



THE MAGYAR NEMZETI BANK'S CLIMATE-RELATED FINANCIAL DISCLOSURE



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Analysis of Environmental Sustainability Risks
and Impacts

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Executive Summary

The MNB's statutory objectives include, both directly and indirectly, supporting environmental sustainability. The effects of climate change can ripple through the economic and financial system through various transmission channels, affect inflation, foreign exchange reserve investments, and influence the operation of the banking system, therefore the involvement of the central bank's primary mandates justifies the MNB's consideration of environmental sustainability issues. In addition, with the "green mandate", the MNB has also received explicit legal mandate to address environmental sustainability aspects with the means at its disposal, without jeopardizing its primary goal.

Climate change, the related transition steps, and the increasingly extreme nature events that are materializing have a significant impact on the economic and inflationary environment, therefore central banks must also analyse the relevant effects and take relevant aspects into account in their decisions. The relationship between climate risks and inflation is supported not only by theoretical models but also by empirical experience; one only needs to remember the droughts of the past period and their effects on food prices. Green investments have an impact on inflation and its volatility through the transformation of energy supply and energy security. Climate change also directly affects the banking system, for example in terms of lending and collateral.

The MNB's strategy on environmental sustainability has been developed in line with its mandates and organisational structure as defined by the Central Bank Act. In the Green Monetary Policy Toolkit Strategy, the MNB established a framework for the implementation of sustainability considerations in the use of monetary policy instruments; the Charter of Sustainable and Responsible Investment (SRI) expresses the central bank's commitment to integrating sustainability considerations into reserve management, while the Green Programme and the MNB's supervisory strategy support the stability of the financial intermediary system. The MNB operates an environmental management system to green its own operational activities.

This report provides an analysis in relation to the MNB's balance sheet and its own operations, while the Green Finance Report provides information on the Hungarian financial sector's risk exposure and financing activity related to environmental sustainability, as well as the MNB's related programmes and regulatory activities.

The MNB assesses the climate-related risk exposure of its financial instruments along the two main risk categories (transition and physical risks), broken down by portfolios. However, the report's analytical framework also extends to the analysis of nature-related risks in a broader sense, given that ecosystem services, the erosion of biodiversity and climate change are closely interrelated.

In the case of sovereign exposures, which account for the largest share of foreign exchange reserves, the countries' combined emission trajectories remain still not in line with the goals of the Paris Climate Agreement. Nevertheless, primarily due to the relatively short maturity and the significant adaptation capacity of the countries, the portfolio is largely protected against the potential negative financial impacts of climate change.

In case of the corporate portfolio within foreign exchange reserves, the exposure to transition risks is relatively moderate, and negative screening indicators suggest that there is no material risk.

Within the foreign exchange reserves, there was over EUR 2.8 billion of exposure in green or other sustainability-labelled bonds at the end of the year. This includes a dedicated green bond portfolio with a nominal value of EUR 500 million, the positive environmental impact of which is, among other things, approximately 123 thousand tons of avoided annual GHG emissions, which is approximately equivalent to the carbon footprint of a Hungarian settlement with a population of 20 thousand.

Climate change may have negative social and economic consequences that could generally increase the importance of safe-haven assets such as gold. In existing climate risk analyses, best practices are emerging for traditional reserve assets, but a widely accepted methodology for gold – due to its special properties – is not yet available; comparability with conventional investment instruments is limited. It can be stated that gold is practically indestructible and will not be damaged even in the event of (climate) disasters. Consequently, its physical risk exposure is negligible, but its transition risk profile cannot be clearly identified.

The report also covers portfolios held for monetary policy purposes. The MNB supports the reduction of GHG emissions not only via its green bond portfolio, but also via the Green Home Programme and the Green Mortgage Bond Purchase Programme. No new exposure is generated under these programmes, and the outstanding portfolio is continuously amortizing through repayments.

In terms of greening its own operations, the MNB exceeded its previous target for the period 2020-2022, with the carbon footprint decreasing by more than 30 per cent. For the 2023-2025 planning cycle, the MNB planned a further 15 percentage point reduction in the carbon footprint. Based on preliminary data, by the end of 2025, the carbon footprint decreased by 3,977 tonnes in nominal terms relative to the 2019 baseline.

Introduction

The G20 Financial Stability Board (FSB¹) established the Task Force on Climate-related Financial Disclosures (TCFD²) in 2015 to develop recommendations on climate-related financial disclosures. This facilitates more informed investment, lending and insurance decisions and allows market participants to better understand the concentration of GHG-intensive assets in the financial sector and the exposure of the financial system to climate-related and environmental risks.

In addition to the TCFD recommendations, binding regulations on reporting of climate risks and impacts coming gradually into force will also improve transparency and comparability. The European Union has established a framework for sustainable finance, within which it has sought to promote transparency on the European financial markets using a number of regulations in recent years. The EU Taxonomy Regulation, which introduced the classification system for environmentally sustainable economic activities, serves as the basis for the framework. Other important pillars are the SFDR³ which regulates sustainability-related disclosures in the financial services sector, and the CSRD⁴, which sets out rules for companies' sustainability-related reporting obligations and the CSDDD⁵, which ensures that companies within its scope identify and address the adverse impacts of their activities, thereby promoting sustainable and responsible corporate behaviour in the operations of companies and in their global value chains. The framework also covers a set of investment instruments that promote environmental sustainability, of which the European Green Bond Standard is of particular importance, which aims to renew the green bond market by creating a set of high-quality sustainable investment opportunities based on strict rules. The fourth pillar of the framework is the regulation on the transparency and integrity of ESG rating activities, which establishes the need for the authorisation and supervision of entities falling within its scope by ESMA, and by requiring the disclosure of the rating methodologies and the separate rating of the pillars E, S and G. The regulation seeks to make ESG rating activities more transparent and comparable, thereby promoting increased investor confidence.

In order to increase the competitiveness of the European Union, significant deregulation steps were taken in 2025 regarding the sustainable finance framework. In February 2025, the European Commission published the Omnibus I package of proposals, which significantly narrows the scope of companies covered by the CSRD and CSDDD directives, and also reduces and streamlines the administrative burdens arising from the disclosure obligations of the companies concerned.

In its opinion⁶ on the proposal, the European Central Bank (ECB) supported the European Commission's initiative to enhance European competitiveness, while drawing attention to the importance of preserving the benefits of a sustainable reporting framework. The ECB explained in its opinion that the proposal could reduce the scope and quality of available data, which could limit the ability of credit institutions to effectively manage sustainability risks, which could lead to risks for financial stability and the wider economy. The European Parliament and the European Council reached an agreement on the proposal in December 2025, allowing the legislative procedure to be completed in the first half of 2026. In addition, the European Commission has published a proposal for a revision of the SFDR, which also aims to simplify the regulation and enhance competitiveness.

¹ Financial Stability Board

² Task Force on Climate-related Financial Disclosures

³ Sustainable Finance Disclosure Regulation

⁴ Corporate Sustainability Reporting Directive

⁵ Corporate Sustainability Due Diligence Directive

⁶ [Opinion of the European Central Bank on proposals to amend corporate reporting and due diligence requirements on sustainability \(CON/2025/10\)](#)

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It is important to note that a growing number of central banks have recently recognised the need to interpret climate risks in the context of broader environmental risks. Similar to other central banks, and market and regulatory organisations, the MNB has primarily focused on the analysis of climate risks over the past few years. In this area, transparency, standardisation, the unification of methodologies and the development of best market practices have improved quite significantly, facilitated also by the analyses published by the MNB in recent years. Nonetheless, a new approach has also emerged recently, suggesting that other nature-related risks should also be assessed in addition to traditional climate risk aspects, since the stability of the ecosystem and the services it provides, biodiversity and climate change are interrelated, and the related impacts may affect economic actors in the form of physical or transition risks. In 2022, at the COP15 Biodiversity Conference, the participating countries adopted the Kunming-Montréal Global Biodiversity Framework (GBF), which aims to halt biodiversity loss and restore ecosystems. Similar to the TCFD, the Taskforce on Nature-related Financial Disclosures (TNFD⁷) was also established, which developed a framework for reporting the related risks.

As a central bank, the MNB is not subject to mandatory disclosure requirements for climate risks, but it intends to set an example by publishing a report in alignment with the TCFD recommendations every year, in order to present the risks and environmental impacts, according to the double materiality principle.

⁷ Taskforce on Nature-related Financial Disclosures

1 Corporate Governance

Significant organizational changes took place last year, but the decision-making bodies of the MNB continue to be the Monetary Council (MC), the Financial Stability Council (FSC) and the Executive Board (EB) according to the organizational structure in effect at the end of 2025. The senior management of the MNB are the Governor, the Deputy Governors, and the Chief Operating Director. Decision-making bodies and senior MNB executives are regularly informed on the impact of climate change and other environmental risks on the financial intermediation system and the MNB's own operations.

The main decision-making body of the MNB is the Monetary Council. The MC's responsibilities include, inter alia, strategic decisions relating to monetary policy, the issuance of legal tender, the management of foreign exchange and gold reserves and the execution of foreign exchange operations in the context of the implementation of exchange rate policy, as well as statistical tasks. The MC is also entitled to make decisions on macroprudential tasks, the oversight of payment and settlement and securities settlement systems, the oversight of the financial intermediary system and the functioning as resolution authority. The MC is composed of the Governor, the Deputy Governors, and members elected by the Parliament. The MC monitors the impact of climate change and other ecological risks on the financial intermediary system on a regular basis and supports adaptation to environmental risks through its strategic decisions.

Within the strategic framework defined by the MC, the Financial Stability Council (FSC) acts on behalf of the MNB in decision-making related to the oversight of payments and settlement and securities settlement systems, macroprudential and resolution authority tasks, and the supervision of the financial intermediary system. The FSC is composed of the Governor and Deputy Governors of the MNB, the executives appointed by the Governor of the MNB, and the Chief Operating Director. The FSC regularly monitors the impact of climate change and other ecological risks on the financial intermediary system and on financial stability and with its measures supports the adaptation of financial system to climate change as well as Hungary's transition to a climate-friendly and ecologically sustainable economy.

As the MNB's executive body, the EB is responsible for implementing the decisions of the MC and the FSC, and for managing the MNB's operations. The members of the EB are the Governor and the Deputy Governors of the MNB. The EB is regularly informed about the impact of climate change and environmental risks on the financial system and the MNB's operations, while through its actions, it contributes to the implementation of the decisions of the MC and the FSC in support of environmental sustainability. The EB, responsible for managing the MNB's operations, is entitled to decide on the identification, management and measurement of significant environmental risks and the implementation of its investments in support of environmental sustainability.

The organizational units under the direct management of the **Governor** are responsible for developing and implementing the bank's social responsibility strategy, as well as for spreading environmentally sustainable financial culture and awareness among broad segments of society.

The organisational units under the direction of the **Deputy Governor responsible for monetary policy, financial stability and foreign reserve management** are responsible for integrating environmental sustainability risks into reserve management, developing the green monetary policy toolkit strategy and evaluating the function of the financial system in supporting sustainable economic growth.

The organisational units reporting to the **Deputy Governor responsible for analyses, payments and central bank programmes** are responsible for formulating the central bank's proposals for structural reforms designed to ensure sustainable development in Hungary; conducting research on sustainable economic growth; monitoring domestic and international macroeconomic topics and economic policies that support sustainable growth. Additionally, this area is also responsible for exploring opportunities for the development of the domestic green loan and green bond markets.

The departments under the direction of the **Deputy Governor responsible for financial institutions supervision and consumer protection** are responsible for conducting analyses and research on financial services and products that support environmental and social sustainability; identifying the prudential implications and risks of climate change and other ecological anomalies and conducting supervisory activities related to such and to sustainable financial regulations; for developing the MNB's position and proposals on sustainable finance; and for contributing to the MNB's educational, training, awareness-raising, research and international relations-related tasks in the field of sustainable finance. The activities of the Deputy Governor regarding sustainability are supported by a dedicated organisational unit, the Sustainable Finance Department.

The organizational units under the direction of the **Deputy Governor responsible for international relations** are responsible for supporting the MNB's international tasks and appearance related to sustainability.

The departments under the direction of the **Chief Operating Director** are responsible for reducing the MNB's carbon footprint from its own operations; for operating the MNB's Environmental Management and Verification System; for monitoring the MNB's waste management processes.

In addition to ad-hoc collaborations and multi-disciplinary projects, the areas of expertise dealing with sustainability and environmental risk topics also report on their activities to each other at **Green Workshop** meetings at the middle management and expert level; this forum is responsible for coordinating climate risk tasks and projects within the MNB.

2 Strategies

The core duties and operational framework of the MNB are set out in the Central Bank Act.⁸ The MNB's primary objective is to achieve and maintain price stability. Without compromising its primary objective, the MNB also supports the maintenance of the stability and the improvement of the resilience of the financial intermediation system, its sustainable contribution to economic growth and the economic policies of the government with the means at its disposal.

An amendment to the law, which entered into force on 2 August 2021, extended the MNB's mandate to support government policies on environmental sustainability. With this amendment, the MNB is legally obliged to integrate environmental sustainability considerations into its activities without compromising its primary objective.

2.1 THE MNB'S GREEN MONETARY POLICY TOOLKIT STRATEGY

The MNB identifies a number of risks stemming from climate change that could have an impact on price stability and financial stability. Accordingly, environmental sustainability considerations must be taken into account in the design of the toolkit in the context of the feasibility of the primary mandate. In July 2021, the document *"Sustainability and central bank policy – Green aspects in the MNB's monetary policy toolkit"*⁹ was published, which elaborates the strategic orientation to mainstream long-term environmental sustainability considerations through central bank instruments. In line with this, the MNB introduced the following measures:

- **Green Mortgage Bond Purchase Programme (GMBPP):** This was the MNB's first asset purchase programme with a focus also on sustainability aspects, aiming to create a green housing lending market through establishing a green mortgage bond market in Hungary, thereby expanding the energy-efficient real estate portfolio. In line with the tightening of the monetary policy stance, the MNB suspended new purchases under this programme in 2022.
- **Green Home Programme (GHP):** Launched as part of the Funding for Growth Scheme, this programme promoted the establishment of a green housing loan market and helped to mainstream environmental sustainability considerations in the domestic housing market by providing low-interest funding from the central bank. With an overall allocation of HUF 300 billion, the programme enabled around 8,600 households to build or buy energy-efficient new homes. The programme was closed at the end of September 2022.
- **Green collateral management:** The MNB assumes risks in connection with its collateral management activities related to monetary policy through instruments accepted as collateral. For this reason, the Bank explored opportunities of greening collateral management, which can influence the greening of bank exposures via liquidity management of commercial banks and foster the growth of the market for green bonds. The MNB supports the issuance of green securities by applying preferential haircuts and promotes standardisation and transparency through green reporting requirements.
- **Integrating macroprudential measures into the green monetary policy toolkit:** Since July 2021, the rules for the Mortgage Funding Adequacy Ratio (MFAR) have given preferential treatment to stable mortgage funding for energy-efficient properties. This measure supports the development of banking frameworks necessary for the uptake of green capital market instruments, the increase in the share of mortgage loans financing energy-efficient real estate, and the diversification of the range of mortgage bond investors, in support of financial stability.

⁸ [Act CXXXIX of 2013 on the Magyar Nemzeti Bank](#)

⁹ [The MNB's Green Monetary Policy Toolkit Strategy](#)

2.2 GREEN FOREIGN EXCHANGE RESERVES STRATEGY

As stipulated by law, the MNB's statutory tasks include the management of Hungary's foreign exchange reserves. The purpose of holding foreign exchange reserves is to support monetary and exchange rate policy; to ensure the necessary foreign currency liquidity; to maintain investor confidence; and to ensure the state's needs of transactional foreign currency. When investing foreign exchange reserves, the central bank follows a threefold objective of safety-liquidity-return: it strives to achieve the highest possible return level, while keeping risks low and ensuring the necessary liquidity. In line with conservative portfolio management, the exposures of the foreign exchange reserves are well-diversified, with a significant proportion of government securities with high credit ratings, which are considered to be free of credit risk, but also including highly rated supranational, corporate and banking issuances.

In addition to fulfilling the primary objectives of reserve holdings, central banks can play an important role in supporting the green transition of economies, for example by supporting green bond markets ("supportive approach"). In addition, the value of foreign exchange reserves may be severely affected by the realisation of climate risks associated with financed emissions ("defensive approach"). Although the likelihood of risks materialising only appears significant in the longer term, even in the short term it is essential to examine the issue and assess the investment strategy from a climate risk perspective.

In 2019, the MNB decided to establish a dedicated green bond portfolio within the foreign exchange reserves, the level of which was doubled in 2024, increasing it to EUR 500 million. The portfolio may include so-called "green-labelled" bonds (green bonds) that comply with international green standards and the general rules for reserve management, in which case the funds raised are used by the issuer for a specific, environmentally beneficial, "green" investment.

In order to integrate sustainability considerations into foreign exchange reserve management as broadly as possible, at the end of 2023 the MNB published its Charter of Sustainable and Responsible Investment,¹⁰ which sets out medium- and long-term objectives. In addition to serving as a compass for the foreign exchange reserves investment strategy in terms of integrating green aspects, the document can also be an example to follow for financial market participants.

