addition to complying with the Green Catalogue, similar to international standards, monitoring and reporting of environmental impact is recommended. It is also recommended that issuers obtain and disclose an external review. The accreditation of an external reviewer company is also a mandatory requirement.[46]

7. Summary

While the green bond market continues to evolve and grow, it is still characterised by heterogeneity due to immature regulation. The market has undergone significant changes since its creation in 2007. The volume of green bond issuance is growing dynamically year on year, and regulation is evolving and deepening. The trend in regulation is clear, given that there were no rules at the launch of the market, then they slowly emerged as recommendations, and more recently they have become more detailed and in some places mandatory. There is therefore a tightening trend that is still underway and which we believe is much needed in the green bond market. This development is also significant in geographical terms, as shown by the fact that by 2021, green bonds had been issued already in

[44] Green Bond Endorsed Projects Catalogue (2021 Edition) http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/4342400/2021091617180089879.pdf
[45] People's Bank of China Green Bond Endorsed Project Catalogue (2020 Edition) https://www.greenfinanceplatform.org/policies-and-regulations/peoples-bank-china-green-bond-endorsed-project-catalogue-2020-edition
[46] Sustainability standards and labels https://www.bourse.lu/sustainability_standards_and_labels

a total of 58 different countries and 33 different currencies[47]. However, the level of development of individual green bond markets and the green quality of issuance varies considerably. With the geographical expansion of the market, the need for harmonisation has arisen, one manifestation of which is the emergence of regional rules and the approximation of regional rules.

There may be trade-offs between harmonisation along with strong regulation and flexibility. Harmonisation will make the different sets of rules in each standard easier to understand, which will facilitate issuance and make things more straightforward for investors. Strong, well-defined rules ensure a transparent market and prevent abuses of green credentials. However, over-regulation and over-harmonisation reduces flexibility and can discourage issuance, both by increasing administrative costs and by reducing the extent to which individual factors and considerations can be taken into account.

As the limits of self-organised development are reached, the development of stricter and more detailed regulation seems justified. Current experience suggests that the market can only develop on a self-organising basis to the point where green considerations do not override business interests. Certainly, this point can be pushed for a long time without binding rules along other incentives, but beyond this point it is necessary to have legally binding rules. Based on our current understanding, in order to achieve a green transition and sustainable financing, business interests may be somewhat overshadowed, in any case, which will be a significant barrier to further organic development of the green bond market.

Beyond setting the rules of issuance, the next key task is to enforce the rules and establish a framework of sanctions for non-compliance with the green objectives. The green bond standards currently do not contain any rules for cases where the issuer fails to meet the sustainability objectives set at the time of issuance (green default). One of the most important aspects of green investment is its green credentials. In order for the market to function properly, it is necessary to create guarantees that encourage issuers to meet green targets, while at the same time establishing liability for issuers in the event of non-compliance with green objectives. The elaboration of sanctions in the event of green default and the related civil liability rules is one of the biggest challenges for the green bond market. However, systematically advancing the development of frameworks and rules can ensure the continued expansion and long-term success of this emerging market segment.

[47] Sustainable Debt Global State of the Market 2021 https://www.climatebonds.net/files/reports/cbi_global_sotm_2021_02f.pdf

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The Hungarian green bond ecosystem and related central bank programmes

Attila Bécsi – Gergely Bognár – Márton Varga

This paper aims to provide a complex overview of the sustainability aspects of green mortgage bonds and corporate bonds issued in the Hungarian market. The analysis explores the potential impacts of using the funds raised from bond issuance, with a focus on high-level sustainability goals, the actions companies intend to take and environmental performance indicators, based on green bond frameworks, the business profile of individual issuers and publicly available data. In addition, by offering a broad picture, the paper summarises the key features of the market, and analyses the most important economic aspects of the domestic green bond ecosystem being established, based on the data examined.

1. Introduction

To effectively address the risks posed by the negative impacts of climate change, it is essential to transform our economic and financial systems along sustainability aspects, in which green financial products can play a significant role. The Organisation for Economic Co-operation and Development *(OECD)* estimates[1] that, as a first step, by 2030 a global investment of USD 6,900 billion annually would be needed to make a meaningful shift towards the net zero emissions target by 2050. Capital allocation of this volume cannot be covered by budgetary resources alone, so the process will also require substantial mobilisation of private sector funds. These can be channelled through sustainability finance products such as green corporate bonds and green mortgage bonds (Lóga - Bognár, 2021). Sustainability financial products are all designed to catalyse the transition to a low-carbon, climate resilient and environmentally sustainable economy, while the development of market segments based on the first two types of securities aims to make borrowing and lending for sustainability purposes available on increasingly favourable terms to an ever wider range of users. This paper presents the first results of the central bank's programmes, also contributing to sustainability goals.

[1] OECD: Investing in Climate, Investing in Growth (https://read.oecd-ilibrary.org/economics/investing-in-climate-investing-in-growth_9789264273528-en)

In recent years, green bonds have become an indispensable component of the capital markets. In general, green bonds are debt instruments through which the proceeds raised are used to finance projects with an environmentally sustainable aspect, thus providing investors with the opportunity to address climate and environmental risks (Clapp et al., 2016). In addition to green bonds and mortgage-backed securities, there are certainly many other financial instruments that include environmental, social and governance (ESG) objectives or are linked to sustainability indicators. This paper, however, focuses exclusively on green bonds, with the aim of exploring the specificities of the Hungarian market.

The green bond segment has recently attracted the attention of a number of leading central banks, and a growing number of them are exploring ways to support a sustainable transformation of the economy without compromising their primary mission of price stability. While the main task of central banks is usually defined as guarding price stability, a growing number of experts and international organisations argue that the physical and transition risks posed by climate change threaten the integrity of the economic and financial system and price stability, which warrant a more active central bank role. In her study (Schnabel, 2021), ECB Executive Board member Isabel Schnabel points out that if climate risks are not addressed in a meaningful way, the default rate on loan portfolios for the top decile of euro area commercial banks most exposed to climate risks could rise up to 30 per cent by 2050. According to *Boneva et al* (2021), the effects of climate change have an impact on economic variables (both on the demand and supply side) and, through the erosion of the monetary transmission mechanism, on the ability of central banks to control inflation trends. Similar considerations have led several leading central banks (Riksbank, Bank of England) to explore the possibility of contributing to sustainability goals and the stability of the financial system, through the purchase of green assets.

2. Green bonds and standards

There is currently no uniformly accepted definition of green bonds in the financial sector, however, a number of organisations have developed their own standards for defining the scope of these securities. The description of the most widespread approaches in the Hungarian market can help to gain a more comprehensive understanding of the topic.[2]

[2] In addition to the description below, the rule frameworks are described in more detail in the study entitled *Green Bond Standards as a Basis for Sustainable Finance*.

The Green Bond Principles (GBP), defined by the International Capital Market Association (ICMA), are the most widely accepted standards in the global green bond market. According to the ICMA's definition, "Green Bonds are any type of bond instrument where the proceeds or an equivalent amount will be exclusively applied to finance or re-finance, in part or in full, new and/or existing eligible Green Projects (...) and which are aligned with the four core components of the GBP".[3] These components are mandatory to be included in the Green Bond Framework linked to the issue. The first and most important of these components is the Use of Proceeds, which shows how the proceeds raised through securities issues support environmental objectives such as mitigation of or adaptation to climate change, conservation of natural resources and biodiversity, and pollution prevention and control. Through the other main components, the ICMA expects the issuer to demonstrate the appropriateness of the methods used to evaluate projects (Process for Project Evaluation and Selection), to monitor the use of the bond proceeds (Management of Proceeds) and to publicly inform investors at specified intervals about the loan objectives and the positive impact of the green project (Reporting). The ICMA also recommends that the issuer of a green bond should appoint an external expert to carry out a pre-issuance review of the green framework of the security. External reviewers are institutions and consultants that evaluate whether the green bond and the framework are in line with the ICMA GBP (Imréné Gál Baji *et al.*)

The other widely used bond standard, the Climate Bond Standards *(CBS)*, was developed by the Climate Bonds Initiative *(CBI)*, a non-governmental organisation. The CBI defines green bonds as securities used to finance projects that promote positive environmental or climate action.[4] The CBI's standard also sets out the process for the verification of a climate bond. CBS also requires compliance with the four core components presented for GBP, but requires a post-issuance verification to obtain certification. A key difference is that the CBI has its own taxonomy, which defines the range of instruments and projects needed to meet global emissions targets. Currently, debt instruments issued under CBS account for approximately one fifth of the global green bond market.[5]

[3] ICMA Green Bond Principles 2021 https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Green-Bond-Principles-June-2021-140621.pdf
[4] CBI: Explaining green bonds https://www.climatebonds.net/market/explaining-green-bonds
[5] CBI: The Climate Bonds Certification Scheme https://www.climatebonds.net/files/files/CBI_Certification_Brochure_Nov2020.pdf

The European Union is making significant efforts to unify the green bond universe along these two standards, which are widely used in international and European markets, and as a result, it published its recommendations for the European Green Bond Standard in December 2019. The EUGBS, part of the ambitious European Green Deal, aims to increase transparency and improve comparability of sustainability asset classes by creating a common set of criteria for European green bonds. The main features of the EUGBS are similar to those of the ICMA GBP and the CBI CBS, but require the security to comply with the EU Taxonomy listing criteria for sustainable activities and to have the opinion of an external reviewer recognised by the European Securities and Markets Authority (ESMA) (Lóga and Bécsi, 2021).

The European Union's Taxonomy Regulation aims to help achieve the continent's climate neutrality target by 2050. The comprehensive definitions of sustainable activities provided by the framework allow companies, investors and decision-makers to identify which activities are deemed environmentally sustainable. The Taxonomy thus lays the foundations for a more transparent market, reducing market fragmentation and helping to channel investments related to sustainability.[6] The Taxonomy sets out six environmental objectives, of which climate change mitigation and adaptation have already been developed in detail. The details of the remaining four objectives – sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems – are expected to be finalised by the end of this year. An economic activity is consistent with the Taxonomy if it meets three interdependent criteria (Chart 1).

Chart 1
The EU Taxonomy Compliance Model

Source: European Commission

[6] EU taxonomy for sustainable activities https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

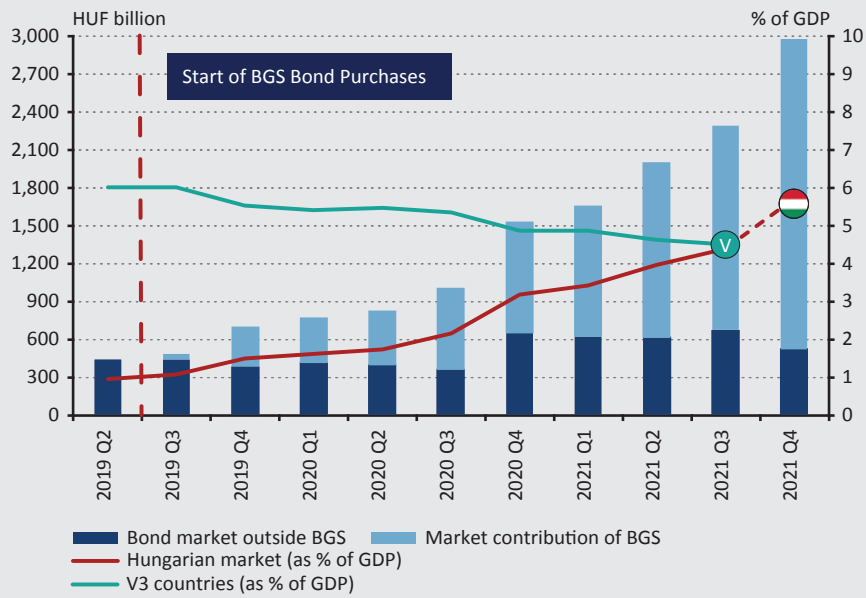
3. The Hungarian corporate bond and mortgage bond market and related central bank programmes

In order to gain a comprehensive understanding, it is important to describe the primary differences in the main features of corporate bonds issued by companies and mortgage bonds issued by credit institutions. Corporate bonds are debt securities issued by a corporate issuer to improve its capital position, make investments, refinance its debt or acquire a company. In the case of these securities, investors lend money to the issuer, who in return (usually in the bond documentation) assumes a legal obligation to pay interest on the principal and, in the case of amortising bonds, to start repaying the principal during the term, while in the case of bullet-type securities, the principal is paid in one lump sum at the end of the term (Lóga et al., 2021). Mortgage bonds – or covered bonds in other words – are issued by specialised credit institutions, or mortgage banks. In the European and Hungarian markets, the collateral is usually mortgage loans taken out on residential and commercial real estate, thus mortgage bonds serve to refinance these assets. Over the past four years, the Hungarian corporate and mortgage bond market has seen dynamic growth, largely driven by the active market development role of the Magyar Nemzeti Bank (MNB).

Prior to 2019, bank loans dominated the debt-based borrowing of Hungarian companies, and bond issuance was limited to a small number of firms, but thanks to the MNB's Bond Funding for Growth Scheme (BGS), the Hungarian corporate bond market has successfully caught up with the average of regional countries. Prior to the launch of the BGS, raising funds through corporate bonds was only available to a small segment of domestic companies, with the aggregate stock of the market at around 1 per cent of GDP. The central bank launched the BGS in July 2019 with the aim of enhancing the efficiency of monetary policy transmission by increasing liquidity in the corporate bond market in a targeted manner and contributing to the diversification of the debt structure of the Hungarian corporate sector. As a result of the programme, by the end of 2021, the Hungarian corporate bond market had septupled in nominal terms and increased six-fold as a percentage of GDP compared to the pre-BGS level, reaching and then surpassing the average level of the other Visegrád countries' markets from a regional laggard position (Chart 2). At the end of December 2021, 83 per cent of the total domestic bond market stock was linked to the BGS, and the volume of issuance outside the programme did not follow the growth dynamics of the bond market. The main reason for this is that issuers that were active in the bond market before the launch of the BGS have renewed their debt through the programme, taking advantage of the favourable issuance opportunities it offers. Since the launch of the BGS, the

issuance of corporate bonds outside the programme has been mainly related to issuers that did not meet the BGS eligibility criteria or had already reached the exposure cap for central bank purchases. In December 2021, the MNB's Monetary Council decided to end central bank purchases under the BGS after the current limit had been exhausted, in order to ensure that all elements of the central bank' monetary policy toolbox are geared towards tightening monetary conditions to address upward inflation risks.

Chart 2
Bond market of domestically based non-financial enterprises catching up with the average of regional countries



Note: Data on the size of the Hungarian corporate bond market as a percentage of GDP for 2021Q4, based on MNB estimates.

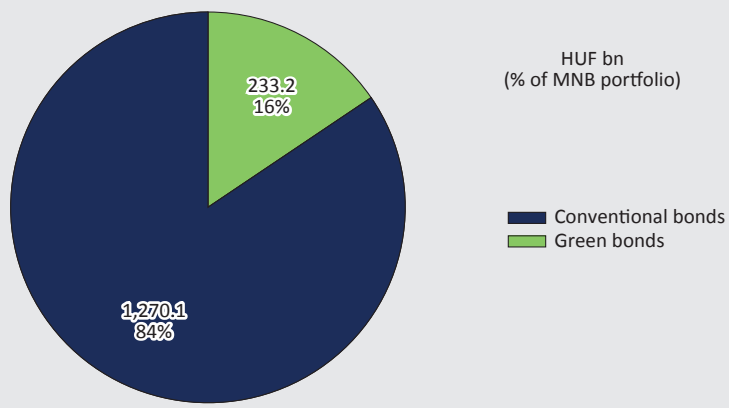
Source: Eurostat, MNB, HCSO

While the MNB did not set a green target when it launched the bond programme, the first green corporate bond was issued under the BGS, and the programme has contributed immanently to the organic development of a sub-segment of green debt instruments in the booming corporate bond market in Hungary. The Monetary Council of the central bank did not explicitly define green targets when launching the BGS, so it purchased all corporate bonds where both the issuer and the security met the requirements of the current product description of the bond

programme. However, in addition to successfully achieving its primary objective of increasing liquidity in the corporate bond market, the BGS has also assisted the competitiveness of the Hungarian corporate sector in a number of indirect ways. As one of these, it has effectively contributed to the organic development of a sub-segment of sustainability rated debt instruments in the dynamically evolving bond market. As a historic milestone for the Hungarian capital market, Hungary's first green corporate bond was issued under the BGS. In August 2020, CPI Hungary, a real estate development company, issued green bonds with an aggregate nominal value of HUF 30 billion. By the end of February 2022, a total of 18 additional green corporate bonds have been placed on the market, allowing issuers to use around HUF 402 billion of raised funds for sustainability-related lending purposes.

By the end of February 2022, all domestic green corporate bonds have been issued under the BGS framework, and the share of green rated securities in the central bank's corporate bond portfolio is outstanding also by international standards. Of the 19 series of green corporate bonds issued in Hungary to date, the MNB has purchased more than HUF 233 billion in nominal value, which means that green corporate debt instruments account for more than 16 per cent of the total corporate bond portfolio held by the central bank (Chart 3), which is considered outstanding even among the leading central banks. In comparison, the share of green securities in the European Central Bank's (ECB) corporate bond portfolio is estimated to be between 3 and 5 per cent, according to the institution's previous communications and experts' estimates.

Chart 3
Share of green corporate bonds in the MNB's corporate bond portfolio (February 2022)



Source: MNB

The mortgage bond market is of key importance to the MNB from both a monetary policy and a financial stability perspective. Since 2018, the Hungarian central bank has introduced three asset purchase programmes in this market, the most recent of which was the Green Mortgage Bond Purchase Programme announced in August 2021. The main strategic objective of the Green Mortgage Bond Purchase Programme is to contribute to the development of the Hungarian green mortgage bond market through targeted purchases, thereby encouraging green mortgage lending. The central bank programme can thus indirectly support the construction of properties with adequate energy efficiency, thereby helping to build a domestic housing market of a healthier composition. Under the programme, the MNB expects compliance with one of the two most recognised international standards (ICMA GBP and CBI CBS), which will contribute to a liquid and transparent market. The programme is in line with the modification of the Mortgage Funding Adequacy Ratio (MFAR), which will allow the central bank to stimulate the issuance of green mortgage bonds on both the demand and supply sides. Over the past year, all five Hungarian mortgage banks have issued green mortgage bonds with a total nominal value of HUF 156 billion, of which the MNB has purchased HUF 60 billion under the programme.

4. Research questions, data and methodology

The research questions of our study were:

(1) What are the general characteristics of the Hungarian green corporate bond and mortgage bond market compared to European markets?

(2) How can green corporate strategies and related measures be characterised in terms of objectives pursued, green metrics and corporate green awareness? For this, we used the bond framework and publicly available corporate data, grouping the Hungarian green bond ecosystem by sector.

In our analysis, we looked at securities issued by 23 green issuers between August 2020 and April 2022.

For research question (1), we examine the size of the bond market, the market structure and the maturity of issuers, comparing aggregate holdings in the Hungarian and European markets. Our research used public data, with a time horizon until April 2022.

To explore research question (2), a breakdown by sectors of the economy was used to understand the market across a broad economic spectrum. Our approach treats corporate bonds and mortgage bonds as one asset class, because our primary objective is to examine the economic impact of green bonds, not to distinguish them from a financial product perspective. The primary sources used for our analysis are the Green Bond Framework and the public data made available by issuers in connection with the issuance of bonds. Taking into account the standardised format of these documents and the evolution of green market conventions, clusters can be formed from the available data. **Our study gradually stratifies the data in order to map all the features of issuers' green finance activities.** Our approach has similarities with the study by Ehlers *et al.* (2021), which also used gradual stratification as a main principle to design efficient taxonomies.

a) *Corporate measures* In order to accurately identify the environmental impact of green bonds, we identified the corporate measures linked to the credit objective of the securities. The possibility of standardisation varies from sector to sector: in some cases (e.g. the real estate sector) there are very specific customs for assessing the "greenness" of assets or projects. In other sectors, however, metrics are less standardised and best practices have yet to emerge.

b) *Sustainable development goals* The Sustainable Development Goals (SDGs) set by the United Nations (UN) are 17 high-level targets that provide a general guideline for the measures needed to achieve social and environmental sustainability. References to these goals have become an integral part of the green bond standards, making them an obvious way to compare the ambition of bond issues.

c) *Action-level indicators.* Most green bond frameworks include action-level indicators that form an integral part of subsequent impact assessment reports. These indicators provide quantifiable information to demonstrate the positive environmental impacts of green projects or investments.

d) *Corporate awareness* We evaluated the mainstreaming of green or sustainability considerations in general corporate governance. Corporate awareness was assessed based on the existence of a sustainability strategy, an action plan, dedicated departments and committees, and senior management positions with a green mandate, defined across the company.

4.1. Results

By February 2022, the market share of green corporate bonds and green mortgage bonds in Hungary was above the European market average. At the end of the period, the total value of green corporate bonds in circulation reached HUF 536

billion, representing around 10 per cent of the Hungarian market. This is well above the European average, where the share of green bonds in the corporate bond market is around 3.5 per cent. The stock of Hungarian mortgage bonds exceeded HUF 156 billion, 9 per cent of the domestic market, while the market share of green mortgage bonds in European countries is around 1.2 per cent. In the latter, the slight difference in the green share in Hungary can be explained by the relatively mature situation of the mortgage bond market, while corporate bond issuance has become a common financing solution in Hungary only in the last two years. In both cases, we can conclude that they are among the most dynamic market segments, both in terms of volume and the number of issuers.

Issues from the 23 issuers are grouped into seven sectors (Table 1). The sector classification is based on the NACE/TEÁOR system. To present a comprehensive picture of the green bond ecosystem, issuers have been grouped according to their economic activity. This classification is based on the Standard Industrial Classification System (TEÁOR'08), which is the same as the European NACE Rev.2 statistical classification standard.

Table 1
Sectoral classification of domestic green bond issuers

Real estate activities	Construction	Financial and insurance activities		Manufacturing	Agriculture	Wholesale and retail trade
		Mortgage Banks	Holding companies			
CPI Skygreen Futureal SunDell Wingholding Kopaszi Gát Biggeorge	GTC	OTP Jelzálogbank Takarék Jelzálogbank UniCredit Jelzálogbank Erste Jelzálogbank K&H Jelzálogbank	AutoWallis LP Portfólió Crown	Hell Energy Vajda-Papír Deltaplast Kométa	Baromfi-Coop	Stavmat Vöröskő

Source: Own results.

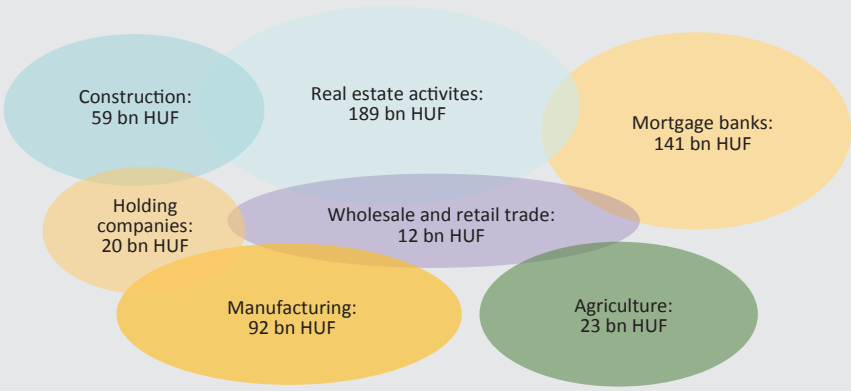
While the average original maturity of Hungarian green corporate bonds is the same as that of the non-green segment, the average original maturity of Hungarian green mortgage bonds is significantly higher than the average for both the Hungarian non-green segment and European green paper. The Hungarian green corporate bonds are all issued with a maturity of 10 years, which is in line with current practice in the non-green market. We find that this is below the European average maturity of 14.4 years. The average original maturity of green mortgage bonds is 9 years, which is above both the domestic non-green issues (7.2 years) and the European market average (6.4 years). Compared to international practice, in Hungary only green mortgage bonds were issued with a significantly longer maturity.

The most significant issuers of green bonds in Hungary are the real estate, construction and finance sectors (Chart 4). Based on the nominal value of the

bonds, we can see that the most important sectors are real estate, construction and finance. Finance can be broken down into two easily distinguishable subgroups; mortgage banks and asset portfolio management companies (holding companies). It can be seen that these groups and sub-groups are directly or indirectly linked to the real estate market. Another important sector is manufacturing, which accounts for around 17 per cent of the Hungarian green bond market. Agriculture is represented by one issuer, followed by two companies active in wholesale and retail.

A European comparison shows that the sectoral structure of the Hungarian green bond market differs substantially (Chart 5). The European market is dominated

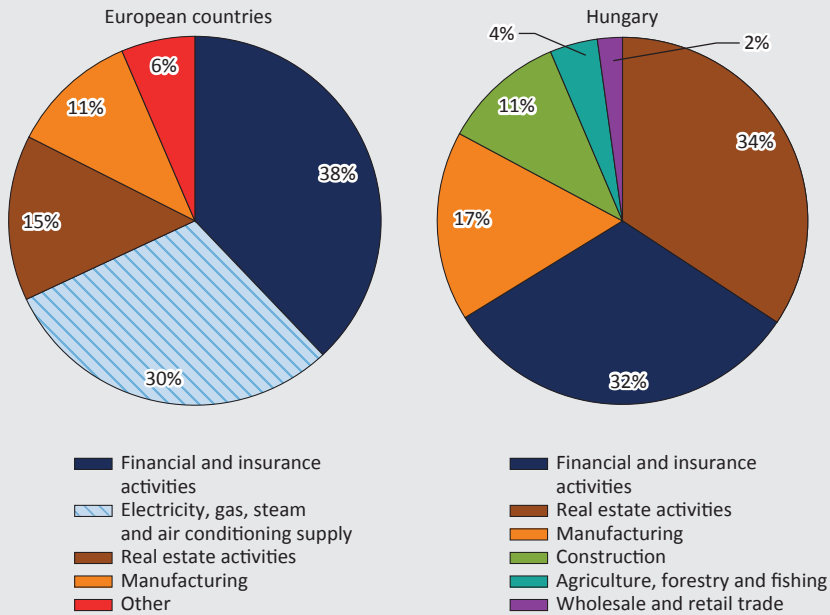
Chart 4
Size and relationship of green bond issuer groups



Source: own research results

by the financial sector (38 per cent), electricity, gas, steam and air conditioning companies (30 per cent) and real estate developers (15 per cent). The Hungarian green bond portfolio lacks utility companies, which could play an important role in decarbonisation efforts. According to the ECB's economy-wide climate stress test (Alogoskoufis et al. 2021), the electricity and gas sector is the second most exposed sector from a climate risk perspective, and could face significantly higher production costs and lower profitability in the future.

