

Louvain School of Management

Climate change: what are the threats and opportunities for Belgian banks?

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I. Introduction

The ecological crisis is a current crisis, and its consequences are likely to increase in magnitude and scope in the future. From a physical and transitional point of view, many modern industries will be impacted by these ecological factors. Prominent economic actors, most notably national governments, banks, and insurers, will have to adapt quickly to environmental regulations aimed at mitigating the consequences of climate change through an urgent ecological transition.

This paper will focus on banks' battle against climate change. It will focus on the current and future challenges and the opportunities ahead to achieve an effective ecological transition. The present and urgent nature of this crisis, combined with my interest in the banking sector, gave rise to the research question of this dissertation which is defined as follows:

Climate change: what are the threats and opportunities for Belgian banks?

First, the literature review will allow positioning the main economic actors in the context of climate change. It will also highlight which European regulations are in place at the bank level to ensure an effective transition. The last part of the literature review will highlight from a general point of view which shortcomings affect the success of the transition and which measures are being taken to mitigate these negative points.

The empirical part will focus on the Belgian banking context. Based on the analysis of the reports made public by more than twenty banks operating in Belgium, an in-depth study of the threats and opportunities for banks facing the ecological crisis will be conducted. After analyzing more than 150 reports of different forms (annual reports, sustainable reports, risk reports, ...), the main trends will be highlighted to answer the research question.

Even if banks have been confronted with the ecological crisis for several years, the analysis has allowed putting forward some rather disconcerting elements. The observation is unanimous; even if the major banks (in terms of market power) seem to be well on their way to mitigating the risks of the ecological transition, the smaller ones fall behind. These will not have the interest to delay too much. The climate context plunges the banking world into conditions where adaptation and opportunism are crucial assets and where it is imperative to be foreseeable.

Many tools exist to help banks anticipate these risks, such as reporting, stress tests, and scenarios, but these are far from optimal. This work will also highlight what gaps they suffer from and why they are still challenging to use. On the other hand, several initiatives are considered game-changers in the environmental transition. A careful follow-up in the coming years of these initiatives will allow to judge whether or not they were fundamental turning points in the ecological change.

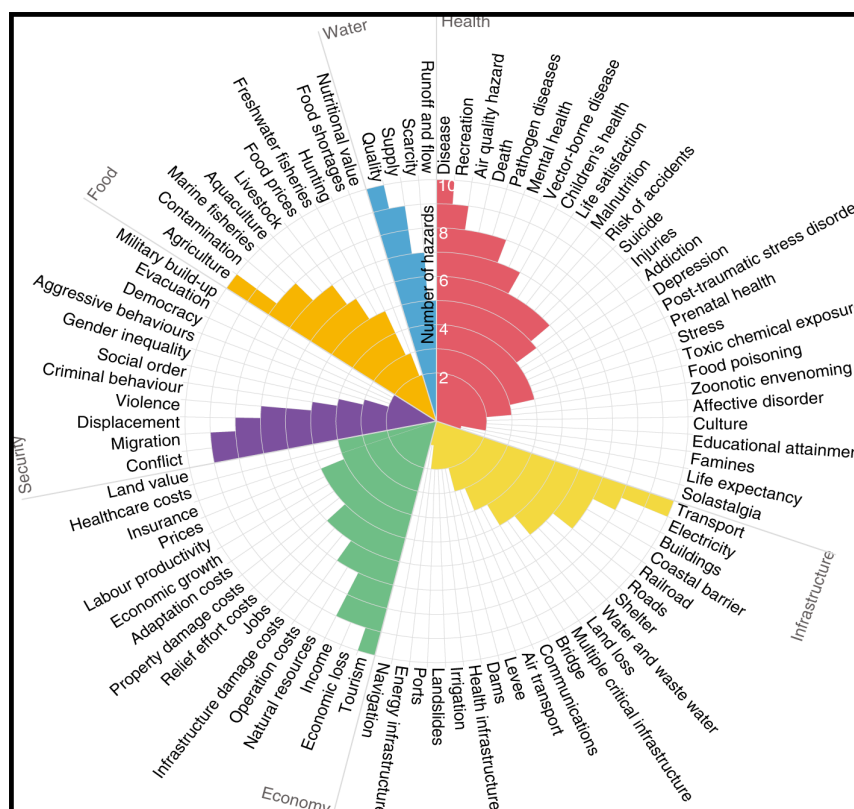
II. Literature review

1. Introduction

1.1 Climate change

Scientists have been unanimous for years that the annual increase in carbon dioxide in the atmosphere will dramatically affect our future. These consequences can already be measured today, and they will only multiply in the coming years. According to a study published in *Nature Climate Change* at the end of 2018, humanity was impacted in 467 different ways by climate change, as shown in figure 1 (Mora, 2018).

Figure 1: Different ways humanity was impacted by climate change in 2018¹



¹ Mora, C. S. (2018). Broad threat to humanity from cumulative climate hazards intensified by greenhouse gas emissions. *Nature Clim Change* 8, 1062–1071.

The same study shows that the most affected critical sectors were health, food, water, economy, infrastructure, and security. Three years later, the situation is still alarming. The latest report of the IPCC (The Intergovernmental Panel on Climate Change, United Nations body for assessing the science related to climate change) translates the current situation of climate change into figures. These figures are presented in the next paragraph.

Human presence has warmed the climate at an alarming rate in recent years. In 2019, CO₂ concentrations in the atmosphere were higher than at any time in at least 2 million years. Global surface temperatures have risen faster since 1970 than in any other 50-year period in at least the past 2,000 years. Temperatures in the most recent decade (2011-2020) exceed those of the most recent multi-century warm period, about 6500 years ago. Under all emissions scenarios considered, global surface temperatures will continue to rise at least through mid-century. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless significant reductions in CO₂ and other greenhouse gas emissions occur in the coming decades. The transition must be made now to limit the impact of climate change.

In theory, the solutions are known. From a physical sciences point of view, to limit man-made global warming to a given level, it is necessary to restrict cumulative CO₂ emissions. The world will get there by reaching at least zero net CO₂ emissions and by strongly reducing emissions of other greenhouse gases. Each ton of CO₂ emissions contributes to global warming. This quasi-linear relationship must be controlled.

