

National Bank of the Republic of Macedonia

National Bank's Medium-Term Climate Change Action Plan for 2023-2025

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Governor's foreword

The implications of the climate change are global-wide, spreading across all social areas. Unfortunately, we are already witnessing the social and economic implications of climate change, which inevitably signal the need for strategic thinking and building systems for greater resilience and mitigation of damages. The Paris Agreement, for example, ratified by our country, is one such international platform whose strategic goals seek to ensure coordinated and complementary international efforts to deal with climate change and adjust to new global landscape.

It is already quite clear that climate change is changing both environment and the context, in the area of finance as well. Transmission channels are mainly triggered by the climate risk drivers or the so-called physical and transition risks. Both may have significant consequences for the financial system stability as well as for the monetary policy. Therefore, the number of central banks that explicitly or implicitly include climate change in their mandate is growing. The central banks activities are mainly directed towards building up the banking system resilience to climate-related risks, thus upgrading its ability to support the transition to a green economy. Moreover, they are increasingly incorporating climate-related risks in both the set of monetary instruments and the analytical framework, due to their potential impact on financial and price stability.

The National Bank has fully recognized the importance of climate-related risks. Therefore, in the past, it has embarked on few specific activities, including the development of this medium-term action plan, which aims to provide a comprehensive, systematic and consistent framework for climate risk management from a central bank viewpoint. Our activities have so far been aimed at incorporating climate change in our medium-term strategic goals, membership in the Network of Greening the Financial System, thus joining a large number of central banks and regulators, establishing a system of ongoing collection of green finance data from our banks. We have also conducted a survey of banks' awareness of these issues and their exposure to climate-related risks.

With this first three-year plan, we aim to frame all our activities and define future steps towards climate risk management in the field of finance. The medium-term action plan illustrates the National Bank efforts to initiate activities in the area of the regulatory and supervisory framework, which also includes the adoption of Guidelines on Managing Climate-Related Risks for banks, and accordingly, amendments to the applicable legislation. Analyses of the impact of climate-related risks on the domestic banks are also envisaged as well as stress testing aimed to assess the banking system resilience. The plan also includes changes to the supervisory approach, with gradual active inclusion of climate-related risks in the evaluation of the banks' risk profile. Active national and international engagement, appropriate design of analytical and research activities as well as building and strengthening of institutional capacities, corporate culture and sustainability of the National Bank's operations are also part of our plan. The Plan also emphasizes the importance of coordinated activities in the country and the need for cooperation with other government institutions and bodies, considering that climate issues require a coordinated national approach.

With the adoption of this medium-term action plan and precisely defined activities for the next three years, we as a central bank are making our best contribution for active climate risk management. The Plan is a supporting tool for our institutional profiling as a sustainable and socially responsible institution, and encourages taking concrete and proactive steps to strengthen the banking system resilience in climate risk management as well as to increase its potential to support green transformation of the economy.



Anita Angelovska-Bezhoska Governor and Chairperson Of the Council of the National Bank Of the Republic of North Macedonia

Introduction

Climate change is one of the biggest challenges of modern society that becomes increasingly important in navigating the policies at global level. The climate change effects can be seen through the constant global warming and frequent natural disasters, which cause human suffering, but also severe economic and environmental damage. Direct damages from natural disasters, over the past decade, have been estimated to average about US dollar 1.300 billion or about 0.2% of the world's GDP, annually¹. According to the analyses, if the global temperature continues to rise in the period ahead, the global GDP losses would range between 8% and 13% by 2100².

The international community is making significant efforts to build policies to deal with climate change. An important milestone in this context was the adoption of the Paris Agreement³ in 2015, which established the global climate risk management framework. Since then, 196 countries, including the Republic of North Macedonia (hereinafter: RNM), have committed to implement the Agreement whose main objective is to limit the rise in global temperature to no more than 2°C and attempt to limit it to 1.5°C by 2050, compared to pre-industrial levels⁴.

Climate change management policies are mainly aimed at mitigating climate change by reducing greenhouse gas emissions, as well as adjusting to their undesired effects.

The national governments are primarily competent for the implementation of these climate policies, for which measures and activities are undertaken for management of climate change and for restructuring of the economies towards the model of sustainable economic development. This originates from the competence of government policies to encourage green finance, which would be achieved through adequate distribution of budget funds, subsidizing of investments in green technologies, definition of classification system (taxonomy) of green or sustainable economic activities, etc., while simultaneously discouraging the use of fossil fuels by regulating greenhouse gas emissions, introducing additional taxes and other charges, etc.

Climate change is an issue that is of interest for the central banks as well, due to the possibility of affecting the achievement of their goals, which are price and primarily financial stability and the competences in the domain of the banking supervision and regulation. The impact of climate change is materialized through two main channels, i.e. risks, which can affect the stability of the individual financial institutions and beyond, the overall financial stability. The first refers to physical risks, i.e. natural disasters that become increasingly frequent and cause damages to the balance sheets of companies and households. This may disturb their ability to repay loans and

¹ Equity Investors Must Pay More Attention to Climate Change Physical Risk by Felix Suntheim and Jerome Vandenbussche, IMF blog, May 2020.

² According to the analysis, global warming of 1.5 °C could decrease the global GDP per capita by 8% by 2100. The economic losses would be even greater (13%) if warming reach the 2 °C threshold. Source: Interactive: The impacts of climate change at 1.5 °C, 2 °C and beyond | Carbon Brief.

³ The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France on 12 December 2015. It entered into force on 4 November 2016. RNM ratified the Paris Agreement in November 2017 (Law on Ratification of the Paris Agreement (Official Gazette of the Republic of Macedonia No. 161/217). ⁴ The main objectives of the Paris Agreement are: (a) to maintain the growth of global average temperatures below pre-industrial levels, to no more than 2°C, with a focus on limiting the growth of temperatures to no more than 1.5°C compared to pre-industrial levels, in order to significantly reduce climate-related risks and their impact; (b) to increase the capacity to adjust to the adverse effects of climate change, to support the climate change management, to develop low greenhouse gas emissions which would not jeopardize the food production; (c) to reconcile financial flows with the path of development, for climate change management and for low greenhouse gas emissions. Key aspects of the Paris Agreement.

cause materialization of credit risk in banks' balance sheets. At the same time, natural disasters may result in damage to the immovable and movable property that is used as collateral for bank loans, which also increases the credit risk exposure. The second channel are the transitional risks, which essentially refers to the risk of banks suffering losses, due to exposure to clients that are not meeting environmental standards, hence having lower income and higher financing costs. Given that the transition to a green and sustainable growth brings about structural changes in the economies, it may also impose a need for adjustment of banks' business models. In this context, the central banks' activities are mainly aimed at building resilience of the banking system to climate-related risks, which also improves its ability to support the transition to a green economy. Climate change may affect inflation through the increasingly frequent natural disasters, which may lead to shocks on the supply side and greater instability and a rise in prices. Due to the uncertainty associated with climate change and its mitigation policies, it is difficult to assess their macroeconomic implications, which, as a factor of uncertainty may complicate the process of decision-making and adoption of monetary measures. The consequences from the climate change may also create risks of disruption of the transmission of monetary measures through their impact on the balance sheets of the private sector and indirectly on financial institutions.

Hence, the central banks, especially in the most developed countries, are increasingly focusing on green finance and climate-related risks. Recognizing the importance of these risks, the National Bank has so far undertaken several activities to increase awareness of the climate change implications and the importance of active contribution of all stakeholders to the creation of a green and sustainable economy. Since March 2021, the National Bank has been a member of the Network for Greening the Financial System, and at the end of 2021, it also took part in the Vienna Climate Change Initiative. With the Strategic Plan 2022 - 2024, climate change became for the first time a strategic goal of the National Bank, with planned activities mainly in the area of analytical and research activity, climate risk monitoring and management as well as analysis of their potential impact on the banking system. In early 2022, the National Bank conducted a *Climate Risks Survey* to understand the current banks and savings houses' practices and policies for monitoring and managing climate-relatedrisks, and the level of banks awareness about these risks. The end of 2022 marked the start of regular publication of data on green loans granted by banks to households and non-financial companies. The National Bank also changed the reserve *requirement instrument* for banks aimed to encourage lending to projects related to domestic production of electricity from renewable sources. In accordance with the amendments to the Decision on reserve requirement, the basis for allocating reserve requirement in denars of banks reduces by the amount of new loans for financing projects for domestic production of electricity from renewable sources.

This Medium-Term Action Plan sets the framework of activities that the National Bank will carry out in the area of climate-related risk management in the next three-year period with specified time dynamics for their carrying out. The Plan concerns several segments of the operations of the National Bank, such as financial stability, banking regulation and supervision, monetary policy, research, financial markets and strengthening of the capacities of the National Bank. Activities in the Medium-Term Action Plan are in accordance with the National Bank mandate and its competences defined by the Law on the National Bank, the Banking Law and the Law on Financial Stability. Hence, it envisages an active role of the National Bank in terms of raising the awareness of banks about the importance of this issue, taking into consideration especially the climate-related risk management and the monitoring of the compliance of the banks' operations with the regulations. This plan mirrors the National Bank endeavors to start activities for setting a

regulatory and supervisory framework that will provide adequate identification and prudent management of climate-related risks by domestic banks. To assess the resilience of the banking system to climate-related risks, analyses of the exposure and the possible impact of these risks on the operations of domestic banks are planned, and if applicable, implementation of stress tests. The Plan envisages research activities in several areas, including analyses of climate change in the context of the monetary policy. Moreover, it envisages further improvement of the national and international cooperation, strengthening of the institutional capacities and the sustainability of the operations of the National Bank. The Plan emphasizes the importance of coordinated activities in the country and the need for cooperation with other government institutions and bodies, given that some crucial climate-related issues (such as green taxonomy/or requirements for publication of data by non-financial companies) are not within the National Bank competence.

This document consists of four sections. The first section gives an overeview of the importance of climate change in the context of the domestic economy with a review of the efforts and activities undertaken at a national level to mitigate climate change and build a sustainable economy. The second section considers the most relevant international and European experiences in the field of regulation and supervision of climate-related and environmental risks, including the activities of European institutions⁵. The third section includes a preliminary analysis of the exposure of the domestic banking system to climate-related risks, together with a short review of the results of the *Climate Risks Survey*, conducted by the National Bank at the beginning of 2022. The fourth section highlights the principles underlying the Medium-Term Action Plan and determines the specific activities in the area of climate-related risks that the National Bank will undertake in the period 2023 - 2025.

This Action Plan is prepared with the technical assistance from the Financial Sector Advisory Center – FinSAC.

⁵ European Banking Authority – EBA, European Central Bank – ECB and the international institutions such as the Basel Committee for Banking Supervision – BCBS.

Summary

The RNM is sensitive to risks stemming from the climate change. This originates from the geographical and climate profile of the country, which exposes it to risks of natural disasters and extreme weather events (such as droughts, torrential rains, floods, heat waves), which caused by climate change may further intensify in the following period. An additional factor is the main economic model that includes high energy intensiveness and is based on climate-sensitive natural resources. The domestic economy has high energy consumption, which measured by unit product is three times higher compared to the European average, although it is slightly lower than the average of the Western Balkan` countries⁶. Electricity production is predominated by fossil fuels (around 74% of the total gross production in 2022⁷), whereby the energy sector causes most of the greenhouse gas emissions in the country⁸. The share of renewable resources in the gross final energy consumption in the domestic economy in 2021 equaled 17.3%⁹, while in the European Union it averaged 21.8%¹⁰. Such situation points to exposure of the country to the risk of transition in the restructuring of the economy to the sustainable development model.

Hence, it is important that on a national level there is a commitment to the issue related to climate change, which is confirmed by the activities undertaken so far. The RNM is a party to the United Nations Framework Convention on Climate Change (1997), which ratified the Kyoto Protocol (2004) and became a signatory to the Paris Agreement (2016). The country made its first step for the operationalization of the obligations from these documents in 2015, when it submitted the first Nationally Determined Contribution to reduce greenhouse gas emissions to the UN Convention, as the twenty-third country in the world. The Nationally Determined Contribution was revised and strengthened in 2021, whereby the ambition by the end of 2030 to reduce greenhouse gas emissions by 51% compared to the 1990 emissions was set as a national goal, which would mean a reduction of 82% of greenhouse net gas emissions. So far, three national plans and three two-year reports on climate change have been submitted to the UN Convention. With the Third two-year updated climate change report, from 2020, the RNM identified the priority activities for sustainability, primarily in agriculture, forestry, waste, energy, transport, health, and biodiversity.

Despite the fact that it is not a country from Annex 1¹¹, the RNM is a candidate country for EU membership, whereby it should adhere to EU policies on climate and energy that are based on the obligations of the countries from Annex 1 of the Framework Convention to reduce emissions.

⁶ According to the 2021 SSO data, the energy intensiveness (measured as spent energy for the production of 1,000 euros of GDP expressed in kilograms of normalized energy unit) in the Republic of North Macedonia is 359.7 kgoe/'000euros, while according to the European Union for the same year is 117,04 kgoe/'000euros, and the average of the countries of the Western Balkan is 377,92 kgoe/'000euros.