Chart 5
European and Hungarian green bond issuers by sector*



Note: The Bloomberg GICS industry classification has been adapted to NACE codes applicable in the EU and Hungary based on our own assessment.

Source: Bloomberg

In the sectoral analysis, the four layers presented in Part 2 are applied to the identified sectors: (a) corporate measures, (b) Sustainable Development Goals (SDGs) integrated in the framework, (c) action-level indicators, (d) corporate awareness. Our results are summarised in Tables 2 and 3.

Details for the different sectors are presented below, based on layers (a) to (d).

Table 2
Evaluation of issuer sectors (real estate, construction, financial and insurance activities)

	Real estate activities	Construction	Financial and insurance activities	
			Mortgage Banks	Holding companies
Number of issuers	7	1	5	3
Issued amount	189 bn HUF	59 bn HUF	156 bn HUF	20 bn HUF
Corporate actions	– Acquisition and construction of green buildings – Installation of the renewable energy sources -Renovation of existing properties – Expanding e-mobility services	– Development, aquisition and management of commercial real estate assets – Installation of the renewable energy sources	– Purchases of new or used homes – Refurbish and renovation of existing homes with energy saving targets	– Acquisition of green buildings – Renovation of buildings with energy efficency goals – Production and/or Installation of renewable energy sources – Development of e-mobility services
Top UN Sustainable Develpoment Goals				
Impact indicators	– Site energy savings (MW/year) – CO_2 emissions avoidance (tCO_2/year) – Spared water usage (m^3/year)	– CO_2 emissions avoidance (tCO_2/year) – Energy efficiency gain relative to baseline (%) – Spared water usage (m^3/year)	– Site energy savings (MW/year) – CO_2 emissions avoidance (tCO_2/year)	– Renewable energy generation (MW/year) – CO_2 emissions avoidance (tCO_2/year) – Share of renewable energy sources (%)
Corporate awareness	Average	High	High	Low

Source: own research results.

4.1.1. Real estate activities, construction[7]

(a) Companies active in the Hungarian real estate market are the most significant players in the green bond market, both in terms of their number and the volume issued (eight issuers, HUF 249 billion issued). The seven real estate companies typically buy, sell, develop and provide various services related to real estate assets. There is a construction company with a very similar profile, focusing mainly on real estate construction and development. Issuers are mostly involved in commercial real estate, but their activities also include residential construction and development. Sustainability criteria are measured by Energy Performance Certificates (EPC) [8], as well as based on BREEAM[9], LEED[10] or DGNB standards[11]. The most widely used benchmark among domestic property developers and companies investing in green buildings is LEED, which is used by eight green bond issuers. As for the other certificates, seven issuers mention EPC[12] and BREEAM as the system to follow for green buildings, and three mention also the DGNB standard.

Table 3
Minimum entry requirements for commercial and residential properties from 2022

	LEED	EPC	BREEAM	DGNB
Category	Gold	10% better than EPC BB minimum	Excellent	Gold
Description	60-70 points out of 110	10% better than NZEB[13] minimum	Top 10% of buildings (best practice)	Minimum 50% performance index

Source: LEED, European Commission, BREEAM, DGNB

[7] As the activities of real estate and construction companies are the same and there are additional similarities in the characteristics of green bond issues, this section deals with them in one category.
[8] European Commission: Questions and Answers on the revision of the Energy Performance of Buildings Directive https://ec.europa.eu/commission/presscorner/detail/en/QANDA_21_6686
[9] BREEAM https://www.breeam.com/
[10] Green building leadership is LEED https://www.usgbc.org/leed
[11] The DGNB System https://www.dgnb-system.de/en/system/
[12] This certification also applies to residential properties and the cost of certification is lower than for the other three schemes. In addition, the EPC forms the basis of the European Energy Efficiency Directives and Taxonomy, allowing this metric to be used in a variety of ways.
[13] In the European Union (EU), the concept of near-zero energy buildings (NZEB) is often used by issuers as it clearly defines the projects and assets that are eligible for support. The concept of NZEB is defined in the EPBD and must be transposed by the EU Member States into their national legislation. See: Commission Recommendation (EU) 2016/1318 of 29 July 2016 on guidelines for the promotion of nearly zero-energy buildings and best practices to ensure that, by 2020, all new buildings are nearly zero-energy buildings https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016H1318, Consolidated text: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast) https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583922805643&uri=CELEX:02010L0031-20181224 and EU Taxonomy Compass https://ec.europa.eu/sustainable-finance-taxonomy/tool/index_en.htm

(b) **When looking at the UN Sustainable Development Goals (SDGs), it is clear that the real estate and construction sector can contribute directly to the achievement of the climate goals.** Most often, as part of the UN SDG *(7) Affordable and Clean Energy*, companies are striving to double the rate of improvement in energy efficiency and significantly increase the share of renewable energy in the energy mix. In practice, this can be achieved by constructing or upgrading buildings that meet green criteria, or by investing in energy efficiency improvements. These measures can also reduce the negative per capita environmental impact of cities, *inter alia* by paying particular attention to air quality and waste management, thus supporting the objective of achieving *(11) Sustainable cities and communities*. The frameworks used by issuers are particularly useful for demonstrating the sustainability of commercial buildings such as offices and retail premises. In addition, some issuers are using the proceeds from the bonds to finance clean and sustainable transport solutions, as they seek to increase e-mobility capacity by installing electric charging stations and expanding e-car sharing capabilities. Through these investments, companies can also contribute to the above-mentioned UN SDGs, in particular *(11) Sustainable cities and communities* by ensuring access to safe, affordable and sustainable transport systems for all.

(c) **Real estate developers and construction companies typically use performance indicators related to energy efficiency and greenhouse gas (GHG) emission reduction.** Examples include energy efficiency measured in primary energy demand (kWh/m^2/year), on-site energy savings (MW)/year), water savings (m^3/year), and avoided CO_2 emissions (tCO_2/year) (Box 1).

(d) **Corporate environmental awareness is above average among these companies.** Typically, they have formulated ESG or sustainability strategies, and some have assigned relevant responsibilities to management functions. The reason for this progress is that real estate development and construction are highly standardised, with quantifiable indicators, providing a sound basis for companies to define and demonstrate their compliance with the relevant standards.

Box 1
Measuring positive environmental impacts

Impact indicators should provide transparent and credible information on the environmental performance of the green bond issuer. As there are many different indicators and sustainability reporting frameworks and guidelines, it is important to indicate which benchmarks and GHG accounting principles are used at the reporting stage.

The June 2021 edition of the ICMA's Harmonized Framework for Impact Reporting was developed by a group of multilateral development banks and international financial institutions to outline general principles and recommendations for reporting. As most companies have issued green bonds in line with the ICMA GBP, this framework can serve as the basis for their reporting structure.

The Framework includes core and other indicators for a number of GBP categories, such as energy efficiency, renewable energy sources, while the proposed benchmarks are generally internationally recognised standards (EU reference standards, UN and WHO guidelines, green building certificates).

There are indicators – such as reduced or avoided GHG emissions – where there is no common standard in the market. In this case, companies can choose their calculation method, but they must disclose their methodology transparently.

For example, in the case of green energy production, the green energy produced can be multiplied by the emission rate of local fuel-burning plants, which yields the avoided CO_2 emissions. Overall, a comparison with a high-carbon emitting alternative can provide an accurate approximation of the environmental benefits of these green projects and assets.

4.1.2. Mortgage banks

Mortgage banks are specialised credit institutions that provide funding for refinancing consumer and commercial mortgages through the issuance of mortgage bonds. Although mortgage banks operate in a highly regulated environment, both in Hungary and in other European countries, and their borrowing operations are closely monitored by supervisory authorities and market participants, the general framework for green bonds is essentially the same as in any other sector. Green mortgage bonds can be issued by mortgage banks for refinancing mortgage loans backed by high energy efficiency collateral. In theory, the collateral can be either commercial or residential property, but in practice Hungarian mortgage banks only include residential mortgages in their bond issues.

(a) The standards used and the definition of the green property included in the collateral are also different between mortgage banks. A series of bonds have been issued with CBI compliance, but it also includes a reference to the EU Taxonomy. Four issuers' frameworks are ICMA compliant, but the set of rules applied is not uniform across all of them. Some mortgage banks only require properties to be in the top 15 per cent based on primary energy demand, and do not take into account the term of the associated bond. However, there are also examples of more stringent approaches, where issuers require compliance with the NZEB or the EU Taxonomy (NZEB – 10 per cent) depending on the year of construction. In all cases, the funds from green mortgage bonds can also be used to refinance loans for renovation purposes. In this respect, a consistent approach can be observed among issuers. The renovation of existing buildings should result in a 30 per cent improvement in primary energy demand, which is in line with the CBI methodology and commercial building construction practices. Other alternative criteria include reference to the EU Taxonomy Regulation[14], the MNB's Preferential Green Capital Requirement Scheme[15] or the Energy Performance of Buildings Directive.

(b) **The main objectives of the UN Sustainable Development Goals (SDGs) are similar to those seen in the real estate and construction sectors.** By refinancing green buildings and property renovations, mortgage banks can contribute in particular to the *(7) Affordable and clean energy* goal by significantly increasing the share of renewable energy and doubling the rate of energy efficiency improvements. This can at the same time support the promotion of the *(11) Sustainable Cities and Communities* goal by reducing the environmental impact of cities.

(c) **Mortgage banks want to measure the positive environmental impact of green bond issuance through two indicators.** The annual energy savings (MW/year) is derived from the difference between the refinanced portfolio and the average energy demand of the national housing stock. If there is not enough data available on each element of their own portfolio, issuers can apply the best 15 per cent rule, leading to a conservative result. The other metric used quantifies the carbon dioxide emissions avoided (tonnes of CO_2/year), which is defined as the annual energy savings multiplied by the corresponding carbon intensity. Using these metrics, mortgage banks can therefore provide an approximate estimate of the positive environmental impacts resulting from

[14] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088, https://eur-lex.europa.eu/eli/reg/2020/852/oj

[15] Notice on the criteria for the Preferential Green Capital Requirement Treatment for housing loans, https://www.mnb.hu/greenfinance/english

refinancing mortgages backed by green buildings rather than conventional "brown" buildings.

(d) **Overall, it can be concluded that sustainability considerations are highly visible in corporate decision-making at mortgage banks.** All issuers have established a committee responsible for the management of green bond issues. In addition, virtually all mortgage banks or their parent banks have a comprehensive, corporate-level strategy for achieving sustainability goals, and in many cases the relevant tasks have been assigned to a separate management function or other dedicated organisational unit.

4.1.3. Holding companies

The three holding companies under review have a wide range of activities. One of the issuers is one of Hungary's market leaders in the wholesale and retail motor vehicle trade and related financial services, with a significant market share in other countries in the region. The other two issuers are involved in the development and letting of residential and commercial buildings, one of which is also involved in the installation and operation of renewable energy sources and mechanical engineering. A common feature of all three companies is that they have significant exposure to the real estate market, either through their own operations or as part of an investment portfolio.

(a) **The majority of green investments are aimed at buying or building new commercial properties or renovating existing ones.** Another significant part of the bond issuance will be used to develop e-mobility services, thereby increasing the share of zero-emission vehicles and the number of charging stations for electronic vehicles.

(b) **Through real estate investment and e-mobility spending, the holding companies aim to support the achievement of the UN Sustainable Development Goals (SDGs) *(7) Affordable and clean energy and (9) Industry, innovation and infrastructure*.** In line with this, as part of the *(11) Sustainable Cities and Communities* goal, issuers are also committed to reducing the per capita environmental impact of cities, with a particular focus on improving air quality and municipal and other waste management practices.

(c) **For these companies, the different projects are linked to clear objectives and metrics.** For investments to improve the energy efficiency of buildings and premises, the energy savings achieved and the carbon dioxide emissions avoided will be quantified, and the capacity of renewable energy sources and their share of total energy consumption will be reported. Related to e-mobility,

in addition to the energy savings results, future reports will include the share of electric cars in the fleet, as well as the number and geographical coverage of new charging stations. In addition to this, as part of the business cooperation, the foreign manufacturing company imposes a number of minimum sustainability requirements on the car dealer, which are also reflected in its green bond issuance framework. These include a target of 30 per cent renewables in the overall energy mix and a number of specific commitments on water use, cooling and heating solutions and modernisation of the lighting system.

***(d)* Sustainability awareness among holding companies is low.** There is no visible comprehensive strategy, specific management function or other activities that explicitly pursue environmental objectives. In the case of one issuer, an ESG strategy is being developed, mainly as a result of cooperation with a foreign manufacturer.

Table 4
Assessment of issuer sectors (manufacturing, agriculture, wholesale and retail)

	Manufacturing	Agriculture	Wholesale and retail trade
Number of issuers	4	1	2
Issued amount	92 bn HUF	23 bn HUF	12 bn HUF
Corporate actions	– Expansion of the production units' capacity to produce less energy– intensive goods – Increasing the share of renewable energy – Reducing waste and water use	– Capacity expansion (feed factory, mixing line, by-product facility) which also results energy-efficiency improvement – Modern biological treatment of 25– 30% of wastewater – Automation of processes	– Acquisition and construction of green buildings (factory and warehouse) – Retrofitting of existing premises to increase energy efficiency – Automation of processes – Modernization of used technologies
Top UN Sustainable Develpoment Goals			
Impact indicators	– Energy saving on units product – GHG reduction per unit of product	– Energy consumption saved (kWh / year) – CO_2e / year avoided – Spared water usage (m^3/ year)	– Energy consumption saved (kWh / year) – CO_2e / year avoided – Spared water usage (m^3/ year)
Corporate awareness	High	Average	High

Source: own research results.

4.1.4. Manufacturing

a) **Manufacturing is the third largest sector after real estate developers (and construction companies) and the financial sector.** These companies (four issuers, 92 billion HUF of issued volume) are investing in capacity expansion, which will ultimately lead to production processes with lower energy consumption, less waste and less water per unit, while also increasing the share of renewable energy in their energy mix.

(b) **The frameworks show that mainly two UN SDGs are positively affected by the commitments.** By issuing green bonds, companies can increase the efficiency of water use, which can make a substantial contribution to achieving *(6) Clean water and sanitation*. More importantly, they also support the goal of *(12) Responsible Consumption and Production*, as these investments result in, for example, less paper or primary aluminium consumption, or meat processing with higher energy efficiency.

(c) **Companies in this sector aim to reduce the carbon intensity of their products, reduce water and energy use and change the raw material for production.** For the energy drink company, the use of at least 75 per cent secondary (recycled) aluminium in can production met the GBP because this raw material can be recycled unlimitedly, whereas primary aluminium is very carbon intensive and PET has limited recyclability. This processing method is also in line with the technical screening criteria of the EU Taxonomy[16] and is expected to be aligned with the EU Green Bond Standard under development. The most common impact indicators measure energy savings per unit of product and GHG reductions per unit of product, mainly reflecting energy efficiency improvements. Water use metrics are also important and are regularly monitored by issuers.

(d) **Sustainability awareness among companies in the sector was considered to be high.** With only one exception, all issuers have a dedicated website that highlights their sustainability efforts and achievements. In addition, most have appointed a manager responsible for sustainability issues. One company has a comprehensive sustainability strategy with critical milestones, and green bond issuance is an integral part of their sustainability journey. Another issuer has already made significant investments in previous years to improve the management of wastewater.

[16] The activity could meet the significant contribution criteria of the Taxonomy.

4.1.5. Agriculture

According to Eurostat, agriculture is responsible for around 10 per cent of total EU GHG emissions,[17] showing that companies in the sector can play a significant role in decarbonising European economies. In Hungary, the share of GHG emissions from the agricultural sector is around 7 per cent of total emissions in the economy.

(a) **In Hungary, there has been only a single green bond issuance in agriculture (one issuer, HUF 23 billion issued).** The use of the funds raised from the bond issue is similar to that of manufacturing companies: expanding capacity, making unit production more efficient and reducing pollution, waste and water use.

(b) **The company can contribute in particular to *(7) Affordable and clean energy* by increasing the share of renewable energy in the global energy mix and *(12) Responsible consumption and production* through sustainable management and efficient use of natural resources.**

(c) **In terms of impact indicators, the company focuses on energy use, CO_2 avoided and water use saved in a year, which is largely in line with the indicators used by Hungarian manufacturing companies.**

(d) **The company has an average level of sustainability awareness.** Although the issuer under review has a dedicated CSR website and a dedicated sustainability officer, the comprehensive strategy is under development and a dedicated sustainability department is still missing.

4.1.6. Wholesale and retail trade

(a) The two wholesale and retail companies have a combined issue volume of HUF 12 billion. One company is primarily engaged in the trade of construction materials, but produces construction materials as well. The other issuer is a retail chain selling household electronics. Due to the special features of the sector, these companies have a large geographical and physical presence, and the funds raised are primarily intended to be used to purchase or build the real estate needed for operations and to renovate existing facilities, such as modernising lighting, heating, doors and windows. In addition, the construction of a new factory and a new central warehouse is a central element, which, in addition to the high energy efficiency of the real estate, can contribute to sustainability ambitions by making production and warehousing processes more efficient.

[17] Eurostat Archive: Agri-environmental indicator - greenhouse gas emissions https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Agri-environmental_indicator_-_greenhouse_gas_emissions&oldid=374989

(b) **Wholesale and retail companies plan to contribute to a number of Sustainable Development Goals.** By building or buying modern buildings or renovating existing ones, companies can double their energy efficiency in line with the *(7) Affordable and clean energy* goal, and contribute to *(12) Responsible consumption and production* by using the latest innovations. The renovation of real estate also serves the improvement of working conditions, which contributes to *(8) Decent work and economic growth*.

(c) **The planned investments are mainly aimed at achieving lower resource use.** Future assessments can thus focus mainly on energy consumption saved (kWh/year) and CO_2 emissions avoided (tonnes/year). In the case of the new plant, the issuer also plans to measure and publish the extent of water and waste reuse.

(d) **The level of environmental and social awareness can be considered high and is reflected in the general corporate philosophy and decision-making processes of both issuers.** Group-wide strategies, dedicated management positions and committees have been set up, and in one case external experts have been engaged. One company, recognising its environmental responsibility, collects electronic waste and discarded electrical household appliances from its customers and ensures that they are properly treated.

5. Summary

In our paper we analysed the Hungarian green bond market. Our assessment is based on the green bond frameworks, the business profile of individual issuers and publicly available data. The main features of the Hungarian green bond market can provide an insight into the current state of the country's sustainable debt market. In addition, based on existing green bond issues, potential areas and directions for development are outlined.

The Hungarian corporate and mortgage bond market has developed intensively over the past four years. By Q1 2022, the total stock of green corporate bonds exceeded around 10 per cent of the Hungarian market, and the stock of Hungarian mortgage bonds accounts for around 9 per cent of the domestic market. These rates are around 3.5 and 1.2 per cent in other European countries.

Compared to the European average, the share of real estate developers in the Hungarian green bond market is higher, which also creates an opportunity to make the sector more sustainable. While utilities and power generation companies account for nearly 30 per cent of total European corporate green bond issuance, these industries are as yet missing from the Hungarian green bond portfolio. The large weight of real estate developers is due to the fact that buildings are responsible for around 40 percent of the EU's energy use and 36 per cent of GHG

emissions, mostly due to the energy demand associated with their construction, demolition, renovation and day-to-day use. In addition, the European Commission estimates that around 2.5 to 3 per cent of the building stock would need to be renovated and modernised each year to reach the EU's net-zero targets by 2050. This rate is only around 1–1.5 per cent at present. It is also important to highlight that according to a report by Climate Action Network Europe, deep energy retrofits can have environmental (energy savings, lower GHG emissions, improved air quality), economic (160,000 additional green jobs) and social (lifting 7 million people out of energy poverty) benefits.[18]

As the goals set by the Green Bond frameworks are in line with the UN Sustainable Development Goals, they also outline the most important areas of commitment for issuers. Based on our analysis, *(7) Affordable and clean energy* is the most supported goal, followed by (11), (9) and (12). Sustainable development goals This preference points to the spread of energy efficiency projects, while the promotion of sustainable cities/communities and environmentally conscious industrial solutions are also often mentioned as objectives in the frameworks. These investments are crucial for achieving climate objectives, including the goals of the Paris Agreement. According to the National Energy and Climate Plan, Hungary plans to increase the share of renewable energy sources in gross final energy consumption to at least 21 per cent by 2030 (MIT, 2018). This will require considerable efforts, and consequently adequate funding, as renewable energy sources only account for 13 per cent (HCSO, 2018).

Concerning the level of environmental awareness in companies, out of the seven sectors concerned, sustainability awareness is considered "high" in four sectors, two sectors have "average" score and there is only one sector where sustainability awareness is considered "low", mainly due to the lack of a comprehensive strategy, dedicated management function, other data or has no form of activity that pursues environmental objectives.

Overall, it can be concluded that green bond issuers have started the transition to a decarbonised economy by investing in sustainable projects and assets, defining appropriate metrics and developing a comprehensive sustainability strategy to remain competitive also in the coming decades in an increasingly net-zero emissions environment.

[18] Climate Action Network Europe: The hidden costs of Europe's decrepit buildings https://caneurope.org/decrepit-renovated-buildings-europe/

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Emergence of a new market segment: Central bank incentives for the Hungarian green mortgage bond market

Tamás Borkó – Evelyn Herbert – Balázs István Horváth

The market for green mortgage bonds, increasingly widespread internationally, has been created in Hungary as a result of the MNB's incentive programmes. Green mortgage bonds offer the banking sector long-term financing with favourable features. According to the green hypothesis, the spread of this new asset class may also be supported by the more favourable risk profile of mortgages used as collateral. The uptake of green mortgage bonds in Hungary has been driven by the MNB's Green Mortgage Bond Purchase Programme, and issuances are also supported by the preferential treatment in the Mortgage Funding Adequacy Ratio (MFAR). The central bank programmes aim to contribute to the energy modernisation of the domestic housing stock and the achievement of climate targets through the promotion of green housing loans, thereby reducing the risks for banks as well. The MFAR regulation was amended once again on 1 July 2022, further supporting the development of the mortgage bond market.

1. Green mortgage bonds as an effective tool to spread green lending

1.1. Main features of green mortgage bonds

Mortgage bonds provide banks with long-term and affordable financing for their lending. Mortgage bonds are covered by mortgages, which are therefore less risky than unsecured bonds. They are therefore considered safer investments, and therefore banks typically have to pay lower yields to attract such funds. In addition, they are long-term securities and therefore provide a stable source of funding for loans, which are also typically long-term, making the development of the mortgage bond market beneficial also from a financial stability perspective.

Green mortgage bonds represent a targeted, secure source of funding for banks to finance the construction and purchase of energy-efficient buildings through mortgage loans, thus contributing to the energy modernisation of the real estate stock. In the case of green mortgage bonds, the issuer undertakes to hold in the portfolio of loans covering its mortgage bonds at least the same amount of mortgages secured by green, i.e. energy-efficient, real estate as the amount of funds raised over the life of the bond. This could encourage banks to prioritise such mortgages.

The spread of green mortgage bonds may also be supported by the more favourable risk profile of underlying mortgages. The "green hypothesis", according to which green mortgages backed by energy-efficient real estate have a lower credit risk than other loans, is becoming more and more widespread. There are two main arguments supporting this. On the one hand, people living in green, energy-efficient properties will have a higher income disposable for repayment due to lower utility bills, which reduces the probability of default (PD) of the loan. Additionally, due to rising demand and tightening regulation, green properties are expected to be more stable in value in the long run, and thus mortgage collateral is expected to be enforceable at a higher price in the event of default, and thus the loss given default (LGD) will be lower. There may be further benefits if the owners of energy-efficient properties show other more favourable behavioural patterns (e.g. in terms of financial awareness). There are undoubtedly methodological challenges in examining this issue, as there are many factors that can affect the likelihood of a loan being orderly repaid, which may be related to the characteristics of the dwelling used as collateral and the characteristics of the homeowners.

Several studies have examined the green hypothesis and have been able to confirm it on smaller datasets, although only a few have provided statistically significant evidence of a correlation between energy efficiency and credit risk on a larger sample size due to lack of data. The best-known large-sample studies on this topic have been conducted in the UK, where several researchers have demonstrated the phenomenon, such as Guin and Korhonen (2020) and Guin *et al.* (2022). In addition, in some European submarkets, a significant relationship between energy characteristics and certain credit risk characteristics and housing prices has been found, for example, by Baccega *et al.* (2019), Schütze (2020), Hyland *et al.* (2013) and Adan - Fuerst (2016), and in the Hungarian market by Ertl *et al.* (2021), as well as by the Energy Efficiency Financial Institutions Group (EEFIG), established by the European Commission[1]. However, a deeper investigation of the relationship between energy attributes and credit risk characteristics over a longer period and with a larger sample size requires more and better quality data.

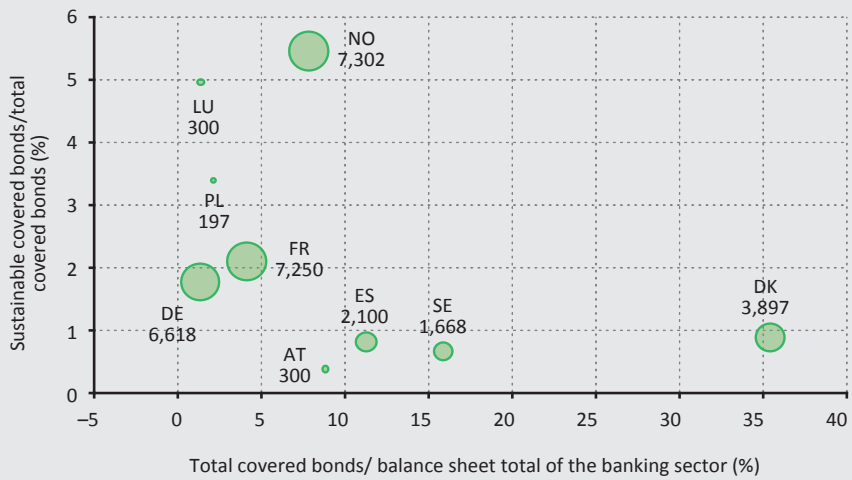
1.2. Emergence and spread of green mortgage bonds

The issuance of green mortgage bonds is becoming increasingly popular around the world, notably in Europe, but also in our region. Although the overall stock and share of green mortgage bonds in the world is still low, a dynamic growth can be observed. In particular, some developed countries in Western and Northern Europe (Germany, Norway, Sweden, Denmark, France) excel in this respect. In the Central and Eastern European region, Poland currently is leading in the issuance of such securities (Chart 1).