In practice, this is more complex to implement because of the many actors and the complex reactions to adopt.

1.2 Climate change and economy

The global economy is primarily impacted by physical and transition risks. Physical risks include damage to infrastructure and property, damage to international trade due to climate shocks (storms, floods, droughts...), and loss of productivity due to rising average temperatures. On the other hand, transition risks result from the adjustment of the global economy to a low-carbon economy. This transition is found in how society deploys resources, uses technologies, and implements new regulations.

Relying on the Swiss Re Institute's research (Swiss Re Institute, April 2021), as a result of climate change, the world stands to lose about 10% of total economic value by mid-century. This is a real-world scenario if temperature increases remain on the current trajectory and the

Paris Agreement and 2050 net zero emissions targets are not met. However, even if the Paris Agreement's goal of limiting global warming below 2 °C is achieved, the economic costs will be genuine.

Understanding the economic consequences of climate change is becoming a necessity for a broader range of economic professionals (Batten, 2018): not just those directly involved in the design of optimal climate policy but also, and especially, those involved in modeling, assessing, and forecasting macroeconomic variables. The national government, central bank, insurances companies, international organizations, or private institutions are brought to play a significant role in the economic transition. They will face complex challenges in the future and will have to consider different factors related to climate change in their management.

This work analyzes the behavior of banks, more precisely the Belgian ones, in the face of climate change. However, to understand the full range of challenges that banks face, it is also essential to analyze the behavior of their key stakeholders in this changing world. The following section will be devoted to it.

2. Impact of climate change on the main actors of the economy

2.1. National Government

National governments must be aware of the risks climate change poses to their country's economic growth. It must ensure that its governance and policy frameworks are robust to face these risks. They must also consider and anticipate the possible implications of large-scale climate-related extreme weather events on public budgets and fiscal policy. The consequences of an economy in transition to a zero net-zero emissions economy must also be considered.

In a second stage, governments must create supportive national policy environments (Bailey, 2021). This means developing climate legislation networks establishing emissions targets, carbon budgets, and other institutional arrangements to open eyes and clarify long-term climate policy. They should also stimulate green industrialization and green investments. Developing financial support strategies for renewables and other low-carbon energy sources will attract sustainable investments and provide clear and stable signals of the governments' commitment to net-zero transition.

Furthermore, it is crucial to empower local governments as each country is governed differently. The authority is often divided by central, regional, and local control in different ways. It is crucial that the national government provide local government with clear policy direction and actively ensure to pursue net-zero emissions. Achieving a climate-coherent national plan is critical.

In addition to being governed differently, countries are not impacted in the same way by global warming. Each geographical situation is different. Therefore, adaptation to climate impacts is needed at all levels of government, from local to international. As noted above, local, regional, and state governments are responsible for proactively planning and implementing these adaptations by tailoring strategies to their unique specific context. Dynamic and creative collaboration among the various actors is a key to success.

2.1.1 Belgium

Due to the federal structure of Belgium, many areas of competence are concerned by the Belgian climate policy. This policy is divided between the regions and the federal government.

Consequently, several different bodies and decision-making processes coordinate Belgian climate policy.

This results in overlapping competencies between the different levels of government. Therefore, this distribution is complex and requires delicate and intelligent coordination structures between the various authorities responsible. For example, in terms of environmental policy, the federal-state coordinates international climate policy, coordinates product policy, and manages the marine environment.

On the other hand, the regions are responsible for air and soil protection, nature protection, and water protection and distribution. To ensure maximum mutual support between the various actors, the Belgian National Adaptation Plan (NAP), drafted by the working group "adaptation" of the National Climate Commission, was adopted on 19 April 2017. This plan aims to provide clear and synthetic information about adaptation policies and their implementation in Belgium. This plan also identifies actions of national scope that will strengthen cooperation and develop synergies between the governments (federal and regional).

At the end of 2019, Belgium sent its final version of the National Energy - Climate Plan 2021-2030 to the European Commission. This plan highlights the energy and climate policy objectives to be followed for the period 2021-2030 and presents the measures to be put in place to achieve them. It includes the five dimensions of the European Energy Union and is in line with the objectives defined for 2030 (European Commission, 2021). This plan is coupled with the Belgian long-term strategy to reduce greenhouse gas emissions, as provided in the Paris Agreement.

2.1.2 Belgium climate change exposure

The NAP also refers to several publications on climate change projections. Based on several scenarios, these projections show that Belgium will be impacted by significant changes in temperature levels and more extreme weather conditions, such as more frequent and heavier precipitation in winter. Belgium will also experience more heatwaves and droughts, leading to water shortages in summer and significant increases in sea level at the coast.

All types of production processes and services will be affected by potential water shortages, flooding, supply problems, infrastructure damage, etc. The most important ones are expected to affect agriculture, fisheries, land use, infrastructure, forests, biodiversity, water resources, tourism, and the Belgian people's health (notably through increased heat waves). A European

Commission study (Ciscar & al., 2014) shows that the Central-Northern Europe region (Belgium, the Netherlands, Germany, and Poland) would be strongly affected by climate change impacts on human health and sea flood damage.

Under the extreme scenario leading to a global temperature increase of 3.5 °C, the overall welfare loss due to climate change to the Central Europe North region would be around € 45 billion/ year (€ 190 billion/ year in all EU), almost 2% of regional GDP (National Bank of Belgium, 2019). Damage associated with sea floods would amount to € 9 billion/ year for the Central Europe North region.

2.2. Banks and financial institutions

Banks and financial institutions are also highly influenced by climate change. A common point highlighted by leading firms such as McKinsey & Company, EY, and PWC, is that banks must manage their financial exposures and help finance a green agenda in the face of climate change. To achieve this, it requires excellent climate-risk management, which must be defined by formulating strategies, building capabilities, and creating risk-management frameworks.

Banks are transversal organizations. It is therefore not always easy to implement solutions to climate change. Many players will be involved in the management of the risks associated with the ecological crisis. Business, financial, risk management departments will have to work together in order to ensure efficient management of the ecological transition.