⁷ Source: SSO, Monthly energy statistics/ Electricity in MWh, by months.

⁸ Most of the greenhouse gas emissions in 2016 were in the category energy industries (51.0%), followed by transport (28.1%) and production industries and construction (13.9%). Source: Third two-year climate change report, Ministry of Environment and Physical Planning, August 2020.

⁹ Source: SSO, Energy indicators.

¹⁰ Source: Eurostat.

¹¹ Annex 1 of the UN Framework Convention on Climate Change refers to the developed countries, including the European Union Member States, which are required to regularly report on the undertaken measures and policies related to climate change and to submit annual data on the national inventory of greenhouse gas emissions, including 1990 data, as the base year and all the years from then onwards. Countries that are not included in Annex 1 are the developing countries and more general rules for reporting on the measures and activities for dealing with climate change apply to them, while the reporting on greenhouse gas emissions is conditioned by the dynamics of providing finances for the preparation of the reports.

Also, as a contracting party of the Energy Community¹², the country is required to implement EU regulations on monitoring, reporting and verification of greenhouse gas emissions. The RNM is one of the six countries of the Western Balkan that in November 2020 signed the Declaration in Sofia, with which the countries of the Western Balkan accepted the European Green Deal¹³, as the cornerstone for the implementation of the Green Agenda for the Western Balkans - GAWB.

The Agenda includes several goals, as follows: 1. Decarbonization: climate, energy and transport/mobility; 2. Transition to a circular economy; 3. Depollution of the air, water and soil; 4. Sustainable agriculture and food production; and 5. Protection of nature and biodiversity.

Regarding the competences in the field of climate change, the Third two-year climate change report indicates the Ministry of Environment and Physical Planning as the national institution for contact with the United Nations Framework Convention on Climate Change and is the national authority for the implementation of the Kyoto Protocol. Other ministries responsible for the policies relevant to climate change include: the Ministry of Labor and Social Policy, the Ministry of Economy, the Ministry of Agriculture, Forestry and Water Economy, the Ministry of Transport and Communications, the Ministry of Health and the Ministry of Finance, as well as other bodies¹⁴.

The National Bank has no competences in the activities that are related to the alignment of the domestic economy with the Paris Agreement and the establishment of policies for transition of the economy to a sustainable development. However, climate change is an important issue for the National Bank due to the possibility of affecting the banking system and price and financial stability. Like for other central banks, the timely actions for building its capacities and those in banks is of particular interest for the National Bank as well, which will contribute to identification of climate-related risks, for their better understanding and assessment of the potential implications, for the purpose of prudent management and building of resilience of the banking system to climate-related risks. The National Bank's interest in climate change also originates from its social responsibility and determination to contribute to issues that are of public interest.

This document has a special focus on the relevant international practices and regulatory and supervisory experiences related to climate–related risks, which contributes to establishing the

¹² The Energy Community is an international organization that unifies the European Union Member States and some neighboring EU countries in order to create an integrated Pan-European energy market. The organization was established by the Treaty establishing Energy Community signed in October 2005 in Athens, Greece, which has been in force since July 2006. The key objective of the Energy Community is to extend the rules and principles from the EU's internal energy market to the countries in Southeast Europe, the Black Sea region and beyond on the basis of a legally binding framework. The Energy Community has nine contracting parties - Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Georgia, Moldova, Montenegro, Serbia and Ukraine. For more information, please visit the following link.

¹³ The European Green Deal - EGD, which was adopted in December 2019, represents a harmonized strategy for a climate-neutral, efficient, in terms of resources and competitive economy for Europe. The European Green Deal aims to transform the EU economy into a sustainable economy and to deal with the challenges for the climate and for the environment. The European Green Deal is also an integral part of the European Commission's Strategy for the implementation of the United Nations 2030 Agenda and the Sustainable Development Goals. In this context, with this Deal, the EU Member States have committed by 2050 to reach zero greenhouse gas emissions, on a net basis and by 2030 to reduce greenhouse gases by at least 55% compared to the 1990 levels.

The European Green Deal is not only a strategy at a level of the EU for undertaking activities for dealing with climate change, but it is also a path for transition to a new model for sustainable economic growth, where the growth is less dependent on the intensive use of natural resources. The European Green Deal is based on a set of policies in several areas, priority sectors and cross-sector topics.

¹⁴ The Office of the Deputy Prime Minister for Economic Affairs is responsible for achieving the Sustainable Development Goals and is also the national authority designated for the Green Climate Fund. The National Committee on Climate Change, established by the Government, provides high-level support and guidelines in the adoption of climate change policies. The Committee is constituted of representatives of the main stakeholders, i.e. representatives from the national institutions, academia, private sector and civil organizations, as well as the climate change coordinators from the ministries.

best practices in the area. Taking into consideration the European Green Deal, special focus is paid to the European regulatory and supervisory practices.

This Medium-Term Action Plan is the first step of the National Bank towards integration of climaterelated risks into the analyses of the domestic banking system and it also provides an initial assessment of the exposure of the Macedonian banking system to the sectors, which in the international practice are assessed as the most climate sensitive. The analysis includes economic sectors that are considered more sensitive to transitional risks, which may arise from the new policies, technological development or the socioeconomic changes caused by climate change. The starting point isthe general classification of these sectors as the most climate sensitive, while the micro-features of each economic entity and the potential measures and activities for transition to more environmentally sustainable operations, are not considered. Consequently, the analysis provides an initial assessment of the domestic banking sector exposure to more climate sensitive sectors, while the magnitude and significance of climate-related risks for the domestic banking sector, which is conditioned by several factors including the progress of climate sensitive companies in green transformation, are not measured. Hence, it requires careful interpretation of the results and supplementing the analysis with more granular data and more sophisticated methods for analysis.

The results of the conducted analyses show that more than half of the total banking loans to nonfinancial companies (between 50% and 55% in the last five years) have been granted to climate sensitive sectors of the economy, particularly in the "Buildings" sector (the total exposure is between 14 and 18% and has a growing trend), the "Transportation" sector (with a stable share of 12% in the analyzed period), the so-called "Energy intensive" sector (between 11 and 13% with small changes by years) and to a lesser extent "Utilities" sector, "Fossil fuels" sector and "Agriculture" sector (joint share of these sectors is about 15%). Although these analyses suggest a relatively high exposure of the domestic banking system to climate sensitive sectors, as it was previously pointed out, it is important to have in mind that the analyses do not take into account the micro characteristics of the individual economic agents that are important for making a more detailed assessment of the exposure of the banking system to transition risks. Hence, there is a need for careful interpretation of the very initially obtained results.

Transitional risks refer to one dimension of climate-related risks to which the Macedonian banking system is exposed to. Physical risks are also important given the exposure of the domestic economy to the risk of natural disasters. Analyses¹⁵ show that the domestic economy is exposed to high risk of devastating floods, including in the urban areas, which means that this risk event may occur at least once in the next 10 years. The risk of wildfires is also high, while the risk of extreme heat waves is assessed as medium, which means that there is higher than 25% probability that in the next five years the country will at least once face a protracted period of extremely high temperatures. These physical risks may indirectly affect the risk profile of domestic banks through the impact on the balance sheets of households and the corporate sector.

The analyses of the exposure of the banking system to climate-related risks are important for monitoring and assessment of the risks for the financial stability. Banks' readiness to identify these risks is equally important, to adequately include them in their risk management frameworks

¹⁵ It refers to the analyzes made using the tool Think Hazard, published in 2020. Think Hazard is a tool developed by the Global Facility for Disaster Reduction and Recovery - GFDRR. GFDRR was established in 2006 as a multi-donor partnership. It supports lowand middle-income countries to understand, manage and reduce the risks from the natural hazards and climate change.

and to efficiently manage them. As part of the preparation of the Medium-Term Action Plan, the National Bank conducted a Survey to perceive the practices applied by banks and savings houses in the domestic economy for managing climate-related risks. According to the answers in the Survey, almost 90% of the respondents consider that climate change is an important source of risk for the financial stability. However, most of the banks and savings houses suggest that the climate-related risk management process is in its initial stage. The respondents indicate the following obstacles as the most significant to better management of this type of risks: the lack of standards and tools, the absence of guidelines from the regulator and the lack of relevant data, thus pointing to the limited internal resources and policies.

Building banking system resilience to climate-related risks is also important in the context of strengthening its ability to contribute to financing the green agenda. The green transformation of the economy requires financial resources that will support the fulfillment of the assumed international obligations. Taking into consideration the estimated financing needs of the Macedonian economy¹⁶, the contribution of private capital in financing is especially important. In this context, the financial system may have an important role by supporting the process of transition of the domestic economy to a new model of sustainable growth that is also incorporated into the Nationally Determined Contributions and the European Green Deal. In addition, it can mitigate the impact of physical risks, through their appropriate identification and inclusion in the risk management frameworks. In the EU, the authorities recognized the important role of the financial sector and with the renewed Sustainable Finance Strategy, which provides for reforms in this sector, it obtained a key role in the activities towards achieving a green and sustainable economy¹⁷.

This Medium-Term Action Plan, which refers to the period 2023 - 2025, includes the key activities that the National Bank will undertake in the area of climate-related risk management with the roadmap for their implementation. The activities are classified in six groups that encompass various segments of the operations of the National Bank, such as banking regulation and supervision, financial stability, monetary policy, national and international cooperation and building organizational culture and knowledge, i.e. strengthening the sustainability in the operations of the National Bank in the context of climate change. The implementation of the Medium-Term Action Plan is expected to contribute to better understanding of climate –related risks, their incorporation into the analyses of the banking system and of the monetary policy and building of a resilient banking system that will be able to support the transition of the economy towards green and sustainable development.

¹⁶ It is estimated that the investments necessary for the materialization of the decarbonization scenario are 7.7% of the total average annual GDP. As stated in the action plans of the individual sectors, in addition to the domestic investments, the country also expects international support (international funds, donors, banks) which will adjust the RNM development path to a low-carbon economy, will further help in separating the carbon emissions from the economic growth and for providing a solid level of real GDP per capita. Together with the international financial support, the country will also need assistance in the form of transfer of technology and capacity building. In this context, the banking sector is expected to have a key role.

¹⁷ The renewed strategy builds on the European Commission` initial Action Plan for financing sustainable growth, which laid down the foundations for channeling of private capital towards sustainable investments. The Action Plan aims to: (i) reorient capital flows towards sustainable investments, (ii) manage physical risks stemming from climate change, resource depletion, environmental degradation and social issues and (iii) foster transparency and long-term commitment to the financial and economic activity.

1. The Medium-Term Action Plan in the context of the RNM

The <u>Paris Agreement</u>, which the RNM ratified in November 2017, required from the country to implement climate policies and activities for climate change management. With this Agreement, the RNM among other things has committed to contribute to: "limit the increase in the global average temperature to well below 2°C above the temperature in the pre-industrial level, while pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial level, perceiving that this will significantly reduce the risks and impact of climate change". In the efforts to join the global response to the challenges, which arise from climate change, the RNM in 2015 prepared the first Nationally Determined Contribution to the Paris Agreement¹⁸. In April 2021, the RNM revised and strengthened the Nationally Determined Contribution, thus setting an ambitious goal: "to reduce greenhouse gas emissions by 51% in 2030 compared to the 1990 levels or expressed in net emissions, reduction of 82% in 2030 compared to 1990 levels".

In accordance with the Enhanced Nationally Determined Contribution to the Paris Agreement, some of the key components of the new efforts of the RNM²⁰ are the following:

- <u>63 policies and measures</u> are proposed to mitigate climate change and pave the way for an ambitious economy-wide commitment making a strong economic case for decarbonization, as a cheaper alternative to implement the existing policies.
- Greening of the economy is projected to create about 8,000 new jobs until the end of 2030.
- The role of the <u>private sector</u> is highlighted, as it participates with 85% of the total investments needed for the implementation of the policies and measures in the industrial sector.
- It is estimated that the shift to a model of <u>circular economy</u> until the end of 2030 could deliver annual savings of 951 Gg greenhouse gases expressed as carbon dioxide equivalents, create 2,740 new jobs and provide economic benefit in a counter-value of Euro 47.17 million. The shift to more advanced waste management practices is sufficient to compensate the emissions created from the solid waste disposal and the emissions that generate the industrial processes and the product use sectors.
- Several gender-oriented policies are taken into account by introduction of <u>gender</u> <u>indicators</u>.
- The <u>Quantification of Synergies and Trade-offs</u> between the Sustainable Development Goals and the goals from the Enhanced Nationally Determined Contribution of the RNM to the Paris Agreement shows that the largest synergies are almost three times stronger than the highest trade-offs.
- An innovative approach for virtual <u>consultation of young people</u> has been used to ensure that their voice and opinions are expressed in the Nationally Determined Contribution.

In November 2020, by signing the Declaration for the implementation of the Green Agenda in Sofia²¹, the six countries of the Western Balkan²² have committed themselves to ambitious goals

¹⁸ First Nationally Determined Contribution of the RNM to the Paris Agreement, 2015.