2.3 SUPERVISORY GREEN STRATEGY

The management of environmental risks also features prominently in the supervisory strategy. As a financial supervisory authority, the MNB considers its mission to preserve and develop the functioning and resilience of the financial system, with a particular focus on consumer protection, digitalisation and sustainability. In the area of sustainability, it pays attention to (i) the appropriate management of ESG risks in the financial sector, (ii) supporting institutions in the sustainability transition (which includes helping the adaptation of the financial sector and encouraging green financing, as well as supporting the spread of sustainable and ESG products) and (iii) financial education related to sustainability and strengthening environmental sustainability awareness. The MNB's supervisory objectives are summarized in its new supervisory strategy covering the period 2026-2031.¹¹

The MNB launched the Green Programme¹² in February 2019, which consisted of several measures concerning the financial system, including analyses aimed at identifying environmental risks, fostering the resilience of the financial system and the frameworks for green financing, and developing social and international relations (education, research, domestic and international professional relations).

The role of banks is crucial in the carbon neutral transition of the entire Hungarian economy, and accordingly it is a fundamental expectation that they are able to make informed strategic and business decisions in this regard. In 2022, the MNB published a Green Recommendation¹³ for credit institutions with the aim of transitioning to green operations by 2025, i.e. to identify, measure, manage, monitor and disclose climate and environmental risks. The recommendation

¹⁰ [The MNB's Charter of Sustainable and Responsible Investment](#)

¹¹ [The MNB's supervisory and consumer protection strategy](#)

¹² [Green Programme of the MNB](#)

¹³ [The MNB's Green Recommendation](#)

was renewed in 2026¹⁴, including guidelines for managing ESG risks and for preparing a prudential transition plan. The new recommendation will gradually enter into force on 1 July 2026. The MNB's recommendation, issued in 2024 and amended in 2025¹⁵, also provides guidelines for assessing ESG risks, the most important element of which is the minimum ESG questionnaire for the affected loan applicants.

Participants of the insurance market are exposed to environmental risks in many ways (e.g. drought insurance, liability claims, revaluation of investments), and thus the need for a green transition is an important aspect for these entities as well. As a first step, in 2022 the MNB conducted a survey on the preparedness of the insurance sector for climate change, and at the end of 2023 it published a Green Insurance Recommendation¹⁶, the requirements of which came into effect on 1 January 2025.

The supervision of financial system actors is a central element of the MNB's supervisory activities. In the course of this activity, the MNB, as a fundamental part of its green strategy, carries out the supervision of actors in the entire financial sector (banking, insurance, pension funds and capital markets) based on international and domestic sustainability-related legislation, recommendations and regulatory instruments, both throughout continuous supervision and on-site inspections.

Due to the prominent role of the financial intermediary system in capital allocation, it is important to mobilise financial services towards financing sustainable economic activities. In 2020, the MNB has therefore launched a preferential capital requirement programme for banks in both the retail, corporate and municipal lending segments. The MNB has expanded the period of the program and the range of eligible exposures in several steps as a result of the annual reviews. Starting in 2026, banks may benefit from preferential capital treatment for new lending purposes, including sustainability-linked loans and bonds, as well as exposures to energy communities.

2.4 SUSTAINABILITY STRATEGY FOR THE MNB'S OWN OPERATIONAL ACTIVITIES

The MNB operates an environmental management system (EMS), in order to reduce the environmental impact of its operations. The system was introduced in 2011 following an assessment of significant environmental risks. Accordingly, the two main approaches in the Bank's long-term environmental strategy are: (i) reducing the environmental impact of the buildings necessary for its operations; and (ii) reducing the carbon footprint of the cash supply chain.

The environmental management system consists of 3-year cycles; the objectives of the 2023-2025 planning cycle are included in the MNB's 2023 environmental statement, the main elements of which are as follows:

- **Further reducing the carbon footprint of the MNB's operational operations, where possible:**
 - Reduce the specific carbon footprint by 75 per cent by the end of 2025 relative to the 2019 base.
 - The electricity consumption of the office buildings serving the operations of the MNB will be ensured entirely with energy from renewable sources.
 - The carbon emissions resulting from operational activities that can no longer be reduced will be neutralized with compensation.¹⁷

¹⁴ [The MNB's new Green Recommendation for credit institutions](#)

¹⁵ [The MNB's new ESG recommendation](#)

¹⁶ [The MNB's Green Recommendation for insurers](#)

¹⁷ 6 per cent of the previous year's amount of the revenue paid from fines imposed by the MNB may be used to promote and support environmental protection goals in order to mitigate the environmental impacts of the MNB's activities (MNB Act, Section 170 (2) f).

- **Further improving the environmental performance of the buildings used by the MNB in its day-to-day operations:**

- The MNB pre-certifies its Buda Centre building according to the requirements of the “BREEAM In-Use” standard and use the pre-certification results to identify any areas for improvement. (In addition to the pre-certification, actual certification was completed; the “Excellent” rating level can be achieved by implementing a few minor measures).
- The MNB will confirm the Excellent rating of the Logistics Centre building.

- **Exploring the possibility of introducing new environmentally friendly technologies as a way of improving internal processes related to operational activities:**

- The MNB conducted a technological test in 2024 to introduce chemical-free office cleaning and office composting, based on which chemical-free office cleaning was introduced. (The office composting process is more of an awareness-raising activity; its environmental benefits in terms of carbon footprint are minimal, but it is ecologically beneficial, but its application involves disproportionately high costs, so the introduction has not taken place yet).

- **Further reducing the carbon footprint of the cash supply chain:**

- Ensuring the smooth flow of cash is one of the MNB’s core tasks. It is important for the MNB to maintain guarantees of fair access to cash in the long term; therefore, in aiming to reduce the carbon footprint of the supply chain, it only considers solutions that do not jeopardise the continuous, reliable satisfaction of the cash needs of households, businesses and credit institutions.¹⁸
- The environmental impact of the cash supply chain has three main components: i) cash production and the activities of the subsidiaries involved in production; ii) cash logistics activities within the MNB (distribution, processing); and iii) the activities of cash logistics service providers (suppliers).
- One important consideration when setting expectations for the MNB’s partners regarding environmental protection is that the MNB has no legal instruments at its disposal to demand that credit institutions, post offices and cash processors operate in an environmentally responsible manner.
- In order to promote an increase in the local reuse of banknotes and coins by credit institutions, as well as a reduction in the transportation tasks of cash processing entities in the supply chain and a reduction in packaging materials, the central bank assumes a consultative role and guides stakeholders towards environmentally conscious operations. In 2023, the MNB issued a recommendation on the promotion of environmental sustainability considerations.¹⁹
- The Hungarian Mint Ltd. obtained the ISO 14001 environmental certification in 2023. This means that all subsidiaries involved in cash production²⁰ operate in accordance with high environmental standards.

2.5 DOMESTIC AND INTERNATIONAL COLLABORATION

The MNB is establishing domestic and international professional relationships in order to effectively implement its green programmes and learn about good practices. The Bank intends to work in partnership with domestic government, market and social actors with knowledge and capacity relevant to climate change and green finance, taking advantage of synergies arising from the cooperation.

¹⁸ Despite the continuous development of electronic payment solutions, cash remains the most commonly used means of payment in Hungary.

¹⁹ [The MNB’s green recommendation for cash processors](#)

²⁰ DIPA Diósgyőri Papírgyár Zrt., Hungarian Banknote Printing Company, Hungarian Mint Ltd.

The MNB and the Hungarian Banking Association have published a joint position²¹ on Green Mortgage Bond Impact Reports. The environmental impact reports published by issuers of green mortgage bonds quantify the positive environmental impacts resulting from the use of funds from the issuance of securities and are therefore of paramount importance for the development of the green capital market. The environmental impact reports previously published by domestic mortgage banks met international expectations, however, in the interest of further developing the domestic market, the MNB and mortgage banks have jointly taken steps to promote and standardize reporting practices. The joint position contains proposals for issuers regarding the formality and content of impact reports and sets out the methodological principles for calculating environmental impacts. In addition, the document has designated reference values for calculating environmental impacts, thereby supporting the standardization of methodologies.

The MNB plays an active role in promoting sustainability awareness. Through its public relations, the MNB intends to support awareness-raising and educational activities on green finance. Green finance lectures offered in cooperation with domestic universities and courses taught in adult education serve to expand the knowledge base related to green finance. International capacity building is supported by lectures given at foreign universities and professional events, as well as the MNB's own Technical Assistance Programme, during which a special role is given to the presentation of the MNB's sustainability efforts and good practices.

In addition to domestic actors, the MNB is also seeking to build international relations in the field of initiatives related to climate risks and green finance. Since 2019, the MNB has been an active member of the Network for Greening the Financial System (NGFS), a global central bank and supervisory initiative. The MNB also joined the Advisory Council of the Energy Efficient Mortgages Initiative (EEMI), which aims to promote preferential loans for energy efficiency investments. Additionally, the MNB actively participates in the development of related regulations by the European supervisory authorities.²²

Starting in 2019, the MNB hosts an annual green finance conference in Budapest, with the participation of renowned experts, market participants and policymakers. These occasions are also used to reward academics, research teams and financial institution for outstanding performance in environmental issues and green finance. Professional articles and studies on sustainability by MNB experts also help to raise awareness, deepen scientific discourse and develop best practices.

²¹ [Joint Position - Recommendations and guidelines for green mortgage bond impact reports](#)

²² EBA, ESMA, EIOPA

3 Risk Management

3.1 CHARACTERISTICS OF ENVIRONMENTAL SUSTAINABILITY RISKS

In analysing environmental sustainability risks, the principle of double materiality is important. Double materiality means that the consequences of climate change may appear as a financial risk factor for an institution, while the institution itself may also have an impact on the environment through its activities and investments. In its analysis, the MNB considers both transition and physical risk channels.

- **Transition risks arise from the difficulties of transitioning to a low-carbon, climate-resilient economy.** Changes in policy or technology, or rapid shifts in consumer attitudes can all cause a sudden revaluation in the prices of financial instruments. As a consequence, credit and market risks may increase and, in certain scenarios, the resulting losses may even pose financial stability risks.
- **Physical risks arise from the physical impacts of climate change, including the increase in the severity and frequency of extreme weather events.** Physical risks include not only the risk of losses resulting from the deterioration of physical assets and infrastructure, but also the disruption of value chains, loss of biodiversity and negative impacts on human health and well-being, which in extreme cases can lead to increased geopolitical tensions, conflicts and migration. This may have an impact on the productivity of certain companies or the value of physical and financial assets, which may also affect financial stability.

It is important to recognise that the functioning and stability of economic and social systems also depend on a number of vital natural services (collectively referred to as biodiversity and ecosystem services). These include: (i) provisioning services (e.g. food supply, timber, dietary fibre, freshwater), (ii) regulating services (climate regulation, CO₂ capture and storage, water quality regulation, pest control), (iii) supporting services (soil formation, pollination, nutrient and water cycling, photosynthesis), and (iv) cultural services (e.g. recreation). Degradation of these systems (e.g. deforestation, water pollution, soil erosion, loss of pollinators) all contribute to the deterioration of the natural environment, which feeds back into the climate change process, and can lead to a mutually reinforcing negative spiral, that can also feed into the economic-financial system through various transmission channels. Risk exposure depends on the extent of reliance of the given economic activity on these ecosystem services; the impact is the function of the direct or indirect pollution or erosion of the service systems, which the activity causes. Due to the complexity of the processes, it is therefore worthwhile to extend the analyses to nature-related risks in a broader sense, in addition to climate risks.

The specific nature of environmental sustainability risks requires an extension of traditional risk management frameworks. Climate change generates changes characterised by a high degree of uncertainty, determined not only by the interaction of economic-financial impacts, but also by environmental, technological and cultural impacts, amongst other things. These processes also affect each other and thus generate unpredictable impacts that can be wide-ranging and potentially very severe. The related risks are non-linear, irreversible and characterised by a fat-tailed distribution pattern.

A significant part of the impacts will occur over a longer period of time and will be reflected as financial and economic risks, but these can only be mitigated by actions taken today. Long time horizons are difficult to reconcile with traditional business planning and risk-taking. In addition, the lack of necessary data is also a frequently cited problem. High-quality, abundant, robust data are essential to understand and assess risks accurately and to develop reliable models. Since models based on historical data are not always sufficient, forward-looking estimates are also required, for example, through scenario analysis or stress tests.

Unlike traditional financial risks (e.g. market, liquidity and credit), one special characteristic of environmental sustainability risks is that, although the details of the occurrence of the risks are unknown, it can be stated with absolute certainty that the materialisation of transition and physical risks – in some combination – is inevitable. Their timing,

severity and subsequent manageability depend on how we respond to them; if the targets of the Paris Agreement are met globally, we will face higher transition risks, otherwise the future will be determined by the occurrence of physical risks.

The process of risk management can be divided into distinct, interdependent phases. The first step is to identify the risks that threaten the operation and business activities of the given institution. Risk assessment involves determining their materiality and magnitude. The active management of risks comes after these steps. From the perspective of the MNB, there are some risks that it only monitors, while others it seeks to purposefully mitigate. Each central bank function – taking into account its objective – has different risk characteristics, and thus risks are presented broken down by central bank functions.

3.2 MONETARY POLICY

Through its monetary policy instruments and reserve management, the MNB takes on Hungarian and foreign exposures, typically bonds or loans, on its own balance sheet. The financial risks of these exposures are identified and analysed, and – in addition to monetary policy considerations – risk management aspects are also taken into account in the related decision-making processes. At the MNB, the tasks of identifying, measuring and managing risks related to the central bank's balance sheet, preparing decisions and monitoring risks are carried out by a dedicated organisational unit. The management of environmental sustainability risks should also be integrated into this conventional framework.

3.2.1 Central Bank Asset Purchases

In its asset purchase programmes, the MNB mainly acquired government securities, mortgage bonds and corporate bonds. During the period of monetary easing, the primary objectives of these instruments included ensuring the achievement of the inflation target and supporting companies' access to long-term, affordable funding and developing certain markets. The introduction of these instruments expanded the MNB's balance sheet and risk exposure. Prior to the launch of the programmes, the MNB assessed the key parameters (e.g. amount, maturity) and their impact and risks (credit risk, market risk) on its balance sheet. In line with the tightening of the monetary policy orientation and utilisation of the allocations, the MNB gradually suspended or discontinued the new purchases under the programmes between December 2021 and May 2022, however, the exposures remain in the balance sheet until the maturity of the assets.

It is also true for the asset purchase programmes that the MNB can more effectively support the green transition of the economy and the government's economic policy and environmental sustainability objectives by taking into account climate risk considerations. The green transition of the Hungarian economy may also improve the MNB's bond exposures from a climate risk perspective.

3.2.2 Central Bank Lending, Collateral Management

The lending activities of central banks serve a range of purposes. Traditional central bank lending is a short-term availability (e.g. overnight, one week), which plays a key role in the liquidity management of the banking system when necessary. In recent years, however, central banks have also applied longer-term, targeted lending programmes. In accordance with the provisions of the Central Bank Act, the MNB does not assume credit risk in connection with its lending activities, i.e. it provides loans to financial market clients only in a secured form.

The MNB also evaluates the climate-related risks in the context of lending and collateral management. By designing these programmes in a targeted manner, central banks can encourage the green transition in the economy and green lending in the banking system. They can influence market participants through the collateral management framework, via their exposure to bank funding and liquidity management, for example, by giving preferential treatment to certain asset classes in order to influence the spreads of certain issuances.

In addition to the aforementioned "policy" considerations, the MNB also takes into account the financial risks of climate exposures associated with collateral. By amending the framework, climate risk exposures can also be reduced in relation to securities accepted for collateral management (it should be noted, however, that the exposure of a central bank in the course of collateral management is only indirect, as the primary obligor of the lending activity is the lending

bank, and collateral is included in the central bank balance sheet only in the event of a bank default). Overall, a greener collateral pool may be preferable for the central bank, due to the potentially lower default risk or higher recovery and lower price volatility.

3.2.3 Foreign Exchange Reserves

Taking into account central banking objectives, in the course of reserve management the MNB determines its investment policy by considering the three-pronged criteria of risk, liquidity and return. The Bank is considered to be a fundamentally conservative investor, in line with international central banking practice. The MNB mitigates the arising risks (credit risk, market risk, liquidity risk) by applying a strict limit system.

The portfolio should be analysed from a “policy” perspective on the one hand and from a financial risk perspective on the other. An example of the former is that the MNB may support green bond markets and, in general, issuers’ access to the market by creating demand, while giving priority to the above reserve management objectives. With these considerations in mind, the MNB is among the first central banks to have established a dedicated portfolio of green bonds, which it monitors for their positive environmental impacts.

Financial risk effects appear in portfolios in such a way that physical or transition risks can represent market and credit risks through increased spreads or the deterioration of default probabilities. In this context, it is worth distinguishing between two approaches:

- **Short term:** The MNB essentially has a short-term investment horizon; the portfolio is protected against the potential financial impacts of climate risks over this time horizon. One reason for this is that climate risks will become increasingly significant over a time horizon of several decades, and, secondly, the MNB mainly holds sovereign debt securities of developed, highly rated countries, and the exposures are well diversified. On the one hand, this means that the risk of default is relatively low on this investment horizon, and, on the other hand, repricing risk is also relatively low because of the short-term exposures.
- **Long term:** The current structure of the reserves allows the MNB to develop its long-term strategy without a rapid and drastic rearrangement of the portfolio. As time passes, it will become increasingly important to take appropriate, gradual steps in the reserves as well.

3.3 FINANCIAL STABILITY

Environmental sustainability risks do not only affect the MNB through its balance sheet. Effects of climate change may spill over into the financial intermediation system through the real economy and cause losses first for economic actors and then for investors and creditors. For example, losses of credit institutions, whether concentrated at one institution or affecting the entire banking system at once, can have serious consequences. Therefore, the MNB, as the authority responsible for the stability of the financial intermediary system, monitors these developments closely.