[1] https://ec.europa.eu/eefig/news/are-energy-efficient-borrowers-less-risky-2021-07-05_en

The first green mortgage bond (Pfandbrief) was issued in Germany as early as 2015 by the mortgage bank Berlin Hyp, followed by several other issues. In Germany, in order to guarantee the high quality of green mortgage bonds, due to the long tradition of mortgage banking, the minimum requirements for green mortgage bonds have been developed by the market players themselves through an association of local mortgage banks, in line with the legal requirements and considering the EU directives. Poland was the first country in the region to issue a green mortgage bond, with PKO Bank issuing its first green mortgage bond in 2019. Following this, Hungary was the second in the region to issue green mortgage bonds in 2021.

Chart 1
Stock and importance of EEA countries' green covered bonds in financial intermediation (31 December 2020)



Source: ECBC (2021), Eurostat. Note: Sustainable covered bonds include securities other than green mortgage bonds, with green covered bonds accounting for around 70 per cent of sustainable covered bonds. AT: Austria, DE: Germany, DK: Denmark, ES: Spain, FR: France, LU: Luxembourg, NO: Norway, PL: Poland, SE: Sweden. The size of the bubbles is proportional to the stock of sustainable covered bonds by country and is shown in EUR millions in the data table.

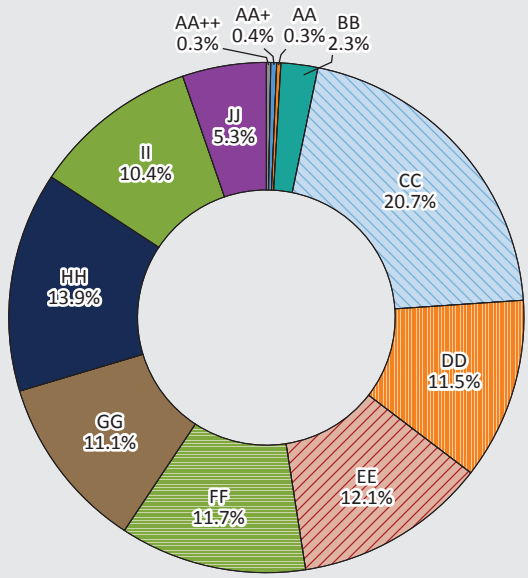
2. Promoting the emergence of green mortgage bonds in Hungary

In line with the favourable features of green mortgage bonds, the MNB has supported the development of the domestic green mortgage bond market in recent years through several instruments. The emergence of green mortgage bonds in Hungary is beneficial for stable bank funding. The emergence of green mortgage bonds has a market-building effect on the entire mortgage bond market, mainly

through the emergence of new investors, including foreign ones, which is beneficial also for the financing structure of banks. The maturity structure between assets and liabilities may improve, and the share of cross-holdings of mortgage bonds between domestic banks, and hence the associated contagion exposure, may decrease.

Green mortgage lending, supported through green mortgage bonds, also contributes to the energy modernisation of the real estate stock and to the achievement of climate policy goals. Since the real estate stock in Hungary is responsible for about 40 per cent of primary energy use and domestic buildings are obsolete in terms of both technical and energy characteristics (Chart 2), there is significant potential for energy savings in reducing the energy use of buildings. The favourable yields of green mortgage bonds that can be issued against green loans financing energy-efficient real estate may encourage banks to favour such mortgages, which may even translate into more favourable lending rates.

Chart 2
Distribution of residential buildings with energy performance certificates issued between 2016 and 2021 by energy class



Source: Lechner Knowledge Centre

One of the MNB's main objectives in launching the Green Mortgage Bond Purchase Programme and the FGS Green Home Programme was to mainstream sustainability considerations in the housing loan market. The MNB has also amended the Mortgage Funding Adequacy Ratio (MFAR) regulation to support the

development of the green mortgage bond market from 1 July 2021. The measures taken are in line with the vision announced in the MNB's Green Monetary Policy Toolkit Strategy to develop a financial system by the end of the decade at the latest that takes into account and effectively integrates environmental sustainability considerations on a broad scale.

2.1. MFAR regulation as a supply incentive tool

The MFAR regulation imposed by the MNB from 1 April 2017 ensures the long-term financing of residential mortgage loans in the banking system with mortgage-based funding. The MFAR requirement expects banks to finance at least 25 per cent of their residential mortgage loan portfolio with mortgage-based funds – mortgage bond issues or refinancing loans from mortgage banks. Funds covered by mortgages are considered a stable, long-term form of financing with a relatively low funding cost due to their favourable risk rating. This allows credit institutions to reduce their on-balance-sheet maturity mismatch on favourable terms and reduce their interest rate risk with the increasing prevalence of loans with longer interest rate fixation periods.

The MNB amended the MFAR regulation on 1 July 2021 to support the development of the green mortgage bond market. The MFAR can provide a meaningful regulatory incentive for the issuance of green mortgage bonds without compromising the original financial stability objectives. To this end, from 2021, green mortgage bonds and refinancing loans can be considered with a weight of 150 per cent in the MFAR numerator (Chart 3). Such green funds are required to have a minimum remaining maturity of 5 years at issuance or at disbursement in the case of a refinancing loan, and to comply with international standards for mortgage bonds, such as the International Capital Market Association Green Bond Principles (ICMA GBP) or the Climate Bonds Initiative Climate Bonds Standard (CBI CBS), and to be certified by a third party rating agency. Mortgage bonds can only be considered as stable funds up to the value of the underlying green collateral.

Chart 3
Simplified formula for calculating MFAR

$$\text{MFAR} = \frac{\overbrace{(1^* \mathbf{MB} + 1.5 * \mathbf{gMB})}^{\text{group with a mortgage bank}} - \overbrace{(1^* \mathbf{RL_g} + 1.5 * \mathbf{gRL_g}) + (1^* \mathbf{RL_r} + 1.5 * \mathbf{gRL_r})}^{\text{refinanced bank}}}{\mathbf{ML} + \mathbf{gML}} \geq 25\%$$

*where **MB** is a mortgage bond, **gMB** is a green mortgage bond, **RL_g** is a refinancing loan given, **gRL_g** is a green refinancing loan given, **RL_r** is a refinancing loan received, **gRL_r** is a green refinancing loan received, **ML** is the residential mortgage loan portfolio over one year, **gML** is the residential green mortgage loan portfolio over one year*

Due to the low green issuance rate, the preferential treatment of green funds has so far had a limited impact on the compliance of institutions with the MFAR, which is expected to become more significant in the future. Based on December 2021

data, the average MFAR level for the banking sector was 30.2 per cent, which would have been 1.2 percentage points lower at 29 per cent without the green allowance. The increase in the MFAR level was most marked for the banking groups with mortgage banks, with two of them seeing an increase of more than 2 percentage points due to the allowance. In the future, as green loan portfolios build up, the share of green funds is expected to increase, and the rising impact of preferential treatment is expected.

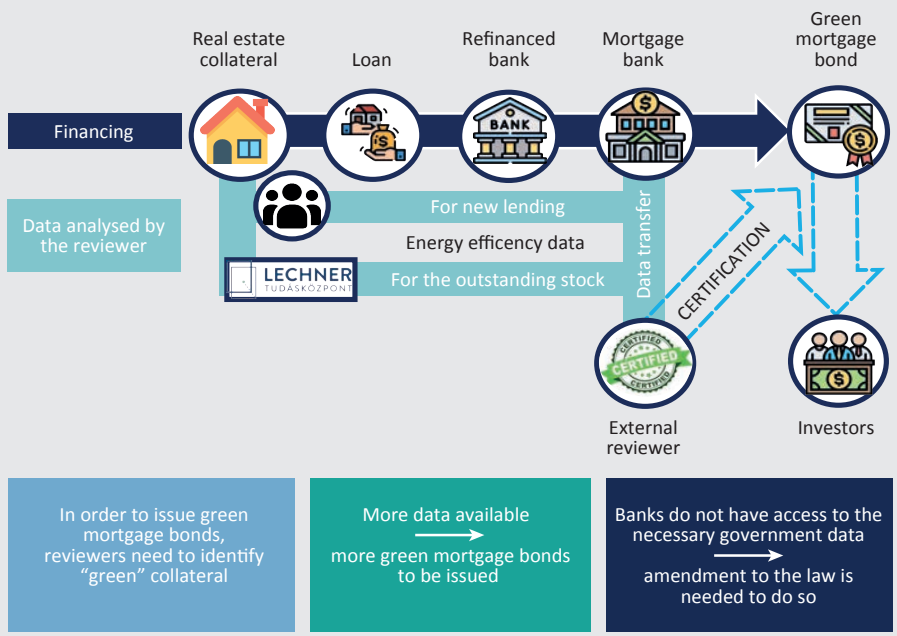
The MFAR regulation was amended once again on 1 July 2022, further supporting the development of the mortgage bond market. The main change concerns the currency of the eligible liabilities: while previously only liabilities denominated in HUF were eligible for the MFAR, the amendment allows liabilities denominated in other currencies to be eligible under certain restrictions and conditions. In addition, the entry into force of the previously announced tightening changes to the regulation (level increase, limitation of cross-ownership by banks, requirement for listing) will be postponed by 1 year to 1 October 2023. In order to further encourage the inclusion of green funds, from October 2023 only green funds will be included in the numerator of the ratio from newly issued foreign currency funds. Until that time, however, to help adjust to the level increase and because of the time needed to build up green collateral and the taxonomic uncertainties required for foreign issuances, non-green foreign currency funds will also be acceptable in the calculation of the ratio.

Further development of the mortgage bond market could make a substantial contribution to the build-up of a larger stock of green mortgage bonds. The acceptance of foreign currency mortgage-based funds and the requirement for their green certification in the MFAR will support the expansion of the investor base and thus the development of the mortgage bond market and the increase in the share of green mortgage bonds. The emergence of foreign currency and green foreign currency mortgage bonds would have overall positive financial stability implications by increasing investor interest from foreign players and deepening the market. However, for a faster green transition and for a more efficient implementation of the green programmes of the central bank and the government, it would be essential for credit institutions to have adequate information on the most important energy characteristics of the properties (Chart 4).

Without a change in the regulatory environment, a significant part of the outstanding green mortgage portfolio will not be identifiable, which will limit proper risk assessment and the achievement of green regulatory objectives. Therefore, legal and effective access to data managed by the state through the Lechner Knowledge Centre is of paramount importance. Without the proposed change, banks are only able to access the necessary data efficiently (by requesting it from the client) for newly disbursed transactions, but this will only mean a

significantly smaller portfolio that will build up more slowly. In addition, a substantial boost to the market could be provided by accelerating the process of standardising the international definition frameworks for green mortgages, including in the EU, which would help to reduce the problems and challenges around the definition and taxonomy of green products.

Chart 4
A potential process for querying energy efficiency certification data



Source: MNB

2.2. The MNB's Green Mortgage Purchase Programme

In line with its Green Monetary Policy Toolkit Strategy, the MNB launched its Green Bond Purchase Programme in August 2021. The basic aim of the programme is to create a domestic green mortgage bond market and to promote best practices through targeted purchases. Through the purchases, the MNB also supports the emergence and spread of green mortgages serving as underlying collateral, closely linked to the former objective, which can contribute to the modernisation of the domestic real estate stock and thus to the achievement of climate targets. The central bank aims to promote green aspects in the housing loan market, which it supports through the FGS Green Home programme, in addition to the purchase of green mortgage bonds. In addition, the Green Mortgage Bond Purchase Programme aims to promote and encourage environmentally conscious consumer behaviour.

Furthermore, in the targeted renewal of its presence in the mortgage bond market, the MNB sought to maintain the past achievements in the development of the mortgage bond market, while also mainstreaming sustainability considerations.

2.2.1. Main parameters of the MNB's presence in the mortgage bond market

In designing the programme, the MNB sought to develop the parameters of the Green Mortgage Bond Purchase Programme in cooperation with the relevant market participants, as set out in the Green Monetary Policy Toolkit Strategy. In the case of a new central bank programme, which is one of the first targeted green asset purchase programmes and affects a developing market segment, the central bank has placed great emphasis on feedback from market participants. In developing the details of the programme, the MNB has relied on consultations with stakeholders, both on the conditions and on the involvement of the central bank in the market.

Under the programme, the MNB carried out transactions in both the primary and secondary markets similarly to its previous mortgage bond purchase programmes, but in a targeted manner, it only purchased green mortgage bonds from issuers. The purpose of the primary market purchases was to encourage and support the placing of new securities, while the secondary market presence served liquidity and market maintenance purposes. In terms of scale, the central bank's presence was stronger in the primary market, where the MNB bid for around 40 per cent of the volume to be issued. In the first phase of the programme, the MNB strived to acquire no more than 50 per cent of the share of outstanding securities within a Green Mortgage Bond series.

On 5 April 2022, as part of the review of the Green Bond Purchase Programme, the MNB decided to tighten the conditions of the programme and to suspend purchases. Having successfully met its initial objectives and laid the domestic foundations for a new market segment, the objective of the central bank's involvement has become to encourage the issuance of mortgage bonds representing better green credentials. The MNB can improve green quality by tightening the conditions of the programme, the detailed parameters of which will be subject to consultation with the relevant market players.

The MNB will maintain the Mortgage Bond Renewal option, which will continue to offer the possibility to renew maturing mortgage bonds, thereby further strengthening the liquid, transparent and well-functioning mortgage bond market created by the previous programmes.

2.2.2. Conditions for participation in the Programme

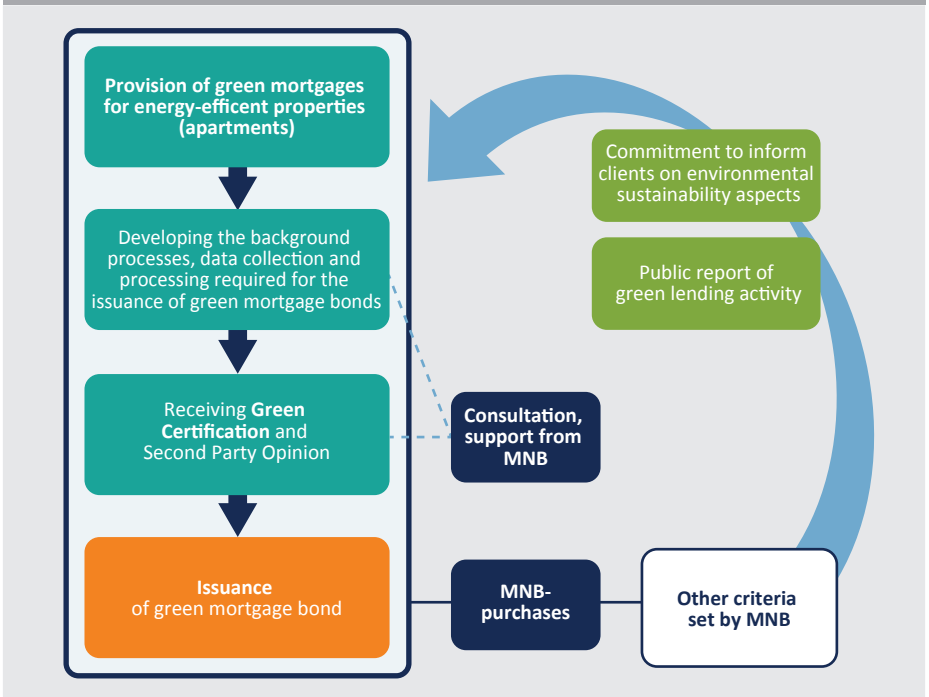
The MNB has set several conditions for participation in the programme to support the assigned strategic objectives. As in its previous mortgage bond purchase programmes, the MNB purchases only fixed-rate mortgage bonds denominated in HUF and with an original maturity of at least 5 years and publicly traded in Hungary under Hungarian law. In order to ensure that the emerging domestic green mortgage bond market is in line with international best practices, participation in the MNB's programme is conditional on obtaining one of two most widely used international green standards – the Climate Bonds Standard[2] developed by the Climate Bonds Initiative[3] or the International Capital Market Association Green Bond Principles[4] – and verification of compliance with the standard by an external, independent party.

To emphasise sustainability aspects, the conditions of participation include providing client information and the preparation of an annual public report. When launching the scheme, the MNB aimed to promote and encourage environmentally conscious consumer attitudes, in line with which it imposed a client information obligation on participating issuers. In addition, the issuer must undertake to present in an annual public report the characteristics of the green mortgage bonds issued under the scheme and of the real estate that serves as collateral for the mortgage loans backing them. Reporting requirements support the transparency of the evolving domestic green securities market and the spread of best practices in the domestic financial system.

In addition, similar to the practice in previous mortgage bond purchase programmes, the conditions also support market transparency and liquidity. Accordingly, it is mandatory to list mortgage bonds on the stock exchange and to ensure daily quotation. Furthermore, due to the domestic market structure, compliance with the conditions is also mandatory for the issuance of mortgage bonds covered by a refinancing agreement, which can be fulfilled by market participants entering into an agreement with each other on certain conditions.

[2] https://www.climatebonds.net/climate-bonds-standard-v3
[3] https://www.climatebonds.net/
[4] https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/

Chart 5
Process and conditions for issuing green mortgage bonds under the Green Mortgage Bond Purchase Programme



3. First issuances and the emergence of the domestic green mortgage bond market

Almost a year of experience shows that the Green Mortgage Bond Purchase Programme has been able to act as a catalyst, creating the domestic green mortgage bond market. As a result of targeted central bank measures, the first green mortgage bond issue in Hungary was made by OTP Mortgage Bank in August 2021, thus creating the domestic green mortgage bond market. Within a few months of the launch of the programme, several market players carried out issuances, and by April 2022, all five active domestic mortgage banks had issued green mortgage bonds.

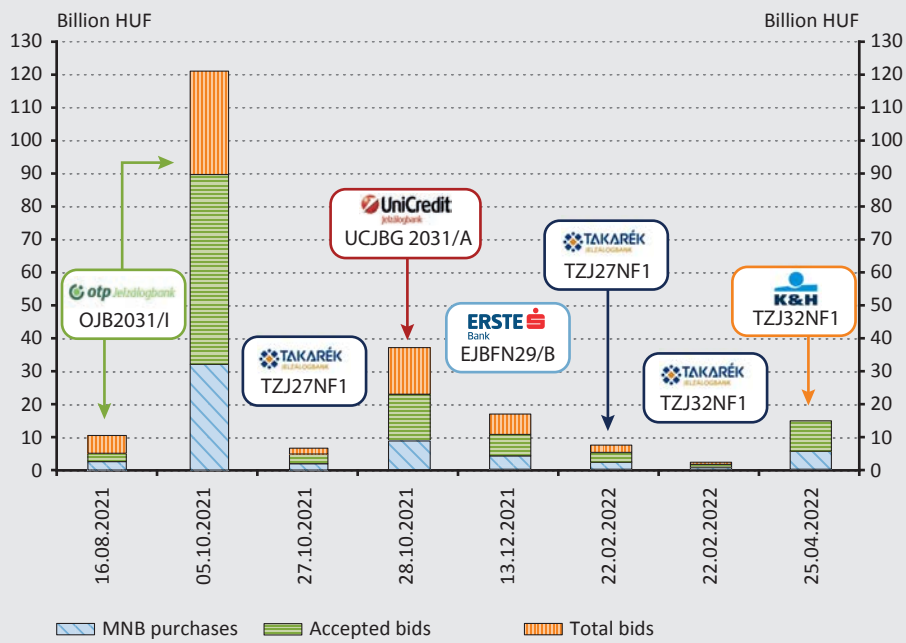
In line with the practice of issuing green securities, mortgage banks first set up a green mortgage bond framework and then started issuing securities series. The international standards used by issuers varied; four of the mortgage banks developed a framework in alignment with the Green Bond Principles, while one chose the Climate Bonds Standard. The experience of the programme so far shows that the details of each bank's green mortgage bond framework can vary considerably, which may affect the amount of green mortgage bonds that can potentially be issued.

3.1. Main features of green mortgage bonds issued

Since the launch of the programme, participants have issued green mortgage bonds worth more than HUF 156 billion. As a result, green issuance has now reached almost 10 per cent of the total HUF mortgage bond market. A substantial part of the total issuance, HUF 95 billion in nominal value, is linked to OTP Mortgage Bank, just like the largest issue, the institution issued HUF 90 billion in nominal value in October 2021 of the OJB2031/I series. Takarék Mortgage Bank has already issued two series under the programme, after issuing the TZJ27NF1 series in October 2021, it issued the TZJ32NF1 series in February 2022.

The maturities of mortgage bonds issued under the programme ranged from 5 to 11 years, while the volume-weighted average maturity exceeded 10 years. The volume-weighted average of spreads relative to the government bond market in the primary market for green mortgage bonds has been slightly positive in the auctions to date, but there have been some issues where the average yield on sales has been below the relevant government bond market yield. The interest rate paid by the securities ranged between 2.50 per cent and 6.75 per cent, an interval that is explained by both the different maturities and the significantly changed yield environment since the launch of the programme.

Chart 6
Issues in green mortgage bond auctions to date

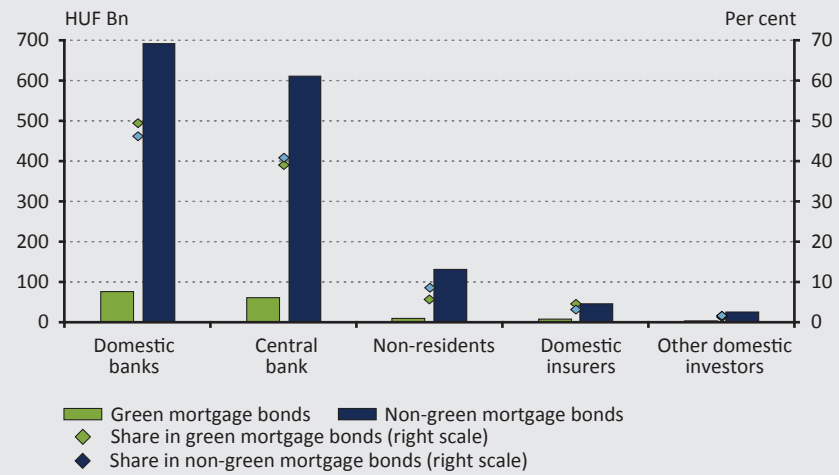


Source: websites of issuers, MNB

3.2. Investor base

Although there is strong demand for green mortgage bonds, the investor base is not yet significantly different from that for non-green mortgage bonds. In addition to the MNB, investors in green securities were mainly domestic banks and credit institutions, and domestic insurance companies and pension funds also bought green securities, similar to the mortgage bonds issued earlier. In the auctions of green mortgage bonds issued so far, the average bids submitted were almost one and a half times the accepted bids, and undersubscription occurred only in one auction, which indicates that there was significant investor interest. However, the analysis of the ownership sectors shows that the investor base has not yet broadened significantly compared to non-green issues, with domestic banks and the MNB still being the main buyers (Chart 7). In the future, however, the share of other investors can be expected to increase, partly due to the growing role of green investment vehicles (e.g. investment funds) and partly due to the greater role of foreign investors. Due to the previous MFAR requirements, green mortgage bond issues are denominated in HUF, making it less attractive to foreign investors. Given the possibility of accepting foreign currency funds in the MFAR in the future, and that consequently foreign currency issuances can be launched, it is expected that foreign investors will also represent a larger share in the future. In the context of targeting foreign markets, a high standard of green criteria becomes even more important, to which the MNB is also paying great attention.

Chart 7
Breakdown of stock of green and non-green mortgage bonds by ownership sector (April 2022)



Source: MNB

Since the launch of the programme, the MNB has purchased green mortgage bonds with a nominal value of approximately HUF 61 billion. The majority of the central bank's purchases were made in the primary market, while only small purchases were made in the secondary market, mainly for market maintenance purposes. In addition, due to its targeted nature, the volume of purchases under the programme is significantly lower than the volumes under the government bond purchase programme or the BGS. Following the creation of the domestic green mortgage bond market, the MNB will continue to support the market on the demand side through the new amendment to the MFAR regulation.

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Green turn in collateral management

László Kiss – Gergely Manasses – András Straubinger

Collateral management is a central element of the traditional central bank toolbox, as central banks can only lend to the banking system in collateralised form. In recent years, there has been a growing demand from both the central bank and the market for greening central bank collateral management and integrating climate risks. The idea is that, on the one hand, collateral management is closely linked to the liquidity and asset management of the banking system, and changes to the collateral framework can affect banking procedures and the development of green markets. On the other hand, greater attention to climate risks could also be a step forward in central banks' risk management. Given the substantial exposure of central banks to climate risk, it is inevitable to examine the climate risk aspects in the context of monetary policy instruments in order to implement an effective monetary policy. The MNB adopts a fundamentally pro-active approach to climate risk issues, which is also characteristic of its approach to collateral management. Accordingly, in 2021-22, the MNB improved the level of transparency for assets accepted as collateral and was among the first central banks to define preferential haircut levels for green assets to support green bond markets. The MNB is exploring ways forward, both in terms of developing methodologies, increasing transparency and practical steps, and the optimal framework for integrating climate risks into the collateral framework.

1. The role, operation and practice of collateral management

1.1. General aspects of central bank collateral management

Central banks provide covered borrowing facilities to the banking system as part of their normal monetary policy toolbox. Lending serves a number of central bank purposes: the central bank can stimulate lending activity in the banking system by providing preferential loans (e.g. FGS); interest paid on loans is a channel of monetary transmission; the central bank lending facility can be an important source of liquidity for credit institutions[1]. Overall, the existence and proper functioning of the lending facility is a priority for both the central bank and credit institutions.

[1] A special form of this is LoRL - Lender of Last Resort. Also known as ELA (Emergency Liquidity Assistance). In times of market stress, if a solvent credit institution has exhausted all its sources of market liquidity, it can apply to the central bank for a temporary loan by offering collateral outside the normal collateral pool, which will decide on eligibility after considering various criteria.

Central bank lending is only available in collateralised form. The exercise of monetary policy is a basic statutory task of the central bank, including collateralised lending, which presumes transparency, accountability and equal treatment. If lending were unsecured, central banks would be more likely to face losses in their lending activities. As a public institution, the loss of public money, in addition to being a cost to taxpayers, represents a serious reputational risk for central banks (Bindseil et. al. 2017). Unsecured lending would require a thorough and time-consuming risk assessment, which would substantially slow down the rapid central bank action expected in the functioning of monetary policy. Central banks interact with a large number of banks with different credit quality, meaning that some banks would not have access to central bank funding or would not have access to it on the same terms and conditions, which would not be market neutral. Taking account of differential counterparty risk would justify lending at different interest rates, but instead central banks use collateralised lending with a uniform interest rate in monetary policy, where the differential counterparty risk is not reflected in the pricing of the loan due to the collateral accepted.