¹⁹ Enhanced Nationally Determined Contribution of the RNM to the Paris Agreement, 2021.

²⁰ Press Release on the new efforts of the RNM for the climate under the Paris Agreement, United Nations Development Programme.
²¹ Sofia Declaration for the implementation of the Green Agenda for the Western Balkans.

²² In addition to the RNM, signatory countries to the Declaration for the implementation of the Green Agenda also include Albania, Bosnia and Herzegovina, Kosovo, Serbia and Montenegro.

related to climate and the environment, structured in five pillars: 1. Decarbonization: climate, energy and transport/mobility; 2. Transition to a circular economy; 3. Depollution of the air, water and soil; 4. Sustainable agriculture and food production; and 5. Protection of nature and biodiversity²³. However, the implementation of the Green Agenda has challenges, due to perceived financial, economic and social costs associated with the transformation processes, the different interests of social stakeholders, the information gaps between decision-makers and oposition from vested interests.

Despite the relatively small area, RNM has a diverse climate, with eight climate regions: sub-Mediterranean, moderate continental sub-Mediterranean, warm continental, cold continental, sub-forest continental mountainous, forest continental mountainous, sub-alpine mountainous and alpine mountainous. The average annual temperatures in the RNM range from about 8°C in the northwestern regions to 15°C in the central regions. Based on the historical average of temperatures, January is the coldest month, while July is the warmest month of the year. Precipitation is not equally distributed on the territory of the country. Itmainly increase moving from the east to the west in the country, whereby the annual quantities of precipitation range from about 400 mm in the southeastern and central regions to over 1,000 mm in the mountain areas, in the western and northwestern regions. In the southern regions with a Mediterranean climate, the largest quantities of precipitation are registered in October, November and December, while in the central and northern regions, where the climate is more continental, the largest quantities of precipitation during the year are registered in May and June²⁴.

The **agricultural sector in the RNM** makes up a relatively small portion of country's GDP (7.2%) and employs 11.8% of the total workforce²⁵. The total number of agricultural holdings in the RNM is 178,125²⁶, which is important for a country with a population of 1.8 million citizens²⁷. However, having in mind that 38.4%²⁸ of the population in the country lives in rural areas, where off-farm employment opportunities are limited, the agricultural sector is of critical importance for the well-being of about half of the population in the country²⁹. Although the RNM has preconditions for cultivation of a wide spectrum of products, including most of continental and Mediterranean cultures, the agricultural sector and the related rural economic activities are particularly vulenrable to changes in climate. During an average year, the evapotranspiration is higher than the rainfall, while the prolonged heat waves and dry periods in 2008 and 2012 led to significant production losses. With less than 10% of the agricultural land irrigated, this trend can be expected to continue, as climate change causes an temperatures to rise and continues to drive more frequent and intense heat waves and droughts. Increased temperatures also have the potential to adversely affect the crop growth cycles, by reducing the amount of time available to develop the harvestable portions of plants in the proper temperature range³⁰.

The water resources in RNM are spatiallu diverse, whith the quantity depends on precipitation and snowmelt. The temperature rise is expected to change the usual course of snow cover creation and snowmelt, with a chance of reducing snawfall, especially at lower altitudes as well

²³ Action Plan for the Implementation of the Sofia Declaration on the Green Agenda for the Western Balkans 2021 - 2030.

²⁴ Source: <u>World Bank Climate Change Knowledge Portal</u>.

²⁵ Source: State Statistical Office. 2021, previous data.

²⁶ Source: State Statistical Office. <u>Structural research for the agricultural holdings in the RNM, conducted in 2016 (on Macedonian language)</u>.

²⁷ Source: Household data is according to the Census carried out in 2021.

²⁸ Source: State Statistical Office, Statistical Atlas, Census 2021.

²⁹ Source: World Bank.

³⁰ Source: Climate Risk Profile - North Macedonia, USAID Fact Sheet.

as premature snowmelt and mountain runoff water. The ski centers in the RNM are also at risk, since most of them are located at an altitude between 1,200 and 1,600 m, with a possibility for more rain and less snow due to temperature rise. The natural fresh water springs are poorly used due to their small capacity, although there are springs with a capacity to supply small towns and villages. Water resources are extremely sensitive to climate change effects, in terms of both quality, quantity and the time dynamics, given the fact that a reduction of the average precipitation in the country is expected in the upcoming period. Access to drinking water is often limited in rural areas, which could further worsen due to climate change. The adverse effects could be significantly felt in agricultural areas, which may face a lack of water for irrigation and thus reduced agricultural yield³¹.

The electricity in the RNM is mostly produced by combustion of fossil fuels, mainly lignite coal. The share of fossil fuels in total gross electricity production in 2022 amounted to 74%³². The renewable resources in the gross final energy consumption in the domestic economy in 2021 equaled 17.3%³³, while in the European Union it averaged 21.8%³⁴. Given the high share of coal in the electricity production, it is worth mentioning that with the first Nationally Determined Contribution to the Paris Agreement our country pledged to reduce the carbon dioxide emissions. With the Revised Nationally Determined Contribution to the Paris Agreement, the scope of targeted emissions has expanded and referred to the greenhouse gases (carbon dioxide, methane and nitrous oxide). The energy sector is expected to make the largest contribution to completing the set objectives, i.e. reducing the net and gross greenhouse gas emissions by the end of 2030. In accordance with the National Energy and Climate Plan of the Republic of North Macedonia, the energy sector aims to reduce the greenhouse gas emissions by 2030 in the amount of 66% compared to 1990 levels³⁵. The determination to reduce the greenhouse gas emissions is expected to help in finding solutions to high air pollution in some parts of the country, especially in Skopje.

In the past few years, significant investments have been made in the production facilities that use renewable energy sources³⁶, and this trend is expected to continue in the following period, given the increased demand for electricity and the amortization of the equipment for fossil fuel production. The RNM is strategically determined to invest in renewable energy sources, such as small hydro power plants, wind farms, as well as biogas plants³⁷, while the private sector and households are interested in investing in photovoltaic power stations and photovoltaic systems. However, it should be born in mind that the electricity production from renewable sources is volatile and primarily depends on the hydropower potential. The hydro plants are sensitive to the expected reduction of rainfalls in the country, as well as the increased risk of landslides and soil erosion³⁸. Hence, it is of strategic importance to the country to invest in the improvement of electricity distribution and transmission network, through cross-border connection with the neighboring countries and diversification of energy used to generate electricity. In order to

³¹ Source: Same as the previous footnote.

³² Source: SSO, Monthly energy statistics/ Electricity in MWh, by months.

³³ Source: SSO, Energy indicators.

³⁴ Source: Eurostat.

³⁵ Source: <u>National Energy and Climate Plan of the Republic of North Macedonia</u>.

³⁶ 38 new power plants that use renewable energy sources starter working in the power system in 2020: 6 hydro plants and 32 photovoltaic power plants. In 2021, the distributive power network included new electricity producers, most of which were photovoltaic power plants or small hydro plants. Source: Annual Report of the ERC operation for 2020 and 2021.

³⁷ Source: Energy Strategy of the Republic of North Macedonia 2040.

³⁸ Source: Same as the previous footnote.

establish full gasification, the construction of main gas pipelines across the country is crucial, as well as construction of secondary/city gas pipeline network.

The biodiversity of the RNM, due to the geographic features (diversified topography) and climate variations during the year, is rich and unique within Europe, registering more than 16,000 species, including 854 endemic species/endemics. The endemic species/endemics are vulnerable to climate change, especially those who persist only in subalpine and alpine regions. Out of the total land area, 40% is forested land, primarily with various species of oak and beech trees, with a small portion, of coniferous trees, mostly in higher altitudes. Most of the forested land (90%) is state-ownedand managed by public companies or local government. The higher temperatures and decreased percipitation are likely to increase the risk of forest fires³⁹.

Given the aforementioned, the RNM is exposed to several geographical and climate-related hazards, some of which are increasing in frequency and magnitude. According to Think Hazard⁴⁰, the vulnerabilities of the RNM are as follows:

- *The wildfire hazard* is classified as *high,* with a probability (greater than 50%) that the encountering weather could support a significant wildfire, which is likely to result in both life and property loss. The level of wildfire hazard is equal throughout the country.
- *The earthquake hazard* is classified as *medium,* with a 10% chance of potentially damaging earthquake in the next 50 years. The level of earthquake hazard is equal throughout the country. According to the loss assessments, earthquakes can make up 78% of total potential average annual loss in the country based on natural disasters⁴¹.
- *The landslide hazard* is classified as *high*, given that the RNM has rainfall patterns, terrain slope, geology, soil, land cover and (potentially) earthquakes that make landslides a frequent hazard phenomenon. Analyzing geography, the greatest landslide hazard is present in the Eastern and Skopje Region.
- *The river flood or urban flood hazard* is classified as *high*, which means that potentially damaging and life-threatening river floods or urban floods are expected to occur at least once in the next 10 years. The highest level of river flood hazard is noted in the Central and Northern Regions of the country, while the urban flood hazard is almost equally present throughout the country. According to the data for the period 1990 2014, floods are the most frequent of all natural disasters in the RNM in this period, with a share of 50%. According to the loss assessments, floods can make up 22% of total potential annual average losses in the country based on natural disasters⁴².

³⁹ Source: Same as the previous footnote.

⁴⁰ Source: Think Hazard, 2020 Report

⁴¹ Source: <u>Global Assessment Report on Disaster Risk Reduction 2015, UNDRR</u>. The annual average loss in the Report is defined as *expected loss associated with the occurrence of future hazards with an assumption for a very long time period*. <u>The assessment of the RNM</u> was made with the help of risk models based on probability, and uses data on natural disasters in the RNM (in the period 1990-2014) and country specific macroeconomic and statistical indicators.

⁴²<u>Global Assessment Report on Disaster Risk Reduction 2015, UNDRR</u>. The annual average loss in the Report is defined as *expected loss associated with the occurrence of future hazards with an assumption for a very long time period*. <u>The assessment for the RNM</u> was made with the help of risk models based on probability, and uses data on natural disasters in the RNM (in the period 1990-2014) and country-specific macroeconomic and statistical indicators.

- *The extreme heat hazard* is classified as *medium* with a chance (more than 25%) that at least one period of prolonged exposure to extreme heat, potentially resulting in heat stress, will occur in the following 5 years. This hazard is more pronounced in the Central and South-Eastern part of the country.
- *The water scarcity hazard* is classified as *medium* with a chance up to 20% that droughts will occur in the coming 10 years. The hazard level is the highest in the Northern Regions of the country.

Considering the importance and the topicality of the global green and sustainable growth, as well as the pronounced trend among central banks to mitigate the undesirable economic consequences of the climate change, including the effects on financial systems, the National Bank in 2020, for the first time, highlighted *the green finance* as a high strategic priority area. Recognizing the climate change-related challenges, in 2021, the National Bank submitted an initiative and became a member of the Network for Greening the Financial System. Given the clear commitment to contribute to green and sustainable economy, set in the Strategic Plan for 2022-2024, during 2022 the National Bank intensified its activities in this area. This three-year plan is one of the steps to include the climate change-related risks in the analyses of the banking system in the RNM.

2. Regulatory initiatives for climate-related risks

In order to provide an adequate framework for covering the climate-related risks drivers, the regulatory and supervisory bodies worldwide have been undertaking decisive actions and initiatives with a twofold purpose to ensure that: (1) banks properly understand, identify, control and manage climate-related risks to which they are exposed to and (2) supervisors are prepared to adequately determine the climate-related risks profile of each bank. In this regard, the Bank of England was the first institution to issue Guidelines for Bank's management of risks from Climate Change in April 2019⁴³. Later on, in November 2020, the European Central Bank (ECB) released a comprehensive Guide on climate-related and environmental risks (framework 1). Following the example of these institutions, other national supervisory bodies in EU have also issued expectations and/or recommendations on the management of these risks⁴⁴.

Framework 1: ECB expectations for banks45

- 1) Banks are expected to understand the impact of climate-related and environmental risks on the business environment in which they operate, in the short, medium and long term, in order to be able to make adequate strategic and business decisions.
- 2) When determining and implementing their business strategy, banks are expected to bear in mind the material impact of climate-related and environmental risks, in a short, medium and long run.
- 3) The banks' authorities are expected to consider the climate-related and environmental risks when developing the bank's business strategy, determining the business objectives, in the overall risk management framework, and to perform an effective oversight of these risks.
- 4) Banks are expected to include climate-related risks and environmental risks in their risk appetite statement.
- 5) Banks shall determine authorities/persons responsible for climate-related risks and environmental risks management, given the control functions.
- 6) For the purpose of internal reporting, banks are expected to introduce a reporting system for the cumulative level of exposure to climate-related and environmental risks enabling bank's bodies to make appropriate decisions.
- 7) Banks are expected to incorporate climate-related and environmental risks into overall risk management framework, for the purpose of their long-term management. Banks are expected to identify and measure these risks as part of the overall internal capital determining process.
- 8) Within their credit risk management process, banks are expected to consider climaterelated and environmental risks in all phases of the process of credit approval, and monitor these risks in their portfolio.
- 9) Banks are expected to consider the impact of climate-related and environmental risks on the business continuity plan and the degree up to which the nature of their operations could adversely affect the reputational risk and/or liability (litigation) risk.
- 10) Banks are expected to regularly monitor the impact of climate-related and environmental factors on their current market risk positions and on future investments, and to develop stress tests, which incorporates climate-related and environmental risks.