The MNB measures the environmental sustainability risks of the financial system using a number of methodologies and processes. For example, the Bank Carbon Risk Index can be used to monitor the evolution of the transition risks of the entire banking system (or individual institutions) on a quarterly basis. This process is supported by various climate stress tests, including a short-term climate stress test carried out by the MNB following the long-term climate stress test conducted in 2021.

The individual assessment of financial institutions is gradually being integrated into micro-prudential supervisory activity. Starting from 2021, since the first edition of the Green Recommendation for financial institutions, the MNB has been monitoring and analysing the preparedness and attitudes of domestic credit institutions in relation to environmental sustainability aspects at the institution level (by means of self-assessments, own action plans and prudential discussions). Sustainability considerations are also increasingly playing a role in the supervision of the insurance and capital market

sectors, in line with the development of the regulatory environment. Increasing resilience to sustainability risks²³ contributes significantly to the stability of the domestic financial system.

3.4 THE MNB'S OWN OPERATIONS

Climate risks affect the operational risk profile of the MNB. Both transition and physical risks are relevant for the MNB and need to be considered when developing and operating the operational risk management framework. Activities related to operational risk management and business continuity management are decentralised within the MNB, where a dedicated organisational unit plays a coordinating role and provides methodological guidance.

International best practices are applied in the management of operational risks: operational risks are assessed in the context of processes, and a bank-wide risk map is prepared on that basis. This is supported by the so-called event register of the relevant losses, on which an annual summary report is provided to senior management. Where climate risks become relevant for a given workflow, they are analysed as part of the normal operational risk management process.

One key area of operational risk management is business continuity, which can be severely impacted by physical risks. Chance and unavoidable external circumstances also play a role in the occurrence of risk events, which can cause uncertainty in the operation of the MNB. The aim of operational risk management is to effectively manage this uncertainty and provide decision-making processes with the widest possible range of information. The direct risks arising from the MNB's operations may be affected by the effects of climate change and environmental degradation, such as the negative impact on the MNB's buildings, for example, of high summer temperatures, which can damage the operational infrastructure, impairing business continuity.

The operations of the MNB involve GHG emissions and other environmental impacts, which may have a negative impact on the environment and thus pose a potential reputational risk to the Bank. The MNB seeks to manage its risks and impact on the environment primarily by measuring and reducing its carbon footprint.

Additionally, transition risks can affect the price of energy used or business travel, which can lead to higher operating costs. This type of materialisation of climate risks needs to be taken into account when planning costs.

²³ Including risks arising from nature degradation in addition to risks arising from climate change, in line with the results of a [joint project of the MNB, the OECD and the European Commission](#).

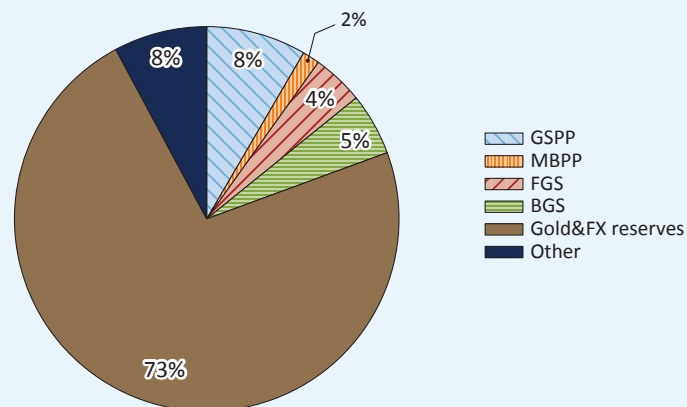
4 Indicators

This report presents a quantitative and qualitative assessment of the environmental sustainability risks and impacts associated with the MNB's balance sheet and its own operations. An analysis of climate risks in the financial system is contained in the Green Finance Report.²⁴

4.1 COVERAGE OF THE FINANCIAL ASSETS SUBJECT TO ANALYSIS

The MNB aims to include the widest possible range of its assets in its analyses. Regarding foreign exchange reserves, the focus of the analysis is on sovereign exposures, representing the core of the reserves, but the assessment also covers other positions, such as corporate portfolios, gold and monetary policy instruments.

Chart 1
Asset side of the MNB's balance sheet



Note: Based on 2025 year-end balance sheet data.

Source: MNB

- **Foreign exchange reserves:** A substantial part of the reserve portfolios consists of sovereign exposures, but also includes issuances by international (supranational) institutions, highly rated corporate and bank issuances and covered securities. The portfolio also includes gold reserves; for which the report also includes an assessment of climate risks and impacts.
- **Funding for Growth Scheme (FGS):** Launched in 2013 to restore the functioning of the SME lending market. Under the programme, the MNB provided funding to participating credit institutions at an interest rate of 0 percent, which they could lend on to micro, small and medium-sized enterprises at a maximum interest rate of 2.5 percent, until 2021.
- **Bond Funding for Growth Scheme (BGS):** Launched in 2019 by the MNB based on a strategic decision to develop the capital market and boost liquidity in the corporate bond market. Under the programme, the MNB purchased bonds issued by non-financial corporates with good credit ratings until 2021.
- **Government Securities Purchase Programme (GSPP):** The MNB purchased Hungarian government securities on the secondary market starting from 2020 to address the adverse effects of financial market turbulence on the domestic markets. While the MNB ended these purchases in December 2021, it continues to hold long-term government securities on its balance sheet.

²⁴ [The MNB's Green Finance Report](#)

- **Mortgage Bond Purchase Programme (MBPP):** First launched in 2018. Under this programme, the MNB purchased HUF-denominated, fixed-rate mortgage bonds from Hungarian mortgage institutions. The Green Mortgage Bond Purchase Programme (GMBPP) was launched in 2021 and closed in May 2022, due to the tightening measures taken by the central bank.
- **Green Home Programme (GHP):** Launched as part of the FGS scheme, this programme promoted the establishment of a green housing loan market and helped to mainstream environmental sustainability considerations in the Hungarian housing market by providing low-interest central bank funding. The programme, with a budget of HUF 300 billion, closed at the end of September 2022.
- **The MNB also assumes indirect risks in the course of collateral management.** The MNB essentially accepts issuances from the entire Hungarian bond market as collateral, in addition to large corporate loans, where – due to the structure of the market – government securities dominate the pledged collateral. The range of eligible securities is relatively wide, with government, corporate and bank securities (including mortgage bonds) included in the eligible portfolio. The transition and physical risks measured in relation to monetary policy instruments well represent the risks arising in collateral management.

4.2 METHODOLOGY AND DATA SOURCES

The MNB analyses the climate risk exposure of its financial asset portfolios in terms of transition and physical risks:

- The primary indicator used by the MNB for measuring **transition risks** is Weighted Average Carbon Intensity (WACI), in a production and consumption approach, and the Bank aims to align this as closely as possible with the ECB's unified methodology²⁵ published in 2023. It is important to note that, based on the principle of double materiality, the WACI can be considered as an "impact"-type indicator on one hand, reflecting the environmental impact of the MNB's financed portfolio, and at the same time, it can also be used as a proxy for transition risks. The advantage of this indicator is that it is relatively easy to calculate and does not require a complex methodological background. However, its disadvantage is that it relies mainly on historical data, i.e. it does not take into account possible future decarbonisation paths, nor does it provide answers as to how a given industry or company can adapt; for example, to what extent it can pass on the cost shock to other actors in the value chain. The analysis was thus supplemented with forward-looking indicators such as the *Bloomberg Government Climate Risk Scores*, the *MSCI Sovereign CVaR*, and the *ND-GAIN index*, which shows both the vulnerability and adaptive capacity of countries.
- Assessing **physical risks** entails significant technical and methodological challenges, including the need for detailed geographical data to determine the severity of potential weather events occurring at different locations. Another difficulty in the calculations is the aggregation of data, for example, when assessing the risk exposure of countries.

Nature-related risks in a broader sense affect the economy in the form of transition and physical risks, similar to climate risks, but due to their specific characteristics, the report treats them separately. Best practices are beginning to emerge in climate risk assessment, while biodiversity and nature-related risks are location-specific and their measurement is much more complex, and accordingly there is still no widely accepted methodology.

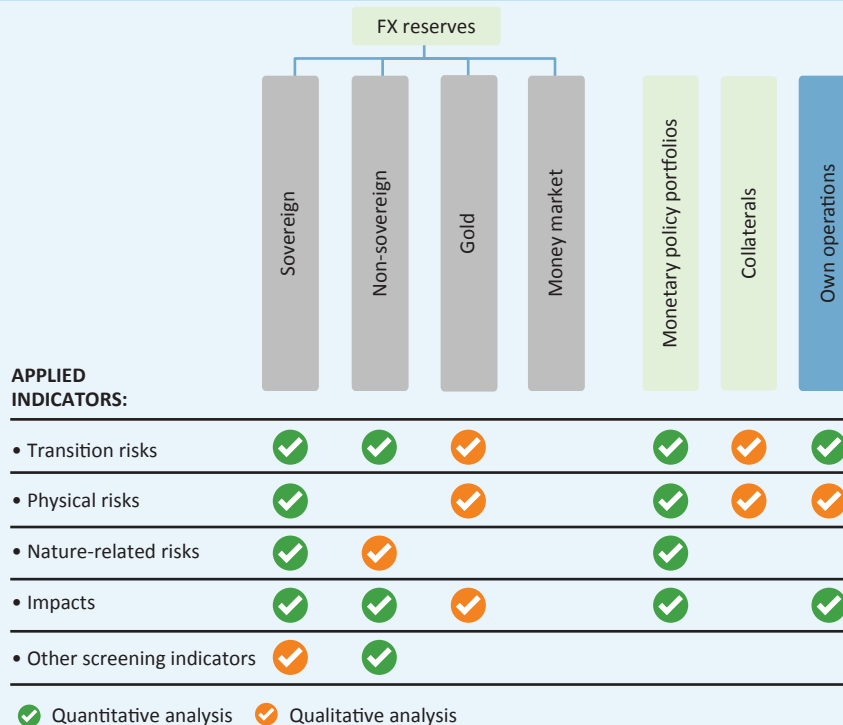
Although most of the indicators used are based on a number of complex methodological assumptions, the results still serve as a useful compass for gaining a broader perspective on the trends and processes, and for better understanding which parts of the asset side of the balance sheet are most exposed to risk.

The analyses were prepared based on the balance sheet data from the previous year-end and the latest data available from the data providers. The methodological description related to each indicator can be found in the Annex.

²⁵ [Overview of Eurosystem climate-related financial disclosures](#)

Chart 2

Asset categories and indicators covered in the report



4.3 ANALYSIS OF ENVIRONMENTAL SUSTAINABILITY RISKS AND IMPACTS

4.3.1 Transition Risks

4.3.1.1 Foreign Exchange Reserves

Sovereign Exposures

In order to achieve greater comparability, the MNB is striving to align its methodology with the practice of the eurozone central banks. Accordingly, in addition to the WACI – as the main transition risk indicator – the Total Carbon Emission and the Carbon Footprint of the portfolios are calculated for sovereign portfolios, both in the production and consumption approaches. The production approach calculates the indicators based on the GHG produced within the country, which is the same approach used by the UNFCCC²⁶ for compiling national emission inventories. The consumption-based approach adjusts the emission data for the effects of foreign trade and captures the GHG emissions generated by the country's consumption (Table 1).

Table 1

Emissions indicators for the sovereign exposure of foreign exchange reserves

	Consumption approach	Production approach
WACI ($tCO_2e/capita$)	10.1	146*
Total Carbon Emissions (tCO_2e)	1,966,462	1,723,518
Carbon Footprint ($tCO_2e/m\text{€ GDP}$)	166	146

Note: * ($tCO_2e/m\text{€ GDP}$).

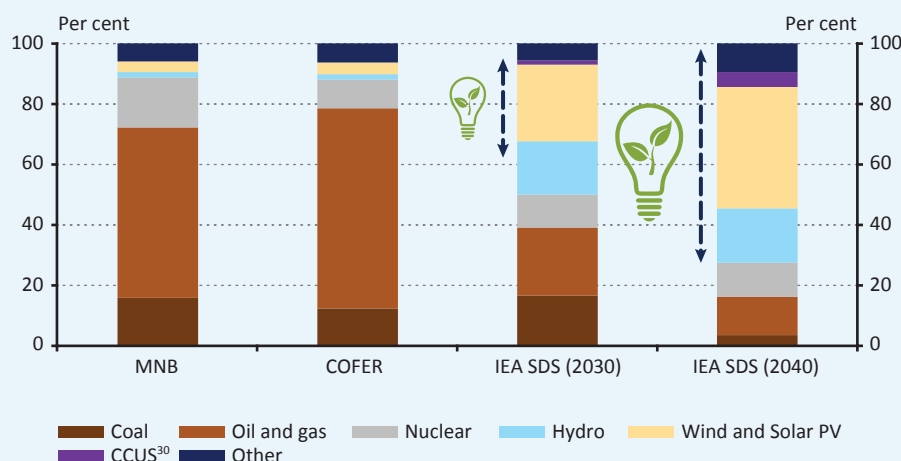
Source: MNB calculations, based on data from MSCI²⁷.

²⁶ United Nations Framework Convention on Climate Change

²⁷ The emission data of some countries have been retroactively revised in the EDGAR (Emissions Database for Global Atmospheric Research) system; the new data is available at the data provider since 2025.

The analysis also examined the energy mix of issuers of sovereign securities included in the foreign exchange reserves. We consider the IMF COFER²⁸ and the Sustainable Development Scenario (SDS)²⁹ published by the International Energy Agency (IEA) as a basis for comparison. The latter represents the profile of the global aggregate energy composition that is necessary to achieve a sustainable transition. The current energy mix of the countries in the portfolio is almost identical to that of the IMF COFER which approximates the world's foreign exchange reserves, but at the same time it differs substantially from the composition deemed necessary in the IEA sustainability scenario, due to the dominance of natural gas and oil (Chart 3).

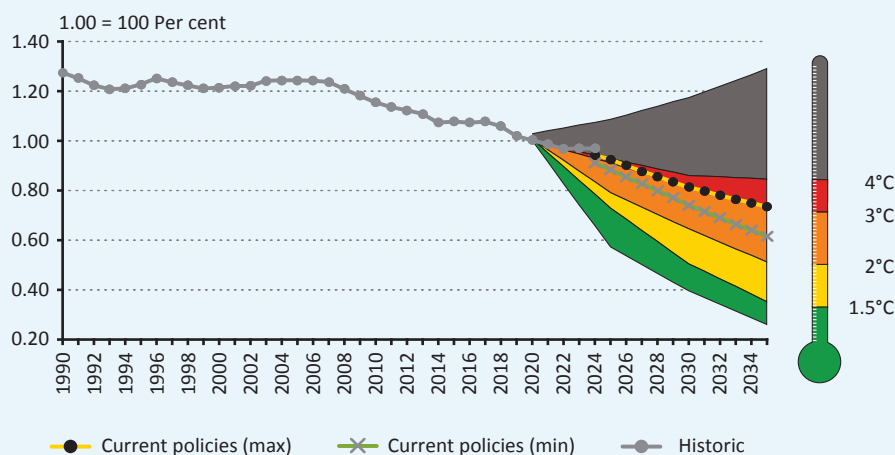
Chart 3
Energy mix of sovereign issuers of foreign exchange reserves



Source: MNB calculations, based on most recent energy production data from the IEA.

A similar picture emerges from the calculations based on the Climate Action Tracker (CAT) data: the combined weighted emissions trajectories of the countries in the reserve do not meet the pro-rata Paris climate targets in either scenario (full or partial fulfilment of national commitments). It is important to note, however, that according to CAT none of the countries in the investment universe relevant for reserve management meet the climate targets over the examined time horizon (Chart 4).

Chart 4
Emissions trajectories of the sovereign portfolio and pro-rata compliance with the Paris climate targets



Note: 2020 emissions = 100 percent

Source: MNB calculations, based on Climate Action Tracker climate scenario data

²⁸ Composition of Official Foreign Exchange Reserves (COFER): a portfolio representing the currency composition of the IMF's official foreign exchange reserves

²⁹ Sustainable Development Scenario

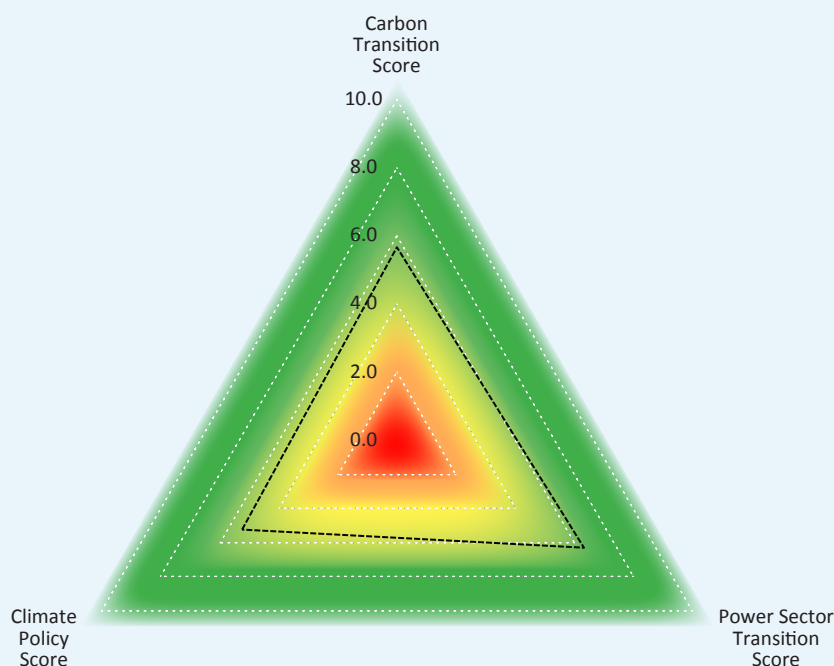
³⁰ CCUS: innovative technologies for reducing GHG emissions (CO₂-capture, utilisation and storage)

Based on the *Bloomberg Government Climate Risk Scores*, the countries of the sovereign exposures of the foreign exchange reserves are relatively better prepared in the climate transition process (Aggregate Climate Risk Score: 5.72/10), but at the same time there is a lag compared to the theoretical best values according to the methodology (Chart 5).