2.2.1 European context

The European Central Bank (ECB) is the main body of the Eurosystem and the European System of Central Banks (ESCB). Their principal roles are to conduct the monetary policy of the European Union, administer the foreign exchange reserves of the EU Member States, conduct foreign exchange operations, and set financial targets. Moreover, they are aware that climate change affects price stability through extreme weather events and brings uncertainties associated with the transition to a low-carbon economy. Therefore, the ECB is committed to taking into account the impact of climate change in its monetary policy framework, banking supervision mandates, and the conduct of all operational tasks.

They have a leading role in the green transition. The ECB developed an action plan with an ambitious roadmap to incorporate climate change considerations into their policy frameworks in various ways. The ECB's banking supervision has published a guide to assist banks on

climate and environmental risks. It requires banks to adopt a comprehensive, strategic, and forward-looking approach to disclose and manage all climate and environmental risks.

2.2.2 Strategy

The adoption of the Paris Agreement on climate change and the UN 2030 Agenda for Sustainable Development in 2015 has substantially impacted the European financial sector. These have pushed the role of banks and other financial institutions in a new direction: to help governments manage the transition to low-carbon and more circular economies on a global scale. Today, European banks are aware of this role. They can establish their strategy with the help of the European Commission's supervision and the high-level expert group's recommendations on sustainable finance. In addition, since the Commission's adoption of the Sustainable Finance Action Plan in March 2018, banks are subject to respect a specific strategy.

This action plan sets out a banking strategy to further link finance to sustainability. To give an idea, it includes ten key actions that can be broken down into three main categories: Redirecting capital flows to a more sustainable economy, integrating sustainability into risk management, and fostering transparency and long-term. Established in 2018 to help banks in the green transition, this action plan is continuously updated to ensure its optimality.

2.2.3 Regulations

The adaptation of banks to climate change often means adapting to new regulations. Their strategies must cope with new rules and commercial pressures that keep increasing. Banks must constantly align their practices, operations, and investments accordingly. This section will be dedicated to listing these principal sustainable regulations and shortly describing them.

- Non-Financial Reporting Directive (NFRD) - Directive 2014/95/EU

Today, European law requires large companies, including banks, to disclose information on operating and managing social and environmental challenges. Since the Directive 2014/95/EU, banks must publish specific information. This information includes ecological issues, social issues and treatment of employees, respect for human rights, anti-corruption and bribery, and diversity on company boards. Directive 2014/95/EU has since been further elaborated.

- Corporate Sustainability Reporting Directive (CSRD)

On April 21, 2021, the European Commission adopted a new Corporate Sustainability Reporting Directive (CSRD) proposal, which would amend the current reporting requirements

under Directive 2014/95/EU. This proposal aimed to extend the scope to all large companies and all companies listed on regulated markets. It also aimed to introduce more detailed reporting requirements and the obligation to report under mandatory European sustainability reporting standards.

The CSRD covers all relevant Environmental, Social, and Governance (ESG) elements. These criteria have become fundamental in the economic landscape. Indeed, in response to increasing investor demand for non-financial information from companies, environmental, social, and governance (ESG) disclosure has significantly improved thanks to reporting. It allows companies to be more transparent about the risks and opportunities they face.

The CSRD is part of efforts to address the data deficit under NFRD. It now allows banks to access much more climate information on greenhouse gas emissions and guarantee relevant information for investors.

- Sustainable Finance Disclosure Regulation (SFDR)

In March 2021, the European Union's Sustainable Financial Reporting Regulation (SFDR) came into force. The SFDR is meant to help both institutional asset owners and retail clients understand, compare and monitor the sustainability characteristics of investment funds by standardizing sustainability disclosures.

Under the SFDR, firms must provide disclosures at both the firm and product level on the incorporation of sustainability risks, consideration of negative sustainability impacts, promotion of environmental or social factors, and sustainable investment objectives.

- Regulation on sustainability-related disclosure in the financial services sector

In May 2018, the European Commission proposed a regulation on disclosures relating to sustainable investments and sustainability risks and amended Directive (EU) 2016/2341. The disclosures regulation was adopted in spring 2019 and was published on 9 December 2019 in the Official Journal. It has been applied since 10 March 2021.

It lays down sustainability disclosure obligations for manufacturers of financial products and financial advisers toward end-investors. These disclosures help to understand the integration of sustainability risks by financial market participants (i.e., asset managers, institutional investors, insurance companies, pension funds...) and the financial products that pursue the objective of sustainable investment.

- European Climate Law

The European Climate Law has the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

This law sets out the objective to achieve by 2050 net-zero greenhouse gas emissions for EU countries as a whole by cutting emissions, investing in green innovations, and protecting the natural environment. The law verifies that all sectors of the economy and society play their part. Under the law, banks are committed to transitioning their loan and investment portfolios to net-zero by 2050.

The European Climate Law was published in the Official Journal on 9 July 2021 and entered into force on 29 July 2021.

- Nomenclature of Economic Activities (NACE)

The NACE code is the standard European nomenclature of productive economic activities. The acronym NACE, Nomenclature of Economic Activities, refers to the integrated classification system of products and economic activities.

NACE codes provide a framework for collecting and displaying a wide range of statistics in economic areas such as employment, national account, and production based on economic activity.

However, the NACE code is not optimal; it is considered outdated by the financial system. Defining what is sustainable is too complex and open to interpretation. There is a need to find a balance between simplicity, transparency, and reliability.

- EU taxonomy

Lately, the United Nations Environment Programme Finance Initiative (UNEP FI), in partnership with the global financial sector and the European Banking Federation (EBF), has been working towards a new sustainable initiative. Together they developed the European Taxonomy forms that could be a game-changer for sustainable financing.

The EU Taxonomy Regulation, proposed by the European Parliament and the Council in June 2020, is a regulation that establishes a classification system for economic activities based on their environmental sustainability (European Commission, 2019). It is, in fact, a classification system that aims to support

mandatory disclosures on different topics to provide clarity to the market about which economic activities can be considered sustainable. The taxonomy covers six critical environmental aspects, including water, circular economy, pollution prevention and control, and ecosystem protection. The EU taxonomy is expected to become the leading standard for determining whether an economic activity can be considered environmentally sustainable or not.

The EU Taxonomy is aimed at a wide range of participants: financial market participants offering financial products in the EU, large companies that are already required to provide non-financial reporting under the Non-Financial Reporting Directive, and the EU the Member States when establishing public measures, standards or labels for green financial products or green (corporate) bonds.