⁴³ <u>Guidelines of the Bank of England for climate-related risk management</u>.

⁴⁴ See for example the National Bank of Hungary "Recommendation No. 47/2021 (IV.14) on climate-related and environmental risks and integration of the environmental sustainability considerations into the activities of the credit institutions. The Recommendation was updated during 2022.

⁴⁵ Guide on climate-related and environmental risks: Supervisory expectations realted to the risk management disclosure, November 2020.

- 11) Banks with material climate-related and environmental risks are expected to evaluate the appropriateness of their stress testing, in order to incorporate these risks in the baseline and adverse scenarios.
- 12) Banks are expected to assess whether material climate-related and environmental risks could cause net cash outflows or depletion of liquid assets. If the assessment indicates such outflows, banks are expected to incorporate climate-related and environmental risks in the liquidity risk management and in the internal liquidity adequacy assessment.
- 13) For the purpose of their regulatory disclosures, banks are expected to publish appropriate and clear data and indicators for climate-related and environmental risks exposure, with due regard to the European Commission's guidelines on non-financial reporting.

In the context of regulatory initiatives, the activities of the Basel Committee on Banking Supervision (BCBS) are of particular importance. This committee has issued the final version of the Principles for the Effective Management and Supervision of Climate-Related Risks in 2022⁴⁶. The Box 2 gives a short review of the basic aspects of this BCBS's document.

⁴⁶ <u>Principles for effective management and supervision of climate-related risks</u>.

Box 2: BCBS's Principles for effective management and supervision of climate-related risks

Climate change could lead to physical and transition risks, which could affect safety and soundness of individual banking institutions and have broader financial stability implications. Considering this, the BCBS in 2020 established a working group to contribute to strengthening regulation, supervision and practices of banks worldwide on climate-related risks, with the purpose of enhancing financial stability.

The BCBS has conducted an analysis on potential "gaps" in the Basel capital accord and consider possible measures for addressing these gaps. The analysis showed that the Core principles for effective banking supervision and the Supervisory Review and Evaluation Process (SREP) are sufficiently broad and flexible to accomodate for appropriate coverage of climate-related risks. However, in June 2022 the BCBS prepared and publish the Principles for the effective management and supervision of climate-related risks, which have to be considered by banks for an adequate risk management, as well as to serve as a benchmark/reference for adequate supervisory practices for climate-related risk assessment.

The document includes 18 principles, 12 of which provides banks with guidelines for effective climate-related risk management, while 6 of them represent recommendations for supervisory authorities. These principles seek to strike a balance in for improvement of the climate-related risk management practices, while maintaining sufficient flexibility given the degree of heterogeinity of the current and new practices that are developing by banks in this area globally.

The Principles for management of climate-related risks cover:

- Corporate governance (3 principles),
- Internal control framework (1 principle),
- Capital and liquidity adequacy (1 principle),
- Risk management process (1 principle),
- Banks' Monitoring and reporting (1 principle),
- Adequate integration of these risks in credit risk management (1 principle),
- Adequate integration of these risks in market, liquidity, operational and other risk management (3 principles),
- Scenario analysis (1 principle).

The Principles for supervision of climate-related risk include:

- Prudent regulatory and supervisory requirements for banks (3 principles),
- Responsibilities, authorizations and activities of supervisory authorities (3 principles).

The national supervisory authorities also take serious activities to incorporate climate-related risks and so-called ESG risks in the Supervisory Review and Evaluation process (SREP). Thus, the EBA is undergoing a review of the guidelines for the implementation of the SREP by the EU supervisory authorities, in order to adequately incorporate the ESG risks. Furthermore, the EBA adopted guidelines on the manner in which the banks should consider the project/client sustainability in making decisions associated with origination and monitoring of loan exposures to the corporate sector, including small and medium-sized enterprises⁴⁷.

⁴⁷ <u>EBA guidelines on loan origination and monitoring</u>, which entered into force in 2022 in relation to the ESG risks.

Central banks and supervisory authorities worldwide are also improving the instruments for measuring the exposure of financial institutions to climate-related risks. Scenario analyses and stress tests gained increasing importance in the realization of the authorities' goals. However, stress tests associated with climate change do not have the characteristics of traditional stress tests conducted for the needs of managing other banking risks. Firstly, the time horizon is usually much longer, given that the adverse impact of climate-related risks would occur in the medium to long-term. Secondly, number of scenarios have been used for the needs of these stress tests, given the uncertainty surrounding the climate-related risks. For example, De Nederlandsche Bank conducted its first macro prudential climate-related risk scenario in 2018, using a five-year horizon within four different transition risk scenarios. In 2020, the Bank of France conducted stress tests related to climate change with a 30-yeartime horizon in four scenarios, three of which for transition risks and one for physical risks. In 2022, the Bank of England and the ECB conducted the so-called *bottom-up* climate-related stress test, to assess the capital adequacy of banks under different scenarios. The ECB used different time horizons, one and three years for transition risks and 30 years for physical risks in a total of six scenarios (four transition risk scenarios and two physical risk scenarios). Meanwhile, the Bank of England defined two transition risk scenarios and one physical risk scenario with a time horizon of up to 30 years. For more details on stress tests (scenario analyses) conducted in these central banks see Table 1.

	Bank of France	De Nederlandsche Bank	Bank of England	European Central Bank
Are firms involved in the exercise?	Yes	No	Yes	Yes
Physical/transition risks	Yes/Yes	No/Yes	Yes/Yes	Yes/Yes
Time horizon	30 years	5 years	30 years	3 and 30 years
Static/dynamic balance sheet	Static for the first 5 years, then reassessed every 5 years	Static	Static, with impact assessment every 5 years	Static - 3-year; Dynamic -30 years scenarios
Number of Scenarios	3 for transition risks and 1 for physical risks	4 for transition risks	2 for transition risks and 1 for physical risks	4 for transition risks and 2 for physical risks
Sectoral breakdown	WIOD classification	NACE Classification -56 sectors	SIC codes	NACE Classification -22 sectors, and other industries aggregated
Target variable	Asset side losses (credit, counterparty	Asset – side losses	Credit portfolio impairment	credit portfolio impairment, asset side losses (market,

Table 1. Main features of climate-related stress tests (scenario analyses) in Europe48

⁴⁸ Sources: (1) derived from the Bank for International Settlements/ Financial Stability Institute (BIS/FSI), Stress-testing associated with climate change with banks-practice comparison, July 2021; (2) explanation of the ECB stress-testing methodology on climate change, October 2021.

	credit and , market risks)			operational) alongside potential impact arising from reputation factors
Output breakdown	Geographic, sectoral, key conterparties (top 15)	Range of losses in banks, insurance companies, pension funds-CET1 impact on banks	Geographical, sectoral, key counterparties (top 100)	Geographical, sectoral, key counterparties (top 20)
Reconciliation exercise	Yes	No	Yes, in a separate questionnaire	No
Communication of results	The results are announced at a systemic level and each bank is individually notified	The assessed impact is announced (aggregate CET1 changes)	The results are announced at a systemic level and each bank is individually notified	The aggregate results are announced and each bank is individually notified

Usually, scenarios represent a starting point of authorities (Box 3) defined by the international Network for Greening the Financial Sector-NGFS. Framing "climate scenarios" includes mapping carbon dioxide emissions and scenarios of future temperature movement in relation to the evolution of physical risks (such as forecasts on the frequency and extremity of certain hazards) and transition risks (such as carbon tax).

Box 3: NGFS Scenarios49

In 2021, the NGFS developed six climate-related risk scenarios and classified them in three clusters. There were no scenarios prepared for the fourth cluster.

Orderly transition- it is assumed that the climate policies are introduced early and become gradually more stringent, consistent with the Paris Agreement. Both physical and transition risks are realtively subdued. This cluster includes two scenarios: 1. A scenario that limit global warning to 1.5°C by the end of the 2100 relative to pre-industrial level throughout stringent climate policies and innovations, reaching global net zero carbon dioxide emissions about 2050, and second scenario, which gradually increases the stringency of climate policy, giving a 67% chance of limiting global warming to below 2.0°C level. **Disorderly transition** – These scenarios assume that climate policies are not timely adopted, while

serious measures that significantly affect the economy are taken. These scenarios involve higher transition risk, due to both delayed or divergent policies, which means different application of these measures in different countries and sectors (for example, carbon prices increase abruptly after a period of delay and not all countries follow their Paris Agreement commitments).



Hot house world – These scenarios assume that some climate policies are implemented in some jurisditions, but global efforts are insufficient to halt significant global warming. This lead to high emissions, which cause global temperature to rise above 3.0°C by the end of 2100 relative to the perindustrial level. The transition risks in this scenario are minimal or absent, while the physical risks are serious and cause irreversible impacts, such as sea level rise. The Nationally Determined Contributions (NDCs) scenario, which falls under this cluster, includes the all pledged policies although they are not implemented yet.

Too little, too late – This scenario assumes that the measures are taken too late, having no contribution to the decrease in temperatures caused by climate change. While no scenarios has been designed for this purpose, this case may be explored assuming higher physical risks due to disorderly transition scenarios.

Most activities in the area of proper regulation of climate-related risks in the past period were aimed at introducing new requirements for disclosure of detailed data and information by banks on exposures to ESG risks. Thus, in accordance with the amendments to the EU Capital

⁴⁹ Source: <u>NGFS portal with climate scenarios</u>

Requirements Regulation 575/2013 credit institutions shall disclose quantitative and qualitative data and information on climate-related risks, which shall enable investors and other stakeholders to assess the credit institutions' exposure and their climate-related risk management practices⁵⁰. In 2017, the Task Force on Climate-Related Financial Disclosures (TFCD) published a report, which determines the main data and information that are recommended to be disclosed by financial and non-financial companies⁵¹.

All of the above mentioned initiatives for an adequate regulatory treatment of climate-related risk refer to improving the current risk management framework (or so-called Pillar 2 of Basel Capital Accord) and expanding the scope of data and information that banks are required to disclose (or so-called Pillar 3 of Basel Capital Accord). A minor part of the initiatives and activities in the past period were aimed at appropriate changes in the first pillar of the Basel Capital Accord, which refers to determining an adequate level of capital for covering risks to which banks are exposed in their operations. In this context, the debate is about whether climate-related risks should be included in the capital requirements in the same manner as the credit, operational or market risk, and if needed, what is the most appropriate manner of their inclusion. We could say that currently there are different expert opinions on the way of incorporating these risks in the prudential capital requirement framework⁵².

2.1. Taxonomies and other regulatory initiatives

One of the most important aspects of implementing sound climate-related risk management practices is the implementation of the so-called green taxonomy. The Green Taxonomy contains clear criteria based on which banks and other economic entities in the country could share a common definition of economic activities that can be considered *green* or *sustainable*. The introduction of a green taxonomy is important for the implementation of other regulatory activities as well, such as requirements for the non-financial companies to disclose data and information on the manner how their activities are in compliance with the criteria prescribed with the green taxonomy.

Activities that have already been implemented in the EU can significantly support the efforts to introduce green taxonomy. The EU green taxonomy was developed by the European Commission as part of the Action plan for providing sustainable development and meeting the EU climate and energy objectives for reduced greenhouse gas emissions to zero carbon by 2050 and halved emissions by 2030. The entire process started in May 2018 with a preparation of draft-regulation (the EU Taxonomy), by establishing an expert group on sustainable finance in July 2018. The purpose of this group is to give recommendations regarding the criteria that economic activities

⁵⁰Article 449a of CRR imposed new requirements for disclosing data and information, such as: 1. information on transition risks, including exposure to carbon-intensive sectors and to customers with greenhouse gas emissions 2. Information on the energy efficiency of real estate taken as collateral for credit exposures, 3. Exposure of credit institutions to physical risks, 4. Information on the rate of the so-called "green assets", 5. Indicators of compliance of credit institutions with the goals defined at the international level (the Paris Agreement) and 6. Other measures to mitigate climate relate risks undertaken by credit institutions. According to the amendments, this type of data and information should start to be disclosed in 2023, with certain exceptions, such as the disclosure of the green asset rate.

⁵¹ The National Bank of Hungary was the first competent authority to introduce the requirement for disclosure data in 2022.

⁵²The EBA has recently published a document available for public discussion, which refers to the treatment of environmental risks in the prudential framework. The EBA document explains its viewpoint on the way to incorporate climate-related risks in the current framework of credit, market and operational risk, in both standardized and modern approaches. The document also discusses the possibility for introducing so-called *Green Supporting Factors and Brown Penalizing Factors* in order to encourage or discourage certain investments in the *green* or *brown* sectors of the economy.

need to meet in order to be considered sustainable. The EU Taxonomy Regulation was adopted in June 2020⁵³. It defines six ecological objectives and four principles for sustainable economic activity (Box 4).