The methodology evaluates the transition risks of individual countries related to climate change in three dimensions, on a scale of 0–10 (10 being the best value).

- *Carbon Transition Score*: assesses a country's past, current and projected GHG emissions.
- *Power Sector Transition Score*: assesses a country's progress and future efforts to decarbonise its energy sector, taking into account the current share of fossil fuel and renewable generation and the level of clean energy investments.
- *Climate Policy Score*: evaluates a country's progress in achieving net-zero goals and in developing frameworks related to green debt issuance and renewable energy policies.

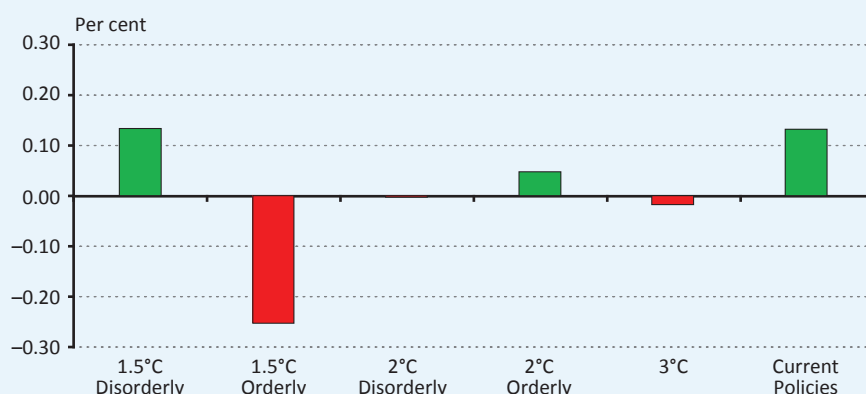
Chart 5
Bloomberg Government Climate Risk Scores of the sovereign portfolio



Source: MNB calculations, based on Bloomberg Finance L.P. data

The Sovereign Climate Value-at-Risk (CVaR) methodology developed by MSCI examines the financial impact of different NGFS climate stress scenarios on the valuation of the sovereign portfolio. Depending on how the transition to a sustainable economy occurs, each scenario assumes different changes in the dynamics of macroeconomic variables (e.g. interest rates), which affect the pricing of financial instruments. “Orderly” scenarios assume that climate policies are introduced early and gradually tightened; both physical and transition risks are relatively contained. “Disorderly” scenarios assume higher transition risk due to delayed or divergent climate policies across countries and sectors. Long-term interest rates tend to rise in transition-based scenarios, reflecting higher carbon prices and a higher inflationary environment resulting from the increased investment required for the green transition (Chart 6).

Chart 6
Impact of NGFS interest rate scenarios on the value of sovereign exposures in the foreign exchange reserves (P&L per cent)



Source: MNB calculations, based on MSCI data

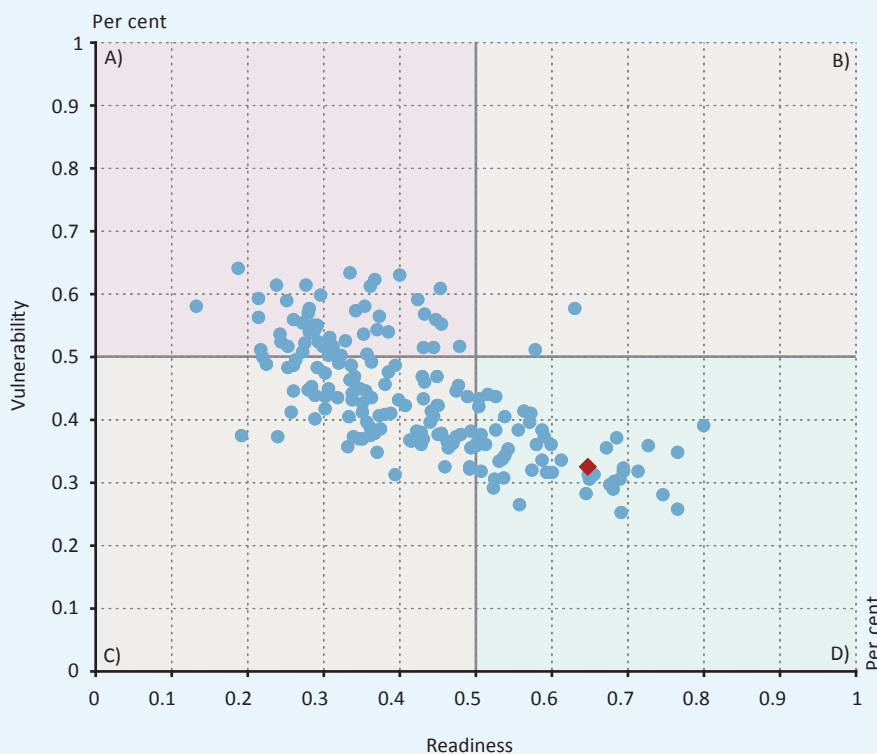
Overall, despite the fact that the emissions trajectories of the countries in the sovereign portfolio do not meet the Paris climate targets, the portfolio is largely protected from climate risks, mainly due to its short maturity. At the same time, it can also be stated that the countries in the reserve are the world's leading economies, with high credit ratings and considerable capacity for adaptation to the negative effects of climate change, which is increasingly appreciated due to extreme weather events becoming more frequent due to the slow implementation of global climate policies.

On the one hand, this is also supported by the University of Notre Dame's ND-GAIN country index, which identifies four main groups of countries, based on 45 indicators, according to each country's vulnerability to climate change and other global challenges, as well as their readiness to improve their resilience:

- These countries face the greatest challenges and need significant investment and innovation to improve their adaptive capacity.
- These countries are more prepared to respond to the challenges of climate change, but they also have high adaptation needs.
- These countries currently face relatively moderate challenges from climate change, but their adaptive capacity is also low.
- These countries are less vulnerable, and their capacity to adapt is relatively good.

Based on the weighted scores of the countries, the sovereign portfolio of the reserves is shown in the “lower right” quadrant, where countries that are less vulnerable and have relatively high adaptive capacity are positioned (Chart 7).

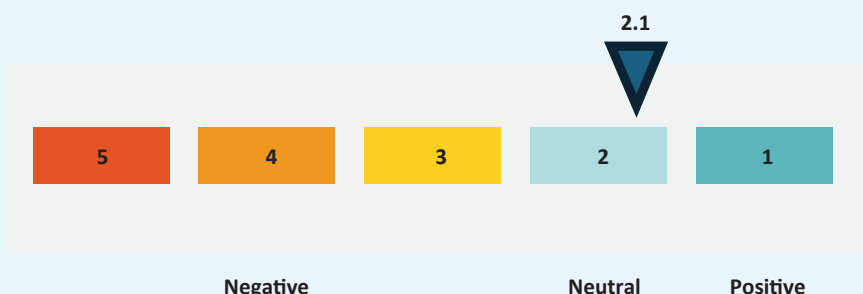
Chart 7
Values of all countries (blue), the sovereign portfolio (red), based on the *ND-GAIN Index*



Source: MNB calculations, based on Notre Dame Global Adaptation Initiative Country Index (ND-GAIN) data

On the other hand, according to Moody's data, the portfolio's weighted average *Environmental Issuer Profile Score*³¹ is 2.1, which means that on a scale of 1 to 5 (1 being low, 5 being very high), the issuers in the portfolio on average are not exposed to environmental issues that would have a material impact on the final rating during Moody's credit rating process. The score takes into account exposures to both transition and physical risks, water management, waste and pollution, and natural capital, as well as mitigating factors associated with each risk category (Chart 8).

Chart 8
Weighted average Environmental Issuer Profile Score of the portfolio at year-end



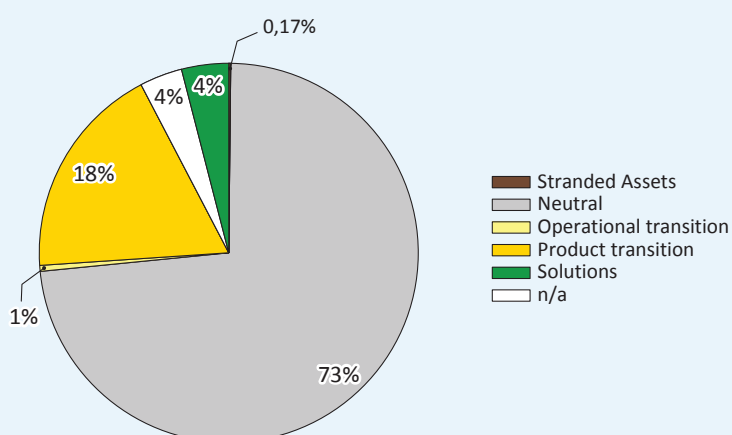
Source: MNB calculations based on Moody's data

³¹ Environmental Issuer Profile Score

Corporate Exposures

The environmental sustainability risk analysis framework also covers the corporate exposures of the reserves. According to MSCI's methodology, the proportion of issuers with significant transition risk in corporate portfolios is marginal. The data provider classifies companies into different categories based on their current emissions profiles. According to the methodology, these categories are the following: companies whose assets are potentially "stranded assets", companies that need to take further steps in the transition of their operating processes (operational transition), and companies that need to take further steps due to a decline in the demand for GHG-intensive products (product transition). The vast majority of the portfolio falls into the "Neutral" category, with limited exposure to transition risks (Chart 9).

Chart 9
Classification of corporate exposures of foreign exchange reserves into transition risk categories



Source: MSCI

For this portfolio, the carbon intensity indicator is expressed as the ratio of financed GHG emissions to the revenue generated by the companies or to the enterprise value.³² The carbon intensity, taking into account direct (Scope 1) and indirect (Scope 2) emissions, was 16.5 $tCO_2e/million\ EUR\ revenue$ (95 per cent coverage) and 5 $tCO_2e/million\ EUR\ EVIC$ (89 per cent coverage) at the end of the year.³³

Based on international best practices, the sustainability risk analysis framework also includes the examination of certain "positive and negative screening" type indicators. The "positive screening" indicators show that some of the issuers in the corporate portfolio of the foreign exchange reserves are already making some sort of environmental sustainability-related commitments. These metrics look for indications of whether the given company is positively contributing to the promotion of sustainable development. Examples include being signatory to the UN Global Compact,³⁴ which is positive for 40 per cent of the portfolio.

The "negative screening" indicators do not indicate problematic entities. These indicators may capture a company's negative involvement in sustainability-related issues. Based on the available sources of data, we are not aware of any information suggesting that any particular company is involved in significant environmentally harmful activities³⁵ or in serious violation of the UN Global Compact guidelines.

³² Enterprise Value Including Cash, EVIC

³³ MNB calculations, based on Bloomberg Finance LP. The data provider uses the emissions data reported by the companies where available, otherwise it uses estimates based on its own methodology. The weighted average reliability index of the data is 7.8, based on the *Bloomberg GHG Estimate Confidence Score*, which indicates relatively high reliability on a scale of 10.

³⁴ [United Nations Global Compact participants](#)

³⁵ The MSCI *Environmental Controversy* indicator identifies companies that are involved in serious violations of any of the environmental objectives set out in Article 9 of EU Regulation 2020/852.

The MNB also monitors various exclusion indicators (for informational purposes). Based on the indicators, no significant risks arise in relation to corporate exposures of foreign exchange reserves. Such indicators include, for example, the “*Exclusion from Paris-aligned benchmark*” indicator by MSCI, which indicates whether a company’s activities fall within the exclusion criteria defined in the EU Paris-aligned Benchmark Regulation,³⁶ and a public list of companies published by Norges Bank Investment Management, that are excluded from their investment universe for some reason.³⁷

Gold Reserves

Gold plays a prominent role in central bank reserves, primarily due to its safe-haven and diversification characteristics. In 2024, in line with its long-term national and economic strategic objectives, the MNB decided to increase its gold reserves from 94.5 tonnes to 110 tonnes.

Climate change can have negative social and economic consequences, such as increased geopolitical tensions and rising inflation, which can increase demand for safe-haven assets in the long term, including gold. In order to understand the impact of gold as an investment product on climate change and its climate risk exposure, it is first necessary to examine the emissions profile of the gold industry’s value chain. The separation of gold from ore accounts for a large part of the value chain’s energy demand, the vast majority of which is related to the use or on-site generation of electricity (see Chart 26 in the Annex). Estimates on emissions per tonne of gold vary widely in the literature, mainly due to differences in the energy mix of the regional electricity grids.

Gold mining can be considered as an emissions-intensive industry in terms of the amount of GHG emissions per tonne of gold produced.³⁸ However, when comparing the environmental impact and climate risks of financial investments – as shown above – it is necessary to examine the extent to which the investment contributes to financing emissions. When analysing bond investments, the carbon intensity indicator, calculated as the ratio of the annual revenue or the value added generated by a given sector or company, and the annual GHG emissions resulting from the production, should be examined.³⁹ Using this logic, it can be concluded that the carbon intensity of the gold industry is relatively favourable, primarily due to the high value of gold.

However, this methodology cannot be applied to physical gold, as the gold bars purchased had a GHG impact only once (during their production), and no significant recurring emissions arise during storage. For this reason, it is preferable to focus on absolute emissions (TCE – Total Carbon Emissions) rather than intensity ratios, as these can be used to compare different asset classes. For example, in the case of companies, the annual nominal GHG emissions (tCO₂e) can be determined, and where applicable, it can also be established for example how much tree planting or annual carbon credit purchases are required to offset this. The amount of GHG emissions generated during production can also be estimated for physical gold (approx. 11,500–55,000 tCO₂e for 1 tonne of gold). Given the one-off emissions associated with gold, if offsetting is used, it is necessary to determine the period over which such neutralisation is to be provided. It can be concluded that the longer the time horizon over which the one-off GHG emissions of gold can be dispersed, the lower the annualised value of the indicator, and thus its climate impact may be more favourable than that of other investment instruments, depending on the expected holding period.⁴⁰

When conducting climate risk analyses related to gold, it is also important to consider the position of the given investor: before making new investments, a number of screening factors can be examined, including the emissions impact of the purchase compared to alternative investments. However, in the case of the existing (legacy) portfolio assets, alternative questions need to be asked, as the environmental impact of gold accumulated in the past is a historical factor.

³⁶ In 2020, the European Commission set the criteria for the EU Climate Transition Benchmark and the EU Paris-aligned Benchmark. The decarbonisation trajectories of the indices labelled CTB and PAB are close to the path that would enable the index to align with the Paris Agreement’s 1.5°C target, compared to the index’s initial baseline. Article 12 of the [Regulation](#) lists the criteria under which a company must not be included in indices so designated.

³⁷ The [exclusion criteria](#) are determined by the Council on Ethics of the Norwegian Ministry of Finance.

³⁸ According to some estimates, the industry’s total annual emissions are approximately 120–130 million tCO₂e (WGC).

³⁹ By purchasing bonds or shares, investors finance the current and future activities of the given company and the related emission.

⁴⁰ For details on the methodology, see: [Baur, D.G. – Oll, J. \(2017\): The Role of Gold and the VIX in Investment Portfolios – A Financial and Sustainability Perspective.](#)

When analysing transition risks, it can generally be said that potential regulatory changes to promote the green transition will have a negative impact on companies engaged in carbon-intensive activities. In the case of gold, however, this relationship is not clear-cut. It can be stated with certainty that there will be no direct effects (e.g. carbon tax) on physical gold already held in the investment portfolios, and accordingly the direct effects of transition risks can be deemed marginal. However, considering that the value of the existing gold investments is determined by the price established by the prevailing market supply and demand conditions, indirect impacts may also play a role. Estimating indirect impacts poses a number of challenges, as it is unclear how regulatory changes or consumer preferences affect supply and demand conditions. In some cases, the price of gold may even rise, thereby improving investors' existing positions.

4.3.1.2 Portfolios Held for Monetary Policy Purposes

Government Securities Purchase Programme

In the analysis of the transition risks and impacts of the portfolio, we used Hungary's emissions profile as a basis.

Table 2
Emissions indicators for the GSPP portfolio

	Consumption approach	Production approach
WACI ($tCO_2e/capita$)	7.5	129*
Total Carbon Emissions (tCO_2e)	991,528	745 680
Carbon Footprint ($tCO_2e/ m\text{€ GDP}$)	171	129

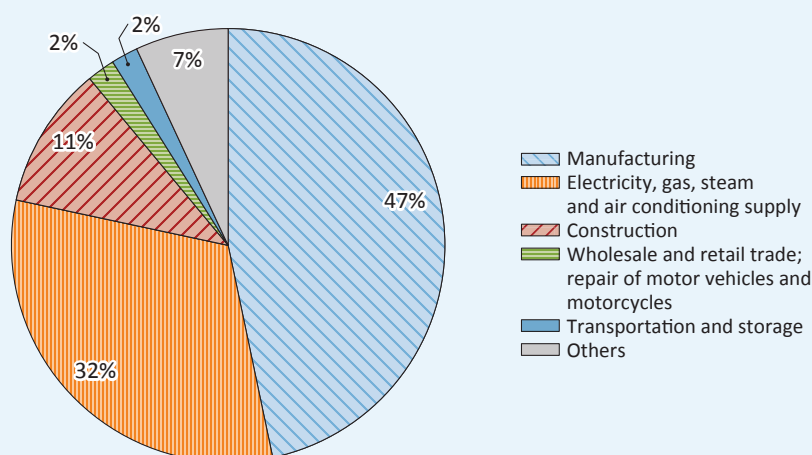
Note: *($tCO_2e/m\text{€ GDP}$).