The framework for collateral management is also influenced by monetary policy, risk management and operational considerations. In the case of a collateralised lending facility, determining the collateral management principles and procedures forms a significant part of the loan facility. Central banks need to design a system that is efficient to operate (both on the central bank and credit institution side), minimises central bank risks, and at the same time adequately supports the central bank purpose for which the lending facility has been designed.

- **Monetary policy objective:** A central element of the lending facility is the identification of the monetary policy objective to be pursued, which must be supported by collateral management. A wide range of monetary policy objectives affect collateral management in different ways. For example, from a banking system liquidity perspective, the structure and maturity of the financial market or whether there is a structural liquidity surplus/deficit in the financial system is of particular importance. The framework also varies over time, it is different in a business cycle and in a crisis, with the scope of collateral typically expanding in the latter. Changes to collateral management rules can actively support certain market segments (e.g. preferential treatment of listed securities, green bonds[2]). In the case of targeted loan products (e.g. supporting SME lending), the framework and conditions for accepting loans provided by banks as collateral should be considered.

[2] The acceptance of a security as collateral has a positive effect on the price of the security, called the eligibility premium. In this way, simply by making a group of securities acceptable, a haircut reduction can have a positive effect on the market segment concerned. Schoenmaker 2019 provides several examples.

Chart 6
Background to the collateral framework

- **Risk management:** For risk management reasons, central bank collateral management is essentially conservative. The aim is to ensure that there is a sufficiently high probability that the central bank will not incur losses when lending. The conservative approach is also reflected in the definition of acceptable collaterals and the application of haircuts.[3]

- **Operation:** The central element of collateral management is the largely automated blocking/unblocking and valuation of securities. More complex procedures are involved for accepting assets of less standardised construction, such as credit claims, as collateral.[4] It is important for the operation of the collateral management system to be sufficiently transparent and robust, eliminating errors and operational risks, while minimising the associated human resource requirements.

- **Other:** The framework used in collateral management varies from one central bank to another, and its final form is determined by a number of factors beyond

[3] It is important to put the fundamentally conservative central bank approach in the right context. One of the central tasks of central bank collateral management is to support liquidity transformation, i.e. providing liquidity for less liquid collateral. In doing so, the central bank also accepts assets as collateral that the market does not (e.g. credit claims). Similarly, for example, in a crisis situation, central banks typically expand the scope of collateral, as opposed to the banking system's more restrictive approach to providing liquidity.

[4] There are many aspects to the functioning of the collateral framework. One of the first issues to be decided is how to assign loans to collateral. In this respect, there are basically two types of collateral management systems: the so-called earmarking system, where the underlying collateral is pledged to each loan granted, and the pool-based system, where the total amount of loans granted to a market counterparty is matched against a collateral pool.

those described above (e.g. it depends on the legal regime applicable to central banks).

There are commonly used risk management tools in collateral management, such as eligibility criteria or the haircut system. Central bank toolboxes can vary widely in design, which is also true for collateral frameworks (BIS 2013). However, there are commonly used risk management tools that each central bank considers when designing its framework.

- **Eligibility criteria:** An important element of the collateral framework is the optimal definition of the range of eligible collateral. Eligibility criteria eliminate the riskiest, most difficult to manage (to price, sale, withdraw) assets from the collateral pool. Central banks typically rely heavily on the ratings of credit rating agencies, using them as a credit risk threshold. (There are, however, other means of capturing credit risk in the central bank context, such as internal ratings.[5]) Market risk may also be a relevant consideration in the eligibility criteria, for example by prohibiting the acceptance of highly volatile equities as collateral. It is important that, in the event of a default by the collateral provider, the central bank can compensate itself as quickly as possible by withdrawing the collateral and then selling it. Central banks tend to accept instruments with relatively simple, transparent and easy-to-understand risks and avoid accepting complex instruments, thus ensuring the efficient implementation of a possible collateral liquidation Nevertheless, while keeping monetary policy objectives in mind (e.g. to ensure the provision of liquidity to the banking system), given that central banks, by virtue of their role, will always remain liquid in their own currency, they are more willing to accept less liquid assets as collateral at appropriate haircuts compared to other actors in the banking system.

- **Haircut**: A haircut is a risk management tool used to determine the price at which eligible collateral is accepted. The higher the market, credit or liquidity risk of a collateral asset class, the higher the haircuts applied by central banks in their valuation. The haircuts protect the central bank from potential negative revaluations during collateral withdrawal and sale (liquidation period). For collateral denominated in foreign currencies, foreign exchange risk can be managed by applying higher haircuts. Interest rate risk (spread risk) is taken into account by applying a haircut differentiated by maturity, interest rate and sector for assets. In the case of liquid securities, determining haircuts is simpler, but for less liquid assets such as credit claims, it requires more modelling.

[5] In the ECB's collateral framework, basically 3 types of ratings are used: External Credit Assessment Institutions (ECAIs); internal ratings of banks (IRBs) and internal ratings of central banks (ICASs). For a detailed description see (EU) 2015/510, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02014O0060-20210101.

- **Pricing:** An important aspect is the market liquidity of collateral, some asset classes (e.g. government securities) are traded in high volumes, with actual, reliable prices available on a daily basis, while other asset classes are less liquid, with no reliable prices. They are priced by theoretical pricing using a selected yield curve and a spread specific to the asset type. (In the case of credit claims, the central bank typically values the asset at its nominal value instead of its price, reflecting pricing uncertainties in the haircut.)

- **Other limits:** In addition to the eligibility criteria and haircut matrix, central banks may also set other conditions for eligibility as collateral. Among these, the ban on the use of securities issued by affiliated companies as collateral (Weber 2016), which is intended to address the risk of wrong-way risk, should be highlighted[6]. In addition, some central banks also define concentration limits, which, for example, restrict the blocking of a large proportion of lower-quality, riskier assets in certain bank pools.

- **Evaluation:** Daily determination of the value of collateral is also necessary to avoid under-collateralisation. In relation to the current value of the loans disbursed, the debtor may be required to provide additional collateral.

1.2. Collateral management at the MNB

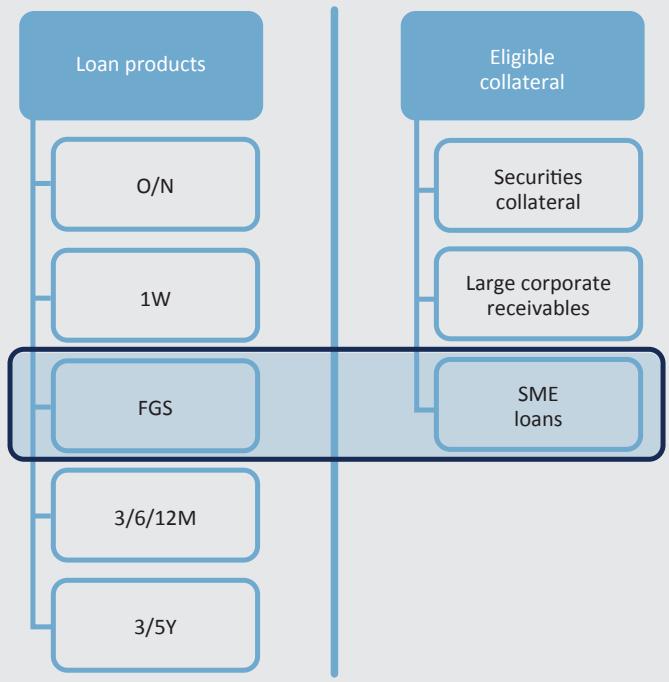
The MNB has several types of collateralised credit facilities. In accordance with the provisions of the Hungarian Central Bank Act, central bank credit as a monetary policy instrument may be obtained from the MNB[7] only against appropriate collateral, and credit institutions may not be financed by the MNB except for monetary policy operations, lending related to the operation of payment systems and extraordinary lending. The MNB's Business Conditions (MNB 2022c) and the FGS Framework Agreement and Product Information Notice[8] published on its website regulate the scope of eligible collateral for intraday credit, overnight secured credit, spot (additional) credit, long-term secured credit and FGS credit.

[6] This risk exists in collateral management when there is a high correlation between the credit deterioration of the money market counterparty and the collateral it has blocked.

[7] Article 18(a) of Act CXXXIX of 2013 on the Magyar Nemzeti Bank CThe collateral framework does not apply to loans that may be linked to the central bank's "lender of last resort" (LoLR) function. The LoLR function is affected by the specific circumstances surrounding the management of individual credit crises.

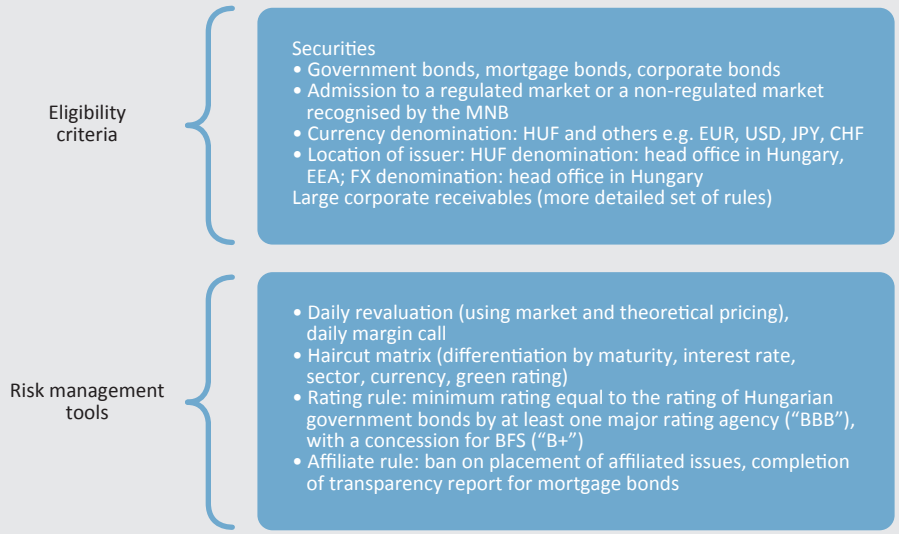
[8] The relevant documents available at: https://www.mnb.hu/monetaris-politika/novekedesi-hitelprogram-nhp

Chart 2
Loans granted by the MNB and eligible collateral (pooling system)



The MNB conducts pool-based, consolidated collateral management. The MNB accepts the same assets as collateral behind all its lending instruments, however, SME credit claims can only be blocked behind FGS loans. Both collateral and loans are valued and matched by the MNB on a pool basis (with the exception of FGS loan claims). The eligible collateral pool securing the loans extended to the client also includes the eligible securities portfolio, eligible large corporate receivables and SME credit claims from FGS loans blocked by the client at KELER Zrt. with the central bank as beneficiary. Clients may initiate a change in the composition of the securities portfolio at KELER Zrt. Banks can request the mortgaging of large corporate credit claims and SME credit claims in favour of the MNB by providing the MNB with data and documents.

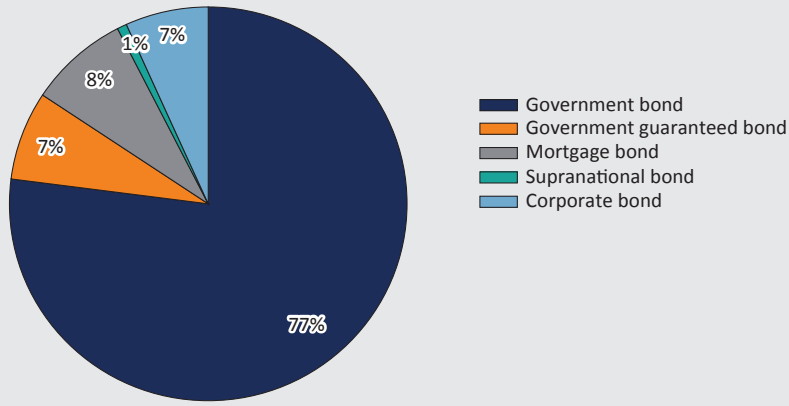
Chart 3
Lines of defence used by the MNB in collateral management



In the context of the collateral valuation, the value of the collateral pool and the stock of central bank collateralised loans are revalued daily. At the end of the day, the system compares the stock of outstanding loans plus accrued interest with the collateral value of the securities portfolio, large corporate receivables and, in the case of FGS Loans, SME credit claims. If the value of the collateral falls below the value of the revalued loans, a margin call is made.

Liquid Hungarian government bonds form the backbone of the eligible collateral pool. In practice, issues from the entire Hungarian securities market are eligible as collateral, as well as SME and large corporate receivables under FGS. Eligible (central bank-eligible) securities are negotiable bonds denominated in HUF or foreign currency admitted to trading on a regulated market or a non-regulated market accepted by the MNB. The issue, the issuer or the party guaranteeing the issue must have at least the same long-term rating as the government securities issued by the Hungarian State, at least from one of the credit rating agencies accepted by the MNB. In addition to meeting the credit quality criterion, eligible securities are government bonds issued by the Hungarian government denominated in HUF or in a currency other than HUF, discount Treasury bills, bank bonds denominated in HUF or in a currency other than HUF, corporate bonds, corporate issues participating in the Bond Funding for Growth Scheme, mortgage bonds. Taking all this into account, the scope of collateral pool covers virtually the entire Hungarian bond market.

Chart 4
Composition of the collateral pool of securities blocked in favour of the MNB (10 March 2022)



The MNB uses collateral-specific haircut values. It is worth distinguishing between the concept of haircut values used for securities and for credit claims. For securities, the haircut is mainly used to manage exchange rate risk (foreign exchange risk, interest rate risk, spread risk), where the MNB anticipates a relatively short liquidation period of a few days to a few weeks. In the case of large corporate receivables and SME receivables, the sale of the collateral portfolio as a whole is expected to take more time (half a year to 1 year), so the role and pricing of credit risk is of particular importance in the context of acceptance rates. The MNB classifies each security collateral into different security categories according to their characteristics (e.g. liquidity) and labels them from L1 to L8, in addition to L9 corporate loans. In addition, the type of interest rate and the length of the residual maturity determine the haircut. The definition of the groups of securities used in collateral management and the table of haircut values per tenor (haircut announcement) is published transparently on the MNB's website, as is the daily acceptance price/value of the securities collateral.

Table 1
Risk management parameters applied to collateral accepted by the MNB MNB (%) (2021)

Maturity period (year)	L1		L2			L3			L4			L5	L6			L7			L8	L9
	Fixed	Zero	Fixed	Zero	Variable	Fixed	Zero	Variable	Fixed	Zero	Variable		Fixed	Zero	Variable	Fixed	Zero	Variable		
0–0,5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		3.5	3.5	3.5	4.5	4.5	4.5		
0,5–1	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.0	1.5	1.5	1.5		4.0	4.0	4.0	5.5	5.5	5.5	5	10
1–3	2.5	2.5	5.5	5.5	2.5	6.5	6.5	2.5	5.5	5.5	2.0		5.5	5.5	5.0	8.5	8.5	7.5	15	20
3–5	4.5	4.5	9.0	9.5	3.0	10.5	11.0	3.5	9.0	9.0	2.5	40	7.0	7.0	6.0	11.5	11.5	10.0	25	30
5–7	6.0	6.0	12.0	13.0	4.0	14.0	14.5	4.0	11.5	12.0	3.0		8.5	9.0	7.5	14.5	15.0	12.5	30	40
7–10	7.5	8.0	15.5	17.0	5.0	18.0	19.5	5.0	15.0	16.0	4.0		11.0	11.5	9.0	18.5	20.0	16.0		50
10–	9.5	11.5	20.0	23.5	6.0	22.5	26.0	6.5	19.0	22.0	5.0		14.0	15.5	11.0	24.5	28.0	20.5	45	60

The lowest haircut is associated with liquid government securities (L1), while the highest is associated with the least standard large corporate receivables (L9). In addition to HUF securities, foreign currency bonds in the L6 and L7 liquidity categories are also eligible. For example, the A-2025/B bond is a fixed-rate HUF government bond with a residual maturity of over 3 years at the beginning of 2022 and a haircut of 4.5 per cent. The MNB evaluates this bond each day (in the case of fixed-rate government bonds, there is likely to be market price observation). Then reduces this value by the haircut: If the gross price is 101, the acceptance rate is 96.5.

2. The link between collateral management and climate risks

2.1. The background to the green turn in central bank collateral management

Central banks are increasingly recognising the importance and relevance of climate change risks in the context of collateral management. Although central banks have been dealing with green finance and climate risk issues for years, it is only in the last year or two that the discussion of these issues has featured prominently in central bank communications. In this context, the issue of collateral management is increasingly being addressed in central bank statements. The ECB is one of the most committed central banks. Christine Lagarde, President of the ECB, announced that an important part of the Bank's strategic goals is to implement sustainability objectives in its collateral framework, emphasising the link between monetary policy and a sustainable economy. (Lagarde 2020) The President of the French central bank, Francois Villeroy de Galhau, has stressed on several occasions the importance of assessing and integrating the impact of climate risks on growth and monetary policy. In his opinion, the euro area collateral framework should include indicators to measure the efforts and results of issuers of securities in achieving

the Paris climate targets (Villeroy 2021). In his 2021 speech, the President of the Bundesbank also mentioned the link between climate risk targets and collateral management. (Weidemann 2021) Central banks are increasingly committed to promoting sustainable development, which for some central banks, including the MNB, takes the form of a statutory mandate.

Setting collateral management rules has an impact on both bank liquidity management and securities markets, so shifting towards green collateral management can move the banking system and securities markets in the right direction. Collateral management, its role in the conduct of monetary policy and climate risks are interlinked in several ways. By adjusting the collateral framework, central banks can influence the green transformation of the banking system and, thereby, the economy, and it is also important for central banks to take climate risk into account in order to protect their own balance sheets. Recognising these correlations, central banks have begun to analyse the relationship and assess the framework for potential changes to collateral management.

- **Sustainability goal:** Natural and economic events related to climate change also have implications for the two classic central bank objectives of maintaining price stability and financial stability. In addition, pursuing sustainability goals is in line with the government's economic policy. If collateral management can support these objectives, it contributes to the achievement of the primary and secondary central bank objectives.

- **Risk:** Climate change is also a source of financial risks The collateral accepted in collateral management carries only consequential, indirect risk compared to the exposures on the balance sheet, as the asset is only included in the MNB's balance sheet when a collateral is withdrawn. However, this indirect risk exposure should not be underestimated. Climate risks affect the credit quality of certain issuers, the price volatility of certain assets and their marketability. In some cases, there may be a stronger than expected correlation between the withdrawal of collateral and its depreciation during a market stress.[9]

- **Market development:** Developing green markets is a priority as part of the green turn that central banks want to see. Collateral management can increase the market demand for green bonds by supporting green bonds (e.g. preferential eligibility, haircuts), improve the conditions for issuers to raise funds, thereby increasing and developing the market.

[9] As a result of the asset purchase programmes implemented, the range and volume of asset types included in the central bank's balance sheet has expanded, thereby significantly increasing the amount of climate risk included in the balance sheet. Partly as a result of these programmes, central bank balance sheets now typically have broad asset coverage. The MNB has also launched several asset purchase programmes in recent years. The assets covered by these programmes are also part of the eligible collateral pool, and in many cases the collateral pool also defines the scope of the assets that can be purchased (e.g. MNB, ECB).

- **Transparency:** One of the central challenges in identifying climate risks is the lack of access to adequate data. The MNB can lead by example (e.g. TCFD report), for example by analysing the assets accepted in collateral management. On the other hand, it can contribute to the development and consolidation of uniform procedures and better coverage of market data by formulating rules, establishing and adopting reporting patterns. This allows the MNB to develop and influence best market practices at an early stage of market development. The central bank can influence the climate awareness of banks, help spread best practice and set a positive example for market participants.

A decision on whether to take a protective or proactive approach to climate risk should be taken in the context of the central bank's objectives. The former is a more inward-looking approach, where the aim is to protect one's own balance sheet rather than actively influencing the market, while the latter, which is the MNB's approach, focuses on how to actively turn collateral management towards promoting a green finance.

2.2. The green transformation of bond markets

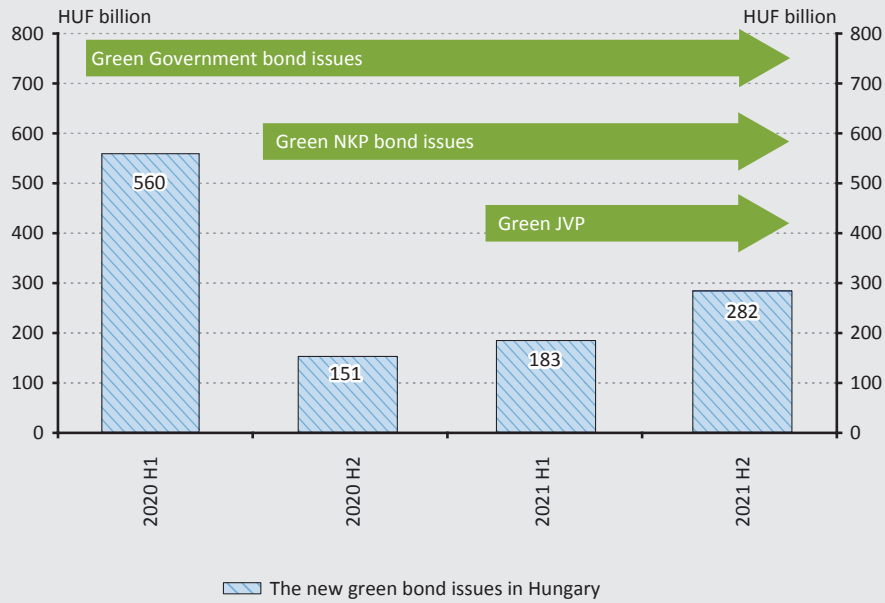
Changes in collateral management are closely linked to developments in bond markets. Securities are at the core of the eligible collateral pool, making it a priority for the central bank to monitor trends in the securities market. On the other hand, collateral management rules actively influence securities markets. (Accepting a security as collateral increases the demand for the paper, improves market access for issuers and can increase the attractiveness of the securities segment.)

The green bond market is growing dynamically, playing an increasingly important role in global bond markets. The market weight of green bonds has not been significant in the past, but there has been a significant increase in the stock over the past few years. Global issuance of sustainability bonds reached record levels between January and September 2021. The global value of green, social and sustainable issues reached USD 777 billion. The largest issuance was in green bonds, with over USD 362 billion, followed by social bonds with USD 171 billion and sustainability bonds with USD 144 billion. The development and uptake of the green market in the securities markets is well illustrated by the fact that, in 2016, the total amount of green bonds issued was only around USD 100 billion compared to the previous figures (Reuters, 2021).

Growth is also evident in the Hungarian financial markets, with more and more companies issuing bonds to finance green projects every year. The short timeframe is due to the fact that there was practically no green securities market in Hungary before 2020, when the international regulatory world and central banks started to place more and more emphasis on climate risk issues. (In the Hungarian market,

BGS or the GMPP have also contributed significantly to the development of this market segment.)

Chart 5
Development of the Hungarian green bond market



Source: Bloomberg, MNB

3. International central banking practice

In the last one or two years, central banks have turned more strongly towards green finance and climate risks, which has also fundamentally shaped the relationship of collateral management with these factors. Green bonds have been present in several central banks' monetary policy toolboxes (e.g. corporate bond purchase programmes) and their adoption has been ensured in collateral frameworks, but this has not been the result of conscious decisions or targeted actions. Prior to 2021, central banks, while ensuring eligibility, did not distinguish between green and non-green securities from a risk and pricing perspective. In line with this, risk management has not moved towards this direction in the past, nor has collateral management focused specifically on green risks and securities. In addition to the priority of monetary policy objectives, due to a lack of climate risk awareness, the central bank's collateral holdings are not in an optimal position from a climate risk perspective; the studies carried out so far suggest that the carbon emissions of the collateral accepted and blocked by the ECB are not compatible

with the Paris climate targets, are distorted from a climate risk perspective (Oustry et. al, 2020, Dafermos et. al, 2021).

The greening of collateral management was raised in several fora, with many stressing the importance of mainstreaming climate risk considerations, however, the number of practical steps taken until early 2022 was low.

- **PBoC: In 2018, the PBoC expanded the range of eligible collateral to include green bonds under the Medium Term Lending Facility (MLF)**. In addition to green bonds with a rating of at least "AA", the scope of eligible collateral has been extended to include bonds issued to finance small and micro enterprises and agricultural enterprises with a rating of at least "AA". In addition, the PBoC has ensured that green (and SME) bonds have first-among-equals status. In addition, the eligibility rules for corporate bonds have also been reformed, with "AA" and "AA+" corporate bonds now eligible for the MLF programme. Before the reform, only government securities, central bank bonds, development bank bonds, municipal securities and "AAA" rated corporate bonds were eligible as collateral for MLF operations.

As a result of the program, the PBoC has lowered the expected return on green bonds relative to comparable non-green bonds by making them a preferred collateral management tool. The regulation and the renewed framework had a significant and lasting impact on the bond market for several months. In numerical terms, the reform has increased the yield spread (greenium) between green and non-green financial bonds by nearly 46 basis points after the reforming the framework compared to the previous framework. The results highlight the impact and importance of the reform of the collateral framework, but also highlight, for example, the low number of analysable bond elements, which highlights the challenges of green bond market data (Hanming et. al. 2020).

- **ECB: The ECB has classified Sustainability-Linked Bonds (SLBs) as eligible collateral from September 2021.** The ECB's collateral framework does not distinguish between green and non-green securities, and therefore green bonds have been accepted as collateral in the past. The ECB has made SLBs eligible by extending the eligible coupon structures. The ECB has reviewed (and is continuously monitoring) how its collateral framework should, and needs to, be modified to support green markets. The ECB regulates in its collateral management exactly which coupon bonds can be accepted as collateral. The previous narrow definition was not appropriate for SLB coupons, so the text had to be revised.

The purpose of the revision of the collateral framework is to signal the Eurosystem's support for innovation in sustainable financing. The current level of SLB issuance and its use as collateral is negligible compared to traditional bonds, so the ECB's move

is considered symbolic. However, the potential of the market is well illustrated by the fact that, according to Bloomberg data, total sustainability-linked debt issuance exceeded USD 130 billion in 2020, an increase of nearly 300 per cent compared to 2018.

Although the number of concrete, practical steps was marginal until early 2022, it is worth noting that several central banks have started work on the issue. The euro area central banks are the most active in green finance. In line with this, the ECB published a roadmap for its monetary policy instruments in 2021 (ECB 2021a), under which the ECB aims to examine three areas by 2022: (i) disclosure requirements for eligibility criteria; (ii) the role of climate risks in credit ratings; methodological review of ICAS ratings; and (iii) a review of collateral valuation and related risk management tools. Thereafter, the ECB plans to take specific steps to amend the collateral framework by 2024, once the conclusions have been drawn. In addition to publishing the ideas set out in the roadmap, the ECB disclosed its analysis of the links between climate risks and monetary policy (ECB 2021b) at the end of 2021, covering the issue of collateral management (e.g. the adoption of SLBs, the functioning of credit ratings). The BdF has also been very active in the area of collateral management, producing two analyses in 2021-22: they developed a concept on how to reduce the climate risk of collateral on a collateral pool basis (Oustry *et al.* 2020), but also analysed the measurement challenges of ABSs' climate risk (André et. al. 2022).