Box 4: Six environmental objectives and four principles of sustainable economic activity determined with the EU Taxonomy⁵⁴

EU environmental objectives:

- 1) Climate change mitigation,
- 2) Climate change adaptation,
- 3) Sustainable use and protection of water and marine resources,
- 4) Transition to a circular economy,
- 5) Pollution prevention and control,
- 6) Protection and restoration of the biodiversity and ecosystems.

The EU Principles for a certain economic activity to be considered as sustainable:

- 1. Significantly contributes to the achievement of one or more environmental objectives. The contribution is considered as significant if it enables the achievement of a certain environmental objective.
- 2. Does no significant harm to any of the other environmental objectives, which means that while significantly contributing to the achievement of a certain environmental objective does no significant harm to any of the other environmental objective.
- 3. It is implemented in accordance with the Minimum Safeguards, defined in the EU Taxonomy.
- 4. Meets the technical criteria, which are predefined for each environmental objective.

Such EU Taxonomy's setup implies a further definition of each of the six objectives in detail and their connection with the four principles for determining sustainable economic activities. This implies the adoption of an additional set of bylaws by the European Commission, which shall enable adequate and unique EU Taxonomy by all member states. Thus, on 9 December 2021 the European Commission adopted the first bylaw to define technical screening criteria to assess the fulfillment of the first two environmental objectives: climate change mitigation and adaptation⁵⁵. This bylaw is effective as of 1 January 2022. The technical criteria and other four environmental objectives are to be published⁵⁶.

The main purpose of this Taxonomy is to direct economic entities (investors, issuers of securities, persons involved in project financing etc.) towards efficient and resilient economy with low carbon emission. At the same time, the Taxonomy may be the basis for the implementation of the new EU regulation for climate change reporting by financial and non-financial entities, including analytical purposes.

55 EU Regulation No2021/2139

⁵³ EU regulation No2020/852

⁵⁴ Taxonomy: Final report of the Technical Expert Group on Sustainable Finance, March 2020.

⁵⁶ In April 2023, the European Commission published a draft regulation to determine the technical screening criteria for the other four environmental objectives.

In the context of the Sofia Declaration from 2020, the European Taxonomy is quickly becoming the main reference in the Western Balkan countries, as a golden standard for classifying economic activities by their sustainability. Following the EU example, the green taxonomy should be implemented on a national level, since the national classification of sustainable economic activities will not only affect banks, but also number of economic entities, including non-financial institutions and public sector entities. In addition to this activity, the practices of other countries point to other activities, which may be taken to establish an appropriate framework for providing green finance and sustainable development, in which the National Bank may adequately be involved⁵⁷.

2.2. International cooperation

International institutions that work on creating global principles and best practices for banking supervision and regulation and on the appropriate exchange of experience and knowledge (such as the Basel Committee, the Financial Stability Board, the competent authorities in the European Union) have already put a lot of efforts in establishing an appropriate framework for managing climate-related risks. In addition, new specialized forums for developing the best practices for measuring and managing climate-related risks by central banks and banking supervisors have been established, internationally.

Perhaps the most relevant one is the Network for Greening Financial System (NGFS), created in 2017, and including 127 members and 20 observers⁵⁸, supervisory authorities and central banks, including the National Bank. The Network's purpose is to help strengthening the global response required to meet the goals of the Paris Agreement, to improve the capacity of the financial system in managing the climate-related risks, as well as to mobilize capital for financing green and low-carbon investments in the context of sustainable development. For this purposed, the Network defines and promotes the best practices that should be applied, both by its members and by all other countries⁵⁹.

Equally important are the activities carried out within the Vienna Initiative⁶⁰ aimed at improving the cross-border cooperation of the countries of Central and Southeastern Europe, including non-EU countries in the processes of identifying and assessing the climate-related risks to the financial system. Through coordinated activities and efficient cooperation, the Vienna Initiative seeks to strengthen and maintain financial stability in the countries of this region.

The International Platform for Sustainable Financing (IPSF)⁶¹, established by the IMF and the World Bank at their regular annual meeting in October 2019, is a similar initiative, with representatives from the EU, Argentina, Chile, China, India, Kenya and Morocco as its participants. The Platform offers a multilateral forum of dialogue between policy makers from the member

⁵⁷ Besides the development of green taxonomy, there are other activities that are crucial for appropriate climate-related risk management, which are not directly dependent on the National Bank operations, such as introduction of a system for energy efficiency assessment of buildings. This system will be crucial to determine the so-called *green mortgages*, i.e. loans for purchasing energy efficiency assessment of vehicles can also be established.

⁵⁸ Source: <u>Network for Greening the Financial System.</u> The data are as of 7 July 2023.

⁵⁹ Source: <u>Network for Greening the Financial System</u>

The Vienna Initiative is a platform for the private and public sector that unites the key international financial institutions, the European Commission and the relevant EU institutions, the global and regional banks present with their subsidiaries in CESEE, as well as the regulatory authorities of several European countries, including the non-EU countries.

⁶¹ Source: International Platform for Sustainable Finance.

countries responisble for sustainable finance, to help investors identify and seize sustainable investment opportunities, thus enabling the realization of the ultimate objective of the platform – scaling up the mobilization of private capital towards sustainable investments. Through the Platform, members can exchange and share information to promote best practices, compare their different initiatives and identify constraints and opportunities for sustainable financing, while respecting national and regional contexts.

3. Exposure of the banking system of the RNM to the climate-related risks 3.1. Exposure of the banking system to the climate-related risks

Banks are exposed to the climate-related risks through their business activities.

If banks fail to identify and adequately assess climate-related risks, this may lead to inadequate decisions in lending and other investments and consequently, to an inappropriate assessment of expected rates of return. For those reasons, it is particularly important that banks establish adequate policies and practices for managing climate-related risks, as an integral part of the risk management framework.

3.1.1. Identification of the main climate-related risks

Banks are exposed to climate change through two key channels, physical risks and transition risks. Physical risks are a direct consequence of climate change, while transition risks arise from the responses taken by policy makers, innovators/companies or consumers to prevent or deal with climate change.

Physical risks mainly refer to the effects/consequences of global warming and extreme weather events. Physical risks can be acute and chronic. *Acute physical risks* are associated with sudden, short and extreme events with a significant adverse impact, such as heavy rainfall that can cause flooding. *Chronic physical risks* are associated with ongoing environmental degradation, such as sea level rise. The impact of physical risks differs from region to region, so that, for example, exposure to a certain type of physical risk in coastal areas differs from exposure to that risk in mountain regions.

Physical risks are by their very nature traditional financial risks. Physical risks materialization can cause immediate destruction or gradual decrease in the value of assets and property, and if such property is pledged as collateral for bank loans, it can result in higher credit loss for the banks. Physical risks often cover a specific geographic area, for example extreme flooding in a certain region, which can lead to significant destruction of real estate in that region. If the majority of bank loans secured by real estate are located in that region, the banks will face an increased concentration risk. Therising uncertainty due to the climate change might also lead to higher risk premiums when setting the interest rates on financial instruments, which in turn, increases market risks.

Transitional risks arise from activities and measures aimed at mitigating the climate change effects as part of the transition from the current, traditional production methods to use of more ecological technologies. The reduction of the carbon dioxide emissions, in line with the Paris Agreement objectives, required targeted climate policies, such as the introduction of carbon taxes, regulatory changes, technological innovation and changes in consumer behavior. The transition to a green economy cannot be carried out all at once, but gradually, according to a predefined framework and dynamics. If climate policy measures are implemented too late, or if actions taken are unplanned and uncoordinated (either within the country or with other countries), investment uncertainty would arise and investors would not be able to fully predict the impact of these policies, which may cause increased financial risks. A disorderly transition could also give rise to price volatility, negative changes in activities with high carbon dioxide emissions and positive

changes in activities with low carbon dioxide emissions, with implication for financial stability if large and correlated assets and products are involved⁶².

Regulatory changes can alter the relative prices of production. Policies aimed at mitigating climate change typically include carbon pricing and emissions trading system⁶³. The introduction of a tax on the harmful gases emission (for example, gases that cause the greenhouse effect) can adversly affect the income from the basic economic activity of the companies and can subsequently reduce their capacity for debt servicing to the banks. Such a measure could also have an adverse impact on the value of shares and bonds of companies that emit gases that cause the greenhouse effect.

The increasing utilization of climate neutral technologies can act as a tipping point for markets and to reduction or full loss of the value of current investments in equipment and fixed assets due to regulatory, social or technological changes. Technological innovation can reduce the cost of renewable energy sources and make these energy sources more competitive relative to fossil fuels, which are the main source of greenhouse gas emissions. However, coal or oil companies, which expect future income from still unexploited oil and coal reserves, may face increased risks in relation to the future value of the reserves of these resources and consequently, the expected future income. Also, the upward trend concerning the utilization of photovoltaic systems or electric vehicles can crowded out the traditional GHG-emitting machines, and accordingly reflect on the income and activities of those companies.

Increased awareness of the global warming effects might change **consumer behavior** or **preferences**, i.e. reduce demand for carbon-intensive goods, rapidly turning high-yielding assets into stranded assets. The significant decrease in the value of carbon-based goods and lower revenues of the producers of such goods due to demand shifts, can lead to disrupted creditworthiness and an increase in non-performing loans in the banks' balance sheets. The extent these risks are materialized to will depend on the manner and the dynamics the policies and behavior of companies and consumers change.

There are also **litigation (litigation) risks** that may arise from initiatives by individuals or companies to compensate for the suffered losses caused by physical or transition risks or due to certain actions taken to reduce the climate-related risks.

The main features of the climate-related risks are as follows:

a) the risks are **systemic** and affect every consumer and every company in all sectors and across all geographical areas. Their impact is correlated, irreversible, and subject to tipping points. Hence, the effects of these risks can be much greater compared to other risks the companies usually analyze and manage,

b) the occurrence of these risks is **uncertain**, yet **predictable**. These are risks that are unavoidable, but they are conditioned by the policies and actions taken to reduce harmful emissions that will affect physical and transition risks,

⁶² Monasterolo, I., S. Battiston, A.C. Janetos and Z. Zheng. 2017. Vulnerable yet relevant: the two dimensions of climate-related financial disclosure. In: Climatic Change 145. 495– 507.

⁶³ <u>EU Emissions Trading System</u>) is one of the **tools set forth by the European Union** in 2005, with industry being its target, in order to attain its objectivesin conformity with the Paris Agreement. It is expected that <u>this mechanism</u> will stir financial stimulation for reducing the emission of harmful gases.

c) **timely action** can help to mitigate future risks. When physical risks develop into systemic risks, the measures for greenhouse gas emissions reduction might be delayed and ineffective in reducing these risks.

3.1.2. Transmission channels of the climate-related risks

The proper integration of the climate-related risks in the banks' risk management frameworks requires deep and comprehensive knowledge and understanding of the existing and potential transmission channels of climate-related risks into financial risks for banks. The indirect effect of the materialization of the climate-related risks on the banks' balance sheets is related with the economic activities to which customers of the banks are exposed to, which add complexity when modlelling the imapcts. The most relevant transmission channels of climate-related risks are summarized in the Figure 1.

Figure 1.

Key transmission channels of the climate-related risks



Source: Network for Greening the Financial System (NGFS)

3.1.3. Exposure of the Macedonian banking system to transition risks

A key prerequisite for measuring physical and transition risks is the possession of appropriate, detailed, accurate, reliable and certain data on the banks' credit exposure, primarily to nonfinancial corporations, and to households, as well. In the context of the domestic banking system, these data, for now, are of limited scope and quality, because a green taxonomy has not been established in the domestic economy yet and the sectors that are sensitive to climate -related risks have not been defined, which hampers the assessment of the banks' exposure to this risk. However, there are ways to make initial assessments of the domestic banking system's exposure to climate-related transition risks. A possible approach, applied in this document, is to make assessment by grouping the banks' credit exposure to non-financial corporations according to economic activity and map the exposure to the sectors that are most sensitive to transition risks. The grouping is according to National Classification of Economic Activities at the level of class (four-digit NACE)⁶⁴, which is standard system of classification of economic activities applied by the European Union, as well as in our country. This classification has primarily been created for statistical purposes, not to cover all sectors that are sensitive to climate-related risks and the data is not detailed enough, but in absence of more appropriate classification, its use to assess the exposure of the banking system to transition risks is fairly common among many other institutions and markets. It is important to note that this analysis does not take into account the micro characteristics of individual economic entities and the possible measures and activities that they may undertake to transition to a more environmentally sustainable operating. Consequently, the analysis should be perceived as an initial assessment of the domestic banking sector exposure to more climate sensitive sectors, not as an assessment of the magnitude and significance of climate-related risks for the domestic banking sector, which is conditioned by several factors, including the progress of climate sensitive companies in green transformation. This requires careful interpretation of these results and supplement of the analyses with more granular data and more sophisticated methods of analysis.