Source: MNB calculations, based on data from MSCI.

Bond Funding for Growth Scheme

For the BGS portfolio, the weighted average carbon intensity calculated from sectoral data is **325 $tCO_2e/million\text{ EUR value added}$** . Three sectors contributed significantly to the portfolio's WACI (Chart 10). The high value of electricity sector is mainly explained by its high GHG intensity, while for manufacturing and construction by their high weight in the portfolio.

Chart 10
Contribution of main sectors to the GHG intensity of the BGS portfolio



Source: MNB calculations, based on Eurostat data

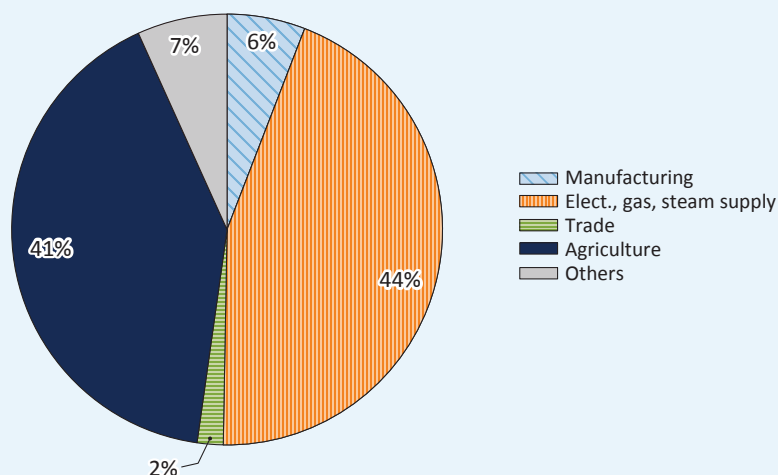
The ratio of carbon-intensive assets (brown share) – categorized based on sectoral classifications – in the **BGS portfolio** was **13 per cent at the end of the year**. It is also important to note that, while this was not a stated objective of the BGS, the MNB also purchased green corporate bonds within the framework of the programme. At the end of 2025, approximately one fifth of the outstanding exposure was green bonds.

Funding for Growth Scheme

The **WACI of the FGS portfolio is 422 tCO₂e/million EUR value added**. Among the loans provided under the FGS, the ratio of sectors with high carbon intensity can be considered low: at the end of the year, 7.97 per cent of the portfolio of investment loans and 10.33 per cent of the working capital and refinancing loans were related to these sectors.

Four sectors contributed significantly to the portfolio's WACI (Chart 11). The high contribution of agriculture and electricity generation, transportation and storage are mainly due to the high GHG intensity of these sectors, while in the manufacturing and trade sectors, it is due to the high portfolio value.

Chart 11
Contribution of the main sectors to the carbon intensity of the FGS portfolio



Source: Eurostat, MNB

This year's report also includes a climate risk scenario analysis for the NHP portfolio for the first time. The study examines the change in the credit risk of the companies that received loans under a macroeconomic scenario assuming a significant increase in the carbon price – which is the same as the scenarios used in the 2025 MNB supervisory climate risk stress test. The methodology takes into account the carbon intensity of companies operating in each sector as well as the spillover effects resulting from the interconnection of sectors, which spread the shock through supplier-customer relationships in the economy.⁴¹

According to the results, in the second year of the scenario, the average annual excess probability of bankruptcy of the portfolio would be 1.22 percentage points, slightly more favourable than the entire corporate loan portfolio (1.5 per cent) compared to the baseline scenario. The largest additional non-performing assets would arise in the electricity, gas, steam supply, agriculture and real estate sectors during this period. In the energy and agricultural sectors, due to their sensitivity to transition risks, in the real estate sector primarily due to the size of the exposure, significant non-performing assets could build up. It should be emphasized that due to the FGS refinancing scheme, the losses arising from default are borne by the banks lending to individual companies, while the MNB has indirect exposure.

⁴¹ Further methodological details: [Várgedő \(2022\): Climate risk stress test: the impact of the carbon shock on the probability of bankruptcy in the Hungarian banking system](#) and in Chapter 2.3 of the 2026 Green Finance Report.

4.3.2 Physical Risks

The links between climate change and natural disasters are documented in a wide range of literature on climate change. According to the data from International Monetary Fund (IMF)⁴², the frequency of climate-related natural disasters (e.g. floods, storms, extreme temperatures) has increased significantly since 1980. According to a 2025 analysis⁴³ by the European Environment Agency (EEA), weather-related extremes caused economic losses of around €822 billion in the European Union between 1980 and 2024, a quarter of which occurred between 2021 and 2024.

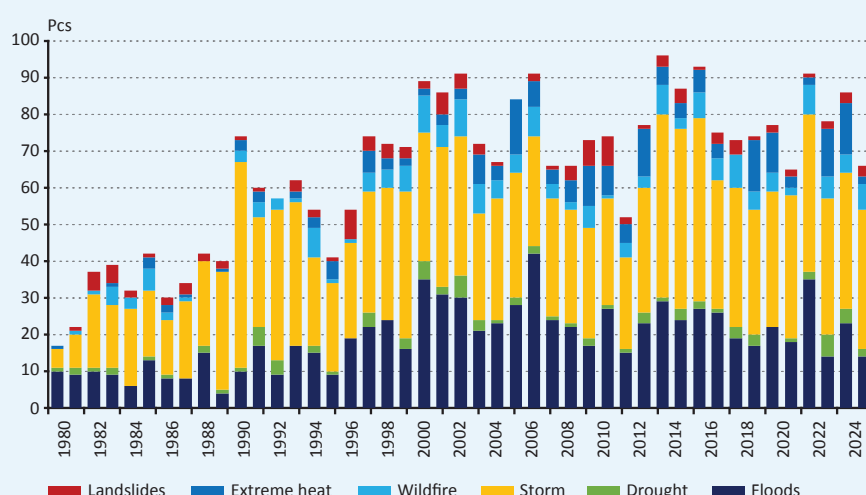
Analysing economic losses presents many challenges, but current trends suggest that climate-related extreme events will continue to increase, and the associated economic losses are likely to increase further.

4.3.2.1 Foreign Exchange Reserves

Sovereign Exposures

In the case of the countries forming the sovereign portfolio, in terms of frequency, storms and floods have been the most typical natural disasters in recent decades (Chart 12).

Chart 12
Frequency of climate change-related natural disasters in the case of the countries in the sovereign portfolio



Source: MNB calculations based on IMF 2022, Macroeconomic Climate Indicators Dashboard – Climate Change Data

According to the IPCC⁴⁴ analysis, drought will be one of the most important drivers of the increase in global crisis risks in the coming decades. The sovereign portfolio of foreign exchange reserves consists primarily of securities issued by developed countries, and thus the physical risk profile is determined by data typical of the world's leading economies. According to the INFORM Climate Change Tool, in the case of the portfolio, under the RCP85/SSP2 climate scenario, a jump in the drought category (in the case of 60 per cent of the current portfolio, ceteris paribus, the exposure level is very high, around 9, in this time horizon) and floods is expected by 2080, while the aggregate physical risk profile (INFORM CC Risk) is characterized by a fundamentally low risk level, primarily due to the high adaptive capacity of the countries forming the portfolio (Chart 13).

⁴² [IMF Climate Change Data](#)

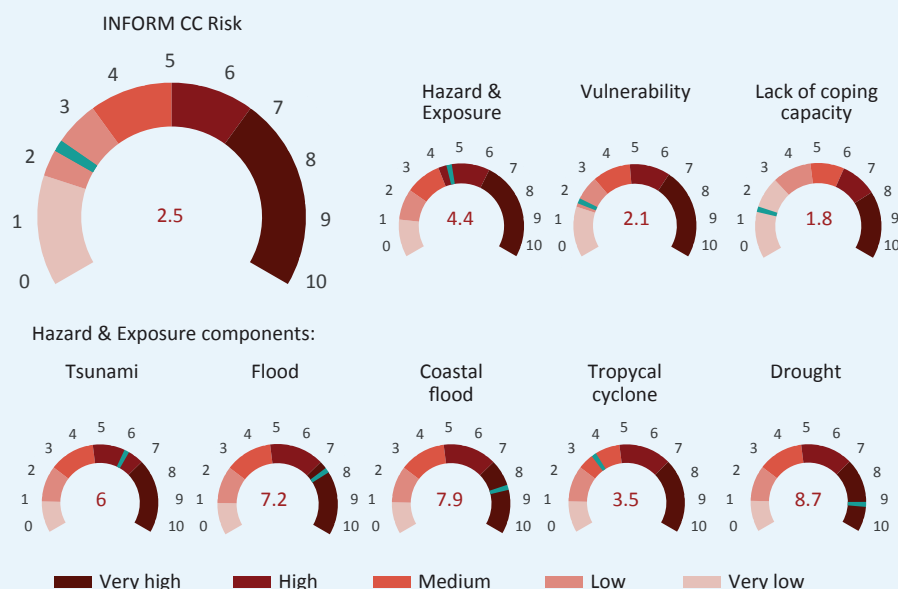
⁴³ [Economic losses from climate related disasters](#)

⁴⁴ Intergovernmental Panel on Climate Change

It is important to note that the exposure and adaptation profile of individual countries (and regions within particular countries) may differ significantly, so an aggregated, portfolio-level weighted average risk index is essentially used for prioritization; further research and more detailed analyses are required to better understand the economic and financial impacts of risk exposures.

Chart 13

Physical risk profile of the sovereign exposures of the foreign exchange reserves according to the *Inform Climate Change Tool*



Source: MNB calculations, based on European Commission – *INFORM Climate Change Tool*

Gold Reserves

The physical risk exposure of gold reserves can only be described through a qualitative analysis. Physical gold is practically indestructible, even in the event of a (climate) disaster, which can be a positive feature compared to other investments, e.g. in securities of specific companies, as physical risks may have a serious impact on the operation and supply chain of certain companies. In the case of bond investments, physical risks are often analysed as supply-side shocks; in the case of gold, this approach implies that the investor takes a position vis-à-vis an entire industry, not a specific company, which is a significant difference compared to bond or equity investments.

Climate change may have negative effects on some actors involved in gold production value chain, but global supply and demand shocks are less likely given no single region accounts for more than one-fifth of global production. This means more stable supply conditions, i.e. local problems that may occur in some specific locations are less likely to lead to global supply shocks.

Based on the above considerations, the physical risk exposure of the gold reserves is considered relatively low compared to other forms of investment.

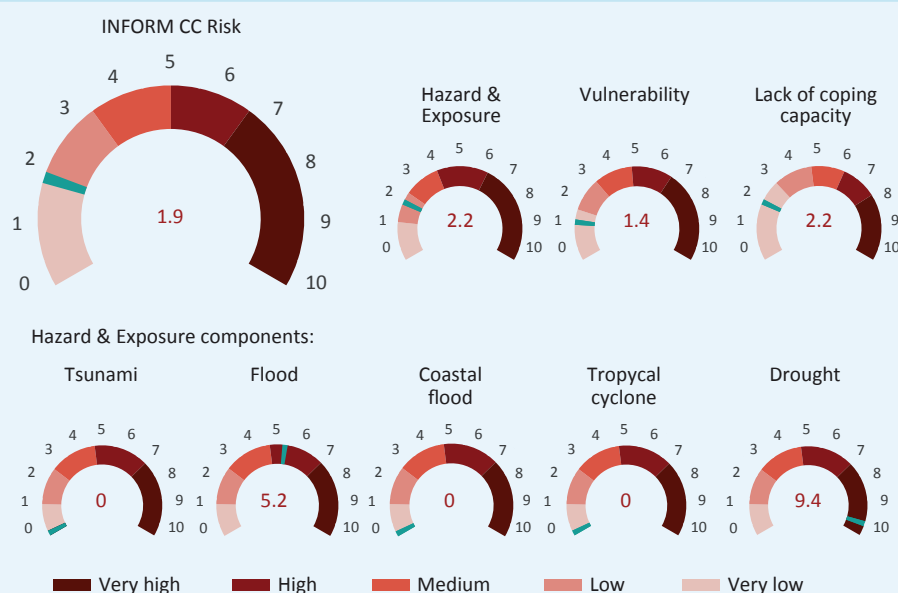
4.3.2.2 Portfolios Held for Monetary Policy Purposes

As for the portfolios held for monetary policy purposes (BGS, FGS, GSPP, MBPP, GMBPP), Hungary's physical risk profile should be used, as the risk profiles of the regions within the country are relatively homogeneous. The Hungarian sovereign risk levels are substantially lower than those of other countries in the FX reserves, but due to Hungary's relatively small geographical area, the concentration risk is significantly higher. Based on the data from the *INFORM Climate*

Change Tool, according to the RCP85/SSP2 climate scenario, by 2080, drought and floods are the main risk exposures for Hungary, but it can also be stated that the country has a relatively high adaptive capacity, so the overall risk profile can be considered relatively low (Chart 14).

Chart 14

Physical risk profile of the monetary policy portfolios according to the *Inform Climate Change Tool*



Source: MNB calculations, based on European Commission – *INFORM Climate Change Tool*

4.3.3 Nature-related Risks

4.3.3.1 Foreign Exchange Reserves

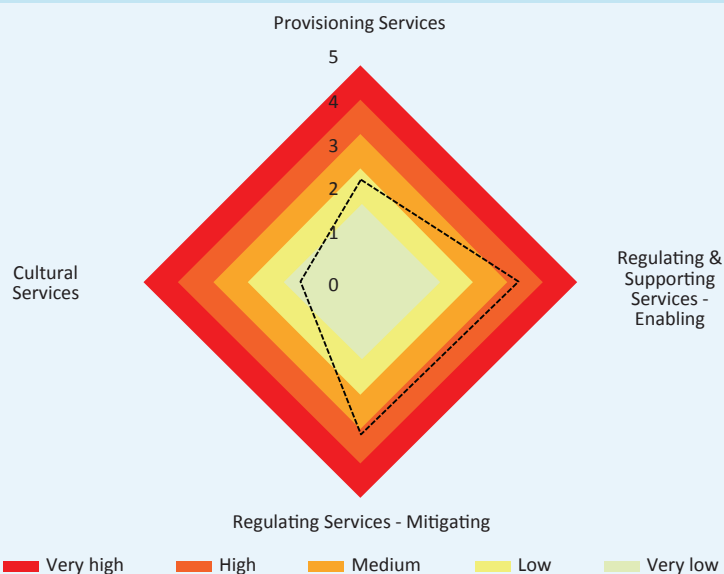
Sovereign Exposures

The *WWF Risk Filter Suite*, developed by the World Wildlife Fund (WWF), provides a good starting point for analysing nature-related risks and impacts of the countries in the portfolio. The platform is based on two pillars: the *WWF Biodiversity Risk Filter* provides a general, high-level assessment of the risks of biodiversity loss and degradation of ecosystem services, while the *WWF Water Risk Filter* allows for a deeper analysis of the water-related risks (e.g. water scarcity, water quality). The data are available at specific geolocation levels, and at regional and national aggregation levels too.

For the countries in the portfolio, the degradation of supporting and mitigating regulatory services represents a relatively high level of risk (Chart 15). The former are natural services (e.g. soil, water, air and ecosystem conditions, pollination) that are essential for certain economic processes, especially crop production and livestock farming. In the case of the latter, it can be stated that intact ecosystems can help reduce the negative impacts of certain natural hazards (e.g. landslides, forest fires, pests and diseases, herbicide resistance and extreme heat).

It is important to emphasise that while nature-related risks are location-specific, the analysis of specific country profiles offers a good starting point, providing an opportunity to see the main trends and identify problematic exposures. For the latter, it is necessary to analyse the data at a deeper level, at a lower degree of aggregation.

Chart 15
Weighted risk scores of the sovereign portfolio, by risk category

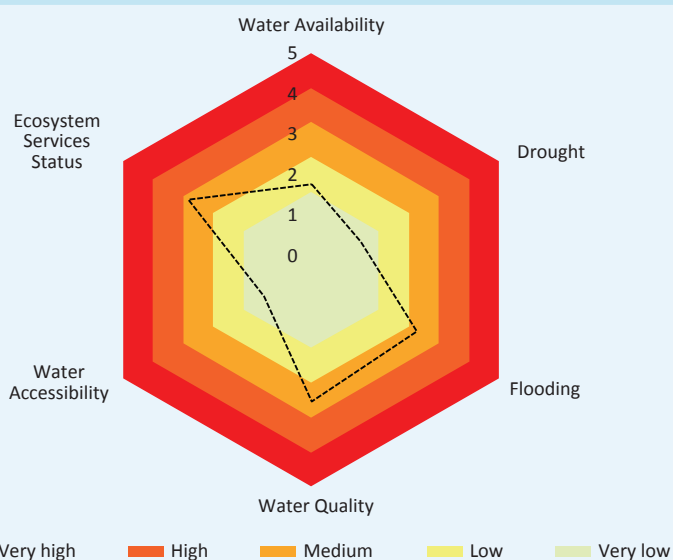


Source: MNB calculations, based on the WWF Biodiversity Risk Filter 2026 data

Within nature-related risks, water-related risks are of increasing importance: water is essential for the development of human societies, necessary for a healthy environment and indispensable for certain economic sectors (e.g. food production, electricity generation, manufacturing, river transportation, etc.). More and more studies are drawing attention to the increase in water-related risks: according to new calculations by Aqueduct, 31 per cent of global GDP will be exposed to high water scarcity by 2050.⁴⁵

Based on the WWF Water Risk Filter methodology, medium risk levels appear in the case of the countries forming the sovereign portfolio, primarily in the categories of water quality and the state of ecosystem services, however, it is important to mention that this methodology is also fundamentally used for prioritization, and in-depth analyses at regional and location levels are required to gain a deeper understanding of the more vulnerable exposures.