International surveys also confirm that climate risks have not yet been incorporated into the collateral frameworks. This is the conclusion of Barmese *et. al.* (2021), which, in addition to the actions of the PBoC and the ECB, also highlights the analytical work of the BdF and assesses and ranks the performance of G20 central banks on green finance and climate risks based on a criteria and scoring system. The analysis by Abdelli *et al.* (2021) is similar in theme and results, showing that only 4 of the 32 central banks surveyed have started to integrate climate risk considerations into their collateral frameworks. In addition to the previous good examples of the ECB and PBoC, the analysis also covers the BdF and BdE ICAS systems, in which ESG aspects are taken into account. (For more useful details on the evaluation of ICAS systems, see Abdelli (2022).) Taking all this into account, the MNB took a major step in 2021 with the introduction of green preferential haircuts to integrate climate risk considerations into the collateral framework, which was an exceptional and innovative step even among central banks.

4. Greening collateral management at the MNB

Similar to the international central banking community, the MNB is analysing options for changes to the collateral framework, on the basis of which it has decided on short-term actions and set longer-term objectives. In the context of asset purchase programmes and collateral management, the central bank's balance sheets are currently highly exposed to climate risks, which implies that an effective implementation of monetary policy cannot be pursued without taking into account sustainability considerations. During 2021-22, the MNB implemented changes in several different areas of collateral management. It did so on the one hand because the liquidity and asset management of the banking system and the collateral framework are closely interlinked, so changes to the framework can influence banking procedures and actively support the development of green markets. In addition, the integration of climate risks can improve central banks' risk management methodologies. The MNB seeks to support the development of related methodologies and procedures within the NGFS (Network of Central Banks and Supervisors for Greening the Financial System), it enhances transparency and sets a positive example by publishing a TCFD report (TCFD - Task Force on Climate-Related Financial Disclosures), and it supports the Hungarian green bond market by reforming the haircut system.

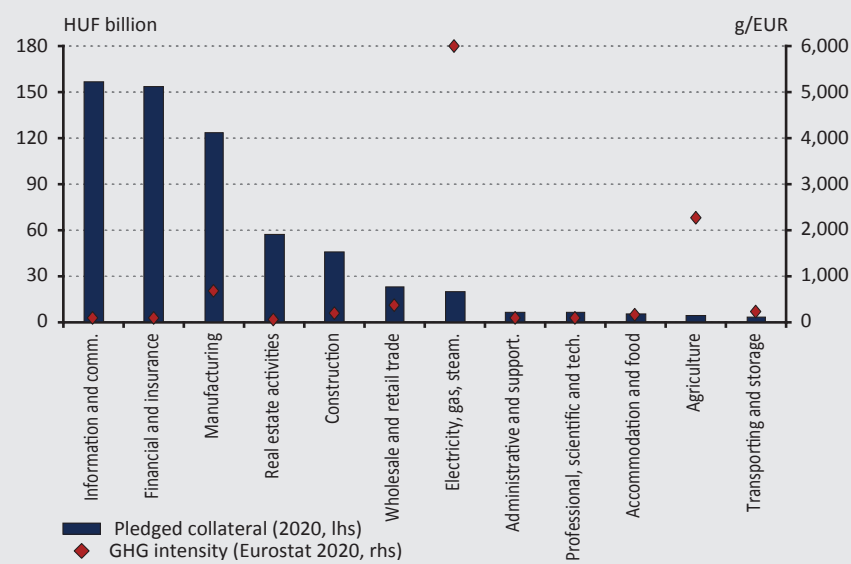
4.1. International collaborations

In recent years, the financial world, led by central banks, has been trying to map the adverse effects of climate change and estimate their impact on markets, and to this end various central bank initiatives have been developed. Perhaps the best-known international initiative and one of the organisations with the most members is the NGFS, established by eight central banks and supervisory authorities at the One Planet Summit in Paris in December 2017. The network aims to help reinforce the steps needed to meet the goals of the Paris Agreement, to strengthen the role of the financial system in risk management and to increase the capital for green and low-carbon investments in the broader context of sustainable development (NGFS, 2021b). The other more well known initiative is the climate-related report (TCFD), established by the Financial Stability Board (FSB) to develop recommendations for better disclosure of climate-related factors and risks, which can help to make better-informed investment and lending decisions and allow stakeholders to better understand the exposure of the financial system to climate-related risks. **The Hungarian central bank is an active member of the NGFS and is currently involved in several projects and publications.**

4.2. Transparency

In Q1 2022, the MNB published its climate change finance report (MNB 2022b), which also integrates collateral management as a key element of the monetary policy toolbox. In the context of the report, the MNB examined and quantified the carbon emissions of blocked securities and the proportion of carbon-intensive assets. In addition, the MNB analysed the carbon intensity of the sectoral distribution of the BGS and large corporate loan portfolio accepted as collateral. The charts presented ensure comparability between the assets used for collateral management and the assets used for the purchase of securities for monetary policy purposes. Central banks' collateral frameworks are public, with some entities disclosing data also on the blocked pool[10], but the international central bank TCFD reports published so far have not included data on collateral management. (BoE 2021, BdF 2021) By preparing the report, the MNB commits to demonstrate the integration of sustainability considerations into the central bank's governance, strategy and risk management practices. Another important purpose of publishing the report is to support the transparent presentation of environmental risks. With the preparation of the report, the MNB has covered 80% of the blocked stock, and the challenge for the coming years will be to improve the coverage and to standardise and develop the methodologies applied for each asset class.

Chart 6
Sectoral breakdown of the volume of BGS and large corporate loans blocked as collateral and the carbon intensity of each sector



Source: Eurostat, MNB

[10] E.g. ECB: https://www.ecb.europa.eu/paym/coll/charts/html/index.en.html

4.3. Preferential green haircut

The integration of green considerations into collateral management practices can contribute to the measurement and management of climate risks and it can thereby support the development of green markets. Collateral management is a central element of the monetary policy toolbox, and the related framework has an impact on the amount of liquidity available to the banking system. It can be used to support individual sectors and the spread of best market practices, while also influencing the level of central bank risk-taking.

By fine-tuning the haircut system, different monetary policy objectives can be supported by taking into account risk management considerations.

- **Monetary policy:** A strong green bond market supports the channelling of resources into green projects, the green transformation of the economy, which helps to achieve monetary policy objectives and is in line with the government's economic policy stance.
- **Green bond market:** Lower haircuts provide banks with preferred liquidity conditions for credit products, strengthen the demand side of the market and improve the conditions for issuers to enter the market.
- **Risk management:** For green bonds, the credit and market risk perception may be different compared to conventional securities. The default risk of green bond issuers may be lower than that of other non-green bond issuers, and they may also have lower price volatility and better stress tolerance due to lower transition risk.

After considering the relevant criteria, the MNB was one of the first central banks to introduce a preferential green haircut in September 2021. The preferential haircut means a haircut allowance of 20 per cent for green bonds, with a maximum of 5 percentage points.

Table 2
Comparison of normal and green haircut values for different categories of securities (fixed interest rate) (year, percentage)

Remaining maturity	BBB corporate	BBB corporate green	B-BB corporate	B-BB corporate green
0-0.5	1	1	5	4
0.5-1	2	1.5	5	4
1-3	6.5	5	15	12
3-5	10.5	8.5	25	20
5-7	14	11	30	25
7-10	18	14.5	45	40
10-	22.5	18	45	40

Source: MNB

With this amendment, the MNB has taken a symbolic step towards supporting the green bond market, while also taking into account the beneficial risk characteristics of green bonds. The greening of the collateral management framework aims to reduce the MNB's exposure to climate risk, encourage the banking system to improve the climate risk aspects of their instruments and develop the Hungarian green bond market.

The MNB decided to apply preferential haircuts after considering several possible methodological changes.

- The haircut instrument can be effective in promoting carbon-neutral investment and can play a promising role in reducing the burdens on governments resulting from the economic transition (McConnell et al., 2020).
- The advantage of the "Green haircut" is that it is simple to implement even with existing data and can support the green bond market and stimulate issuance in the short term.
- However, haircut changes alone will not be a solution to climate risks. Some studies have looked at the ECB's blocked collateral in terms of carbon exposure and found that even aggressive increases in haircuts do not significantly reduce the carbon intensity of the ECB's collateral pool (Dafermos et al., 2021).

5. Possible directions for further greening of collateral management

In addition to ensuring market stability and the necessary liquidity at the banking system level, the transformation of collateral management cannot happen overnight, and system-wide changes can only be achieved in the longer term. Although the MNB has taken the first steps to integrate climate risks into the

collateral management system, further analysis is needed on the next steps. This should include an assessment of the opportunities (what can be achieved, by what means) and the associated costs and challenges.

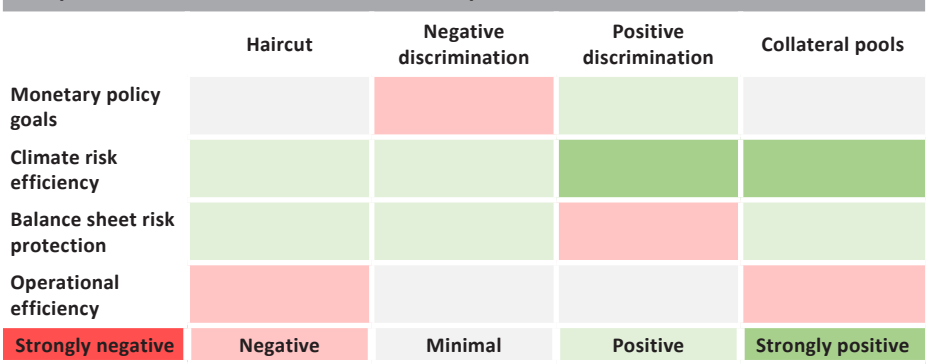
5.1. Opportunities to move

Despite little practical action, the greening of collateral management has been a priority for central banks around the world. Although the number of practical steps taken by central banks to green collateral management has been low so far, with only one or two central banks having made minor or major changes to their collateral framework, all central banks are working on how to move forward. The MNB is also continuously analysing the situation, and other steps beyond the introduction of the green preferential haircut should be considered in order to better integrate climate risks in collateral management.

A number of central bank and market analyses have been carried out in recent years on potential changes to the collateral framework. While practical examples cannot yet be relied on when determining the way forward, there are a number of analyses that can offer good guidance. Among these analyses, some provide a good overview of the options (e.g. NGFS 2021a), some perform a more in-depth analysis of a certain direction and some remain at the problem definition stage, but provide useful ideas on the areas to be analysed (e.g. Dikau 2020).

- **The NGFS (2021a) provides a good summary of a range of possible ways forward.** The study focuses on the operational implications of climate change for central banks, with a particular focus on the implementation of the monetary policy. In this context, it examines the introduction of certain instruments (e.g. haircut modification, climate risk requirements for collateral pools) and their potential impact on key variables (e.g. risk management, impact on the extent of climate change).

Chart 7
Comparative assessment of the different options



Source: NGFS (2021a)

With respect to climate risks, central banks may use different instruments in the context of the changes to the collateral framework. (i) Changes to haircuts should be considered from a risk management and market support perspective. (ii) In addition, in relation to collateral, there may be a need to terminate the eligibility of certain assets, or to discriminate negatively (e.g. tighten eligibility, blocking criteria) based on an assessment of the issuer's or the asset's climate risk profile. (iii) Active support, positive discrimination (e.g. relaxation of eligibility, lock-in conditions) of using climate-friendly products (e.g. green bonds) as collateral to be considered by the other side. (iv) Instead of/besides targeting individual assets, central banks can also improve their climate risk position by conducting climate risk analysis of locked pools and encouraging pool transformation.

Although the actions of individual central banks may differ substantially, there are common points that all central banks need to consider when taking action on climate risk in terms of potential impacts. (i) It is important for changes to be consistent with the primary monetary policy objectives and not to limit their effectiveness. (ii) The different instruments have different degrees of effectiveness from a climate risk point of view, some of which have a rapid, substantive impact, others are only of symbolic importance. (iii) Central banks should consider what protection the introduced instrument or modification provides in relation to their own balance sheets and the risks they assume. (iv) It is important for central banks to introduce an instrument that can be operated efficiently from both the central bank and the banking side.

- **Some analyses address the problem of credit ratings.** Monnin (2020) points out that central bank collateral management is heavily dependent on external credit rating agencies, which do not capture climate risks adequately. To address this weakness of the collateral framework, it proposes a number of solutions: adding climate risk metrics to credit ratings; strengthening and modifying ICASs with climate risk metrics; putting pressure on credit rating agencies to modify their methodologies, for example by considering limiting their acceptance; modifying the methodological requirements for IRBs. Abdelli (2022) also draws attention to the importance of the role of ICASs and the direction of their development.

- **In the context of climate risk management, the modification of the eligibility criteria and haircut levels has been addressed in various analyses.** Dafermos (2021) analyses different scenarios for potential changes to the collateral framework, including the removal of eligibility of certain corporate assets, differentiating haircut assignment on a climate risk basis and measuring the WACI of collateral holdings. Schoenmaker (2019) would apply a carbon-intensity-linked haircut methodology to bank bonds in addition to corporate bonds. McConnell (2020) also analyses the applicability of haircuts, suggesting that a brown haircut (a higher haircut value could be assigned to brown sector issuance) and a carbon

tax could be jointly effective tools for governments, and a preferential green haircut could reflect the higher resilience of assets to transition risk.

- **Improving transparency in the area of green finance and climate risks is a prerequisite for progress in the short term.** Some analyses mention in this context that progress could be made by setting higher transparency requirements (Weidemann 2021; ECB 2021b).[11]

- **Central banks can also support climate risk objectives by setting limits and standards for the collateral pool.** Oustry's (2020) analysis, instead of seeking to move towards greening on an individual security basis, approaches the issue on a total collateral portfolio basis for individual banks. It measures the contribution of the collateral pools (corporate exposures) to the Paris climate targets and it is the responsibility of the bank placing the collateral to ensure that its pool meets the required target. Anzizi (2020) also raises the possibility of introducing a pool-based limit, however, the introduction of a limit on the minimum proportion of green bonds is reviewed here.

5.2. Challenges in moving forward

There are no established uniform best practices for mapping and managing risks from climate change. Studies in the market and among central banks analyse a wide range of possible procedures. The mapping of the objectives to be supported and the collateral management arrangements that support them, and the linkages between them, has been done or is in progress, and some steps can be implemented risk-free in the short term, but central banks still need time for the development of longer-term, potentially deeper changes. In doing so, central banks need to decide on the basic concept to be followed (e.g. preferred instrument, target) and the responses to the challenges.

In view of the initial phase of the green bond market, climate risk analysis, the central bank, similar to market participants, faces substantial challenges, which require caution before taking any real action. Although collateral management rules can be very detailed and therefore complex and lengthy, there are certain cornerstones that determine how they function.

- **Monetary policy objective: Any change in climate risk rules can be implemented in a way that does not jeopardise the fundamental objectives of monetary policy, i.e. in case of conflict, it is subordinate to those objectives.** During the covid crisis, central banks have typically broadened the range of eligible assets (e.g. ECB (2020); MNB (2020): eligibility of investment fund shares and large

[11] The MNB's collateral framework already provides for a transparency condition for the eligibility of mortgage bonds. (https://www.mnb.hu/letoltes/jelzaloglevel-transzparencia-riport-hu-en-220131.xlsx) A similar concept could be applied also in the context of climate risk disclosures.

corporate receivables). In such a period, introducing changes that reduce the acceptable stock (e.g. exclusion or penalisation of "brown" assets) is not realistic, even if it supports the climate risk objective. For example, Schoenmaker (2019) sets out relevant principles: no major changes in the asset mix, broad scope for eligibility, application of the gradualism principle. It must also decide whether to take a protectionist or proactive approach to monetary policy objectives.

- **Credit ratings: Traditional credit ratings form a key part of central bank collateral management, as they provide information on the expected return on an asset in a single figure (data).** The ratings are easily accessible to all and come from a regulated market. The market considers the current reflection of climate risks in credit ratings to be unsatisfactory (Monnin 2020). Credit rating agencies claim that climate risk considerations are included in ratings, but only if they have an impact on the risk profile of the rated bond or entity. Since ratings typically provide assessments over a 3-5 year time horizon, and climate risks can pose a risk over a multi-decade time horizon, their role in ratings may be limited in reality. The concept of traditional ratings is based on historical data, whereas for climate risks these can only be used to a limited extent. Another challenge for credit rating agencies is the lack of robust, complete data coverage, also experienced in the market. There are rating agencies that provide metrics showing how climate risks have impacted credit ratings (e.g. Fitch ESG Relevance Score), but again, only limited impact can be identified if applicable (Fitch 2021). Rating agencies are working towards developing ratings and metrics that take specific account of climate risks over longer time horizons (e.g. S&P Climate Credit Analytics, Climate Risk Gauge). The FSB has previously recommended investors to become independent from traditional credit rating agencies (FSB 2010), which has been implemented in central bank collateral management only to a limited extent (e.g. ICAS, IRB for unrated entities, receivables). A move in this direction is a major challenge for central banks.

The use of ESG ratings could be an alternative to traditional credit ratings, but it cannot be used effectively in the short term either. The market for ESG ratings is relatively new, the correlation between ratings is not ensured as it is for traditional ratings (Berg et al. 2019; Dimson *et al.* 2020), there are many players in the market, the market is unregulated, which is problematic in terms of transparency and comparability (ESMA 2021; IOSCO 2021).

- **Pricing: Proper pricing is fundamental in collateral management.** In the traditional securities market, determining appropriate pricing parameters challenging, except for liquid securities. This is even more true in a relatively new market such as the green bond market. Market perception, analysis shows that the impact of climate risks is currently not reflected in prices. (Mastouri 2021, Stroebel 2021)

- **Central bank risk models: Central banks may choose to develop their own risk models, which can be approached both by building models from basic data and by involving external data providers in the implementation, using their models and data** (a special form of the latter is the use of credit ratings).

- **Data: A key issue for modelling is access to the right data, which is currently not ensured.** In the context of climate risks, the lack of transparency poses a challenge at the company and instrument level, which also means a lack of data and the lack of robustness and comparability of data. In the absence of adequate data, the relevant models cannot be built in a satisfactory manner. Data availability is not only a central bank problem, the market is facing similar challenges: for example, green mortgage bond issuers have not collected energy certificates related to mortgages in the past (Wass 2021, Nagy 2021), green bond issuers provide incomplete and incomparable data on an irregular and voluntary basis (EF 2021). Market coverage of TCFD and other climate risk reporting is improving year on year, but is far from being comprehensive and uniform (TCFD 2021, ECB 2022).

There are fundamental definition gaps in the market with respect to green ratings of loans or securities and disclosure procedures. There are market standards, such as the Climate Bonds Initiative (CBI) or the Climate Bonds Standard (Version 3.0) defined by the International Capital Market Association (ICMA), or the Green Bond Principles (2021), which are useful starting points, but differ in several points and do not guarantee comparability and accountability. (CBI 2019; CBI 2021; ICMA 2021, MNB 2022a) Central banks can achieve short-term results in this area by developing standards and demonstrating good examples. Although regulation is lagging behind market changes, progress is ongoing and the EU taxonomy and the EU Green Bond Directives currently being implemented are expected to bring substantial progress. (EU 2020; EU 2021a; EU 2021b)

Due to the lack of input data, it is not clear which would be the best metric for the collateral management to build on. In the context of sovereign exposure, the energy mix metric is often used, while for companies various carbon intensity metrics WACIs are focused on, but there are gaps for all of them (Kolozsi 2022).

It is also necessary to consider whether to regard the data as risk factors that can be incorporated into normal risk categories and translated into traditional market or credit risk (BIS 2021) or to treat and assess climate risks as separate risk categories.

- **Data providers: Similarly to the use of credit ratings, central banks can contract external partners also for data and modelling, but their use is currently limited.** The market for data providers is diverse, with different models and coverage available on the market. Metrics can follow also a nominal or score-based approach (BoE 2021, BdF 2021, MSCI 2020). Coverage is best for large companies,

while in other sectors (e.g. sovereigns) and smaller markets (e.g. Hungary) coverage is weaker or still under development. But also for Oustry (2020), the relatively high European coverage meant only 61-63% of blocked marketable assets.

- **International benchmark:** A core element of the central banking community is that the different institutions move in the same direction, while respecting market specificities. In this context, guiding action by major central banks could make a major contribution to a meaningful shift towards greening collateral management at the global level. A nearly uniform set of procedures is beneficial also for market players.

- **Market specifics:** The list of monetary policy objectives to be pursued and the instruments that could potentially be used is similar for different central banks, however, the specificities of each market need to be taken into account when developing the framework. Differences may arise from regulatory differences (e.g. central bank mandate), but it is also important to take into account market specificities and central bank preferences. For Hungarian collateral management, it is a given that the majority of the market is represented by Hungarian government securities and that the typical credit quality is "BBB" or lower, based on the rating of the Hungarian government. The structure, complexity and size of the euro area market is substantially different, with implications for eligibility criteria and haircuts. These considerations are also relevant when determining the collateral management aspects of green financial decisions.

- **Operability:** An essential element of the changes to the collateral framework is for it to be transparent and to be able to be operated as much as possible in an automated manner, at low cost and operational risk for both the central bank and market participants. In other words, only those metrics and procedures can be used for which the data are also available at the banks, practically at the security level.

Given the above, it is understandable why, even with a clear central bank commitment, the transformation of the collateral framework is proceeding more slowly than expected. There are fundamental shortcomings in the market in terms of data access and metrics, due to the young age of the market and the lack of standards and regulations. In the short term, as a first step, progress is needed in this area (data, transparency, reporting), which can provide a solid basis for further steps.

6. Summary

The MNB considers it its mission to carry out its tasks in line with its mandate under the Central Bank Act, without compromising its primary objective, while mainstreaming environmental sustainability considerations. Maintaining liquidity in markets and efficient transmission is essential for the effective functioning of monetary policy. Collateralised lending, and within it the collateral framework, has an important role to play in this. By today, it is clear that climate risks cannot be ignored as they affect economic processes, including banking and central bank operations, in many ways. Although the collateral framework has already used a number of risk management tools, the extension of the models analysed to include climate risks is desirable and justified. In addition, support for climate-friendly financing is needed to achieve sustainable development and the climate targets set. The MNB has been previously accepting green bonds as collateral, but from 2021 it will do so at a more favourable preferential haircut. In addition to risk management considerations, the aim of the framework revision is to develop the Hungarian green bond market, which is still in its infancy, and thereby support sustainability goals.

The MNB has taken the first steps towards incorporating climate risk considerations into the collateral framework by accepting green bonds as collateral and applying a preferential haircut, but further fine-tuning and revision of the framework is still to be considered. The MNB's actions so far put the bank in leading position among central banks in the context of adapting its collateral management to take account of climate risk. Although a number of possible directions for further greening the collateral management have been the subject of intense research in a number of international fora, the green turn is still in its infancy in global financial markets. No commonly adopted methodology or best practice has yet emerged, and most central banks, despite their commitment, are still analysing the situation and the optimal courses of action. The lack of data of sufficient quantity and quality, the immature reporting standards, the difficulties in identifying pricing parameters and the uncertainties related to credit ratings are among the most significant challenges. Overall, the integration of climate risk considerations into the collateral framework is necessary and desirable, but it requires the development of the market and reporting, and it should be emphasised that changes to the monetary policy framework can only be implemented with great prudence and adequate timing.

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Promoting the green home loan market: the FGS Green Home Programme

Laura Komlóssy – Sándor Winkler

In its green toolkit strategy, the Magyar Nemzeti Bank (MNB) aims to support sustainable economic transformation and the achievement of climate goals, while increasing the climate-awareness of the financial system. The housing loan market is a good starting point for the central bank to encourage the incorporation of green considerations, given the low energy efficiency of the housing stock, which accounts for a third of domestic primary energy consumption, and the considerable scope for modernisation. The Green Home Programme, launched in October 2021 as part of the Funding for Growth Scheme, in line with the Green Monetary Policy Toolkit Strategy and as one of its first steps, promotes the creation of a green housing loan market and the mainstreaming of environmental sustainability considerations in the domestic housing market by providing low-interest central bank funds for the construction and purchase of energy-efficient new homes. In the first months of 2022, demand for the Green Home Loans available under the programme increased significantly, and the MNB increased the total amount available of the programme.

1. Reason for launching the programme

The FGS Green Home Programme (GHP) introduces a new approach to the housing and credit market, helping to achieve sustainability goals. With the launch of the GHP, the Magyar Nemzeti Bank aims to address the lack of "green" considerations in the credit market and the low energy efficiency of the housing stock. The GHP helps to "green" the housing market by increasing the demand for sustainable homes, thereby indirectly encouraging the supply side to develop such condominiums, while also promoting the construction of energy-efficient family houses. In addition to the housing market, the programme also introduces a new approach to the credit market by making financing conditions for housing with better energy efficiency significantly more favourable. The programme also supports monetary policy objectives by shaping credit market conditions and strengthening financial stability.

The domestic housing stock is outdated from an energy point of view. A detailed picture of the energy efficiency of residential property can be obtained from the energy performance certificates issued for second-hand residential property transactions and for the occupation of newly built residential property. Only 23.9 per cent of energy performance certificates issued between 2016 and 2021 were

rated CC or better, while only 3.2 per cent of the certificates issued between 2016 and 2021 met the BB level, which will be a requirement for new-build residential buildings from 1 July 2024 (Chart 1)[1]. Since 2016, there has been a gradual improvement in the distribution of ratings of certificates issued, mainly due to an increase in the number of new-build dwellings. The share of certificates with a rating of at least CC, or "uptodate", increased from 19.3 per cent in 2016 to 32.1 per cent in 2020, but fell to 25.3 per cent in 2021 due to a significant decline in the delivered new-build dwellings. Within the certificates issued, the share of residential properties with a rating of at least BB, i.e. meeting the near-zero energy requirement, increased from 0.9 per cent in 2016 to 6.4 per cent in 2021, but this is still very low. In Budapest, the proportion of better-rated properties was slightly higher than in the countryside, due to a proportionately higher number of new-build dwellings.