In the absence of a generally accepted methodology, the classification of economic activities sensitive to transition risks follows the Battiston et al. (2017)⁶⁵ approach. In their paper, the authors use the term "policy-sensitive sectors related to climate change" (or Climate Policy Relevant Sectors – CPRS), and they define them as economic activities that are susceptible to positive or adverse impacts during the transition to a green economy. These sectors are significantly important for the assessment of transition risks. As sectors sensitive to climate policies, the authors identify the following six sectors: Fossil fuel, utilities, energy-intensive, buildings, transportation and agriculture. Each of these sectors consists of a hundred groups of activities (three-digit marks according to NACE) that can be connected with the technologies that are significant for the energy transition. This classification is presented in Table 2.

⁶⁴ The national classification of activities consists of four levels of detailed classification. Thus, the first level has the widest scope of sectors, where the names are indicated by letters, sorted in alphabetical order (so-called sections). In the second level, titles are given with two-digit numerical designations (so-called divisions). The third level consists of names with three-digit marks (so-called groups), while the names in the fourth level are shown with four-digit marks (so-called classes).

⁶⁵ Battiston, S., A.Mandel, I.Monasterolo, F.Schütze and G. Visentin. 2017. A climate stress - test of the EU financial system. In: Nature Climate Change 7. 283–88.

Table 2.

Distribution of activities by classes (the four-digit classification) of NACE in the six identified sectors sensitive to climate policies (Climate Policy Relevant Sectors)

Climate Policy	Role in the	Transition risk	NACE, 4-digit code
Relevant Sectors	greenhouse gas emission		
Fossil fuels	Production of primary energy from fossil fuels; Indirectly responsible for GHG emissions from fossil fuels	Revenues primarily from fossil fuels (for example, coal mining, oil refining); diversification, i.e. use of different resources is not possible	Extraction of coal, gas and oil (e.g. class 05.20), manufacturing related to the refining of coal, oil (e.g. class 19.10) and gas (e.g. class 35.21), retail trade in motor fuels and lubricants (e.g. the six identified climate sensitive sectors (CPRS) 47.30)
Utilities	Production of secondary energy; responsible for GHG emissions relative to type of fuel used	Revenue arising from production, transmission or distribution of electricity; diversification is possible (e.g. solar, wind)	Electricity production (e.g. class 35.11),
Energy intensive	Activities that are based on high energy use in the business process	Impact of changes in energy prices or restrictions on the use of energy sources that cause high greenhouse gas emissions	Mining and quarrying (e.g. group 07.10), various manufacturing sectors based on the EU list of industries with high carbon emissions (e.g. 11.01, 13.10, 23.51)
Transportation	Provision of transport services and support for transport services	Fossil fuel intensive, but without strict dependence on greenhouse gas emissions; diversification is possible	Manufacturing of motor vehicles, ships and trains (e.g. 29.10), road construction (e.g. 42.11), trade in motor vehicles (e.g. 45.32), transportation (e.g. 49.10)
Buildings	Provision of building services from construction to rental	Energy intensive, but diversification is possible	Construction of residential and commercial buildings (e.g. 41.20), accommodation facilities (e.g. 55.10), activities related to real estate 68.20)
Agriculture	Agriculture, forestry and related services	Energy intensive, but diversification is possible	Agriculture, forestry and fishing (the four-digit activities of sector A)

Source: OeNB Financial Stability Report 40, November 2020.

Chart 1 shows the participation of CPRS sectors and other sectors in the total banks' exposure in the RNM in recent years following this methodology.

Chart 1.

Participation of CPRS and other sectors in the total bank exposure to non-financial companies in the RNM in the period 2017 - 2022



Source: NBRM calculations, based on data submitted by banks

The analysis of the banks' corporate credit portfolio, according to the sensitivity of individual activities and sectors to climate policies, shows that more than half of the total banks' credit exposure is attributed to sectors sensitive to climate policies. The share of these sectors in the total credit exposure of banks to the corporate sector in the last five years is maintained at the level of about 55%, while the other sectors (which are defined as sectors that are less sensitive to climate change) participate with about 45%. The structure of the corporate credit portfolio remained relatively stable within the analyzed period (2017 - 2022), although since April 2021, a slight increase in the share of these sectors has been registered. However, a positive feature of the domestic banking system is that the share of these sectors is not substantial compared to other sectors. Namely, the part of the portfolio of sectors less sensitive to climate policies is also significant, which mitigates the banks' exposure to high transition risks. However, it should be considered that this analysis determines the exposure to sectors sensitive to climate policies, but does not assess the risks magnitude.

Chart 2 shows the exposure of the domestic banking system to each of the six sectors sensitive to climate-related policies. The chart indicates that the share of each of these sectors in the total credit exposure of the banking system remained quite stable within the analyzed period. In the next period, concentration of credit exposures by activity and sector will be analyzed (whether there is a small number of larger clients or the exposure is more evenly distributed among multiple credit users), which will require more granular data on individual credit users.



Chart 2 Banks' exposure to sectors sensitive to climate policies in the period 2017 - 2022

Source: NBRM calculations, based on data submitted by banks

According to the analysis, the sector with the most significant exposure for domestic banks to the transition risk is **"Buildings"** sector, which includes activities for the construction of residential and commercial buildings, as well as activities related to real estate. In contrast to the grouping required this analysis, in other analyses of the National Bank, construction includes civil engineering, which for the purposes of this analysis is included in the transport sector. The share of this sector in the total banks' credit exposure in the analyzed period ranges between 14% and 18% and is increasing.

The second largest exposure is to the **"Transportation"** sector, which includes activities related to the production of motor vehicles, road construction, trade in motor vehicles and transport services. The exposure of this sector to transition risks arises from the introduction of new regulations that improve the energy efficiency of vehicles, higher prices of fossil fuel due to the introduction of taxes on carbon emissions or other regulations pertaining to climate change that may increase the production costs and in general of carrying out the activities in this sector. In addition, the demand for certain services or products can change, such as for example greater use of electric vehicles, which together with the introduction of taxes for carbon emissions, can significantly affect the activities of companies in this sector. During the analyzed period, the share of this sector in the total currency exposure of the banking system is stable and equals 12%.

Third most exposed sector is the so-called **"Energy intensive"** sector. This sector includes activities that require significant use of energy, such as mining and quarrying and other industrial sectors considered energy intensive under the <u>EU carbon leakage list</u>. The share of this sector in the total credit exposure ranges from 11% and 13%, with slight changes throughout the analyzed period.

The exposure to other sectors is less significant. Usually, the **"Agriculture"** sector is considered highly sensitive to climate change, but the exposure of the domestic banking system to this sector is only 2% of the total credit exposure, with a stable share within the analyzed period. The low banks' exposure to agriculture can possibly be explained with the source of the agricultural production funding, meaning, it is probably mostly financed from own sources or government subsidies, and less from bank loans. Agriculture as a sector is much more exposed to physical than to transition risks.

The six climate sensitive sectors do not fully coincide with the sectors within NACE. As a result, Chart 3 ilustrate the mapping of these six sectors with the NACE sectors. The aim is to see the extent to which the main economic activities that make up the domestic GDP are sensitive to climate policies.

Chart 3

Mapping of the credit exposure to the six climate policies-sensitive sectors and basic economic activities according to NACE



Source: the NBRM calculations, based on data submitted by banks Note: The mapping was made for the sectors and activities to which most of the banks' exposures are (hence, agriculture is not covered due to its insignificant participation in the total credit exposure of the banks (about 2%).

The analyses shows that more than 60% of the NACE mining and quarrying sector refer to activities that are sensitive to climate policies, namely, energy intensive (CPRS). The NACE sectors of supply of "Electricity, gas, steam and air conditioning", activities related to "Real estate", "Transport and storage", and "Construction" are almost entirely sensitive to climate policies. This points to possible effects of climate policies on these sectors, and thus indirectly on domestic banks. However, as stated above, this analysis represents an initial assessment of the exposure of the domestic banking sector to climate-sensitive sectors and the results should be interpreted

carefully, while additional analyzes will be conducted for a more detailed assessment of the exposure to climate-related risks in the next period.

3.1.4. Exposure of the Macedonian banking system to physical risks

In addition to transition risks, the exposure of the banking system to physical risks is equally important, given that their materialization can cause significant losses for the banking system.

RNM is exposed to natural disaster risk. Our country is exposed to risk of potentially devastating floods at least once in 10 years⁶⁶. The risk of heavy rains, which can cause landslides and flooding of large agricultural lands, residential and industrial buildings and other property, is also important. Due to changes in the intensity and quantity of precipitation and/or temperature, climate change is likely to alter the slope and bedrock stability. However, the timing and locations of landslides can hardly be determined, as it depend on the local geological condition and other non-climate factors.⁶⁷.

According to the Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2013), the continued emissions of greenhouse gases will cause further global warming and it is almost certain that extreme high temperatures will become more frequent in most land areas over the next 50 years. The warming will not be equal everywhere. For the RNM, the temperature increase over the next 50 years is expected to be slightly higher than the global average. The water scarcity is classified as medium, which means that the probability of droughts in the next 10 years is up to 20%⁶⁸. The risk of extreme heat is classified as medium, which means that the probability of the occurrence of at least one period of prolonged exposure to extreme heat (heat shock) in the next 5 years is more than 25%⁶⁹. RNM already faces and is exposed to a high risk of forest fires that are difficult to control. The danger of such wildfires is classified as high, with the probability of encountering weather taht could support significant wildfires being greater than 50%. The expected further increase in temperature and greater variability of precipitations may cause increase in duration of the fire season (due to longer drought periods during the seasons of prolonged exposure to extreme heat) and even increase the severity of fires. RNM is located on the Eurasian tectonic plate, a fault line exists in the north - south direction in the easterncentral part of the country, which means earthquakes are also a hazard⁷⁰.

The exposure to the risks of natural disasters and the probability of materialization of these risks is not equal for the entire country, except for the probability of wildfires occurance, which is assessed as high for the territory of the entire country. Proper management of the physical climate-related risks by the banks requires data on the geographical distribution of loans, to be used for monitoring and analysis, which can help to determine the exposure to regions that are more vulenrable to natural disasters. In the interest of bank proper physical risks management, it is extremly important for the bank to identify such risks. For example, a bank should identify whether it has high credit exposure to the agricultural sector in areas with a high probability of flooding, or to timber industry producers in areas at high risk of forest fires and should assess the effects of such exposures on credit risk and expected credit losses. Also, when managing

⁶⁶ Source: Think Hazard Report for RNM, 2020

⁶⁷ Source: Think Hazard Report for RNM, 2020

⁶⁸ Source: Think Hazard Report for RNM, 2020

⁶⁹ Source: <u>Think Hazard Report for RNM, 2020</u>

⁷⁰ Source: <u>World Bank Climate Change Knowledge Portal</u>

credit risk, it is important to determine the location of the real estate used as the loan collateral, especially if it is in areas prone to landslides, floods, or earthquakes, as these events can damage buildings and reduce their value, i.e. the loan collateral value, thus affecting the amount of credit losses. Figure 2 presents the main physical hazards related to climate chnages significant for the RNM.



Figure 2.

Overview of the main physical hazards in the RNM and their seveirity by individual regions

Source: Think Hazard.

According to Figure 2, the probability of wildfires and earthquakes occurrence is equal for the entire country.

Concerning the other five hazards, the severity and probability to happen are differently distributed across regions. When managing the climate –related risks, it is extremly important for banks to monitor these five hazardsand their different distribution across regions, in order to take adequate actions to properly manage the risks that may arise.

Banks are exposed to direct impact of physical risks through their potential implications for their business premises in all business units, which in turn affects the bank's exposure to operational risk. The banks' indirect exposure to physical risks originates from the direct exposure of the banks' customers to these risks, which is why these risks become a credit risk for the bank. In accordance with the data availability, only a general overview of the exposure of the banking system to various physical risks is given below, while for assessment of the subsequent (secondary and tertiary) effects more granular data is needed.

The total number of banks' operating units in the RNM at the end of 2021 was 388, almost half (43.6%) of which are in the Skopje Region. Figure 3 shows the regional distribution of the banks' operating units in the country. Apart from the hazards that are equal distributed in the country (wildfires and earthquakes), both Skopje and Southeastern Region are more exposed to risk of landslides. Skopje and Vardar Region are more than other regions exposed to risk of river flood.



Figure 3: Banks' operating units in the RNM by regions

Source: NBRM calculations, based on data submitted by banks

In the households' loan portfolio, the exposure to physical risks is most common in the portfolio of housing loans, mainly due to the potential decrease in the value of the pledged real estate. According to data as of June 2022, 35.21% of the total households' loan portfolio are housing and commercial property loans (34.84% for residential and 0.37% for commercial buildings), while the rest of the portfolio is consumer and other loans. Almost half of the total loans granted to households (47.09%) are in the Skopje Region, followed by the Pelagonia Region (10.14% of total loans). This means that the banks have the highest exposure to the Skopje Region, which is why more granular data analysis of the credit exposure in this region is needed, both at the level of the entire banking system and at individual bank level.