The first step of this EU Taxonomy was a test. From January to August 2020, 26 banks tested the EU Taxonomy across Europe. The case study was conducted on more than 40 transactions and existing customer relationships across a wide range of macro sectors. The testing exercise highlighted some of the benefits of the European taxonomy and provided recommendations for legislators, regulators, labels, and certification schemes used by banks.

The benefits of this new initiative are numerous. First, the European taxonomy is a positive initiative that aims to strengthen sustainable finance by bringing consistency and transparency to the industry. It will also enable informed investment decision-making. Another benefit is defining future environmental requirements and reorienting finance to a sustainable economy. This taxonomy will clarify sustainability criteria and navigate the economy to a low-carbon and resource-efficient economy. By helping financial markets adapt to sustainability, the European taxonomy has a vital role in the future of the European economy.

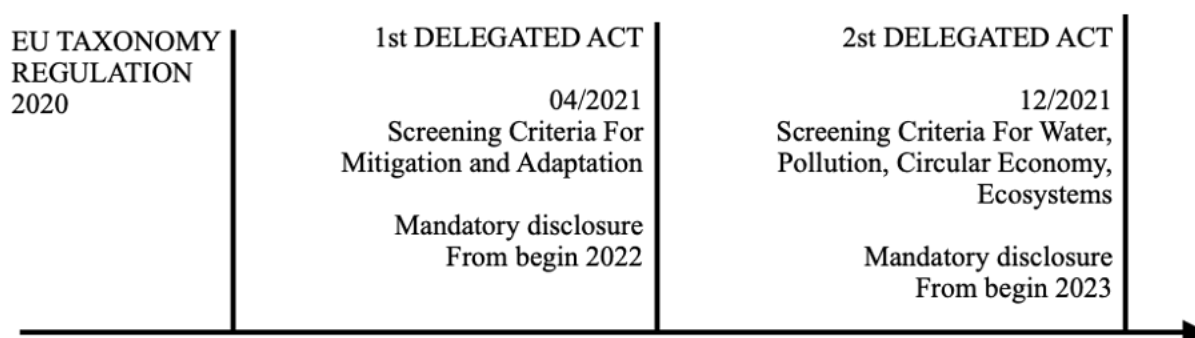
Furthermore, the banks share the standard view that the EU Taxonomy will bring reputational benefits to the industry by mitigating potential perceptions of greenwashing. The objective of the testing exercise was to reassure the participants of the adoption of a new taxonomy. It was also for participants to develop an initial and practical understanding of its application. According to the EBF report (European Banking Federation, 2021), this exercise was a success in the banking community and allowed to move to the next step.

As a result of the recommendations and lessons learned from the case study, the EU Taxonomy will be implemented in two Delegated Acts. The College of Commissioners reached a political agreement on

the text of the First Delegated Act on the EU Climate Taxonomy on April 21 (2021) and requires disclosure starting on 1 January 2022. The second Delegated Act was approved by the end of 2021.

Below, in figure 2, is a timeline detailing the publication date of each Act and the mandatory disclosure deadlines for each delegated Act.

Figure 2: timeline publication date of each Act and mandatory disclosure deadlines of the EU Taxonomy²



2.3. Investors

Today's investors need as much information as possible to guide their investment choices. Indeed, financial market efficiency relies on accurate firms' risk opportunities and exposures. With climate change's rapid and hazardous effects, relying on relevant and up-to-date information becomes even more critical. This section will detail investors' information needs, expectations, and attitudes towards climate change.

2.3.1 Investors' needs

The effects of climate change are disrupting existing business models. Firms' exposure to risks has been further modified by the physical (natural disasters, ...) and transition risks (government regulations, climate-related innovations, ...) of climate change. As mentioned above, information on risk exposure and other non-financial information has become a crucial resource. However, according to a study conducted by the European Corporate Governance Institution (ECGI) in March 2020 (Ilhan, Krueger, Sautner, & Starks, 2020), many regulators and investors claim that climate risk disclosure is currently insufficient and that current quantitative and qualitative climate risk disclosures are uninformative and inaccurate. Yet, as discussed earlier, steps have been taken to address potential gaps in the present disclosure.

² Noonan, D. (2021). *EU Taxonomy Fundamentals*. Greenomy. Consulted on 26 November 2021, retrieved from <https://greenomy.io/blog/taxonomy-fundamentals>

Regulators, governments, and NGOs have joined forces to improve corporate reporting on climate risks. Examples include the EU taxonomy in the banking sector. Other international initiatives (for instance, the Financial Stability Board initiated in 2015 the Task Force on Climate-related Financial Disclosure) and national ones have emerged to tackle this issue.

The situation must evolve so that these initiatives meet the requirements of investors. The economic literature shows that investors want companies to provide more sustainability disclosures that are material to financial performance. They want disclosure of the material link between a company's management of sustainability factors and its financial performance. Investors also need consistency. There are so many different reporting frameworks and guidelines to choose from. Given the difficulty of choice and many potential stakeholder interests to consider, companies often fail to disclose the relevant sustainability information that investors need. The reliability of some information must also often be questioned. Some companies do not yet have the suitable systems to collect quality sustainability data. Advanced technology and techniques exist for tangible sustainability factors, such as greenhouse gas emissions. However, for other equally essential categories (corporate culture, human capital, ...), it is still difficult to estimate the companies' performance.

The above arguments suggest that non-financial reporting is not yet optimal. However, investors have a significant role in the non-zero transition, and improved initiatives will help them in this vital task.

2.3.2 Investors sustainable behavior

Climate change will affect long-term investment returns, although it is still difficult to estimate the magnitude of this impact. Climate risks and rising temperatures will lower returns on some assets, including stocks and bonds. New global and European sustainability regulations will significantly impact low pricing power and high emissions intensity industries. Investors' first reaction must be to consider these factors in their long-term investment strategy.

Today, large investors with complex portfolios manage risk through well-established mechanisms, including asset selection, diversification, insurance, and liquidity (Gründl, Dong, & Gal, 2016). Climate change creates new challenges for these investors as its well-established risk management mechanisms have become partially or fully ineffective and need to be redefined. New regulations and government policy responses are challenging to measure and unclear risk management techniques. With increasing exposure to physical and transitional risks, investors must deploy new strategies to manage these risks.