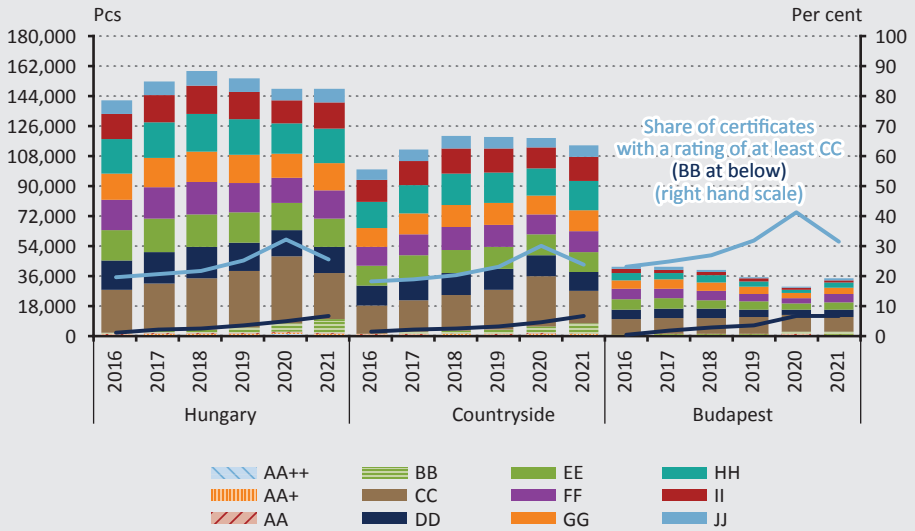
Overall, the energy performance of the total housing stock may be even worse[2], given that the certificates issued cover all new dwellings and only a certain proportion of second-hand dwellings sold, most of which have been certified in transactions in recent years, and more marketable, better condition properties are probably overrepresented within the transactions. According to data presented in the November 2021 Housing Market Report of the MNB, nearly 50 per cent of applicants are using the home renovation subsidy introduced by the Government from February 2021 to also finance energy efficiency investments, which at the same time means also that half of the amount claimed under the renovation programme does not help improve the energy efficiency of residential properties. The energy efficiency of the Hungarian housing stock is particularly important because, according to the EBRD study, these buildings account for one third of final energy consumption in Hungary, so substantial savings could be achieved in this area[3].

[1] From 1 July 2024, after several postponements of the original entry into force on 1 January 2021, the energy compliance rules for new residential buildings will be tightened, so that instead of CC, i.e. modern, only residential buildings with an energy rating of at least BB, i.e. meeting near-zero energy requirements, will be allowed to be put into use.

[2] This is also suggested by the fact that, according to the 2015 KSH Housing Survey, 61 per cent of housing needs renovation, and 81 per cent was built before 1990.

[3] See: European Bank for Reconstruction and Development: Hungary: Modernisation of Public and Residential Buildings - Identification and Elaboration of Support Programmes, 30.11.2020. Link: https://www.ebrd.com/news/2020/energy-efficiency-in-hungary-begins-at-home.html

Chart 1
Number of energy performance certificates issued for (used and new) residential and accommodation building by category, broken down between Budapest and the countryside

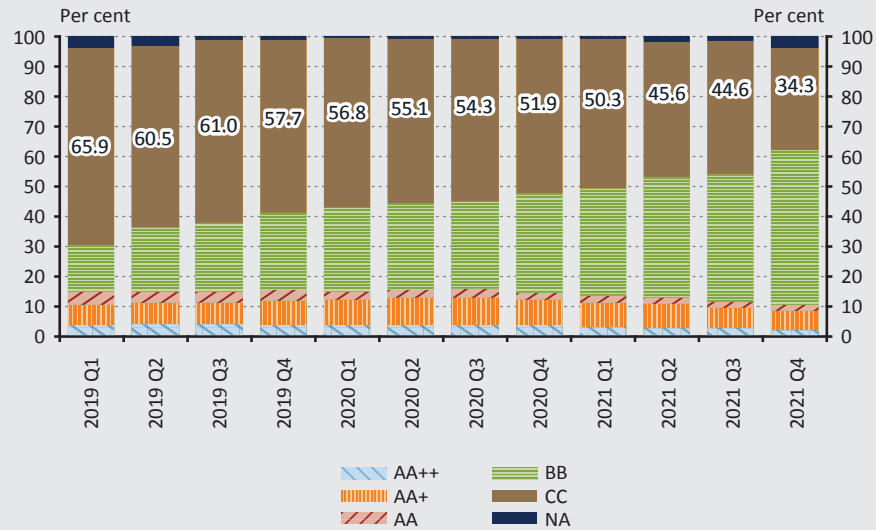


Note: In the case of multi-apartment residential properties the energy performance certificate is prepared separately for each flat. The figures contain certificates issued before the occupancy permit of newly built properties as well as certificates issued upon the sale and purchase of used homes.

Source: https://entan.e-epites.hu

There are still many buildings in the new-build housing market that do not use renewable energy before the near-zero energy requirement is introduced. Looking at the new housing market in Budapest, it can be seen that since 2019, the proportion of new condominiums under development and for sale that meet the requirement for at least near-zero energy requirements (hereafter referred to as the NZE requirement), i.e. that achieve a BB energy rating, has been steadily increasing (Chart 2). To meet the NZE requirement, buildings currently also must meet a 25 per cent renewable energy rate. New homes meeting the NZE requirement accounted for 29.9 per cent of the supply in the Capital in Q1 2016, while their share increased to 61.8 per cent by Q4 2021. However, the share of new housing not meeting the NZE requirement, i.e. not sufficiently energy efficient or not using renewable energy, is still significant, at almost one third, which justifies stimulating the market towards more sustainable energy.

Chart 2
New condominiums under development and sale in Budapest by energy efficiency rating



Note: According to 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

The lack of mainstreaming of green considerations in the credit market makes it difficult to renew the housing stock. Banks currently do not take into account sustainability considerations in their lending, i.e. there are no dedicated "green" market-based loan products in the banks' product range. In the absence of all this, households have no incentive to take environmental considerations into account when deciding to buy a home or take out a loan. On the financing side, the so-called "green hypothesis" suggests that it may be worthwhile to offer more favourable conditions for the purchase or construction of energy-efficient buildings. On the one hand, the maintenance costs of these properties can be lower in the long run, which can reduce the probability of default (PD) and the loss given default (LGD), and on the other hand, in the long run, the shift in demand towards "green" properties and more modern technical features can make them more value-proof, which results in an overall lower credit risk for banks. In the international literature, several studies have shown that lenders face lower risks when financing properties with more favourable energy performance. Baccega *et al.* (2019) looking at data from four EU countries for Belgium and the Netherlands, Billio *et al.* (2021) on data for Denmark, and Guin *et al.* (2020 and 2022) on data for the UK showed a significant negative relationship between the energy characteristics of financed properties and loan

default. In addition to these studies, Schütze (2020) found lower expected losses for green mortgages using data for Germany.

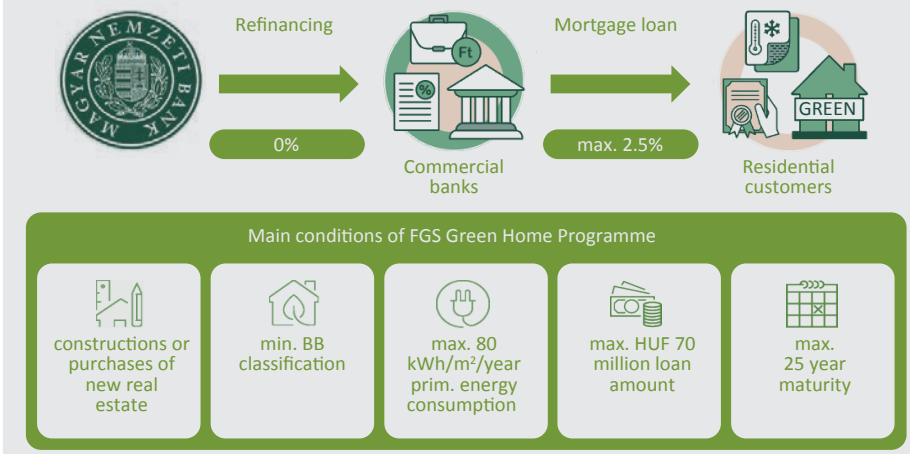
2. Eligibility criteria for the FGS Green Home Programme

The GHP was launched on 4 October 2021 as part of the MNB's green toolkit strategy, as part of the Funding for Growth Scheme (FGS), with a total amount available of HUF 200 billion. The programme supports the purchase and construction of new energy efficient homes by providing low-cost loans with predictable interest rates fixed until the end of the maturity. As in the previous phases of the FGS, which supported the SME sector's access to finance , the central bank provides refinancing funds to credit institutions at 0 per cent interest, which they can lend on to retail clients at a maximum interest rate of 2.5 per cent (Chart 3). The loan is therefore available only to natural persons for the purchase or construction of new energy-efficient flats and family houses (with an energy rating of at least BB and, under the conditions in force until mid-April, a maximum primary energy consumption of 90 kWh/m^2/year[4]) for their own use. The maximum loan amount is HUF 70 million and the maximum maturity is 25 years. In view of the protracted constructions, there is a 4-year availability period for the final drawdown, but the first disbursement (full disbursement in case of a lump sum) must be made within 3 years from the date of signing the contract. In the context of housing purpose, the debtor(s) who also become owner(s) must undertake to reside in the residential property for at least 10 years (not all co-debtors must become owner(s) and register in the property).

As in the case of the Certified Consumer-Friendly Housing Loan, a number of consumer-friendly conditions have been introduced in the case of GHP for the benefit of borrowers. In addition to the requirements on client information and the maximum assessment period, the range and level of charges that banks can levy are limited. In addition to the interest, only disbursement fees (up to 0.75 per cent of the loan amount, but not more than HUF 100,000), early repayment fees (up to 1 per cent of the amount prepaid, but not more than HUF 30,000 per contract and per occasion) and third party costs (e.g. notary fees, valuation fees) can be charged.

[4] According to the taxonomy issued by the European Commission, a residential or non-residential building is considered "green" (climate change mitigating) if the primary energy demand of the building, as determined by its energy performance, is at least 10 per cent below the threshold for near-zero energy (BB) buildings (100 kWh per square meter per year or less).

Chart 3
Operation and main parameters of the NHP Green Home Programme



Note: As of 19 April 2022, the criterion for primary energy use has been tightened to a maximum of 80 kWh/m2/year, compared to a previous maximum of 90 kWh/m²/year.

Source: MNB

The rising interest rate and inflation environment has played a significant role in the substantial increase in demand for Green Home Loans and a surge in loan applications in the first months of 2022. Given that the volume of loan applications received by banks, including those already contracted, could reach the full amount of the programme by the end of March, several banks stopped accepting loan applications (some of them temporarily). The higher than previously expected interest in the preferential loan under the GHP is partly due to the fact that the gap between the Green Home Loan and market interest rates has been widening since the launch of the programme, and partly to the fact that the significantly lower installment may encourage households to buy new energy-efficient home rather than second-hand. In addition, rising inflation and a more uncertain environment due to the war have led more and more retail clients to opt for property rather than other forms of savings, and the fear of exhaustion of the total amount available and possible cancellation of the programme has led many to bring forward their housing purchases and loan applications.

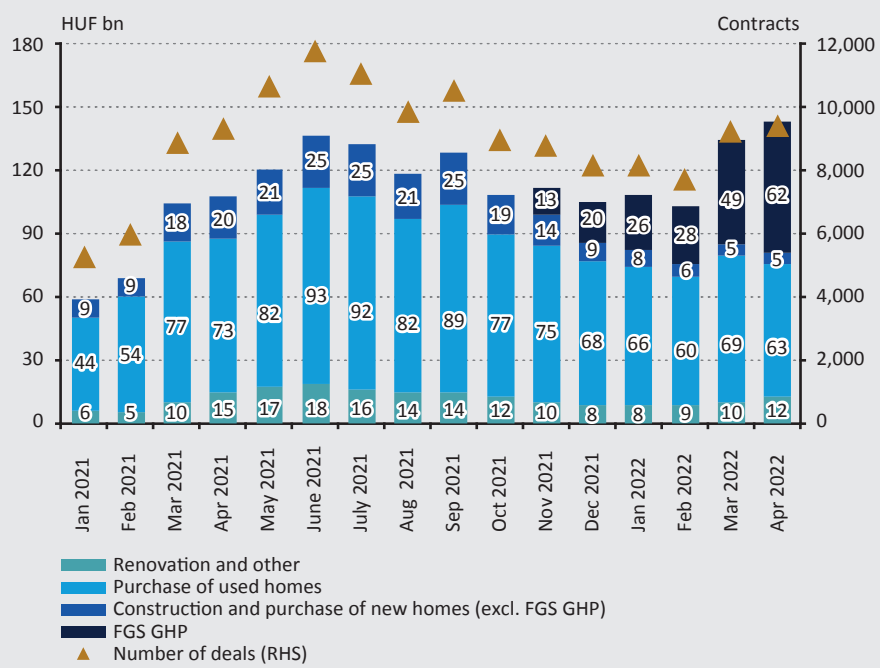
In view of the strong demand for Green Home Loans and the importance of sustainability considerations, the Monetary Council increased the total amount available of the programme by HUF 100 billion to HUF 300 billion at its meeting on 5 April [2022]. At the same time, the energy requirements for eligible properties have been tightened to encourage the purchase and construction of even greener flats and houses. In addition to the unchanged requirement for category BB, the upper limit for the primary energy consumption of a property has been reduced to 80 kWh/

m^2/year[5] instead of the previously required 90 kWh/m^2/year. By the end of April, the volume of loan applications received by most credit institutions had reached the new limit available to them, and they stopped accepting loan applications.

3. Development of the FGS Green Home Programme so far and characteristics of the loans under the programme

Since November 2021, the GHP has significantly contributed to higher volumes of new housing loans, with significant interest from retail clients since its launch. While in October last year, there were no contracts signed under the GHP due to the protracted product development and time-consuming loan approvals at some banks, in November 47 per cent of the loan volume issued for the purchase or construction of new housing, in December it was 68 per cent, in January and February this year around 80 per cent and in March and April it accounted already for over 90 per cent of the total volume of loans issued for the purchase or construction of new housing, amounting to a total of HUF 198 billion (Chart 4). In March, the GHP accounted for more than a third of all housing lending, while in April almost half of the lending volume was already under the GHP.

Chart 4
New housing loans to households in the credit institution sector



Source: MNB

[5] As of 19 April 2022, only housing loan contracts that meet the stricter energy requirements will be eligible under the GHP.

The growing interest advantage of Green Home Loans (GHL) compared to market rate loans played a role in the increase in the volume and share of GHL, with lower instalment driving demand towards new homes. Indeed, the loan amount-weighted average APR (eliminating state-subsidised transactions) of GHL contracts was around 2.6 per cent, while market loans for the purchase and construction of new housing, excluding state-subsidised transactions, increased from 4.7 per cent at the beginning of the year to 5.7 per cent in April, in a rising interest rate environment. Based on our experience, the rise in long-term benchmark rates due to the monetary tightening cycle is followed only with a lag by market mortgage rates, while at the same time a growing proportion of banks are, and to an increasing extent, factoring rising funding costs into their interest rate decisions.

The average loan amount of contracts signed under the GHP is higher than the average loan amount of contracts signed under the market schemes for the purchase and construction of new housing. Excluding loan contracts with state support (HPS), the average loan amount under the GHP was HUF 28.2 million in the period from November to April, while the average loan amount for loans under the market scheme was around HUF 17 million. The median loan amount was HUF 25 million for the GHP and HUF 12 million for the market scheme. Taking into account transactions with state subsidies, the average loan amount in the GHP was HUF 34 million. There is also a difference in terms of maturity between the central bank and market loan contracts. The average maturity of Green Home Loans was around 22.6 years from the date of contracting, while the average maturity of new home loans contracted on market terms was 18.8 years for the period between November and April.

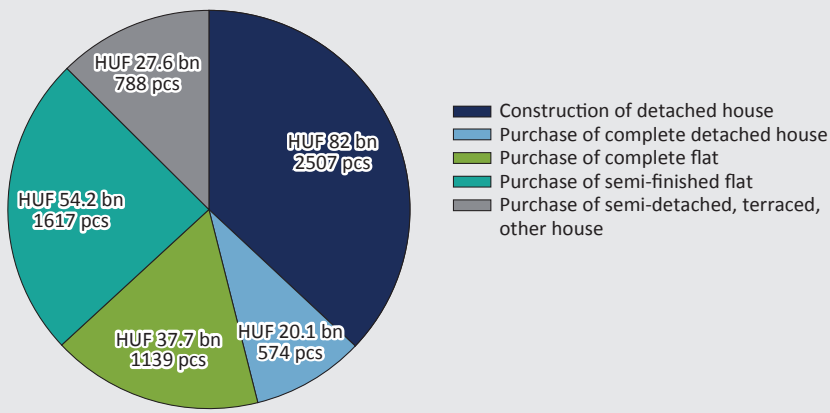
By 3 June 2022, credit institutions participating in the programme had reported 6,625 transactions to the MNB, amounting to HUF 222 billion.[6] In the case of nearly 60 per cent of the contracts, the borrowers also benefited from state interest subsidies ("green HPS"). The actual outstanding stock as of 7 June 2022 - i.e. already drawn but not repaid - was HUF 74 billion, one third of the contracted amount, as most of the contracts are related to pre-construction/under-construction properties, thus (also) involving a later drawdown.

Households have taken out nearly half of the contracted volume, totalling almost HUF 102 billion so far for the construction or purchase of detached houses (Chart 5). More than 80 per cent of this volume has been used to finance the construction of detached houses, 60 per cent of which are in rural areas, with an average loan amount of HUF 30 million. 41 per cent of the loans were linked to flats, 59 per cent of which were for semi-finishedflats and 41 per cent for complete flats. More than

[6] Contracted volume reported to the MNB by 3 June 2022, as part of the AL12 reporting. The volume/number of contracts actually concluded may slightly exceed this.

four-fifths of the latter loans flowed to the Central Hungary region (and almost 60 per cent were directly linked to Budapest). The average amount of loans taken out for the purchase of complete flats in the capital exceeded HUF 36 million. For semi-finished flats, the dominance of the Central Hungary region and Budapest is slightly lower, with 76 per cent of the loan volume flowing to the Central region, of which 43 per cent was directly linked to Budapest. The average loan amount of loans taken out for the purchase of semi-finished flats in Budapest was nearly HUF 4 million higher than that of loans for complete flats. Around 12 per cent of the volume was spent on the purchase of semi-detached and terraced houses, of which more than 50 per cent was related to the Central Hungary region. The average loan amount was around HUF 32 million.

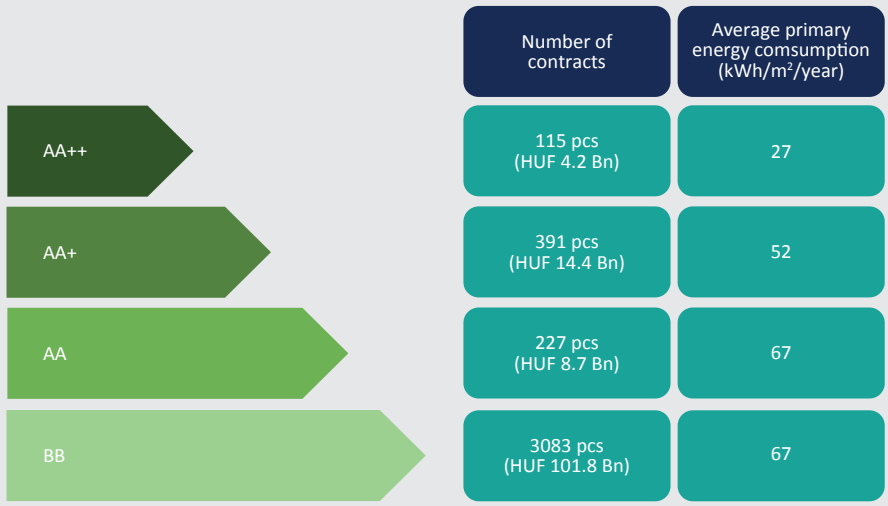
Chart 5
Distribution of the contracted volume under the FGS GHP by loan purpose and property type



Source: MNB

The energy rating of almost 60 per cent of the properties financed under the GHP so far is already known, of which 81 per cent have an energy rating of BB and 19 per cent have an energy rating more favourable than BB (Chart 6). The average primary energy consumption is significantly lower than the current maximum of 90 kWh/m^2/year required by the programme (from 19 April 2022 it will be 80 kWh/m^2/year) for properties with a BB energy certificate, at around 67 kWh per square metre per year – thus meeting essentially even the criteria for the overall energy performance indicator of the AA class – while for properties with the best energy rating of AA++ it is only 27 kWh/m^2/year.

Chart 6
Distribution of properties financed under the FGS GHP by energy classification

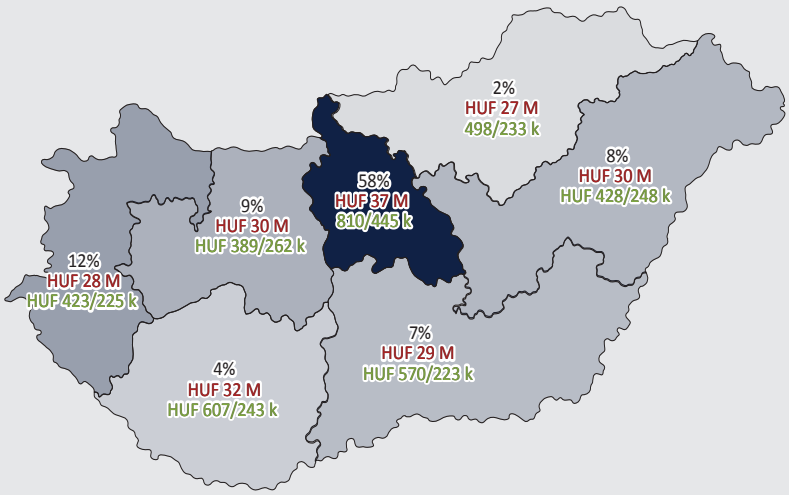


Note: Participating banks only need to report the energy rating of the property after the completion of the energy certification of the property.

Source: MNB

Almost 60 per cent of the volume of contracts signed so far was related to properties under construction or already built in the Central Hungary region, and in terms of the number of loans, more than half of the loans were used in this region (Chart 7). Here, the average loan amount is HUF 37 million, which exceeds the average loan amount of HUF 34 million for the entire portfolio. In contrast, the average loan amount for loans related to real estate in rural regions amounted to HUF 29.4 million. While the average price per square metre of houses in rural regions was 239 thousand forints, with minor variations by region, the average price of dwellings was close to 486 thousand forints, but there was a significant variation between the individual values by region. The average term of the total GHP portfolio is 21 years.

Chart 7
Regional distribution of contracts concluded under the FGS GHP based on volume



Note: Regional distribution of the volume is shown in black, the average loan amount in the given region is shown in red, and the average price per square meter per apartment / house type resulting from the quotient of the sale value and the useful floor area given by the bank is shown in green.

Source: MNB

4. Summary

With the launch of the Green Home Programme, the MNB aimed to promote the creation of a green housing loan market and to facilitate the implementation of environmental sustainability considerations in the domestic housing market. The programme has played a prominent role in housing lending in recent months, with almost half of all housing loans granted under the GHP in April this year, but after the end of April there was no significant spare capacity left for banks to accept new applications. The contracts signed under the programme, worth HUF 222 billion by the beginning of June, supported the purchase and construction of new homes for more than 6.5 thousand households, and the total amount available will enable around 10 thousand households to acquire a green home with a favourable loan. In line with the green toolkit strategy adopted last July, the MNB also intends to support the renewal of the domestic housing stock in the long term and is examining the conditions under which it can support the green transition in a sustainable way once the HUF 300 billion limit is exhausted.

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Green aspects of the government securities purchase programme and a snapshot of Hungarian green government bonds

András Sulyok

On 4 May 2020, in response to the financial market turbulence caused by the coronavirus epidemic, the MNB launched the government securities purchase programme, which included the purchase of the 30year green government bond (2051/G) issued on 28 April 2021. With this, in addition to its monetary policy objectives and, in line with its environmental sustainability mandate, the MNB has contributed to the development of the forint green bond market and the improvement of the debt profile of the Hungarian government. The Hungarian Green Bond Framework provides a stable backdrop for existing and future green government securities issuance, with an increasing emphasis on regular issues of HUF green government bonds in addition to international issues.

1. MNB's government securities purchase programme

On 7 April 2020, the Monetary Council of the Magyar Nemzeti Bank (MNB) decided to launch a government securities purchase programme in the secondary market in order to create a stable liquidity situation in the government securities market and improve the efficiency of monetary policy transmission. During the financial market turbulence of March 2020 caused by the coronavirus epidemic, domestic yields rose sharply, with the yield on the then 10-year benchmark paper (2031/A) rising from 2 per cent by more than 100 basis points in one day. The MNB's mandate was to achieve and maintain price stability, preserve financial stability and support the Government's economic policies, also in the exceptional macroeconomic environment at the beginning of the epidemic. In line with this, dampening the impact on financial markets and ensuring the stability of domestic financial processes in an uncertain economic environment has become a priority, thereby preventing damage to monetary transmission. The government securities purchase programme has provided an opportunity to provide a targeted, rapid response of the scale needed in this sub-market and to improve the efficiency of monetary policy transmission.

The MNB published details of the programme on 28 April 2020[1] and launched the purchases on 4 May. Purchases were made exclusively on the secondary market, i.e. the MNB did not directly purchase government bond issues, but only entered the market for securities already in circulation, thus complying with the rules on the prohibition of monetary financing. The central bank carried out the purchases at market prices, most of which took place at Tuesday auctions announced by the MNB. In addition to auctions, the MNB also had the possibility to purchase government securities on the stock exchange and in the OTC market through outright purchases, subject to the conditions of the individual transaction, and in accordance with the principles of market neutrality and equal treatment. The programme's counterparties were the credit institutions that are the primary dealers of the Hungarian Government Debt Management Agency (hereinafter: 'ÁKK') and the public and open-ended securities funds managed by the 10 largest investment fund managers[2]. The MNB did not limit the maturity of the government securities that could be purchased, but declared that it would focus on purchases of securities with a maturity of at least 3 years, which was intended to support the middle and long end of the government securities yield curve. The programme had no financial envelope, but a comprehensive evaluation and technical review was carried out for each HUF 1000 billion stock.