Chart 4



Regional distribution of real estate and other loans to natural persons

Source: NBRM calculations, based on data submitted by banks

Other loans
Real estate loans

Chart 5 presents the distribution of the banks' corporate portfolio by region

Chart 5

Distribution of loans to non-financial corporations, by region



Source: NBRM calculations, based on data submitted by banks

Similar to the households' loan portfolio, majority of corporate loans (55%) were granted in the Skopje Region, which puts this region in the centar of the physical risks analysis. It is followed by the Southeastern and Pelagonia Region, where in each of them 8% of the total corporate loans are granted. The Skopje Region has been considered prone to high risks of flooding and landslides.

However, to have a more accurate picture of the banks' exposure to climate –related risks, more granular data and exposure analysis at individual bank level is needed.

3.2. Current practice of managing climate-related risks in the banking system of the RNM

At the beginning of 2022, the National Bank conducted the Climate-related risks Survey. The purpose of the Survey was to perceive the banks and savings houses practices, and the policies they apply to monitor and manage climate-related risks, and thereby to observe their awareness of these risks. The Survey covered issues about the following: the scope of the climate-related risks in the strategic documents of the institutions, the organizational set-up for managing the climate-related risks, the way of managing them, as well as issues about the transparency of information on the management of the climate-related risks.

According to the answers in the Survey, almost 90% of the respondents recognize the importance of the climate –related risks for the financial system and consider that the climate change is an important source of risks for the financial stability. However, small number of banks and savings houses have considered climate change in their development plans. According to the majority of the respondents (87%), they have not established internal acts for managing the climate-related

risks, most of them (80%) have not started to monitor the climate-related risks in detail and do not assess the impact of climate-related risks when placing funds or establishing a business relationship with a customer. According to the aforementioned, most of the institutions do not have a body that is exclusively responsible/involved in this matter. Such answers suggest that the climate-related risk management process in banks and savings houses is in its initial stage.

The Survey showed that less than half of the respondents have introduced new products/services in response to climate change. Generally, these are loans financed with credit lines from the European Bank for Reconstruction and Development - EBRD to support the competitiveness of SMEs for projects in the field of energy efficiency and renewable energy sources, as well as safety at work and energy efficiency loans to households through the GEFF program by the EBRD. According to the responses to the Survey, the majority of respondents are planning/thinking about introducing new or changing current products/services in response to climate change. They generally refer to products such as loans for financing energy efficient projects and green loans intended for households and the corporate sector, as well as green project financing.

Main factors that encourage institutions to strengthen climate-related risks management include requirements of investors/institutions that provide financial support and good operating practices of financial institutions. Customers' requirements, parent entities' policies and availability of consulting/expert assistance are also pointed to as a motive, but by a smaller number of respondents. When it comes to challenges related to better management of this type of risks, respondents include lack of standards and tools, absence of guidelines from the regulator and lack of adequate data, indicating limited internal resources and policies as well.

In general, the conclusions from the survey' repsonses confirm the strategic importance of climate-related risks and emphasise the need for more detailed guidelines by the regulator, with clear expectations for the financial institutions. Integration of these risks in the risk management system of banks and savings houses and their effective management could contribute to mitigating the consequences of their potential materialization.

4. Activities related to the implementation of the Medium-Term Action Plan 4.1. Principles

The medium-term action plan relies on the following principles:

- **The Medium-Term Action Plan has combined objective** of improving National Bank's understanding of the climate-related risks ensuring that: 1. Banks adequatly manage climate-related risks, and 2. the National Bank can comprehensively measure and evaluate climate-related risk exposure of individual banks and the overall banking system.
- The Medium-Term Action Plan is mindful of the role of the National Bank. When Medium-Term Action Plan activites were defined, the National Bank's primary goals prescribed in the Law on the National Bank of the Republic of North Macedonia were considered, as well as its tasks, which are primarily related to the role of the central bank as a macroprudential and supervisory authority for banks. The role of the National Bank will aim to creating environment and building capacities to ensure sound assessment and proper climate-related risk management by the banks, as well as assessing the potential

impact of climate-related risks to financial stability. Other activities, such as the introduction of green taxonomy are not under the direct competence of the central bank.

- **The need for a gradual and iterative approach.** The introduction of recommendations, guidelines and regulations for banks will be carefully set in line with the overall progress made by the country in this area. Moreover, the introduction of an efficient climate-related risk management system in the banks would likely be a long-term process, as banks will need to close significant data, methodological and human resources gaps.
- A proper regulatory framework will be developed gradually. The National Bank will begin by drafting and adopting non-binding guidelines for climate-related risk management by banks. Applying the principle-based approach can enable the National Bank to dynamically adjust expectations in line with the progress effectively made by the banks. Once a certain progress will be achieved, the National Bank may assess the need to introduce binding regulatory and supervisory requirements.
- The National Bank will follow the work of the European and international organizations. In accordance with the country's European agenda, the National Bank follows the regulatory and supervisory initiatives of the competent EU institutions. The RNM has also committed (mainly through the 2020 Sofia Declaration) to align with the objectives of the European Green Deal. In addition, the National Bank will continue to follow the recommendations from the international organizations, such as Basel Committee on Banking Supervision (BCBS), the Financial Stability Board (FSB) and other international and European standards and best practices.
- **Continious engagement with international and regional organizations.** For establishing an appropriate regulatory and supervisory framework for the climate-related risks, the National Bank will deepen cooperation with the supervisory authorities, primarily from the EU member states and the region, will participate in relevant forums, such as the Vienna Initiative, and will consider the possibility to join the Sustainable Banking Network.
- **Engagement at the national level.** For the purposes of implementing the Medium-Term Action Plan, the National Bank will cooperate with other state bodies/institutions (such as Ministry of Environment and Physical Planning, Ministry of Economy, Ministry of Finance, etc.), responsible for implementing climate policies.
- Promotion of the Medium-Term Action Plan, including organizing conferences and workshops for the purpose of informing the public about the National Bank activities related to climate risks, as well as providing regular information on the ongoing developments in this area.
- Need for integrating climate-related risk assessment into the existing supervisory mechanisms, tools and supervisory procedures. There is a clear consensus that the climate-related risks are not individual risk categories, but drivers of other risks (credit risk, operational or market risks). The Medium-Term Action Plan will help banks and savings houses to build foundations for incorporation of climate-related

risks in their risk management systems. The National Bank will accordingly integrate climate-related risks in the supervisory risk assessment process, i.e. in the supervisory assessments of the business model, corporate governance and the risks to the bank's capital position.

4.2. National Bank activities

The activities forseen in the National Bank Action Plan are divided into six functional areas:

- Regulation-related activities. Within the scope of these activities, the Banking Regulation and Bank Resolution Department will develop and publish Guidelines on managing climate-related risk by banks, as well as amendments to the applicable regulatory framework (for corporate governance, reporting and publishing data related to these risks, risk management, especially considering the internal capital determination process, etc.). At a later stage, the National Bank will assess the need to incorporate climate-related risks into the capital adequacy regulation, if such an approach is established and accepted in the EU or internationally.
- Supervisory activities. The National Bank's On-site and Off-site Banking Supervision Departments will monitor and evaluate the banks' activities regarding the management of climate-related risk and accordingly update the risk-based supervisory approach and other supervisory assessment methodologies.
- Activities related to financial stability. The Financial Stability and Macroprudential Policy Department will focus on the assessment of the potential impact of climate-related risks on financial stability in the RNM. Banks' exposure to climate-related risks will be assessed using scenario analyses, and stress tests, if applicable.
- **National and international engagement.** The National Bank will participate in regional and international forums and will engage with the relevant institutions in the country (especially in the context of the adoption of green taxonomy).
- Research activities. The Monetary Policy and Research Department and the Financial Market Operations Department will analyze the impact of climate change on the National Bank operations, including on monetary policy and foreign reserves management. For this purpose, the National Bank will engage with professional, scientific and educational institutions.
- Building institutional culture and capacities. The Strategy and Prevention Office will
 prepare an Assessment of the sustainability of the NBRNM's activities in the context of
 climate change. The NBRNM will assess the need for development of necessary skills for
 the employees.

Image 4: National Bank activities



4.2.1. Activities in 2023

- **1. Financial stability. Preparing a Dashboard with so-called "green" indicatos.** Defining the main so-called "green" indicators for the purpose of monitoring the sustainability of the financial system and the overall economy.
- **2. Building institutional culture and capacities.** Assessment of the NBRNM's internal needs and preparation of a Plan for the development of the necessary skills of the employees who will be involved in the implementation of the Medium-Term Action Plan (trainings, etc.).
- **3. Climate-related risks regulation.** Development and publishing of Guidelines on managing climate-related risk by banks. These guidelines are intended for banks and savings houses and will include the National Bank expectations regarding the manner of managing these risks.
- 4. Engagement with national institutions. Cooperation with financial regulators and other national authorities/institutions (such as Ministry of Environment and Physical Planning, Ministry of Economy, Ministry of Finance, etc.), that are responsible for implementing climate policies.
- **5. Engagement at international level.** Further participation in the activities of the working groups of the Network for Greening the Financial System and other international and regional forums (i.e. the Vienna Initiative), including bilateralengagement with other competent institutions/bodies from the region and beyond.
- 6. Research activities. Preparation of an analysis to review the international practices and experiences in the field of potential options for "greening" the monetary policy operations and foreign reserves management that will best suit the context of RNM.
- 7. Activities related to financial stability. Assessment of potential impact of climate-related risks on financial stability. Conditional on the available data, a more detailed analysis will be made to assess the banking system's exposure to transition and physical risks.
- 8. **Research activities.** Following the best international practices, and for the purpose of increasing the awareness of climate change importance, the National Bank will cooperate with the universities in the country, organize lectures and/or research workshops.

- **9. Research activities.** Preparation of a working paper on the climate change impact on the RNM economy that could be carried out in cooperation with the domestic universities.
- **10. Building institutional culture and capacities.** Development of a National Bank' Sustainability Policy with respect to climate-related risks (Sustainability Policy). The Sustainability Policy will, among other things, include rules of conduct of the National Bank's employees and will define a set of indicators for monitoring the Policy implementation.

4.2.2. Activities in 2024

- 1. Supervisory activities. Self-assessment of climate-related risks by banks and action plans. Banks will make a self-assessment of their compliance with the Guidelines on managing climate-related risk and submit it to the National Bank, including action plans for risk management activities.
- Activities related to financial stability. Sustainability and Green Finance Survey. Conducting a survey intended for borrowers (with focus on corporate sector clients). The survey could, *inter alia*, contain questions related to: 1. The sustainability of companies' activities, 2. Ability of companies to calculate carbon footprint of their economic activities, 3. Other issues, including the banks' evaluations of companies' sustainability during the lending procedure.
- 3. Activities related to financial stability. Preparation of a methodology for macro stress test of climate-related risks using a "top-down" approach. A starting point for designing the scenarios and methodology will be the NGFS approach. The exercise will be based on a "top-down" approach, whereby simplified assumptions and reference values might be used, especially for transition risks (i.e. greenhouse gas emissions per industry).
- Activities related to financial stability. Top-down macroprudential stress test. A top-down macroprudential stress test could be implemented following the realization of the previous activity.
- 5. Activities related to financial stability. Analyses of green finance and climaterelated risks in the RNM will be periodically published in the NBRNM's Financial Stability Report. These analyses may include overview of "green" indicators, macroprudential stress-testing results, and other relevant information and data.
- **6. Supervisory activities.** An update of the Supervisory Risk Assessment Methodology (business model, corporate governance, credit risk, operational risk, market risk) and the Bank Capital Assessment Methodology (process of determining internal capital, etc.) by including climate-related risks in accordance with changes to the regulatory framework/guidelines for climate-related risks.
- 7. National/international engagement. The National Bank will cooperate with financial regulators and other national authorities/institutions (such as Ministry of Environment and

Physical Planning, Ministry of Economy, Ministry of Finance, etc.), responsible for implementing climate policies. The National Bank will continue to participate in the working groups of the Network for Greening the Financial System and other international and regional forums (such as the Vienna Initiative) and foster bilateral cooperation with other competent institutions/bodies from the region and beyond.

- 8. National/international engagement. Organizing a climate-related risks and sustainability conference. The National Bank will organize a Conference to promote the Medium-Term Action Plan and its new approach to sustainability.
- **9. Supervisory activities.** The results of the horizontal assessment of banks' compliance with the Guidelines on managing climate-related risk will be incorporated in the annual supervisory assessment of bank risks. The supervisory assessment of the business model, corporate governance and credit risk will be in the spotlight, in terms of banks' exposure and management of climate-related risks. The conclusions of this assessment will be shared with the banks within the annual supervisory dialogue.
- **10.Supervisory activities. Defining reporting forms for climate-related risks.** Considering the features of the banking system and following the Guidelines of the European Banking Authority and the international practices, the National Bank will define a set of reporting forms for the banks to periodically submit data on their exposure to climate-related risks (physical and transition risks).
- **11.Building institutional culture and capacities. Collaboration with universities.** Following the best international practices, the National Bank will continue to actively cooperate with the domestic universities and organize lectures, study competitions and/or research workshops.
- 12. Supervisory and financial stability activities. Horizontal analysis of the results of the banks' self-assessment and their action plans. The National Bank will assess the banks' action plans and the activities proposed by the banks and will share the results of its assessment with the banks, accordingly.