A great deal of research and analysis has been conducted to provide new solutions for investors facing the challenges of responsible investment. Scenario building on the impact of carbon pricing on fossil fuel stocks, raising awareness of climate change risk among institutional investors, and managing inefficient pricing of climate change risks can be valuable solutions.

2.4. Insurances companies

Like many other players, insurance companies have to face the many new challenges that climate risk brings. McKinsey research (McKinsey & Company, 2020) shows that their main warning is the escalating climate change risks and the shifting industry regulations. Indeed, more frequent dramatic events combined with the evolving need to meet regulatory requirements threaten the company's business models. This section will serve as an overview of the current situation in the insurance industry and detail the strategies being implemented to mitigate the consequences of climate change.

2.4.1 Situation overview

Insurers play a critical role in addressing climate change. Stronger and more frequent natural disasters will continue to destroy homes and businesses at record rates in the future. In this regard, their primary role is to provide the flows of capital needed to help individuals and communities to recover from climate disasters. Indeed, proper insurance prevents the direct consequences of a catastrophe from falling largely on individual citizens or national governments (Arzabkowski, & al., 2019). Secondly, insurance plays a role in understanding climate change risks. It helps promote measures that individuals and communities can take to improve their protection against climate-change-related disasters.

Insurance companies need to formulate short- and long-term strategies to maximize their effectiveness. For example, in the case of property insurance, since it is a relatively short-term product, the strategy must be renewed accordingly. On the other hand, insurance must be integrated into a comprehensive, long-term climate adaptation strategy.

Regardless of the short or long term, insurance strategies must begin with risk identification and analysis, usually through rigorous modeling. To accomplish this task, one resource is crucial: risk information. The amount of available and adequate data on asset risk exposure, combined with improvements in risk modeling, allows for formulating individual and shared strategies that accurately reflect specific risks.

It is also imperative that insurance companies share risk information and their expertise with countries and local communities to help them better identify specific climate change risks (Arzabkowski, & al., 2019). As stated in the report of the World Economic Forum (World Economic Forum, 2020), the world will often fail to respond to the challenges of climate change (extreme heat, natural disasters, and biodiversity loss,...) in time. That's why the role of insurance is crucial. They are no longer individual catastrophe bearers but must become the interactions between communities and climate change prevention. Insurers should use their understanding of risk to help local communities and thereby protect a larger share of the global economy.

Insurers must be careful not to underestimate the real threat of climate change. While the effects of climate change are occasionally localized and impact only specific regions, its effects are primarily systemic. Its impacts fall on entire communities and stress local economies. This systemic trend will affect both consumers and insurers and threaten the whole business model of companies. By disrupting the traditional business model, the effects of climate change could make the insurance of certain risks unaffordable for consumers or unfeasible for insurers.

Faced with the changes brought on by climate change, the insurance business model must be adapted. Customers, shareholders, and regulators are now demanding that insurance solutions go beyond traditional risk transfer and expect solutions for environmental insurance products. Electric car insurance, catastrophe insurance, and renewable energy projects insurance are some examples. This adaptation means increasing the ability to recover from specific events, reducing vulnerability, and promoting resilience to catastrophes.

2.4.2 Belgian insurance context

In Belgium, the insurance sector is dominated by a small number of players. In 2020, AG Insurance, AXA, KBC, and Ethias were the most prominent insurance providers in terms of market share. A notable trend is that many banks in Belgium offer insurance policies such as home insurance, car insurance, or life insurance. That's why in the top 15 of the leading insurance companies in Belgium in 2020, other banks like Belfius and Argenta could also be found (Statista, 2021).

2.5. *Asset managers*

Like the other economic actors, climate change impacts asset managers. They need to examine their firms' climate risk exposure at a portfolio and fund level in depth. Given the persistent

and long-term nature of climate risk, asset managers must also oversee the integration of climate risk considerations into their business strategies, governance, and risk management processes to meet rising regulatory expectations and increased exposure to physical risk.

Climate change also brings a change in mentalities and therefore impacts investor preferences. Their awareness of ESG investments is growing, representing opportunities for asset managers to offer new green products and sustainable investment strategies. This change in mindset also translates into increased demand for disclosure, and asset managers must ensure that their climate risk disclosures are accurate and transparent enough.

2.6 Other banks stakeholders: customers, banking supervisors, and regulatory authorities

Other players are also important to mention. Banks' customers, supervisors, and regulators must be mentioned because their impact will be considerable.

Banks have to provide excellent customer service to their clients. Customers play a significant role. Without them, no transition will be possible. Therefore the system must be designed to identify opportunities for improvement and encourage the adoption of good environmental, social, and economic practices. Within this transition, clients will insist on data protection, governance, and confidentiality. The banks should also carry out this task.

Supervisors also have to be careful in environmental management. Their core competence involves examining the financial condition of individual banks and evaluating their compliance with laws and regulations. These regulations are influenced by climate change, and they will have to adapt to the ecological conditions. Banking supervisors should carefully consider the climate change-related risks faced by the banks. Bank supervisors are required to assess the physical, transitional and other risks arising from climate change. It is also their role to guide banks in the right direction. For example, banking supervisors should consider encouraging or even requesting banks to follow the TCFD recommendations.

Regulatory authorities will also have to integrate climate risks into their activities. In particular, they will have to assess climate risk as a financial risk in stress tests. Their role will be to encourage or mandate climate-related financial disclosures.

3. Threats and Opportunities

After analyzing the current situation of the different actors in the context of climate change, it is time to focus exclusively on the banking sector from a global perspective. This section will be dedicated to analyzing the threats and opportunities it faces. This part will highlight elements that will be useful in later parts of this work. Global trends will be identified, and these will later be compared to the Belgian ones.

3.1. *Treats*

3.1.1 Reporting challenges

Many experts, consultants, executives, and NGO leaders have pointed out the need to pursue a greener and more socially responsible agenda. To achieve this, one initiative would revolutionize this transition: public reporting of sustainability performance.

Even if all these experts are still convinced that sustainable reporting helps in the transition and that many academic studies conducted previously show a positive and significant relationship between ESG disclosure by companies and financial performance, it suffers from many gaps (Buallay, 2019).