Chart 16
Weighted risk scores of the sovereign portfolio, by risk category



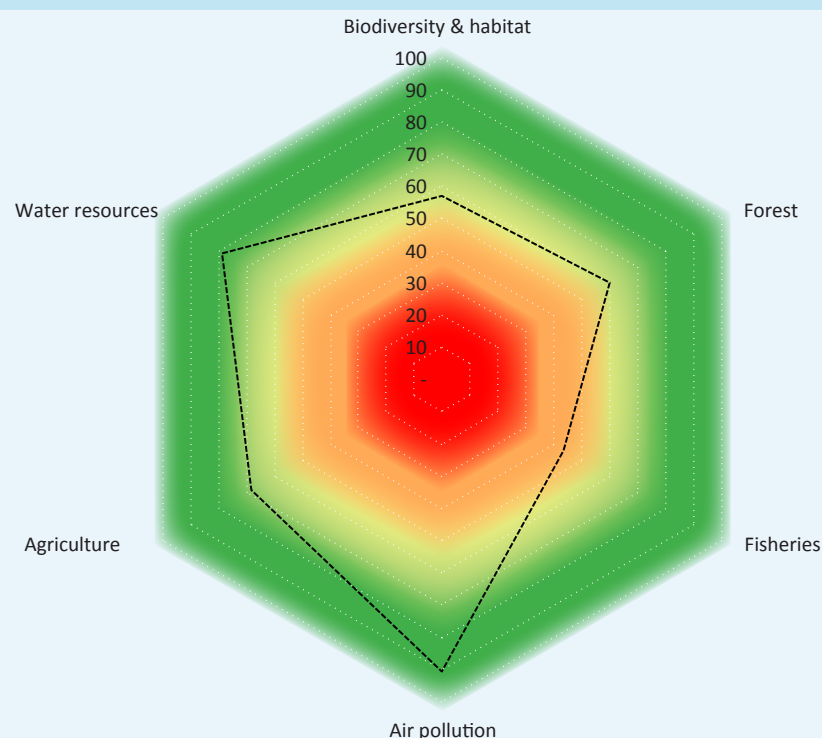
Source: MNB calculations, based on the WWF Water Risk Filter 2026 data

⁴⁵ [25 Countries, Housing One-Quarter of the Population, Face Extremely High Water Stress](#)

Examining nature-related risks and impacts using the *Environmental Performance Index (EPI)*, we can conclude that the combined score of the countries in the portfolio (59.8) ranks in the first quintile of the global ranking. The methodology developed by the Yale Center for Environmental Law & Policy ranks countries using 58 performance indicators in three main categories (climate change, ecosystem vitality and environmental health). On a scale of 0 to 100, a high score identifies the best-performing countries, while a low score identifies the lower-performing countries (currently, the highest score is 75.7 and the lowest is 24.6).

In addition to the overall scores, the data is also available separately for each performance indicator, providing more detail on the exposures in the portfolio. The ecosystem vitality category can be further divided into six subcategories, with the portfolio lagging behind most in the “fisheries” and “biodiversity and habitat” subcategories.

Chart 17
Weighted risk scores of the sovereign portfolio, by risk category



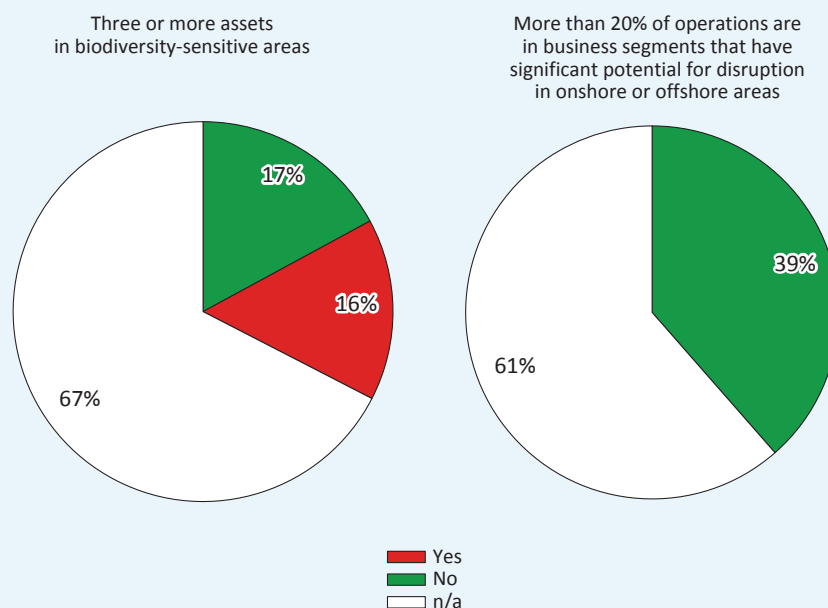
Source: MNB calculations, based on the Environmental Performance Index⁴⁶ data

Corporate portfolios

Nature-related risks and impacts of the corporate exposures can be assessed using “screening”-type indicators too. For example, based on the MSCI database, in the case of 16 per cent of the portfolio, there is information that a given company has three or more known physical assets in biodiversity-sensitive areas (Figure 18/A), however, based on the available data sources, we are not aware of any information that more than 20 per cent of a given company’s operations are carried out in business segments that could cause significant potential disruption in terrestrial or marine areas (Figure 18/B).

⁴⁶ Block, S. – Emerson, J.W. – Esty, D.C. – de Sherbinin, A. – Wendling, Z.A., et al. (2024). 2024 Environmental Performance Index. New Haven, CT: Yale Center for Environmental Law & Policy. epi.yale.edu

Chart 18
Portfolio exposure to sectors relevant to nature-related risks and impacts

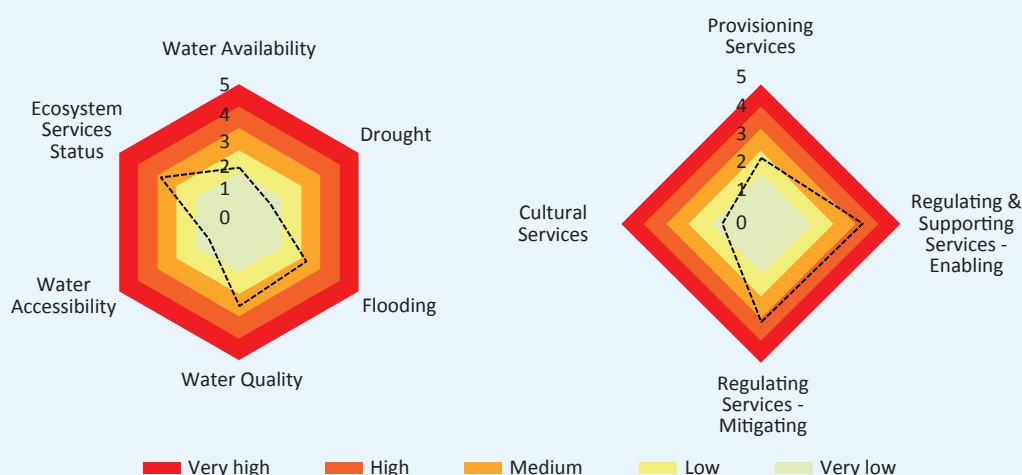


Source: MNB calculations, based on MSCI data.

4.3.3.2 Portfolios Held for Monetary Policy Purposes

As for the portfolios held for monetary policy purposes (BGS, FGS, GSPP, MBPP, GMBPP), Hungary's risk profile can be used as a starting point. The *WWF Risk Filter* data shows that elevated risks are present in the categories of water quality and floods (Chart 19/A), and in supporting ecosystem services (Chart 19/B).

Chart 19
Exposures of the monetary policy portfolios by risk category



Source: WW Risk Filter Suite 2026

4.3.4 Positive Environmental Impact: Avoided GHG Emissions

For some portfolios, the environmental impact analysis of the programmes and the assessment of the expected or realised positive environmental impacts are also of particular importance. The environmental impacts identified at the level of individual issuers allow the portfolio to be evaluated not only in financial terms, but also in terms of the emissions reductions achieved, while also maintaining the primary financial objectives.

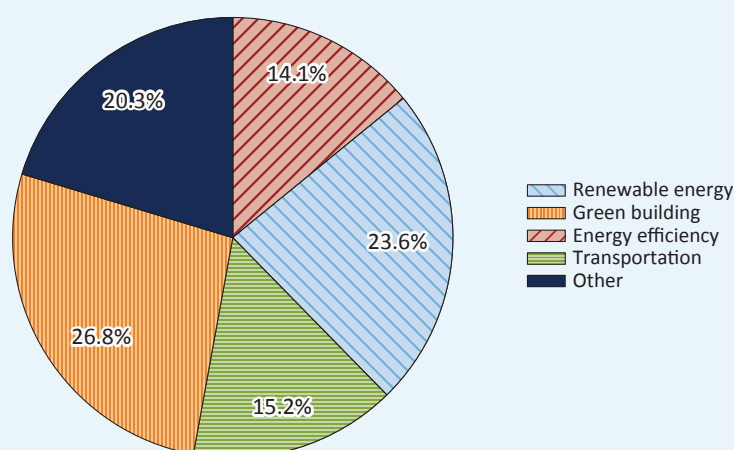
One possible approach to this is the estimation of the avoided GHG emissions. For this analysis, calculations are available for the green bond portfolio, the MBPP/GMBPP and the GHP portfolios.

Dedicated Green Bond Portfolio

Within the foreign exchange reserves, at the end of the year, there was more than EUR 2.8 billion of exposure in bonds with green or other sustainability labels.⁴⁷ This includes a dedicated EUR 500 million notional green bond portfolio, the positive environmental impact of which is monitored separately by the MNB. In the case of green bonds, the funds raised are invested by the issuer in specific projects that are beneficial from an environmental and energy efficiency perspective. Green bonds facilitate the channelling of capital into green investments and may reduce the cost of funding.

Renewable energy and green buildings account for the vast majority of the funded projects within the dedicated portfolio. The portfolio is denominated in EUR, which reflects the predominance of European issuers and the geographical distribution of the realised green projects.

Chart 20
Distribution of financed green projects by type in the dedicated green bond portfolio



Source: Compiled by MNB from bond issuers' own impact reports

The positive environmental impact of projects financed by green bonds should always be interpreted against a baseline scenario, which represents the hypothetical CO₂ emissions in the absence of the green projects. In 2025, the green bond portfolio contributed to the avoidance of approximately 123,000 tCO₂ emissions, which is roughly equivalent to the annual carbon footprint of a Hungarian settlement with a population of 20,000.⁴⁸ Traditional reserve management objectives and considerations are just as relevant for the green bond portfolios as for the MNB's other FX reserve portfolios, which means that the goal is not necessarily the optimisation of the environmental impact; the environmental impact generated in connection with the investment is rather a kind of positive externality.

Mortgage Bond Purchase Programme

According to our estimates, via modernisation of the housing stock, the MBPP contributes to an annual savings of approximately 13,000 to 34,000 tonnes of GHG emissions, while in the case of the GMBPP, the impact is between approximately 3 to 4,000 tonnes. Mortgage bonds are special securities collateralised by at least 80 per cent of the principal and interest payments on mortgage loans disbursed by mortgage banks and their partner banks, as required by law. These loans are backed by real estate, and accordingly the MNB's mortgage bond purchases indirectly finance the construction, purchase and renovation of properties.⁴⁹

⁴⁷ Sustainable, social, transition

⁴⁸ [KSH publications – Indicators of sustainable development](#)

⁴⁹ It is worth mentioning that, compared to Western Europe, the MNB's programmes were able to achieve a relatively high reduction in emissions, which is because Hungarian properties are more outdated.

Green Home Programme

The specific emissions value of the properties financed under the GHP is about one-third of the average, which corresponds to annual GHG savings of approximately 38,000 to 49,000 tonnes. When analysing the positive environmental impact of the GHP portfolio, the emissions calculated based on the energy efficiency indicators and the specific emissions factors of the financed properties are compared to the estimated average value of Hungarian properties.

4.4 EVOLUTION OF THE MNB'S ENVIRONMENTAL FOOTPRINT

4.4.1 Operational Activities

The MNB's target for the 2020–2022 cycle was to reduce its operational carbon footprint by at least 30 per cent relative to 2019. The target was exceeded, as the MNB reduced its per employee carbon footprint by nearly 60 per cent by the end of 2022 compared to the baseline.

The objectives of the 2023–2025 planning cycle are contained in the MNB's 2023 Environmental Statement⁵⁰, in which the central bank projected a further 15 percentage point reduction in the specific carbon footprint by the end of the cycle – with regard to the system boundaries defined in the document. Based on preliminary⁵¹ data, by the end of 2025, the carbon footprint related to operational activities decreased by 3,977 tonnes in nominal terms compared to the base.

Table 3
Carbon footprint of the MNB's operations over time

Carbon emissions/sources	Evolution of the carbon footprint (t CO ₂ e)							Change to 2019 base (per cent)	Change to 2019 base (tonnes)
	2019. base	2020.	2021.	2022.	2023.	2024.	2025.*		
Natural gas and district heating	848	966	981	1,975	1,127	1,323	1,177	38.8	329
Vehicles fleet	123	104	104	116	122	118	140	13.9	17
Refrigerants	-	5	5	3	2	2	2	-	-
SCOPE 1 total	971	1,076	1,091	2,094	1,251	1,443	1,319	35.8	348
Electricity	4,092	2,624	3,013	87	7	105	124	-97.0	-3,968
SCOPE 2 total	4,092	2,624	3,013	87	7	105	124	-97.0	-3,968
Air travel	945	201	33	411	811	649	476	-49.6	-469
Business travel (car, abroad)	2.4	0.4	0.5	2.8	3.9	3.1	1.9	-21.4	-0.5
Business travel (car, domestic)	7.8	1.9	2.7	10.4	10.3	15.0	8.7	11.7	0.9
Taxi	2.6	3.2	3.5	4.6	2.3	1.8	2.2	-16.9	-0.4
Banknote briquette (used as an energy source)	-	18	17	15	14	14	13	-	-
Recycled paper	-	2	3	1	1	0.5	2.0	-	-
Communal waste	-	156	110	61	57	52	98	-	-
SCOPE 3 total	958	383	170	506	899	735	601	-37.3	-357
SCOPE 1 - SCOPE 3 total	6,021	4,082	4,273	2,687	2,158	2,283	2,044	-66.1	-3,977
Specific carbon footprint (tonnes/employee)	4.6	3.1	3.2	1.9	1.5	1.5	1.3	-72.6	
Specific carbon footprint (tonnes/ 000 m²)	119.6	81.1	84.9	57.8	46.4	48.9	29.9	-75.0	

* preliminary data

Source: MNB.

⁵⁰ [MNB Environmental Statement](#) (the MNB took possession of the Szabadság square building – following its full reconstruction – in mid-2025. The building's emissions are not included in the 2023–2025 planning cycle targets and reporting).

⁵¹ Not yet audited at the time of preparation of the report.

Key information related to environmental sustainability of operational activities:

- MNB Buda Center: During the renovation of the building, environmental awareness aspects were considered, therefore nearly 4,000 m² of lawn and shrub area were created around the building. In addition, 76 deciduous and 13 evergreen trees were also planted. Regarding the interior spaces, the third largest green wall in Europe was created in the large auditorium, and 56 green windows and 6 indoor trees ensure the improvement of indoor air quality.
- MNB Supervisory Center and Money Museum: Nearly 2,000 m² of green area was created around the building. In addition, a total of 35 trees and 12 bushes were also planted. Regarding the interior spaces, a 48 m² green wall was created in the auditorium.
- MNB Logistics Center is located on a 5.6-hectare site, the building complex with a net area of 14,021 m² is surrounded by a green parkland area of over 10,000 m², on which more than 150 columnar maples have been planted. A solar panel system was put into operation on the MNB Logistics Center site in May 2025, which produced 281,600 kWh of electricity by the end of the year and resulted in cost savings of 14.5 million forints, along with 128 tons of GHG avoidance.

All three buildings were developed according to the strict standards of the BREEAM environmental building rating system. The buildings meet the requirements of the standard regarding water consumption at a high level. The MNB drilled its own well to irrigate the large green area in the Logistics Center, and the water needed for the plants is provided from the well via an automatic irrigation system.

In the future, the MNB will focus on increasing the efficiency of energy use and is seeking opportunities to further green its energy mix and further increase the proportion of renewable energy.

However, emissions cannot be eliminated completely. To compensate for emissions that cannot be further reduced, the MNB financed habitat restoration projects too, with the active involvement of WWF Hungary. Projects included planting a 27-hectare forest near the village of Geszt in the Körös–Maros National Park in 2022, and afforestation and grassland reconstruction on 32 hectares at Drávaszentes jointly with the Danube–Drava National Park Directorate in 2023. Furthermore, in 2024, a new habitat reconstruction project covering approximately 36 hectares was carried out in Kállósemlén, in the Hortobágy National Park.