The government securities purchase programme was subsequently extended to include debt securities issued under a government guarantee or surety, and the MNB's shareholding limit in some series was also revised several times. The programme initially covered only government securities, but in order to increase the effectiveness of the programme, from 6 October 2020 the range of instruments eligible for purchase was extended to include debt securities issued under a government guarantee or surety, using the same strategic parameters as for government securities purchases[3]. At the start of the programme, it was stipulated as a condition that, in the case of government securities purchased by the MNB, the amount of each series of government securities held by the MNB as a result of the purchases could not exceed 33 per cent of the outstanding nominal value of the respective series of government securities. Along with the extension of the programme, the Monetary Council also decided on 6 October 2020 to increase the amount that can be purchased for each series of securities from 33 per cent to 50

[1] MNB press release of 28 April 2020: Az MNB május 4-től elindítja állampapír- és jelzáloglevél-vásárlási programjait (The MNB to launch its government securities and mortgage bond purchase programmes from 4 May).
https://www.mnb.hu/sajtoszoba/sajtokozlemenyek/2020-evi-sajtokozlemenyek/az-mnb-majus-4-tol-elinditja-allampapir-es-jelzaloglevel-vasarlasi-programjait
[2] MNB (2020a)
[3] MNB press release of 6 October 2020: A Monetáris Tanács döntése a Magyar Nemzeti Bank eszközvásárlási programjának technikai módosításairól (Decision of the Monetary Council on technical amendments to the asset purchase programme of the Magyar Nemzeti Bank).
https://www.mnb.hu/sajtoszoba/sajtokozlemenyek/2020-evi-sajtokozlemenyek/a-monetaris-tanacs-dontese-a-magyar-nemzeti-bank-eszkozvasarlasi-programjanak-technikai-modositasairol

per cent. This was necessary to ensure that the previous limit would not restrict the MNB's intervening at a given point on the yield curve. Finally, on 9 March 2021, the 50 per cent limit was also lifted[4] to allow the MNB's purchases to exceed the 50 per cent limit for each series, if justified by the stability and liquidity situation in the government securities market. The MNB's stake subsequently exceeded 50 per cent in four series of government securities with maturities over 10 years, but remained close to 50 per cent.

The volume of purchases by the MNB decreased after the initial intervention, and from the end of summer 2020, in order to avoid turbulence in the money market, weekly purchases increased gradually, reaching around HUF 50-60 billion per week until the phasing-out of the programme began in August 2021. In the first week of the programme, the MNB purchased close to HUF 80 billion of government securities, mainly focusing on the 10-year segment. After the initial purchases, the government bond market stabilised, and in the summer of 2020 the MNB temporarily discontinued targeted purchases (while maintaining the central bank's collateralised credit tender). Thereafter, purchased volumes stabilised at HUF 40 billion per week, rising to HUF 50 billion from the beginning of October 2020, and following smaller purchases due to declining sales at the end of 2020, weekly purchases were around HUF 60 billion per week. In addition to a constant presence, the central bank was flexible in its communication, not only in the structure of purchases but also in the volume of purchases. When opportunities arose, the central bank reduced the volume of purchases, but if tensions in the money market increased, it was ready to buy beyond the weekly HUF 60 billion level, as was the case in the week of 10 May 2021 (Chart 1). With its decision of 24 August 2021, the MNB started to gradually and cautiously phase out the programme[5], and finally decided to discontinue the programme on 14 December 2021 by gradually reducing the weekly purchased volume[6]. At the same time, the MNB will continue to closely monitor liquidity developments in the government securities market and is prepared to intervene with temporary and targeted government securities purchases, if necessary, to maintain stability in the government securities market (Chart 2).

[4] MNB press release of 9 March 2021: A Monetáris Tanács döntése a Magyar Nemzeti Bank állampapír-vásárlási programjának technikai módosításáról (Decision of the Monetary Council on the technical amendments to the government securities purchase programme of the Magyar Nemzeti Bank).
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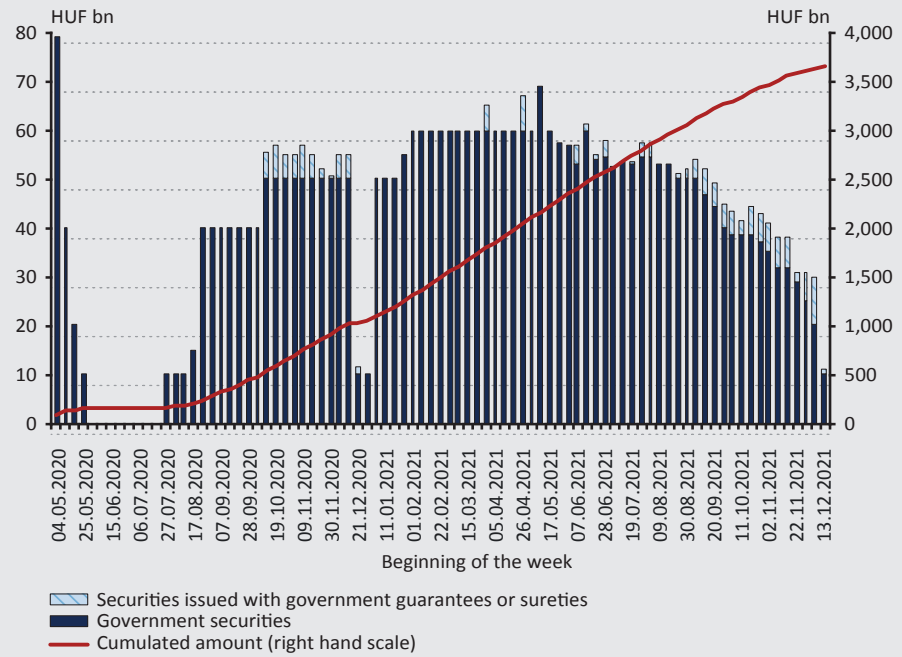
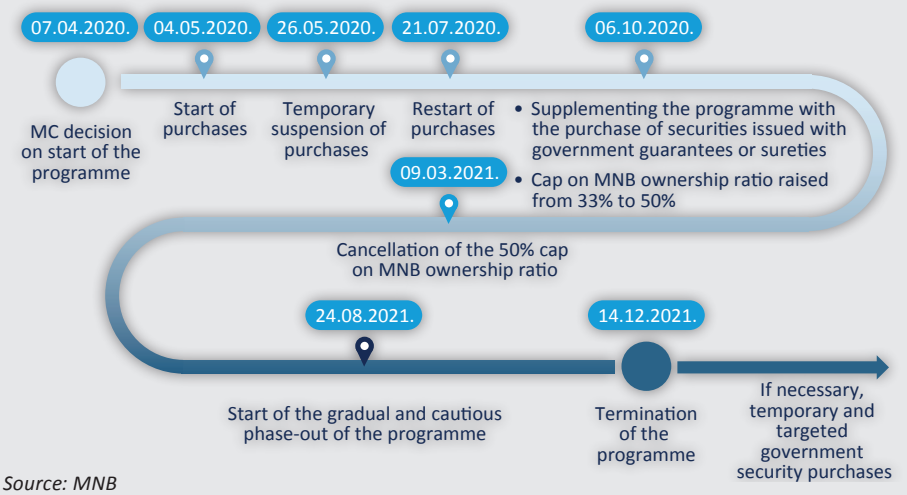
[5] MNB press release on the Monetary Council meeting of 24 August 2021
https://www.mnb.hu/monetaris-politika/a-monetaris-tanacs/kozlemenyek/2021/kozlemeny-a-monetaris-tanacs-2021-augusztus-24-i-uleserol
[6] MNB press release on the Monetary Council meeting of 14 December 2021
https://www.mnb.hu/monetaris-politika/a-monetaris-tanacs/kozlemenyek/2021/kozlemeny-a-monetaris-tanacs-2021-december-14-i-uleserol

Chart 1
Weekly purchased volumes of the MNB under the government securities purchase programme



Source: MNB

Chart 2
Most important decisions concerning the MNB's government securities purchase programme



Source: MNB

The government securities purchase programme also included the purchase of 30-year green government securities issued on 28 April 2021. During the programme, the MNB sought to improve monetary transmission at the long end of the yield curve by purchasing fixed-rate government securities denominated in HUF, mainly focusing on the long end of the government securities yield curve. The 2051/G green government bond met the above criteria, and the MNB's purchases of the 30-year maturity 2051/G were at the most distant point of the yield curve.

2. Hungary's Green Bond Framework

Hungary's green government bond issuance is summarised in the Green Bond Framework[7], prepared in May 2020, which sets out uniform objectives and rules for the use and reporting of the proceeds of green government bonds issued by the Hungarian government. The document states that Hungary is committed to combating climate change and biodiversity loss. On the basis of the Paris Agreement, Hungary supported the EU's climate neutrality target at the December 2019 European Council and is striving to achieve climate neutrality by 2050, accordingly, which, if successful, will balance remaining domestic greenhouse gas emissions and removals by 2050. This goal was also set by Parliament in Act XLIV of 2020 on Climate Protection. To achieve this, several strategy documents and action plans have been prepared, to the implementation of which the Green Bond Framework contributes by providing a common framework and rules for raising part of the necessary funds from the capital market in the form of special green bonds. The Green Bond Framework is in line with the voluntary terms and guidelines set out in the Green Bond Principles (2018) published by the International Capital Markets Association (ICMA) and has also sought to align with the latest market practices[8].

When issuing Green Government Bonds, the State refers directly to the Green Bond Framework, thereby ensuring that the resources involved are used in accordance with the overall strategic objectives set out. Green government bonds are issued similarly to conventional government bonds, but differ in their use and reporting requirements. One of the strategic goals of debt management is to increase investor diversification, which is why the ÁKK also seeks to attract international investors when selling Hungarian green government bonds. To this end, in line with the objectives set out in the Green Bond Framework, Hungarian green government bonds were issued in several international markets, including the euro, Japanese and Chinese markets, in addition to the domestic forint bond market. The Green Bond Framework allows the funds raised from different issuances to be used according to a coherent, comprehensive strategy, rather than earmarking them for individual purposes. Additionally, with several green government bond

[7] Hungary (2020)
[8] The ICMA has updated the Green Bond Principles since the publication of the Hungarian Green Bond Framework in June 2021.

issues, including international ones, it is not necessary for the specific rules to be repeated and reviewed by investors for each individual bond, but it is sufficient to familiarise oneself with the Green Bond Framework.

Investor confidence has been boosted by the fact that the Green Bond Framework has also received an external, independent preliminary rating from CICERO Shades of Green[9], an internationally recognised green bond rating agency, which gave it a mid-range rating on a three-point scale. The Hungarian State has asked CICERO Shades of Green to independently rate the Green Bond Framework, whose opinion will cover not only the Green Bond Framework but also all government bonds issued under it for 3 years from its issue in May 2020. There are 3 scales for rating projects, reflecting a comprehensive and qualitative assessment of climate and environmental risks and objectives, according to whether they contribute substantially to a long-term low-carbon and climate-resilient vision or are simply "climate friendly" (e.g. investments in fossil technologies but increasing efficiency to reduce greenhouse gas emissions). Based on the above, an overall rating is derived from the aggregated rating of the projects. The other part of the evaluation is the governance rating, which takes into account the objectives of the programme, the project selection process, the management of the funds raised and the reports provided to investors. In both respects, the Hungarian Green Bond Framework was rated in the mid-range: the projects received an overall "medium green" rating and governance received a score of "good".

The proceeds from the bond issue can be used by the Hungarian State for purposes falling within six green sectors, with a significant part of the proceeds financing expenditures related to transport. The net proceeds of the bond issue can be used for "Eligible Green Expenditures" as defined in the Green Bond Framework, which are charged to the central budget of Hungary. They can be used for investment, intervention, tax or operating expenditures. Eligible Green Expenditures may include expenditures towards government agencies and other public sector entities, provided that they do not themselves raise funds for green financing. To avoid double accounting, expenditures that obtain other dedicated funding (e.g. EU funding) are excluded. The Green Bond Framework classifies Eligible Green Expenditures into six green sectors (Table 1). As 21 per cent of Hungary's emissions come from transport and this share has more than doubled since 1990, nearly 90 per cent of the funds raised are intended to be allocated to this sector. One third of the total amount is foreseen to finance electric public transport (rail, metro, trolleybus or tram), but part of the expenditure on rail transport, development and operation of the rail network indirectly finances fossil elements, as only 41 per cent of the rail network was electric at the time the Framework was adopted. Any expenditure related to the nuclear power, armament and defence sectors, as

[9] CICERO Shades of Green (2020)

well as fossil fuel and power generation, is completely excluded from Eligible Green Expenditures.

Table 1
Green sectors and green expenditure eligible for inclusion

Green sectors	Green expenditure eligible for inclusion
1. Renewable Energy	Expenditures to support the development of renewable energy generation
2. Energy Efficiency	Expenditures to support energy efficiency improvement in the public and private sector
3. Land Use and Living Natural Resources	Expenditures to promote sustainable agriculture, biodiversity and preservation of living natural resources
4. Waste and Water Management	Expenditures to support water treatment and supply, waste management, waste water collection and treatment
5. Clean Transportation	Expenditures to promot clean transport services and a modal shift towards public transportation
6. Adaptation	Expenditures to develop climate change extreme weather events observation systems and support adaptation related infrastructure

Source: Green Bond Framework

Eligible Green Expenditures are selected annually. Under the coordination of the Ministry of Finance, the relevant ministries send their budget expenses that meet the definition of Eligible Green Expenditures to an inter-governmental working group, which then reviews them and checks that they meet the criteria and definition of the Green Bond Framework. Finally, the Steering Committee approves the selected Eligible Green Expenditures. Chaired by the Ministry of Finance, the Ministry of Innovation and Technology, the Ministry of Agriculture, the Ministry of Interior and ÁKK are represented in both the inter-governmental working group and the steering committee (this may change after the formation of the new government in 2022).

The funds raised from the bond issue will be allocated annually to selected Eligible Green Expenditures. The funds raised may be allocated to the following Eligible Green Expenditures:

(i) incurred in the two budget years preceding the year of issuance,

(ii) incurred in the same year as the issuance; and/or

(iii) future budget expenditures.

This means that it is worth allocating the funds received in as a waterfall to the earliest possible Eligible Green Expenditure, as previously eligible expenditures might not be used in the following year. The inter-governmental working group monitors the level of unused Eligible Green Expenditure in line with the above and allocates the funds obtained, which are finally approved by the steering committee. To this end, the inter-governmental working group meets regularly, while the steering committee meets at least once a year. The Ministry of Finance keeps records of the amounts not yet allocated.

Transparency is ensured by regular reporting to investors on the use and impact of the funds raised from green government bond issues. The Green Bond Framework requires the publication of two reports. The annual Allocation Report includes the amount raised from the issuance of green government bonds, its allocation to Eligible Green Expenditures and a breakdown by green sector. The Impact Report provides more information on Eligible Green Expenditures and details the impact of the expenditures on various indicators. Each relevant ministry collects the data for the reports and prepares the relevant texts, coordinated by the Ministry of Finance. The reports are reviewed by the inter-governmental working group and approved by the steering committee. The Allocation Report is also assessed by an external, independent party prior to approval by the steering committee (CICERO Shades of Green). Once approved, the reports will be published on the ÁKK's website[10].

3. Realised and expected green government bond issues

Following the launch of the Green Bond Framework, the first issue was made in June 2020 on the international market in EUR, attracting HUF 517 billion in funding[11]. Hungary has mandated three major international players, Credit Agricole CIB, ING Bank and J.P. Morgan Securities, to act as the lead managers for the issue. The maturity of the euro-denominated green government bond is 15 years, which is significantly longer than the average remaining maturity of foreign currency debt at the end of 2019, which is 4.8 years. The bond pays an annual interest rate of 1.75 per cent. The issue raised EUR 1.5 billion (HUF 517 billion), with an outstanding, over quintuple investor interest. The resulting yield was 190 basis points higher than the benchmark euro mid-swap yield for the same maturity, which was 50 basis points lower than the original price indication, due to a significant oversubscription.

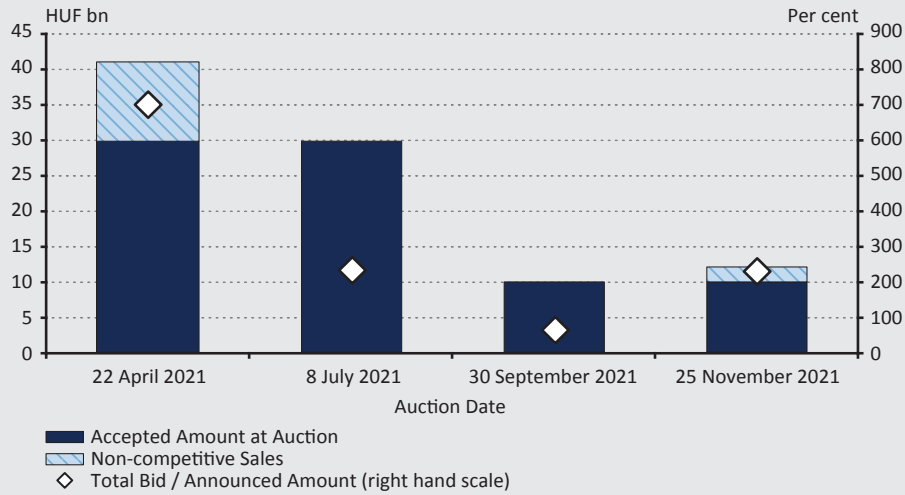
[10] https://akk.hu/zold-kotveny
[11] Press release of ÁKK of 2 June 2020
https://akk.hu/download?path=1b44a2ab-11bf-42a3-9e88-aaaf966c978a.pdf

The euro issuance was followed by a Japanese yen-denominated "Samurai" green bond issuance in autumn 2020, for an amount of HUF 57 billion[12]. The green bond was issued together with conventional Japanese yen bonds. The lead managers for the Samurai bond issues were Japan-based Daiwa Securities Co Ltd, Nomura Securities Co Ltd and SMBC Nikko Securities Inc. Of the four series issued, the two with the longest maturities were the 7-year and 10-year green bonds, and of the total JPY 62.7 billion issued, JPY 20 billion (HUF 57 billion) was raised from the green series. The two series pay a coupon of 1.03 and 1.29 per cent, respectively, and the resulting yield spreads have been set at 1.00 and 1.20 per cent above the yen swap. With this issue, Hungary became the first foreign sovereign to issue a green bond in Japan.

Following the successful foreign currency issuances in 2020, sales of HUF green bonds started in 2021 and by the end of the year a total of nearly HUF 94 billion 2051/G green government bonds were sold. The new HUF green government bond has been issued in the same way as HUF bonds available to institutional investors and is accordingly available to domestic and foreign investors, including households through the Treasury. ÁKK has timed the issue symbolically for 22 April 2021, the Earth Day. In addition to being the first green government bond denominated in HUF, the new series 2051/G also became the longest maturity HUF government bond, with its 30-year maturity being 10 years longer than the longest 20-year maturity 2041/A bond in circulation at the time of issue. The bond pays an annual interest rate of fixed 4 per cent. The success of the first auction is demonstrated by the fact that bids received were seven times higher than the announced HUF 20 billion, thus HUF 30 billion, more than the announced amount was accepted, and a further HUF 11.2 billion sold in the non-competitive phase following the auction. During the rest of the year, 2051/G was auctioned three more times, with less interest than in the first issue (Chart 3).

[12] Press release of ÁKK of 15 September 2020
https://akk.hu/download?path=0695c33f-de71-4d4d-b0cc-6533a7733cf8.pdf

Chart 3
Auctions and non-competitive sales of 2051/G

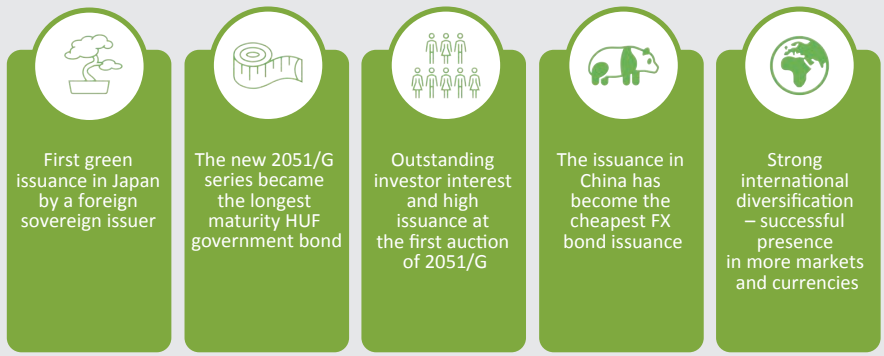


Source: ÁKK/Government Debt Management Agency

In addition to the 2051/G HUF Green Government Bond, green government bonds denominated in yuan were issued in a new international market in China at the end of 2021, in an amount equivalent to HUF 50 billion[13]. The new Panda bond has a maturity of 3 years and pays an annual interest rate of 3.28 per cent. The lead manager of the bond issue was the Bank of China (Beijing). There was strong interest in the bond and the 1.78-fold oversubscription resulted in a much more favourable pricing compared to the yield premium of the previous Panda issue in 2018 (China Development Bank yield curve 3-year point + 0.59 per cent), while the conversion to euro in the fixed rate foreign currency swap transaction resulted in a euro interest rate for the Hungarian State of below 0 per cent (-0.013 per cent), making it the cheapest foreign currency bond issue ever by the Hungarian sovereign. The issue raised 1 billion yuan (about HUF 50 billion). The key successes and achievements of the green government bond issuances completed by the end of 2021 are illustrated in Chart 4.

[13] Press release of ÁKK of 15 December 2021
https://akk.hu/download?path=5b475706-6134-4b87-bec5-4487ca6c639e.pdf

Chart 4
The key successes and achievements of the green government bond issuances completed by the end of 2021



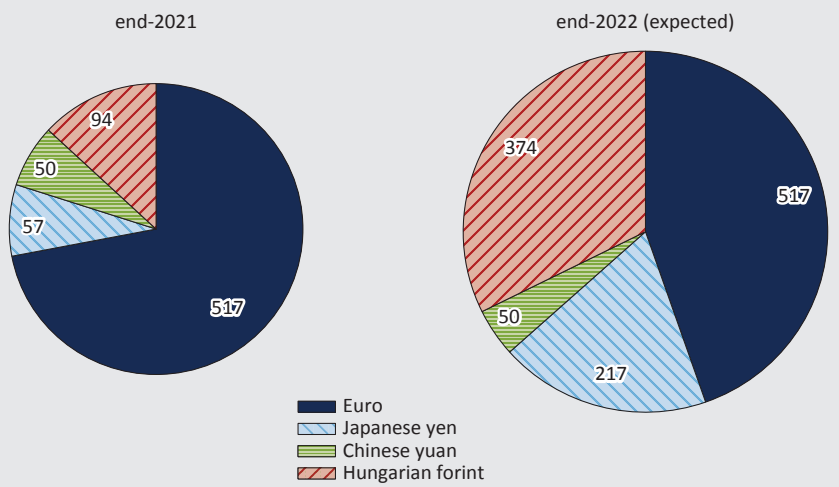
Source: MNB

The Hungarian government will continue to issue green government bonds in line with the Green Bond Framework in 2022, with the focus shifting towards forint issues. According to the 2022 financing plan of the central budget[14], ÁKK will continue to sell 2051/G in the fixed bond auction system at quarterly intervals, while also introducing a new 10-year green government bond with monthly auctions. In 2022, ÁKK plans to raise HUF 40 billion from the 30-year green bond and HUF 240 billion from the 10-year green bond, which corresponds to 1 and 7 per cent of the planned gross government bond issuance, respectively. In the first two months of 2022, HUF 48.7 billion of the 10-year green bond 2032/G with a fixed interest rate of 4.5 per cent was issued, exceeding the pro-rata share of the annual plan by HUF 8.7 billion. The green government bond 2051/G has not been announced in the first two months of the year. The financing plan also includes another issuance of a green government bond denominated in Japanese yen, which took place earlier this year on 18 February 2022[15]. Similar to the 2020 Samurai issue, four series were announced, but in addition to the 7 and 10-year series, the 5-year series was also a green government bond. Daiwa Securities Co Ltd, Mizuho Securities Co Ltd and Nomura Securities Co Ltd were the lead managers of the bond issue. Compared to the September 2020 Samurai bond, pricing was more favourable across all maturities, with 59.3 billion yen (about HUF 160 billion) of the total 75.3 billion yen coming from green bonds, nearly three times the amount of green Samurai bonds subscribed in September 2020.

[14] ÁKK Zrt. (2021)
[15] Press release of ÁKK of 18 February 2022 Újabb sikeres japán jen devizakötvény kibocsátást hajtott végre Magyarország (Another successful Japanese yen bond issue in Hungary) https://akk.hu/download?path=5e54ec38-fa5a-4e40-bd4b-a67107f4f6d2.pdf

As a result, 87 per cent of Hungarian green government bond issuance was denominated in foreign currency by the end of 2021, but if the 2022 financing plan is met, the share of HUF-denominated green government bonds will be around one third by the end of 2022. Based on the 2022 financing plan, no further green government bond issuance is expected in the international market for the rest of the year, and with regular monthly auctions of 2032/G, an amount well in excess of that of 2021 is expected to be raised in 2022 through HUF green bonds, thus the share of HUF bonds in Hungary's sovereign green bonds is expected to increase from 13.1 per cent to 32.3 per cent. The euro continues to dominate among foreign currency green government bonds, but euro-denominated bonds are no longer expected to reach half of the total green government bond issuance by the end of 2022 (Chart 5).

Chart 5
Hungarian Green Bonds by currency (HUF billion)



Source: ÁKK/Government Debt Management Agency

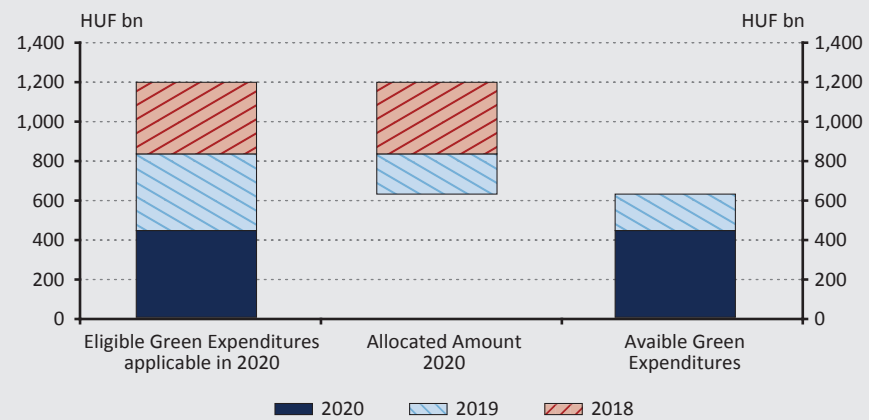
4. Use of proceeds

Based on the 2020 Allocation Report, HUF 574 billion was raised from the 2020 green bond issuance and the corresponding amount of Eligible Green Expenditures has been allocated. ÁKK published the 2020 Allocation Report on 17 March 2021[16]. For 2020, HUF 574 billion from euro and Japanese yen green government bonds issued in 2020 can be allocated to Eligible Green Expenditures incurred from 2018 onwards, due to the 2-year rule, where allocations are prioritised from older to

[16] Hungary (2021a)

newer expenditures. In line with this, the entire 2018 Eligible Green Expenditures (HUF 372 billion) and part of the 2019 expenditures (HUF 202 billion) have been allocated. For the remainder of 2019 expenditures (HUF 190 billion), for the 2020 expenditures (HUF 441 billion) and for Eligible Green Expenditures in subsequent years, the amounts raised from green bond issuance after 2020 can be allocated (Chart 6). The 2021 Allocation Report is not yet available at the time of writing this paper, therefore we will consider the Eligible Green Expenditure incurred up to 2020 based on the 2020 Allocation Report.