Many regulators and investors argue that climate risk disclosure is inadequate as discussed earlier in the work. There is not enough transparent information on how non-financial issues (especially sustainability issues) affect companies and, conversely, how companies themselves affect society and the environment.

In a study conducted by the European Commission on the review of the non-financial reporting directive, various comments were made about the quality of sustainable reporting. The main remarks were the following (European Commission, 2020):

- Reported non-financial information is not sufficiently comparable or reliable.
- Companies do not report all non-financial information that users think is necessary, and many companies report information that users do not feel is relevant.
- Some companies from which investors and other users want non-financial information do not report such information.
- It is hard for investors and other users to find non-financial information even when reported.

Another major problem was detected in this study and is described as follows: *Companies incur unnecessary and avoidable costs related to reporting non-financial information. Companies face uncertainty and complexity when deciding what non-financial information to report and how and where to report such information. In the case of some financial sector companies, this complexity may also arise from different disclosure requirements contained in different pieces of EU legislation. Companies are under pressure to respond to additional demands for non-financial information from sustainability rating agencies, data providers and civil society, irrespective of the information that they publish as a result of the NFRD (European Commission, 2020).*

This problem is essential and is a threat to the ecological transition. The demand for better information for investments is driven by investors' need to understand better the financial risks resulting from the sustainability crises. To combat climate change, investors need more information about the growth of financial products that actively seek to solve environmental and social problems. As long as they don't have it, investment decisions will be compromised, only slowing down the ecological transition.

To achieve the green transition in a reasonable timeframe, capital markets and shareholders need robust, timely, and actionable information on material ESG issues provided by companies. Nevertheless, assessing a company's materiality (identifying potential ESG issues that could impact a company and its stakeholders) suffers from many defaults.

- Materiality

The term material refers to decision-useful ESG information disclosed by companies and investors' effective use of this information. Sustainability reports are created as a result of the materiality assessment process by the companies. Only these pose particular challenges.

1. The multiple perspectives of materiality

The concept of materiality is often based on two different perspectives. On the one hand, there is the business perspective: *a topic is material when it has a significant impact on the company's financial performance*. On the other hand, there is the societal perspective: *a topic is material when it matters to society, and the company significantly impacts this topic* (World Business Council for Sustainable Development, 2021).

For instance, the Global Reporting Initiative definition of materiality emphasizes sustainability issues that are important to stakeholders and have significant impacts on society. Conversely,

the Sustainability Accounting Standards Board definition emphasizes sustainability issues that are financially material, such as issues that influence the company's financial performance.

The lack of clarity on these different perspectives of materiality is becoming apparent. A global definition of the concept of materiality has never really been acted upon, and as a result, the use of this concept remains messy and often context-dependent. The selected materiality perspective has consequences on the design of sustainability reports and the results of the materiality assessment process.

2. Multiple stakeholders mean multiple opinions

As mentioned before, there are many economic actors, and to achieve the ecological transition, all of them will have to play an important role. Their views vary, and what one considers material is not necessarily material for another.

Moreover, unlike financial reporting, where the interested parties are specialists who have a certain level of understanding of finance, the audience for ESG disclosures may be more diverse. Indeed, sustainability reporting is exponentially more complex and opaquer. Sustainability reports are essential, but more important is that individuals can understand them enough to use them.

Therefore, it is difficult for companies to judge who will be their target audience and their level of understanding. Being able to anticipate which stakeholders will be most interested to develop a common and straightforward language must be a priority for companies.

3. ESG materiality it's not financial information

As we know, financial reports are supported by robust accounting practices, regulations, and strong datasets. On the other hand, when deciding if an ESG topic is material, there is not yet a single best practice to judge. Material ESG information does not necessarily exist, and data systems to identify material ESG topics are not yet optimal. There is an apparent absence of a standardized, one-size-fits-all methodology.

- Reliable sustainability data

The failures of sustainable reports are greatly influenced by the insufficiency and poor quality of sustainable data. Banks lack specific climate risk data. KPI's on sustainability are not clearly defined, which leaves room for interpretation, resulting in data that are not compatible and comparable. However, there are several internationally recognized reporting guidelines. For

instance, the Standards of the Global Reporting Initiative (GRI), the SASB, or even the Greenhouse Gas Protocol. These initiatives guide companies in the right direction, but this does not erase the problem, as explained in a following section.

Difficulties in the company's overall commitment can also weaken the quality of the information. Setting up processes to collect, monitor, analyze and report data takes time and resources. Bringing data together from multiple sources is a difficult task but crucial for reliable data. Data management is non-negligible and must be strengthened to allow sustainable data to improve.

- Unnecessary, and avoidable costs

The components of ESG sustainability reporting costing are not always precise, so it is essential to always be able to itemize these costs. Hiring professionals, data expenditures (collection, analysis, and reporting), equipment costs, and training-related costs are all associated with sustainability reporting. It is essential to maintain high efficiency and avoid unnecessary and avoidable expenses.

Building, designing, and presenting these reports is also not an easy task. It requires time, experts, and deep knowledge of the subject matter. The Basel III risk reports are a good example. It goes through complex and precise calculations that must consider every financial detail to ensure its reliability.

- Lack of mandates and auditing

Although more than 90% of the world's largest companies now produce ESG reports (Harvard, 2021), a minority of them are validated by third parties. As a result, much of the data collected is misleading and incomplete. In contrast, financial reporting follows agreed-upon standards, and audit committees that assure compliance.

- Too many initiatives and standards

Many different initiatives have been created to guide companies in the right direction. However, the multitude of initiatives with different benchmarks and metrics has resulted in reports that are not comparable across companies. The primary role of these standards is to ensure that the data is meaningful and comparable across networks. This is not the case here. Investors are then unable to compare the performance of different companies, which makes sustainable reporting irrelevant.