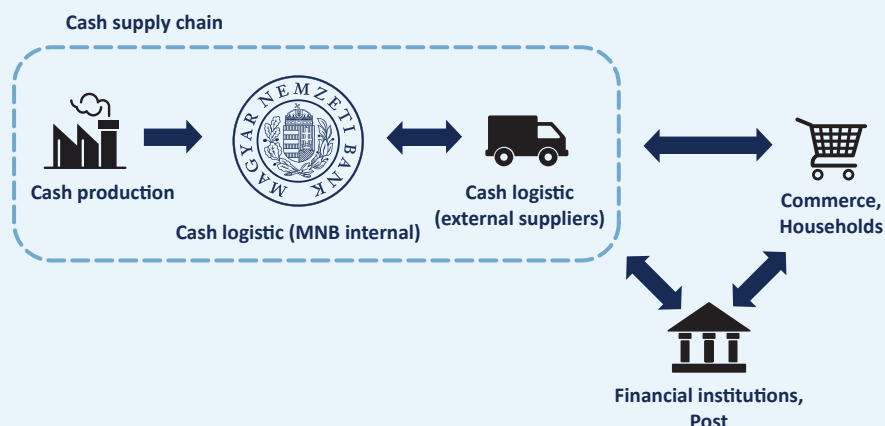
In addition to carbon offsetting, the projects also provide ecosystem services, thus contributing, among other things, to the preservation of biodiversity and to mitigating the effects of climate change.

4.4.2 Carbon Footprint of the Cash Supply Chain

In measuring the environmental performance of the cash supply chain, the MNB focuses on the following activities:

- Cash production, the operations of MNB subsidiaries involved in the production process
- Cash logistics activities within the MNB (distribution, processing)
- Activities of the cash logistics service providers (suppliers)

Chart 21
Flow of cash in the economy



The carbon footprint of the cash supply chain is calculated using the Bilan Carbone methodology, using emissions factors. It is important to point out that the process focuses on the root causes of the most significant environmental impacts. The aim is to establish a comprehensive picture that can be used to track changes year after year. Cash production accounts for 20 per cent of the carbon footprint of the entire cash supply chain, while transportation comprises 80 percent.

The majority of the environmental impact of the cash supply chain is related to supply chain operators (mainly cash logistics transport companies), where fuel consumption was the main source of emissions. Within the cash supply chain, in the case of cash production and the MNB's internal logistics, CO₂ emissions are caused mainly by the energy consumption of buildings and the machinery and equipment needed for production and processing.

Table 4
Carbon footprint of the cash supply chain

Period	Carbon footprint (t CO ₂ e)	Change versus 2018 (tonnes)	Change versus 2018 (per cent)
2018	21,204		
2019	19,522	-1,682	-7.9
2020	18,273	-2,931	-13.8
2021	21,078	-126	-0.6
2022	16,892	-4,312	-20.3
2023	13,540	-7,664	-36.1
2024	12,922	-8,282	-39.1
2025*	13,336	-7,868	-37.1

* The data are calculated from the raw data received from the actors in the cash supply chain.

The analysis shows that the main factors contributing to the recent improvement in environmental performance are:

- MNB subsidiaries involved in cash production organise their activities based on strict environmental management system requirements.
- The internal cash logistics activities of Hungarian Mint Ltd. and the MNB are carried out within a single facility (MNB Logistics Centre), where 100 per cent of the electricity used comes from renewable sources since 2022; this significantly reduced the carbon footprint compared to previous years.
- Among the actors in the cash supply chain, the vehicle fleet of the transport companies carrying out activities with the highest environmental impact is constantly being modernised.

- In 2025, the carbon footprint increased compared to the previous year, primarily due to the increase in the amount of cash⁵² in circulation and the increase in the number of ATMs.

In the future, the most obvious way to reduce the carbon footprint of cash transportation may be to decrease the distances travelled by cash transport vehicles and upgrade the vehicle fleet. This can be achieved without jeopardising the security of the cash supply, primarily by encouraging the reuse of banknotes and coins at the local (bank branch) level. This would eliminate the need to transport fit-for-circulation banknotes flowing into the branches for processing and then returning them, to meet demand. The number of dedicated machines (typically ATMs with banknote reuse capability) has increased in recent years, but they only account for around one-quarter of the entire ATM network, still leaving significant room for further growth in the future.

⁵² In 2025, the amount of cash in circulation increased by HUF 630 billion compared to the previous year; the number of ATMs increased by 511.

5 Annex – Metrics Used in the Analysis – Methodology and Limitations

Emissions Indicators

While consistency is a primary consideration in the analysis, there may be differences in the range and the calculation of the emissions metrics disclosed for different asset categories, due to methodological specificities and the available data sets. Methodological differences make it difficult to compare the results of portfolio evaluations and do not allow for the calculation of a carbon emissions or carbon intensity ratio aggregated at the balance sheet level.

a) Sovereign Portfolios

The central banks of the euro area published their first harmonised climate-related financial reports in 2023. Disclosures were prepared on the basis of a consistent framework following the TCFD and PCAF recommendations. In the common framework, central banks use a uniform methodology to measure and publish the weighted average carbon intensity (WACI) and the total carbon emissions and carbon footprint for their euro denominated portfolios managed by them for non-monetary policy purposes. Individual central banks may publish analyses with a broader coverage and different indicators; for example, the ECB published an analysis covering corporate bond holdings purchased for monetary policy purposes, in addition to non-monetary policy portfolios.

In order to achieve a higher degree of comparability, the MNB strives to bring its methodology closer to the practice applied by euro area central banks. Accordingly, in addition to WACI – as the main transition risk indicator –, the total carbon emissions and the carbon footprint of sovereign portfolios are also calculated, both in the production and consumption approaches. The production approach takes the GHGs produced within a country as the basis of calculating the indicators. This approach corresponds to the approach followed by the UNFCCC in preparing national emissions inventories. The consumption-based approach modifies emissions data for the effects of foreign trade, capturing the GHG emissions generated by a given country's consumption.

b) Corporate Portfolios

When estimating the carbon intensity of the FGS and BGS portfolios, sectoral averages were used due to the lack of company-specific data, which may distort the results of the analysis. For the sectoral classification, the MNB used NACE categories, within which, for the BGS, more detailed industry carbon intensity data are also used, with a weighing corresponding to the proportion within the portfolio. The main disadvantage of this approach is that the most carbon-intensive sectors may also include companies that are trying to achieve carbon neutrality through new, innovative technologies, while sectors classified as non-carbon intensive may also include companies with particularly high carbon intensity (e.g. an issuer's green bonds may have the same sectoral classification as its traditional bonds even though the amount of carbon emissions is significantly different). This is also the case for the biased classification of companies producing green energy. Taking all this into account and keeping robustness, international best practice and comparability in mind, reclassifications and corrections were applied in the calculations to tackle any distortions with material effects.

Table 5	
Sovereign asset portfolios (FX reserves, Government Securities Purchase Programme)	
Weighted Average Carbon Intensity (WACI)	
Description	This indicator measures the portfolio's exposure to carbon-intensive entities. It is the GHG intensity per PPP-adjusted GDP (production approach) or per population (consumption approach) of the emitting country multiplied by the proportion of exposure in the portfolio, excluding LULUCF. Unit of measure: tonnes of CO ₂ e/EUR millions of GDP or tonnes of CO ₂ e per capita.
Formula	$WACI = \sum_i \frac{\text{market value of exposure}_i}{\text{market value of portfolio}} * \frac{\text{GHG emission of the country}_i}{\text{PPP – adjusted GDP or GDP (at 2019 prices) or population}_i}$
Data source	MSCI (converting PPP-adjusted GDP in International \$ with EUR/USD exchange rate)
Total Carbon Emissions (TCE)	
Description	Indicator of the total GHG emissions financed by the portfolio, excluding LULUCF. Unit of measure: tonnes of CO ₂ e.
Formula	$TCE = \sum_i \frac{\text{market value of exposure}_i}{\text{PPP adjusted GDP}_i} * \text{GHG emission of the country}_i$
Data source	MSCI
Carbon Footprint (CF)	
Description	Total GHG emissions of the portfolio relative to the size of the portfolio. Unit of measure: tonnes of CO ₂ e/EUR millions of GDP.
Formula	$CF = \frac{\sum_i \frac{\text{market value of exposure}_i}{\text{PPP adjusted GDP}_i} * \text{GHG emission of the country}_i}{\text{market value of portfolio}}$
Data source	MSCI
Corporate asset portfolios (BGS, FGS)	
Weighted Average Carbon Intensity (WACI)	
Description	A metric quantifying the GHG emissions of the assets in the portfolio arising in the production of a unit of value added. Unit of measure: tonnes of CO ₂ e/EUR millions of value added
Formula	$WACI = \sum_i \frac{\text{nominal value of investment}_i}{\text{market/collateral value of portfolio}} * \text{GHG intensity of sector}_i$
Data source	Eurostat (Air Emissions Intensities)
<i>Note: In the TCFD recommendations for the corporate sector, turnover data are used in the calculations, but in the MNB's TCFD report, due to gaps in individual data, the corporate WACI metrics are calculated using value-added-based sector GHG intensity data instead of turnover.</i>	

Proportion of Carbon Intensive Assets (brown share)

The analysis of carbon-intensive (brown) corporate exposures is important for investors, because the transition to a carbon neutral economic structure will be most challenging for companies with high carbon intensity, both from a technological and regulatory perspective. To identify carbon-intensive industries, the TCFD Working Group recommends the Global Industry Classification Standard (GICS) sector classification. According to the TCFD's assessment, the energy and utilities industries (excluding water utilities and renewable energy companies) are the most carbon-intensive sectors, and therefore the financial exposure to companies operating in these sectors should be assessed. The MNB used the NACE Rev. 2 sector classification, instead of the GICS classification, within which the GICS carbon-intensive sectors can be matched with a high degree of overlap. The disadvantage of the metric is that it does not assess exposure based on the carbon intensity of individual issuers, but rather on the basis of sector classification, thus providing an indirect picture of brown assets.

Energy Mix

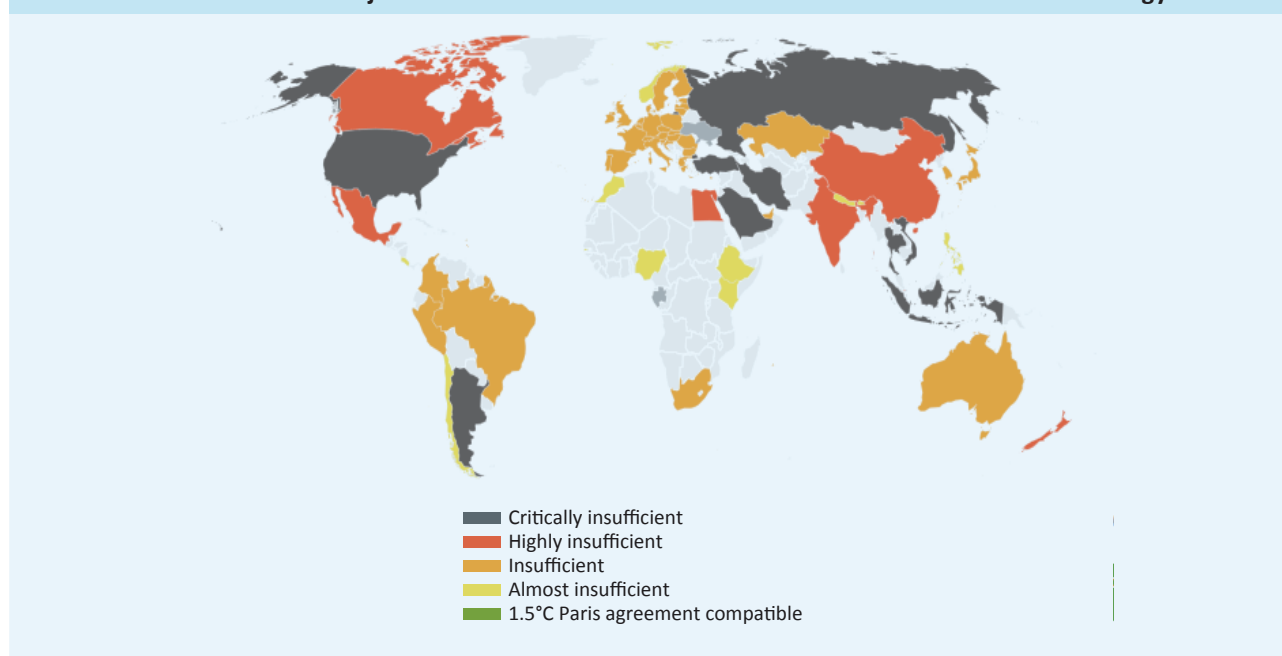
In order to meet the goals of the Paris Climate Agreement, the composition of the world's energy production needs to shift significantly from fossil fuels to renewable energy sources. One way of measuring the risks arising from this transition could be to study the energy mix of the countries issuing securities. The energy mix is a good starting point for examining the transition risks arising from the structural characteristics of the energy supply, but it does not provide information on the level of energy supply, the capacities required for the transition and the strategic plans and measures of a given country to address climate risk.

Climate Action Tracker (CAT)⁵³

For a forward-looking assessment of transition risks of the sovereign portfolios, data from Climate Action Tracker are suitable, which outlines potential future emissions pathways based on the GHG reduction commitments of countries, which are measured against the targets of the Paris Agreement. For the calculation of reserve-level aggregate indicators, the weights were determined according to the proportions of sovereign exposures included in the foreign exchange reserves.

Chart 22

Assessment of the emission trajectories of countries around the world based on the CAT methodology



Bloomberg Government Climate Risk Scores

Bloomberg uses three dimensions to assess each country's relative transition risks related to climate change compared to other countries. On a scale of 0 to 10, 10 is the best score.

- *Carbon Transition Score: assesses a country's past, current and projected emissions.*
- *Power Sector Transition Score: assesses a country's progress and future efforts to decarbonise its energy sector, taking into account the current share of fossil fuel and renewable generation and the level of clean energy investments.*
- *Climate Policy Score: evaluates a country's progress in achieving net-zero goals and in developing frameworks related to green debt issuance and renewable energy policy.*

⁵³ [Climate Action Tracker](#)

MSCI Sovereign CVAR⁵⁴

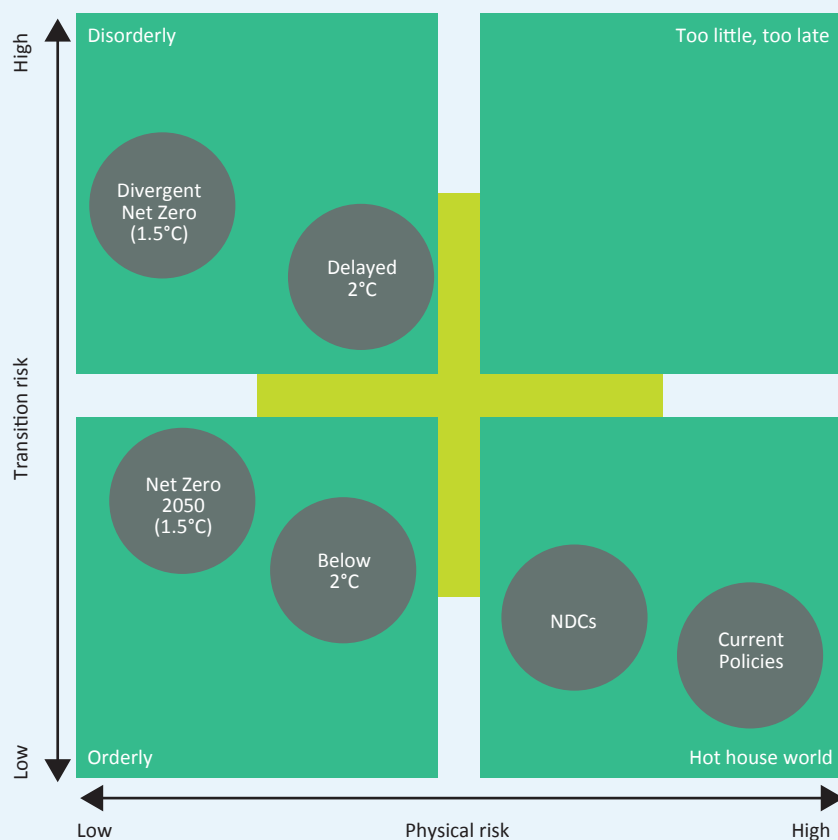
The MSCI⁵⁵ Sovereign CVAR examines the financial impact of NGFS scenarios and assumes different changes in yields and monetary policy responses to climate change. A methodological assumption is that the market immediately reprices individual financial instruments today in a way that reflects future interest rates in a given climate scenario.

- **Orderly 1.5 °C (“Net Zero 2050”):** In this scenario, global warming is limited to 1.5 °C through stringent and immediate climate policies. This temporarily increases inflation via a sudden increase in the price of polluting energy sources, which leads to a rise in short-term yields.
- **Orderly 2 °C (“Below 2 degrees”):** Global warming is limited to 2 °C by immediately implemented climate policies that are more moderate than in Net Zero scenarios. As a result, yields diverge less from the climate-agnostic baseline scenarios, resulting in smaller yield curve shocks (the shock on the curve tends to be more parallel).
- **Disorderly 1.5 °C (“Divergent Net Zero”):** Despite limiting global warming to 1.5 °C, this scenario involves higher carbon prices due to divergent policies across sectors and a quicker, later phase-out of fossil fuels. The lack of policy coordination places a high burden on consumers. Interest rates tend to rise compared to the baseline (after a short dip for some countries) and remain higher for longer. This tends to push the longer end of the yield curve up more.
- **Disorderly 2 °C (“Delayed transition”):** Global annual emissions will not decline until 2030. By then, drastic action is needed to limit warming to 2 °C, with varying levels of action across countries and regions. The disorderly transition leads to an increase in interest rates once the delayed transition begins. Generally, the shorter end of the curve is less affected, but the longer end moves more upward.
- **3 °C (“NDC”):** In this scenario, currently pledged Nationally Determined Contributions (NDCs) are fully implemented, reaching energy and emissions targets in all countries. Carbon prices increase slightly, resulting in a mild impact on the yield curve.
- **3 °C (“Current policies”):** The current lax climate policies will continue, so there will be no transition risks, only productivity losses resulting from physical risks in the given countries.