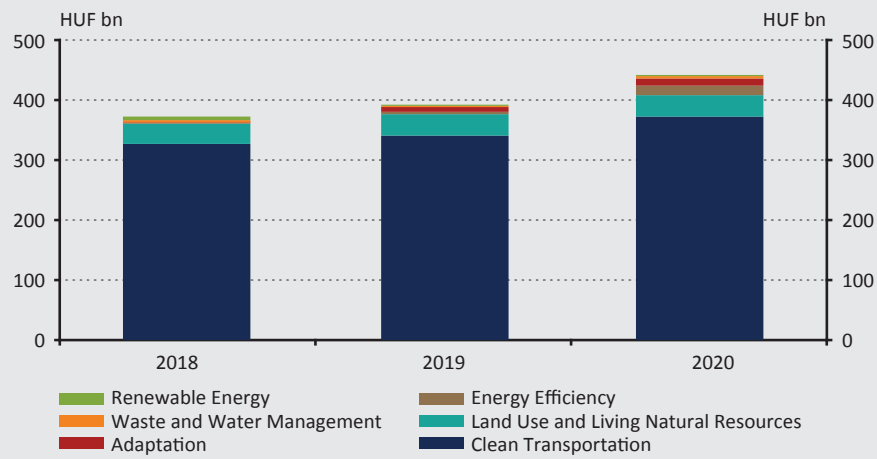
Chart 6
Allocation of funds raised from green government bond issues in 2020 to Eligible Green Expenditures



Source: Hungary Green Bond Allocation Report 2020

The 2020 Allocation Report classifies Eligible Green Expenditures into six green sectors under the Green Bond Framework, with a significant share of expenditures falling under the Clean Transportation category as planned. The annual structure of Eligible Green Expenditures has not changed significantly over the three years between 2018 and 2020. The share of the Clean Transportation category was above 80 per cent in all three years, although it decreased slightly. The green sector with the second largest share is Land Use and Living Natural Resources, with an annual expenditure of over 30 billion, but its share did not reach 10 per cent in any of the years. Eligible Green Expenditures classified in the Energy Efficiency and Adaptation sector has multiplied, but still remained below 5 per cent even in 2020 (Chart 7). More than half of the expenditure is intervention expenditure, a quarter is operating expenditure and only 20 per cent is linked to investment.

Chart 7
Eligible Green Expenditures 2018–2020



Source: Hungary Green Bond Allocation Report 2020

Clean Transportation expenditures between 2018 and 2020 could have been financed by green government bond issuance of more than HUF 300 billion per year, mainly to support rail transport. A significant part of the expenditure on Clean Transportation was linked to rail transport, including reimbursement of investment, and operating and staff costs. The aim of the support is to keep rail competitive compared to less green means of transport, in particular cars, which indirectly affects a large share of the population by reducing congestion and emissions. The Clean Transportation category also includes minor non-rail expenditure, such as expenditure to modernise urban public transport. A small part of the funds raised from the green bond issue was also used for the tax allowance for environmentally friendly vehicles.

Eligible Green Expenditures in the category of Land Use and Living Natural Resources amounted to HUF 30–35 billion per year. Almost half of these were related to the public programme to support agricultural producers and create a sustainable and competitive agri-food economy. In addition, operating costs of HUF 7-11 billion per year, including the costs of national parks, are also included here. Other expenditure under this heading includes nature protection and preservation of biodiversity (e.g. maintaining a gene bank) and education and awareness-raising programmes.

Eligible Green Expenditures classified in the other green sectors together did not reach the 10 per cent share. These include Energy Efficiency, Adaptation, Renewable

Energy, Waste and Water Management, all of which have been supported by funds raised from green bond issuance through a number of public programmes.

The 2020 Allocation Report has also been reviewed by CICERO Shades of Green and is considered to be in line with the Green Bond Framework and relevant international principles and guidelines[17]. The external report also drew the attention of investors to the fact that the funds raised from the green bond were also allocated to operating costs of the Hungarian State. While this is in line with the Framework Programme, it encourages further transparency on operational expenditure in the impact report.

Green bond issues have made a significant contribution to protecting our environment and reducing greenhouse gas emissions. The 2020 Impact Report[18] was published on 6 December 2021. The Impact Report shows that support for rail transport, the backbone of sustainable mobility, has played a crucial role in meeting decarbonisation targets and strengthening its role in the fight against climate change. Measures implemented within the Clean Transportation green sector have resulted in avoiding greenhouse gas emissions equivalent to more than 1,100 kilotons of carbon dioxide, while expenditures in the Renewable Energy and Energy Efficiency categories have resulted in the removal of 8 and 50 kilotons, respectively (together, 1.09 kilotons for every billion forints spent). Under the Land Use and Living Natural Resources expenditure category, more than 120,000 projects were implemented, supporting sustainable agriculture on nearly 800,000 hectares. One of the results of Water and Waste Management expenditures is that additional areas have been added to the drinking water and sewage systems, so that at the end of 2019, 94.9 per cent of Hungarian households had access to the drinking water network and 82.6 per cent to the sewage network.

5. The MNB's involvement in the forint green government bond market

Under the MNB's government securities purchase programme, with the purchase of the 2051/G bond, in addition to its monetary policy objectives, the MNB has contributed to the development of the forint green bond market and the improvement of the debt profile of the Hungarian government, in line with its environmental sustainability mandate. The funds raised from green government bonds should be used for green expenditure, so supporting the development of a sovereign green bond market is compatible with the MNB's environmental sustainability mandate. In addition, the emergence of investors interested in green bonds in the Hungarian government bond market diversifies the investor

[17] CICERO Shades of Green (2021)
[18] Hungary (2021b)

base, bringing into government financing a segment that would not necessarily be interested in conventional government bonds and is typically interested in holding to maturity as a long-term investor. And with its 30-year maturity, the 2051/G green government bond issued in 2021 is 10 years longer than the previous longest maturity government bond, so the issue also contributes to the lengthening of government debt, reducing renewal risk. With the introduction of the 30-year 2051/G, the yield curve in the government bond market has been extended from the previous 20 years to 30 years, providing a benchmark for other institutional investments and contributing to an even more efficient management of long-term institutional investments. In addition to the green considerations, the above will have a positive impact on the debt profile, make the financing of Hungarian sovereign debt more resilient, reduce vulnerability and contribute to building the long end of the HUF money market.

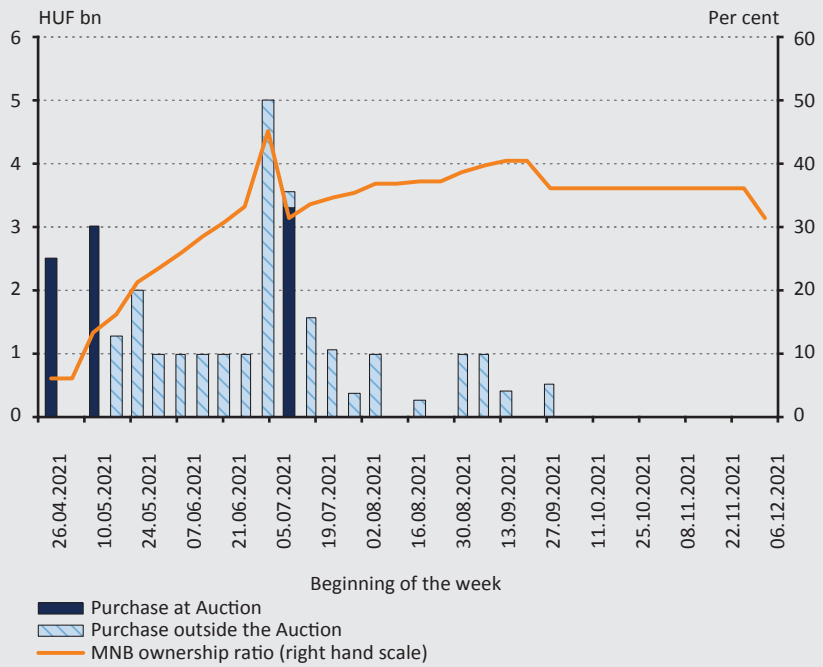
The MNB has supported the issuance of forint green government bonds from the outset. In its publication on the possibilities of launching a green bond market, published in summer 2020[19], following the issuance of FX green government bonds, the MNB called for the issuance of HUF-based green government bonds, building on retail government bonds, preferably with the same financial terms, and in this context the introduction of Green Baby Bonds linked to the Start Securities Accounts was also raised. Prior to the first auction of 2051/G on 22 April 2021, issued primarily for institutional investors but also available for purchase by private individuals, the MNB also communicated its support and made clear that the MNB's government securities purchase programme will also cover the newly issued green government bond[20]. The MNB's communication also played a role in the success of the first issue of 2051/G, which attracted bids seven times the announced volume and the ÁKK increased the acceptance volume by one and a half times at the first auction.

The MNB mainly purchased the 2051/G green government bond outside auctions, for a total of HUF 29.4 billion, which represented 31.4 per cent of the market stock at the end of the government securities purchase programme. The primary dealers had the opportunity to buy 2051/G at the auction of ÁKK on 22 April 2021, which fell on Earth Day, and on the following Tuesday, 27 April 2021, the MNB included it among the securities to be bought at its own auction and fully accepted the submitted volume of HUF 2.5 billion. The 2051/G was auctioned twice more by the MNB: two weeks later and after the July 2021 auction of the ÁKK. In addition, the MNB regularly bought from the 2051/G bond outside the auction in small quantities, usually only HUF 1-1 billion, thus supporting the market for 2051/G with its continuous presence. Larger amounts were limited to the weeks after the

[19] MNB (2020b)
[20] Portfolio.hu (2021)

first issue and around the July auction of the ÁKK. The market generally did not require more support for 2051/G paper, there was no selling pressure on this paper, and therefore the MNB discontinued buying this paper as the phasing out of the programme progressed from mid-October 2021, with total weekly buying volumes declining (Chart 8).

Chart 8
Weekly purchase volumes and ownership ratio of the MNB in the 2051/G green government bond

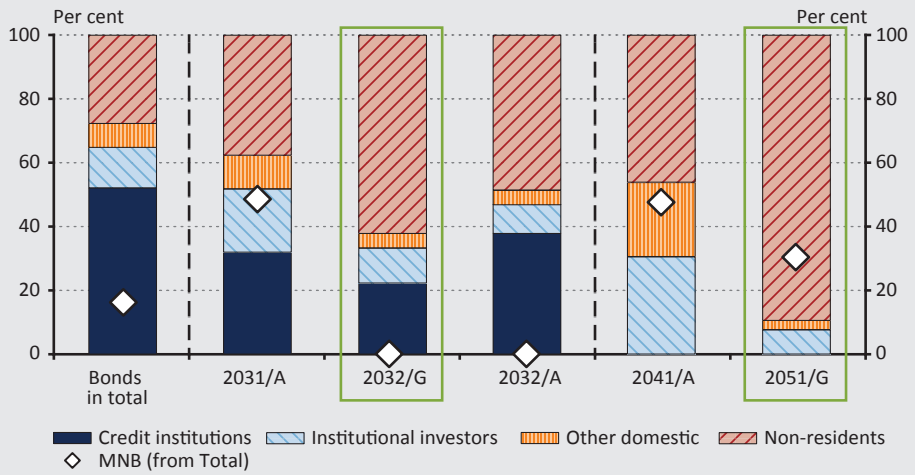


Source: MNB, Government Debt Management Agency

6. Investors of forint green government bonds

Most HUF government bonds are held by domestic credit institutions, but the MNB has also acquired a significant stake. As a result of the MNB's government securities purchase programme in 2020-2021, at the end of February 2022, the MNB held a significant 16 per cent stake in the domestic forint bond market, which was close to 50 per cent for the longer government bond series that constituted the focus of the programme. Excluding the MNB's stake, more than half of HUF government bonds are held by domestic credit institutions, 13 per cent are held by domestic institutional investors, 7 per cent by other domestic players, and non-residents hold less than one-third (Chart 9).

Chart 9
The MNB's ownership ratio in Hungarian green bonds and other bonds, and the distribution of holdings other than the MNB (28 February 2022)



Source: MNB

The 2032/G and 2051/G HUF green bonds are mainly held by non-residents. The 2032/G green government bond is also held by a higher proportion of non-residents than the conventional government bonds 2031/A and 2032/A, which are close to maturity, with their share in the 2032/G paper exceeding 60 per cent at the end of February 2022. If we look only at the two new, 2032/G and 2032/A papers issued in January 2022, it appears that the higher share of non-residents in the case of the 2032/G green bond is offset by a lower domestic credit institution share. In the case of 2051/G, the share of non-residents is also around 60 per cent, but apart from the MNB's ownership of more than 30 per cent, the share of non-residents is close to 90 per cent. This is outstanding even compared to the second longest maturity 2041/A paper, where the share of non-residents is 24 per cent (46 per cent excluding the MNB's stake).

The stake held by domestic institutional investors (insurance companies and funds) for 2032/G and 2051/G HUF green bonds is not higher than average, but strengthening this segment could increase the domestic share in green bonds as well. A common assumption about green bonds is that they are held to maturity by long-term investors. Typical examples are insurance companies and funds, which invest a significant part of their assets in instruments with a long maturity. At the same time, domestic institutional investors seem to have added HUF green bonds to their portfolios to an even lesser extent. In the case of the 2032/G paper, the 10 per cent stake held by institutional investors – apart from the MNB's share – is in line with the average for government bonds, while the 7 per cent seen in the case of

the 2051/G is below the average. Meanwhile, institutional investors are considered to be more significant players in the case of other long bonds, with above-average holdings of 20 per cent and 30 per cent respectively for 2031/A with a remaining maturity of almost 10 years and 2041/A with a maturity of close to 20 years (apart from the MNB's stake). However, increasing the domestic share of green papers could be constrained if strong foreign interest persists and these players view the paper as a buy-and-hold investment.

Foreign investors in HUF green bonds are concentrated in Europe, especially in the Benelux countries and the UK, which are considered to be the financial centres, but 2051/G is also held in significant quantities by US investors. The majority of non-resident holdings of HUF green bonds (around 60 per cent) were deposited with domestic credit institutions, while a smaller share (around 40 per cent) was deposited with foreign institutions at the end of February 2022. Unfortunately, the ultimate depositary and investor may not be necessarily known, so it is assumed that in the case of foreign depositories, the origin of the ultimate investor is the same as the domicile of the first reported depositary. These suggest that nearly 90 per cent of the non-resident holdings in 2032/G were held by Belgian and British investors, about evenly split, while for 2051/G nearly 40 per cent of the foreign holdings were held by non-European, US investors, 30 per cent by Belgian investors and 20 per cent by Luxembourg investors. Investment of over HUF 1 billion also came from Austria, France and Germany (Chart 10).

Chart 10
Geographical distribution of foreign investors in 2032/G and 2051/G green bonds (28 February 2022)

Note: in the case of a foreign depositary, based on the country of the depositary
Source: MNB

7. Pricing of forint green government bonds

In addition to the diversification of the investor base, the more favourable pricing of green bonds, i.e. the existence of "greenium", is also commonly cited as an advantage of green bond issuance. The theory of the green premium, or greenium, is based on the idea that a premium is created on the side of the green bond issuers, as some investors are willing to pay more to invest in green-labelled assets. Greenium can be driven by a broadened investor base who want or are only able to buy green bonds specifically, and by holding green assets, investors can showcase their commitment to fighting climate change. Furthermore, as a result of the sustainability objectives, it is a safer, less volatile investment, making it more attractive to investors, which is also supported by a hold-to-maturity attitude in line with the long-term objective. The existence of greenium may also contribute to the popularity of green products as they become more and more fashionable. However, there are also counter-arguments to the existence of greenium, as the liquidity of special green bonds, which are assumed to have lower issuance volumes, is also lower than that of conventional bonds, which would lead investors to expect higher yields in the green bond market. Nevertheless, the rational investor, indifferent to green goals, would choose the one with the higher yield between two bonds with the same characteristics in all other respects (e.g. seniority, maturity, coupon payment, etc.) apart from the green label, eventually equalizing the pricing of the two bonds. Several uncertainties complicate the measurement of greenium, as it is not trivial to find a suitable benchmark, and even if one is found, it is difficult to eliminate demand-supply, momentary liquidity and other effects from the causes of the yield gap.

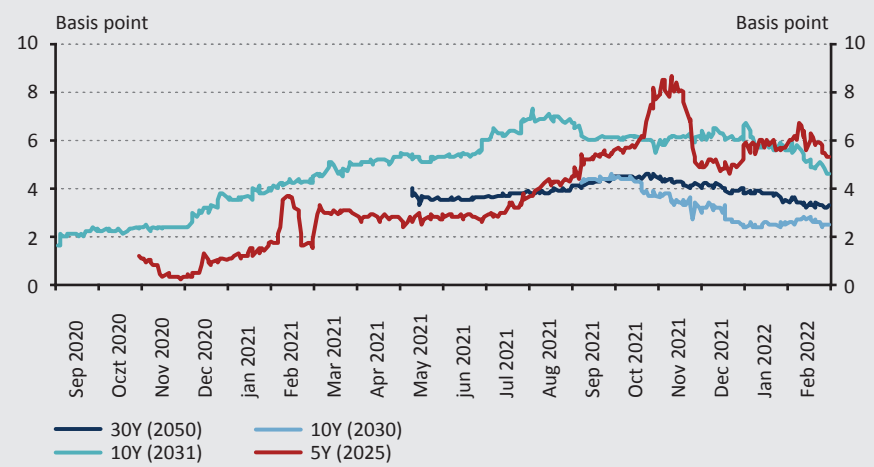
Several studies have attempted to show and measure greenium. Even a comprehensive summary of these would go beyond the scope of this paper, therefore only the most relevant analyses are highlighted. According to the Climate Bonds Initiative's (CBI) regular study of primary issuance, 26 of the 33 non-sovereign green bond issues surveyed were priced at or below the yield curve in the first half of 2021, and the green bonds of the three sovereigns surveyed also achieved greenium at issuance (pricing at the yield curve can suggest greenium due to the lack of a new issue premium)[21]. A 2019 study by Gianfrate and Perri, based on a multi-sector sample from 2007 to 2017, found that greenium exists in the primary market (18 basis points on average) and that greenium persists in the secondary market[22]. A 2021 study on the estimation of the pricing of green bonds issued under the Next Generation EU programme examined the greenium of public and supranational green bonds between 2014 and 2021 and confirms the existence of a greenium of 0.7 basis points based on the data examined and the regression result,

[21] Climate Bonds Initiative (2021)
[22] Gianfrate & Peri (2019)

which increases for AAA rating and supranational issuers (2.6 and 3.8 basis points respectively)[23]. Also in 2021, a study by Kapraun et al. finds greenium only in cases where the issuer is a sovereign, supranational entity or a corporation with a large series of issues to which investors can attach greater credibility and environmental impact[24]. By contrast, Larcker and Watts do not identify greenium in their 2020 study, which was based on matching the issues by municipalities in the US[25].

Although the greenium rate of German green bonds has not yet reached a stable level, the structure has been set up in such a way that its existence can be verified and measured well. One of the simplest and most obvious ways of measuring greenium is when a country has issued both a "conventional" and a "green" bond with the same characteristics (currency, maturity, amortisation, coupon payment, nominal interest rate, etc.), thus, the yield difference between the two papers can be used to clearly measure greenium. An example is the case of Germany, where, in addition to linking all green bonds to a conventional bond ("twin bonds"), a full green bond yield curve is planned to be built up over the years, which could serve as a benchmark for European green capital markets[26]. So far, 5, 10 and 30-year green bonds have been issued, and based on their yields, the average greenium of German green bonds can be between 2 and 6 basis points (Chart 11).

Chart 11
Development of the yield spread (greenium) between German conventional bonds and their green counterparts

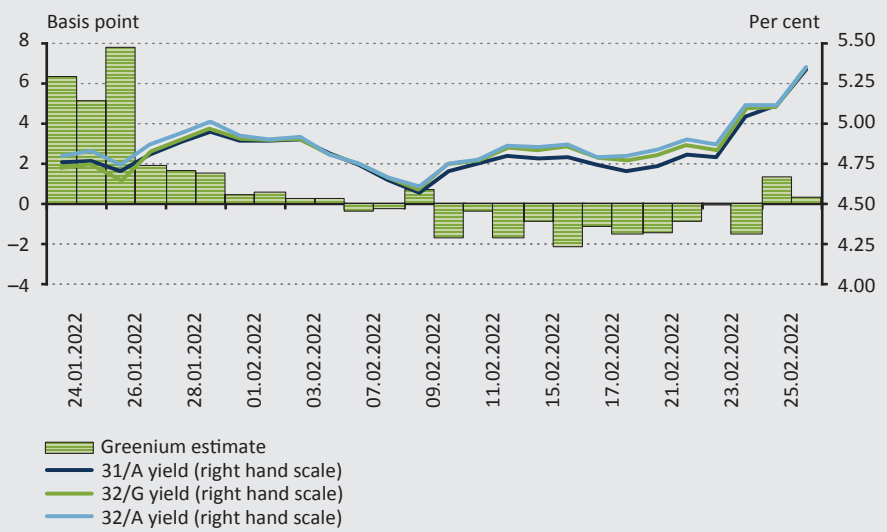


Source: Bloomberg

[23] Hinsche (2021)
[24] Kapraun, Latino, Scheins & Schlag (2021)
[25] Larcker & Watts (2020)
[26] Bundesrepublik Deutschland, Finanzagentur Gmbh: The Bund's green twins - Green Federal securities https://www.deutsche-finanzagentur.de/en/institutional-investors/federal-securities/green-federal-securities/

It is more difficult to measure the exact rate of greenium on Hungarian sovereign green bonds. Unlike German green bonds, there is no comparable conventional bond alternative to the HUF 2051/G Green Bond, moreover, its maturity is 10 years longer than that of the next longest 2041/A bond. Therefore, the uncertainty in the estimation of the greenium is quite high and the result of the estimation depends on the yield curve model applied and the methodology used to remove other distorting effects. In any case, between the end of August and mid-November 2021, the yield of 2051/G did not reach the yield of 2041/A, which has a maturity of 10 years less (although the difference in duration of the two bonds is smaller than the difference in maturity). There is no conventional counterpart for 2032/G either, but in terms of maturity, the 2031/A and 2032/A bonds are close. From the issuance of 2032/G on 26 January 2022 until the end of February 2022, the difference between the average yield of the two closely matched bonds and the yield of 2032/G was around 5-8 basis points in the days following issuance, a difference that subsequently essentially disappeared, and the pricing of 2032/G was close to the average of the two government bonds with close maturities (Chart 12). Both 2032/A and 2032/G attracted strong interest in government bond auctions in January-February 2022, with an average of HUF 45 billion bids received in the four auctions of the 10-year benchmark 2032/A, compared to an average of HUF 49 billion bids received in the two auctions of 2032/G. Based on the above, while there is no significant difference in pricing between the two, investor interest in the green bond is stronger.

Chart 12
Developments in yields on 2032/G and Hungarian government bonds that are close in maturity and the difference between former and the average of latter (estimated greenium)



Source: Bloomberg

Summary

Under the Green Bond Framework, announced in 2020, the Hungarian State may raise more than HUF 1,100 billion from the domestic and international markets until the end of 2022 to finance dedicated green, sustainability and environmental expenditure of the central budget. The HUF 574 billion raised in 2020 has already been allocated to green expenditures, nearly 90 per cent of which has been used to support clean transportation and within that mainly rail transport. In this context, measures implemented between 2018 and 2020 have avoided the emission of greenhouse gases equivalent to more than 1,100 kilotons of carbon dioxide, thus making a major step towards achieving the decarbonisation targets and contributing to the fight against climate change. The remainder has also supported a wide range of projects and public programmes, including the development of a sustainable agri-food economy, the extension of drinking water and sewage system, and investments in energy efficiency.

In line with its environmental sustainability mandate, the MNB has also contributed to the above results through its supportive communication and has supported the development of the 30-year HUF green government bond market through its government securities purchase programme. In addition to the monetary policy and green objectives, the MNB's support is also justified by the fact that the 30-year green government bond also has the effect of reducing the country's vulnerability. The issuance of green government bonds diversifies the investor base with players seeking long-term investments and with an interest in holding to maturity, so that issuing bonds with longer maturities than the average remaining maturity of the debt helps to lengthen the maturity of the sovereign debt and reduce the risk of renewal. In addition, the government bond market yield curve, extended to 30 years with the new 30-year green government bond, will help build the long end of the HUF money market by providing a benchmark for other institutional investments, which will make it more efficient for other market participants to manage long-term investments and attract long funds.

As part of its government securities purchase programme between 2020 and 2021, the MNB purchased HUF 29.4 billion of the 30-year green government bond 2051/G, which represented 31.4 per cent of the outstanding stock at the end of the programme in December 2021. The MNB made regular weekly purchases of the 2051/G green government bond, with larger volumes in the weeks around the first and second auctions of the ÁKK. In addition, weekly purchases mostly amounted to only HUF 1-1 billion out of the HUF 50-60 billion weekly purchase volumes, so the MNB was continuously present in the market for 2051/G, but it did not generally require a higher level of support, and in parallel with the phasing out of the programme, the MNB stopped buying green government bonds from mid-October 2021.

Investors in HUF green government bonds are dominated by non-residents, and their weight may be offset by a strengthening of the domestic institutional investor sector. The share of non-resident holders is outstanding for the 2032/G and 2051/G papers. This is partly explained by the fact that, for risk management reasons, credit institutions do not take an active role in the segment of over 10 years. Institutions accumulating pension savings or providing long-term (e.g. life) insurance could create significant natural demand in the market for government bonds with long maturities, and green government bonds with sustainability objectives would fit their long-term profile. Strengthening these actors would increase their investable assets, of which green bonds with long maturities could also benefit, thus, in addition to promoting the lengthening objectives, it would also increase the more stable investor base and reduce sovereign external debt.

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