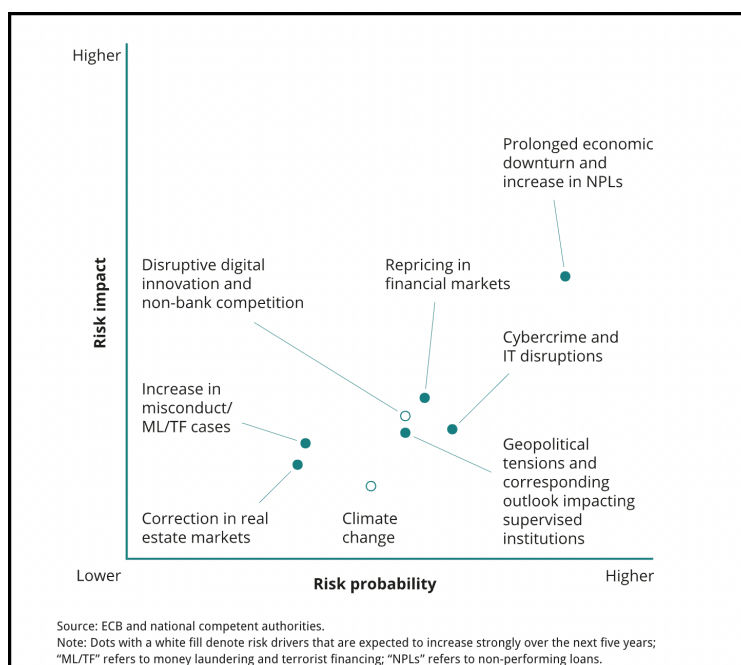
3.1.2 Eligibility criteria

The popularity of green products is rising all over Europe. However, the definitions of green projects vary per region and even change over time due to social, regulatory, and technological developments. This is why defining the eligibility of a green product today faces many challenges. Bad tagging represents a significant risk because a lack of criteria and transparency leads to many negative consequences for the ecological transition. These consequences are mainly characterized as follows: inadequate green contractual protection for investors, issuer confusion and fatigue, poor measurement quality and transparency of reporting, greenwashing, and price complexity. More structured information is needed. It would allow borrowers to easily identify and verify eligible or taxonomy-compliant green activities. Similarly, it would allow financial institutions to have a more accurate view of their eligible green portfolios.

3.1.3 Climate Risk Management

Each year, the European Central Bank publishes a risk assessment. This tool highlights the main risk factors expected to affect financial institutions over the next one to two years. Below, in figure 3, is the Risk Assessment for 2021.

Figure 3: European Central Bank Risk Assessment 2021³



³ European Central Bank. (2021). *Risk assessment*. European Central Bank.

The place of climate change in this matrix may be surprising. It describes that climate change will not have a significant impact on the operations of the banking system in the next two years. However, after a close look at the matrix, it can be seen that dots with a white fill denote risk drivers that are expected to increase enormously over the next five years.

This is evidence that the impact of climate-related risks is becoming more apparent to banks. It is critical to emphasize the need to accelerate progress in managing and disclosing these risks. The financial system needs to be on guard. The ECB is aware of this and quoted the following in their Banking Supervision early 2021: *Despite the increasing awareness of climate-related risks and the growing involvement of high-level decision-making bodies in monitoring such risks, few banks incorporate climate risk comprehensively in their risk management frameworks* (European Central Bank, 2021).

Climate change risk management must be an integral part of banking governance today. Banks have to have qualified risk managers and the right processes in place. To achieve this, several principles are necessary to ensure its success.

One of the fundamental principles of risk management is to formulate clear climate risk governance. In other words, make sure to have the right people in place and ensure their proactive communication with the board. To achieve this, banks typically implement comprehensive internal reporting workflows. To ensure cultural unity, responsibility for climate risk management must be cascaded throughout the whole organization. Another formality, as stated in the EBA Guidelines (European Central Bank, 2020), is *that institutions are expected to understand the impact of climate and environmental risks on the business environment in which they operate, in the short, medium, and long term, to be able to make informed strategic and business decisions.*

Banks must also align risk processes. An outdated risk taxonomy that does not consider tomorrow's main threats could be fatal for banks. Climate change disrupts the codes as it impacts the classic risk taxonomy in many ways. This is why risk managers should inject climate-risk considerations into all risk-management processes. This includes capital allocations, loan approvals, portfolio monitoring, and reporting.

3.1.4 COVID-19

COVID-19 has highlighted the global response to an unexpected crisis. The mobilization of international solidarity was quickly dashed and replaced by national thinking. All over the

world, nations have turned inward. The unilateral protection of their citizens took precedence over all other concerns. Fear of the stranger was born, and borders were closed in a free world. Instead of fostering global solidarity and multilateral cooperation, institutions suffered from the pervasiveness of the nation-first mindset.

Meantime, climate change is an even more significant and more complex global challenge. By its nature, different from COVID-19, this crisis requires concerted international action. However, the health crisis has upset this joint effort to address climate change. Since it began, the COVID-19 pandemic has dominated public life, weakening and reducing climate change to a secondary role. This solitary behavior in the face of the virus has forced countries to put aside their efforts in international relations but also to reduce the efforts and resources devoted to foreign policy (Borrell Fontelles, 2021). In the wake of the COVID-19 pandemic, governments worldwide committed more than \$12 trillion in fiscal stimulus, but very little of it was aimed at green, sustainable, or climate goals (World Economic Forum, 2020).

There are many lessons to be learned from the COVID-19 pandemic that can help understand the ecological crisis. Here are some examples:

- Irreversible change: Once the virus has been transmitted, it is difficult to control its expansion and trace its path. Scientists agree that climate change will likely operate similarly once temperatures have warmed beyond certain critical levels. Large-scale climate patterns (polar jet stream, ocean salinity,...) may be changed forever with irreversible effects (Manzanedo & Manning, 2020).
- Blurred points: When the covid exploded, expansion speed was difficult to measure and forecast. The climate could also plunge the world into uncertainty and disruption with unforeseeable consequences.
- Weakening of international solidarity: Countries' self-centeredness during the covid pandemic could be repeated shortly. Increasingly frequent extreme events and shortages of food or water worldwide would lead to competition for resources and mass migration (Manzanedo & Manning, 2020).
- Speed of recovery: as mentioned above, the COVID-19 exploded rapidly. In comparison, the climate crisis has been around for a long time, and its explosion is

slower, not to mention that its impacts may be even more significant. To maintain the speed of climate change recovery, there is no time to lose.