When using the methodology, it is important to highlight that the potential losses associated with the interest rate risk of the bond portfolio are not the same as the macroeconomic costs to the economy as a whole in different scenarios. From a macroeconomic perspective, the impact of the different climate scenarios on economic variables such as real GDP is likely to be much more relevant than changes in interest rates.

⁵⁴ [MSCI - How Climate Transition Risk May Impact Sovereign Bond Yields](#)

⁵⁵ With regard to all MSCI data presented in this report, it should be noted that MSCI Solutions LLC obtains the information from sources it believes to be reliable, but does not guarantee the accuracy, completeness or timeliness of such information. None of the data should be used on its own to determine which securities to buy or sell, or when to buy or sell them. None of the information constitutes investment advice or a recommendation to make (or refrain from making) any investment decision and should not be relied upon as such. Details on the use of the data can be found at the link below: <https://www.msci.com/notice-and-disclaimer-for-reporting-licenses>

Chart 23**Depiction of different NGFS scenarios in terms of transition and physical risks**

ND-GAIN Country Index⁵⁶

The University of Notre Dame's ND-GAIN country index identifies four main country groups based on 45 indicators, according to a country's vulnerability to climate change and other global environmental sustainability challenges, as well as its ability and readiness to improve resilience:

1. These countries face the greatest challenges and have a strong need for investment and innovation to improve their adaptive capacity.
2. These countries are better prepared to respond to the challenges of climate change, but they also have greater adaptation needs.
3. These countries currently face relatively moderate challenges related to climate change, but their adaptive capacity is also low.
4. These countries are less vulnerable, and their capacity to adapt is relatively good.

⁵⁶ [ND-GAIN Country Index](#)

Vulnerability is assessed by taking into account six life-sustaining factors: food, water, health, ecosystem services, human habitat and infrastructure. Each factor is represented by six additional indicators, which can be grouped around three main components:

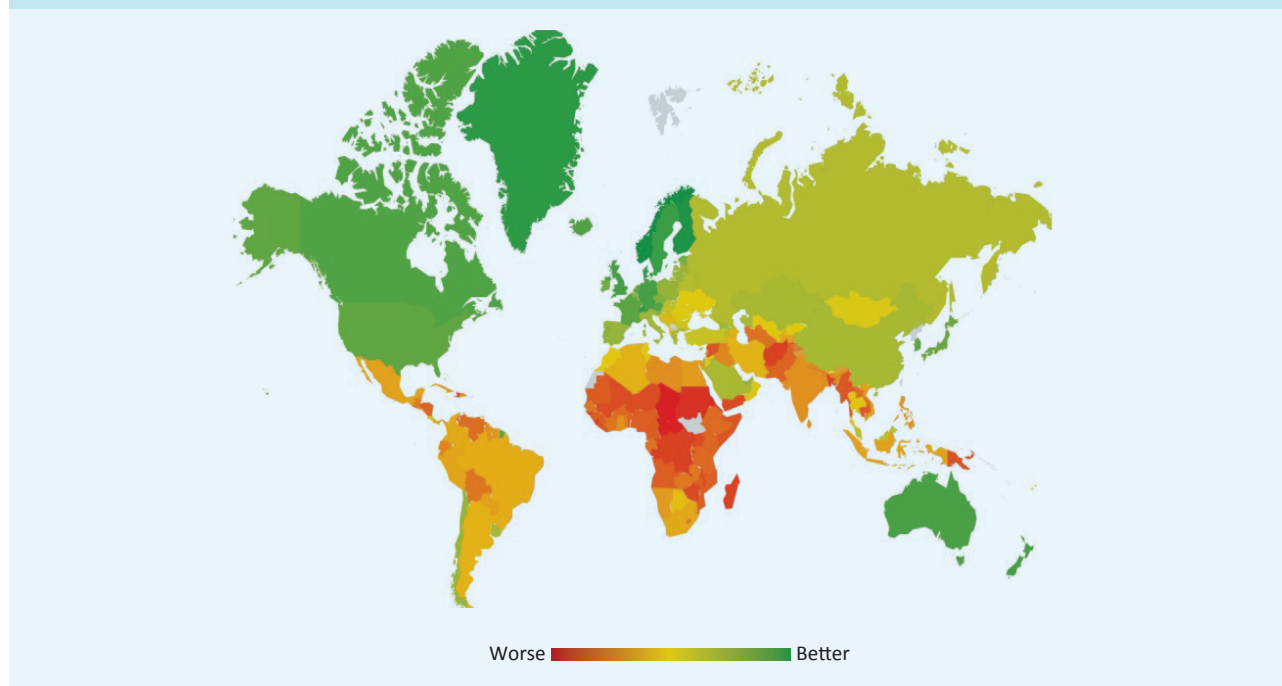
- The extent to which human society and the factors that support it are exposed to changing climatic conditions in the future. (This mainly captures the physical factors contributing to vulnerability).
- The extent to which climate change affects the population; factors that increase vulnerability include the degree of dependence on climate-sensitive sectors, and factors such as topography and demographics, and the proportion of the population vulnerable to climate hazards.
- Society's ability to adapt to reduce the negative effects of events related to climate change.

Readiness is assessed by the methodology by taking into account the ability of a given country to direct investments towards measures that facilitate the adaptation process.

- Economic readiness: an investment environment that facilitates the mobilisation of capital from the private sector.
- Governance readiness: the stability of the social and institutional structure that contributes to investment risks.
- Social readiness: conditions that help a given society to use investments efficiently and fairly.

Chart 24

Evaluation of countries around the world based on the ND-GAIN Country Index scores



Avoided GHG Emissions

- *In the case of the foreign exchange reserves, the reductions in GHG emissions published in each issuer's impact reports were aggregated for the analysis. There are significant differences in the methodology of the reports published by issuers, and the lack of transparency makes the analysis difficult; in some cases, therefore, direct consultation with the issuer or reliance on expert estimates was necessary.*
- *In the case of MBPP, the estimate was made by combining data on the mortgage bonds purchased, on mortgage loan disbursements and on the total estimated stock of residential properties in the National Building Energy Strategy. Energy savings are converted into emissions avoidance based on the Clim'Foot database and the emissions factors of the Partnership for Carbon Accounting Financials (PCAF).*
- *Information provided by mortgage banks in their impact reports was used for the GMBPP.*
- *The annual GHG emissions generated during the annual operation of the properties participating in the GHP were estimated based on the specific energy consumption (energy classification), size and emissions factors provided by the PCAF. The methodology takes into account only the GHG emissions savings in the operation of buildings; no data are available on emissions associated with construction.*

There are no new purchases in the programs. In the case of MBPP and GHP, the calculations are based on 2024 data, in the case of GMBPP, they have been updated according to the annual reference values.

WWF Risk Filter Suite⁵⁷

The platform is based on two pillars: the WWF Biodiversity Risk Filter provides a general, higher-level assessment of the risks of biodiversity loss and degradation of ecosystem services, while the WWF Water Risk Filter allows for a deeper analysis of the water-related risks. The platform covers several risk categories in line with the TNFD recommendations: physical and reputational (transition-regulatory) risks.

The extent of the physical risks is determined by the degree to which an economic process depends on the ecosystem services (dependency), the erosion of which can lead, for example, to a decline in productivity or an increase in the costs of production factors.

The Biodiversity Risk Filter distinguishes four main risk categories:

- *Provisioning services: Many economic processes rely on inputs provided by nature, the quantity or quality of which can lead to increased costs or disruptions to the production process. This risk category includes the four main natural resources needed for production: fresh water, timber, wild plant and animal species, and marine fish.*
- *Regulating and supporting services are essential for certain economic processes, particularly crop production and livestock farming. This risk category includes five main ecosystem services: condition of soil, water, air, ecosystem and pollination.*
- *Mitigation services: the occurrence of natural hazards can severely affect certain economic processes, the negative impacts of which can be mitigated by intact ecosystems. This risk category includes the following natural hazards: landslides, wildfires, pests, diseases, resistance to herbicides and extreme heat.*
- *Cultural services: some industries, such as tourism, real estate and education, may be heavily dependent on culturally valuable landscapes, seascapes or specific locations. The degradation of the key attraction elements can negatively impact businesses that rely on these features.*

⁵⁷ <https://riskfilter.org/>

In the case of the Water Risk Filter, physical risk arises from natural and human-induced degradation of freshwater ecosystem services. It includes six risk categories: 1) Water supply, 2) Drought, 3) Flooding, 4) Water quality, 5) Access to water, and 6) Status of ecosystem services.

The platform uses a variety of data sources as input for the different indicators, typically expressed in different units of measurement. For comparability and aggregation purposes, raw data are normalised on a scale from 1 to 5, with individual thresholds for each indicator; a risk score of 5 is very high, while a score of 1 represents very low risk.

Methodological limitations of country scores:

- *The scores do not reflect the wide range of risk variability that can occur in a large country such as the United States. For example, the water situation in California may be completely different from that in New York.*
- *The scores do not reflect the sectoral materiality of the different industries present in a given country, but only the area-weighted average of the “natural state” of the indicator for that country.*
- *The scores do not use asset-level data, i.e. they do not take into account all the different and diverse corporate activities within the country. In some countries, there may be 100 moderate-risk sites, while in others there may be 10 very high-risk sites. Mapping databases of economic activity with nature-related risk maps is important for the proper measurement of macroeconomic risks.*

EPI Environmental Performance Index Scores⁵⁸

The 2024 version of the EPI Index, developed by the Yale Center for Environmental Law & Policy and the Columbia University’s Center for International Earth Science Information Network, evaluates the countries in relation to eleven environmental sustainability issues, using 58 performance indicators spanning three main categories (climate change, ecosystem vitality and environmental health), to assess the countries in their progress of implementing the UN Sustainable Development Goals, the Paris Climate Agreement, and the Kunming-Montreal Global Biodiversity Framework.

The advantage of a comprehensive composite index is that it condenses data on dozens of sustainability issues into a single indicator. To make each metric easier to interpret, raw environmental data is transformed into indicators that score countries on a scale of 0 to 100, from worst to best performance.

The climate change category accounts for 30 per cent of the index, while ecosystem vitality accounts for 45 percent. The latter aims to show how well countries are doing in protecting the ecosystem services in six subcategories: biodiversity and habitats, forests, fisheries, air pollution, agriculture and water resources. The environmental health category accounts for 25 per cent of the score: it measures how well countries protect their population from the health effects of environmental pollution. It is divided into four further subcategories: air quality, wastewater and drinking water, heavy metals and waste management.

The index is useful in that it allows for the synthesis of the environmental information, a compact comparison between the countries and the identification of trends and problem areas, while at the same time obscuring differences in detail at this level of aggregation. Furthermore, it is important to note that the EPI Index is based on a number of assumptions and subjective methodological choices, and readers are therefore advised to treat the scores and rankings as a starting point for further analysis and examination of more detailed data.

⁵⁸ [EPI – Environmental Performance Index](#)

IMF Climate-related Disasters Frequency⁵⁹

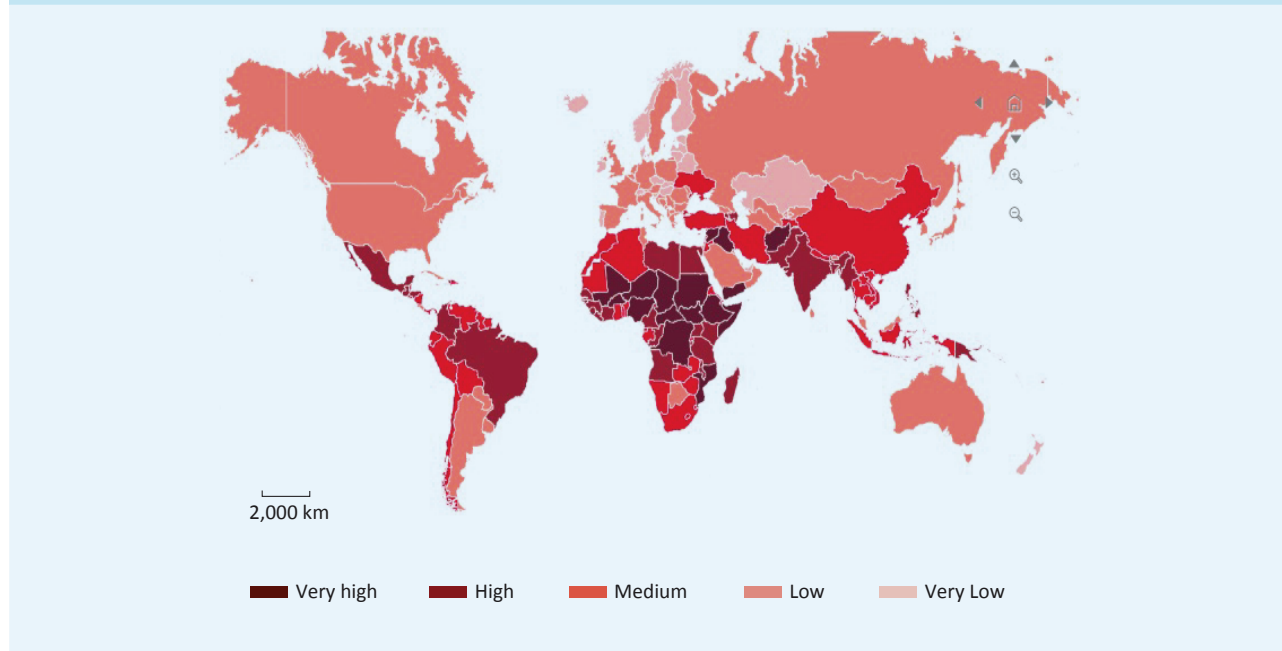
The Climate-related Disasters Frequency database is part of the IMF Macroeconomic Climate Indicators Dashboard, which provides comprehensive data on the frequency of climate-related natural disasters, tracking trends in floods, storms, droughts and wildfires. The data show that these events are increasing in both frequency and intensity, with developing countries often experiencing greater vulnerability and greater financial impacts than developed economies. Data source: Emergency Events Database (EM-DAT), Centre for Research on the Epidemiology of Disasters (CRED). EM-DAT records human and economic losses at the national level for disasters that meet at least one of the following criteria: i) caused ten or more deaths, ii) affected one hundred or more people, iii) led to the declaration of a state of emergency, iv) led to a request for international assistance.

INFORM Climate Change Tool⁶⁰

The INFORM Climate Change platform provides a basis for climate risk scenario analyses. The methodology is based on the overall INFORM Risk Index, a composite indicator that assesses the risk of humanitarian crises or disasters requiring international assistance for individual countries, taking into account climate change and socio-economic trends. The model is based on concepts published in the scientific literature and considers three dimensions of risk: hazards and exposures, vulnerability and lack of response capacity. The index is rated on a scale of 0-10, with 5 categories, ranging from “very low” risk to “very high” risk.

Chart 25

Evaluation of countries around the world based on the INFORM Climate Change Tool



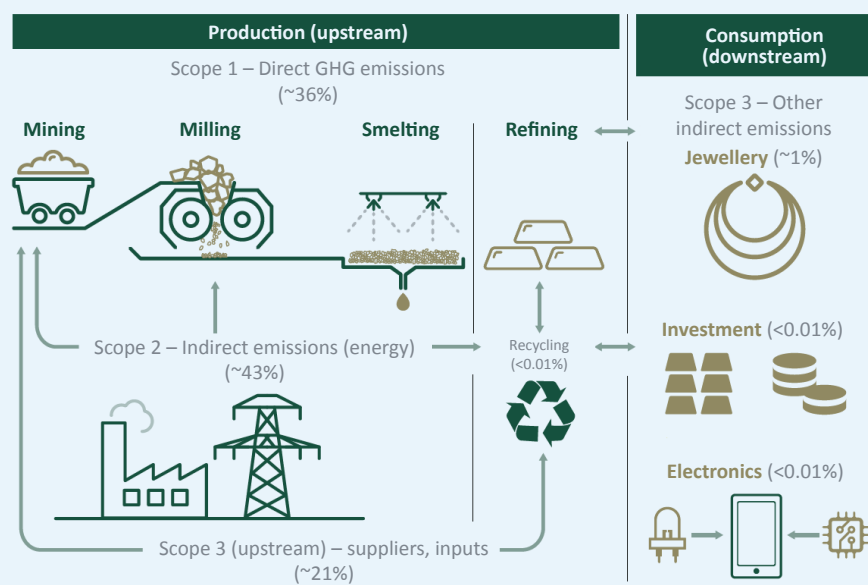
⁵⁹ [IMF Climate Indicators Dashboard](#)

⁶⁰ [INFORM Climate Change Tool](#)

Gold Value Chain and Related GHG Emissions

In order to understand the climate change impact and climate risk exposure of gold as an investment product, it is first necessary to examine the emissions profile of the gold production value chain. The separation of gold from ore is responsible for a large part of the value chain's energy needs, the vast majority of which is related to the use or on-site generation of electricity.

Chart 26
Distribution of emissions in the gold value chain



Source: World Gold Council (2019)

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