4.2.3. Activities in 2025

- 1. Regulation-related activities. Consideration of the need to prescribe a detailed obligation for banks to publish data and information on climate-related risks. This activity will entail expansion of the existing requirement for banks to publish data and information on climate-related risks and ESG risks, by prescribing a detailed overview of quantitative and qualitative data and information on managing these risks, as well as quantitative data on banks' exposure to physical and transition climate-related risks.
- 2. Regulation-related activities. Amending risk management bylaws, particularly those regulating internal capital, corporate governance, etc. After the publication of the Guidelines on managing climate-related risk by the banks and the assessment of the banking system based on the self-assessment, the National Bank may amend the

applicable regulation for managing individual risks (credit risk⁷¹, in particular), the risk management regulation (in relation to the requirements for the process of determining the internal capital), as well as other bylaws that need to be amended to allow proper climate-related risk coverage (e.g. good corporate governance regulation).

- **3.** Supervisory activities. Thematic on-site supervision at a selected sample of banks. The National Bank will start conducting thematic on-site examinations of climate-related risks, with an aim to verify the practices of climate-related risk management in the banking system.
- **4. Supervisory activities. Supervisory risk assessment process.** Within the annual risk assessment, a full climate-related risk assessment will be carried out, which will include: 1. Assessment of the banks' business model, 2. Corporate governance, 3. Credit risk, and 4. Operational risks.
- 5. National/international engagement. The National Bank will cooperate with financial regulators and other national authorities/institutions (such as Ministry of Environment and Physical Planning, Ministry of Economy, Ministry of Finance, etc.) responsible for implementing climate policies. The National Bank will continue to participate in the working groups of the Network for Greening the Financial System and other international and regional forums (such as the Vienna Initiative) and foster bilateral cooperation with other competent institutions/bodies in the region and beyond.
- **6. Building institutional culture and capacities. Engagement with universities.** Following the best international practices, the National Bank will continue to cooperate with the domestic universities and organize lectures, competitions and/or research workshops.
- 7. Activities related to financial stability. The National Bank will monitor and analyze the banking system exposure to climate-related risks in the Financial Stability Report, update the scope of the Review of "green" indicators and conditional on the availability of data, will carry out activities to implement macroprudential stress test for climate-related risks.

⁷¹ Extending the existing obligation for banks to prescribe the manner of considering the impact of climate-related risks in the credit risk management, in their internal credit risk management regulations. This requirement is set in the <u>Decision on the methodology</u> for credit risk management (Official Gazette of the Republic of Macedonia No. 57/2023) which will apply from 1 January 2024; the requirement regarding the climate-related risks will apply from 1 January 2025.

Glossary

The terms used in this Medium-Term Action Plan shall have the following meaning:

- 1. **Anthropogenic emissions** shall denote emissions of greenhouse gases, aerosols or other atmospheric compounds that have an impact on the concentration of greenhouse gases or aerosols, resulting from human influence (use of fossil fuels, logging or deforestation, use of land or land conversion, poultry production, waste management or industrial processes).
- 2. **Anthropogenic removals** shall refer to the removal of greenhouse gases from the atmosphere caused by human activities.
- 3. **Biodiversity** shall represent the totality of living organisms as an integral part of ecosystems, and includes the diversity of species, among species, as well as ecosystem diversity.
- 4. Global mean surface temperature shall be an estimated global average of surface air temperature over ice-covered land and oceans and of the temperature in the few meters below the surface of ice-free oceans, with changes usually expressed as deviations from the value over a reference period.
- 5. **Global warming** shall be the estimated increase in global mean surface temperature over a 30-year period or over a 30-year period of a given year or decade, expressed relative to pre-industrial levels (1850-1900), unless otherwise specified.
- 6. Transition risks drivers shall represent the activities undertaken in response to climate change that could cause, increase or decrease transition risks. These include changes in policy, legislation and regulation, changes in technology and in market and consumer behavior, each of which can drive, accelerate, slow down or disrupt the transition to a green economy and the achievement of sustainable development.
- 7. **Physical risks drivers** shall denote changes in the weather and climate that lead to increase physical risks and impacts on economy (for example, risk of flooding).
- 8. **Ecology** shall be the relationship of air, soil, water, animals and plants in a certain area or most often, a scientific study of that relationship.
- 9. Greenwashing shall mean wrongly or inaccurately informing of creditors, investors and other economic entities that the funds collected for financing, or the product or service offered by a certain entity have a positive impact on the average life, in order for the entity to expand the list of investors, creditors or consumers or to provide access to better financing conditions.
- Environmental, social and governance risks (ESG risks) denote the probability of losses or additional expenses, or loss of planned income, or loss of reputation of the financial institution due to the negative financial impact of current or future ESG factors on bank's counterparties and bank's assets.

- 11. Environmental, social and governance factors (ESG factors) shall represent a set of criteria that reflect the environment and ecosystems (environmental factors), rights, interests and wellbeing of people and society (social factors) and transparency and legal compliance (governance factors) that impact the entity's investment decisions or its operations.
- 12. **Circular economy** shall represent an economic system in which the value of products, materials and other resources are retianed in the economy for the longest possible period, increasing their efficient use in production and consumption, thus reducing the adverse impact on the environment, and minimizing the waste and the release of harmful in all phases of their life cycle. This system relies on recycling and rational consumption of resources and is an alternative to the traditional, linear economy.
- 13. **Ecosystem** shall be an area where plants, animals and humans live together with the environment, and their mutual relationship can be considered as a system. The boundaries of that system depend on the focus of interest, so the size of an ecosystem can range from very small areas to the entire planet Earth.
- 14. **Ecosystem services** shall be the direct or indirect impact of ecosystems on the economic, social, cultural or other benefits that people or society can have from those ecosystems.
- 15. **Energy efficiency** shall be the ratio of the achieved useful output, to the input of energy for achievment of the useful output.
- 16. **Green economy** (low carbon economy) shall mean an economywith low carbon emissions that uses resources efficiently and in the public interest.
- 17. **Green credit** shall mean credit exposure that is used to improve energy efficiency of households and the corporate sector, support investment in green technologies, materials and the like, support investment in renewable energy sources, as well as for control and/or prevent pollution, protection of the environment, reduction of climate-related risks, etc.
- 18. **Carbon footprint** shall be an absolute or relative measure of greenhouse gas emissions from an entity or industry.
- 19. **Carbon intensity/Emission intensity** shall be the amount of carbon dioxide (CO2) emissions released per unit of another variable such as gross domestic product (GDP), energy consumption for production or transport. An activity or process is considered carbon intensive if it has high carbon dioxide emissions relative to a certain reference value.
- 20. **Transmission channels** shall denote causal chains that explain how climate risks drivers give rise to financial risks that impact banks directly or indirectly through their counterparties, investments and the economy in which they operate.

- 21. **Climate**, in the narrower sense of the word is usually defined as average weather conditions or as the average value and variability of surface changes such as temperature, precipitation and/or wind or other relevant changes over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. Climate in a wider sense is the state, including a statistical representation, of the climate system.
- 22. **Climate neutrality** shall be a state in which human activities have no net effect on the climate system. The state implies net zero emissions of carbon dioxide or greenhouse gases, that is, a state in which anthropogenic emissions are decreased to zero (or almost to zero) or a state in which the current greenhouse emission is neutralized by anthropogenic removals in a precisely defined period of time. This condition is also known as carbon neutrality.
- 23. **Climate projection** shall be the simulated response of the climate system to a scenario of future emission or concentration of GHGs and aerosols, generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission/concentration/radiative forcing scenario used, which is in turn based on assumptions concerning, for example, future socioeconomic and technological developments that may, but not necessarily, occur.
- 24. **Climate vulnerability** shall refer to the amount of damage that can be expected at different intensities of the physical hazard. In determining climate vulnerability, secondary impacts such as disruptions to normal business processes caused by the physical hazard may also be included.
- 25. **Climate sensitivity** shal be the change in annual global mean surface temperature in response to a change in the atmospheric concentration of carbon dioxide or other radioactive radiation.
- 26. **Climate change** shall represent change in the average value of the climate or its variability, which persist over a longer period of time (usually decades or centuries). Climate change is the result of natural processes, external disturbances and long-term disturbances in the atmosphere or in land use as a result of human activities.
- 27. **Climate system** shall be the atmosphere, the hydrosphere, the cryosphere, the earth's surface and the biosphere, as well as their interrelations.
- 28. **Macro (or macroeconomic) transmission channels** shall denote the mechanisms by which the climate risk drivers affect macroeconomic factors, such as labor productivity and economic growth, and how these, in turn, may have impact on banks through an effect on the economy in which these banks operate. Macroeconomic transmission channels also capture the effects on macroeconomic market variables such as risk-free interest rates, inflation, commodities and foreign exchange rates.
- 29. Micro (or microeconomic) transmission channels shall be a mechanisms through which climate risk drivers affect banks' individual counterparties, potentially resulting in climate-related financial risk to banks and to the financial system. This includes the direct

effects on banks themselves arising from impact on their operations and their ability to fund themselves. Microeconomic transmission channels also capture the indirect effects on name-specific financial assets held by banks (e.g. bonds, derivatives, shares).

- 30. **Impaired asset** shall be an asset that at a certain point before the end of its economic life ceases to generate returns as a result of changes related to the transition to a low-carbon economy.
- 31. **Carbon taxation (carbon tax)** shall generally refer to a tax levied on the carbon content of some goods and services, typically in the transport and/or energy sectors. The purpose is to reduce CO2 emissions by increasing the price of these goods and services.
- 32. **Sustainable investments** are understood as investments in economic activity that are considered to contribute to the achievement of environmental protection goals.
- 33. Sustainable finance shall refer to process of taking climate, environmental and social factors into account when deciding on financing, which leads to increased investments in long-term and sustainable activities.
- 34. **Sustainability** shall be a dynamic process that provides resilience to the natural system and to humans in an equitable manner.
- 35. **Sustainable development** shall be development that covers the needs of today's generation without jeopardizing the ability of future generations to meet their needs and allows for a balance between social, economic and environmental needs.
- 36. **Tipping point** shall refer to the critical point of changes in the system's features, beyond which there is a reorganization, often abrupt, after which the system no longer returns to the initial state, even if the drivers of change are reduced/non-existent. For an ecosystem, this point refers to the critical threshold at which the global or regional climate changes from one steady state to another.
- 37. **Adapting to climate change** sheal mean taking measures to adapt to current or expected climate changes and their impact, in order to prevent or reduce damage from those changes, while using potential opportunities.
- 38. **Climate-related risks** shall denote potential risks that may arise from climate change or from efforts to mitigate climate change and related impacts and their economic and financial effects.
- 39. **Greenhouse gases** shall be those gaseous constituents of the atmosphere, natural and anthropogenic (human-related), which absorb and emit radiation at certain wavelengths within the spectrum of thermal infrared radiation emitted from the Earth's surface, from the atmosphere and from the clouds. This radiation causes a "greenhouse" effect. The main greenhouse gases in the Earth's atmosphere are: water vapour (H2O), carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4) and ozone (O3).

- 40. **Taxonomy of sustainable economic activities** shall mean a system of recognition of economic activities that are considered to contribute to the achievement of environmental protection goals (sustainable economic activities) based on established standards for determining the compliance of economic activity with the principles of sustainable development and environmental standards. Such a taxonomy allows investors to direct resources towards the transition to a low-carbon economy. The taxonomy also facilitates a system for publishing data related to climate change.
- 41. **Transitional risks** shall refer to an institution's financial loss that can result, directly or indirectly, from the process of adjustment towards a green economy and achievement of sustainable development.
- 42. **Climate change mitigation** shall imply human activities to reduce or prevent the emission of greenhouse gases. It is commonly associated with the goals defined in the Paris Agreement in terms of keeping global warming well below 2°C and pursuing efforts to limit the temperature increase even further to 1.5°C relative to pre-industrial levels.
- 43. Management of climate-related risks shall imply identifying, measuring or evaluating, controlling or reducing and monitoring the drivers of climate-related risks and their impact on other risks to which banks are exposed in their operations (for example credit, market, operational, liquidity risk or other risks).
- 44. **Physical risks** shall denote economic costs and financial losses resulting from the increasing severity and frequency of:
 - Extreme weather events such as heatwaves, landslides, floods, wildfires and storms (so-called acute physical risks);
 - Longer-term gradual shifts of the climate, such as changes in precipitation, extreme weather variability, ocean acidification, and rising sea levels and average temperatures (so-called chronic physical risks);
 - Indirect effects of climate change, such as loss of ecosystem services (e.g. desertification, water shortage, degradation of soil quality or marine ecology).
- 45. **Physical hazard (or hazard)** shall be the potential occurrence of a natural or humaninduced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.