Scientists have long warned about climate change and emphasized the need for quick and decisive action to avoid its worst consequences. The covid pandemic has shown that an unprepared global crisis is disastrous for our world. Yet, to date, not enough measures have been put in place to reduce fossil fuel use and CO₂ emissions. As a result, greenhouse gas concentrations continue to rise daily. If banks, investors, and other economic agents don't take into account the lessons of COVID-19, the climate crisis will be soon uncontrollable. Laxity, procrastination, and no action from financial institutions are significant threats to climate change.

3.1.5 Greenwashing

The new environmental concerns and numerous new regulations disrupt the financial and industrial world. Industries seek the development and commercialization of green products while the business world supports the move towards a world with zero net emissions. These positive trends may have a hidden vice: greenwashing.

Over the past decade, stakeholders and investors have become increasingly concerned about the environmental footprint of industries and other businesses, including banks. As a result, they are increasingly pressuring companies to disclose their environmental performance. To tackle this problem, Corporate Social Responsibility (CSR) has been established and is gaining importance among business leaders. CSR and sustainability reporting are practical tools in the fight against climate change. However, they can be intentionally biased in the case of greenwashing.

Banks and other financial institutions can bias their stakeholders with greenwashing as selective disclosure (de Freitas Netto, Sobral, Ribeiro, & al. , 2020). They could hide poor environmental performance with positive communication about ecological performance to create an overly optimistic corporate image. Another way to counteract environmental pressures for companies is to use greenwashing as decoupling. This principle *tends to deflect attention to minor issues or lead to creating 'green talk' through statements aimed at satisfying their requirements in terms of sustainability but without any concrete action* (Siano, Vollero, Conte, & Amabile, 2017). Both forms of greenwashing impact the financial system when investors insist on companies' honesty.

3.1.6 Impact on profitability

The banks offer three main products to ensure an effective transition: green loans/credits, sustainable bonds, and SRI funds through asset management.

Theoretically, offering green products to customers could lead to higher profitability for firms. Often, green investments result from long-term investment plans in research and development, allowing for more product differentiation, lower competition, and higher product price (Berrone et al., 2013). Moreover, offering sustainable financing opportunities could only benefit their reputation. However, by providing these products, the bank exposes itself to risks, particularly profitability risk.

To attract new sustainable customers, banks are offering products at attractive rates. Green credits are offered with reduced rates and extended-term lengths. However, a significant part of current banking profitability is captured through return on sales (ROS), return on assets (ROA), and return on equity (ROE). Offering reduced rates could thus significantly increase the risk of profitability by decreasing their credit fees.

This is why banks may be tempted to invest elsewhere. Fossil fuels present simple yet extremely alarming alternatives for climate change. According to the Fossil Fuel Finance Report of 2020 (Rainforest Action Network, 2020), fossil fuel lending has increased every year. If it stays at the current rate, it will surpass \$1trn by 2030. Fossil fuel projects present themselves to banks with an artificially low cost. These alternatives are still too profitable and represent less risk on profitability, unlike green products.

3.2. *Opportunities*

While there are threats, there are also opportunities. This section will show what solutions and initiatives exist to turn these threats into learning points and opportunities.

3.2.1 Reporting opportunities

Today, as demonstrated previously, sustainable reporting is not optimal. Fortunately, the problems mentioned above are being addressed by several initiatives that seek to make sustainable reporting effective and indispensable.

- Classification

As mentioned earlier in this work, the European Taxonomy could be a game-changer for sustainable financing. By establishing a classification system for economic activities based on their environmental sustainability, this initiative could eradicate the challenges posed by the materiality assessment process. The double materiality perspective could be clarified as each economic activity and investment could be classified more simply and comprehensively.

- Working together

Climate change is a global crisis that can only be managed through joint global policy action. Everyone must work towards the same goal. To do this, the public and private sectors, including banks and insurance companies, should be the first to work together. Governments and regulators should enable the creation of publicly available climate datasets. For their part, as a provider of risk transfer capabilities, risk knowledge, and long-term investments, insurance can facilitate the transition to a low-carbon economy sharing precious information. Banks and investors should increase their transparency, price, and data disclosure. There is a need to see more political action on carbon pricing and incentives to invest in nature-based and carbon offsets solutions. Sustainable reporting should benefit from this shared information and disclose companies' roadmaps on how they intend to achieve net-zero emissions targets.

- Global Initiatives

As stated above, the many different reporting guidelines, metrics, and sustainable standards sometimes make it difficult for companies and investors to keep up. One initiative, however, is beginning to stand out from the rest: The Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). These recommendations are gradually becoming the most recognized ones, and it continues to push for international adoption of the standards across all financial services. Because it is obvious that the financial markets need clear, comprehensive, high-quality information on the impacts of climate change, it is crucial to centralize everything into one global initiative.

In their 2021 Status Report (TCFD, 2021), the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) published that the number of TCFD supporters has grown by over a third since last year report. More than 1,000 new organizations now support the TCFD recommendations, bringing the total to over 2,600 globally. TCFD supporters are now spread across 89 countries in almost every economic sector.

As written in their Global Progress Report for the Banking Sector, there have been calls to make the TCFD mandatory to accelerate adoption and drive stronger action (BCS Consulting, 2019). For example, the United Kingdom has shown leadership in this area by recently publishing its Green Finance Strategy, which calls for all publicly traded companies and large asset owners to disclose TCFD-compliant information by 2022

More recently, a global group of central banks and supervisors created the Network for Greening the Financial System (NGFS), which aims to redirect capital to sustainable investments and integrate climate-related risks into financial stability monitoring and micro-supervision.

3.2.2 Risk management solutions

- Scenario analyses and stress tests

Scenario analyses and stress tests have become an integral part of banks' risk management. This allows them to estimate the extent of the damage caused by physical and transitional risks and how to react potentially. Many authors have developed scenarios to guide banks in the right direction.

Scenario analyses and stress tests are powerful tools because they integrate climate risks that are far-reaching in terms of magnitude and scope. They can also incorporate many actors (households, companies, and governments) across different sectors and geographies. These tools effectively test financial firms and the financial system, explore structural changes in the economy, and assess risks to bank portfolios. They allow understanding the impact of climate change on business strategy, risk appetite, and risk management.

- Risk Report

The Basel Committee on Banking Supervision developed a set of internationally agreed measures to strengthen banks' regulation, supervision, and risk management. These standards, categorized in Three Pillars, have become the minimum requirements for internationally active banks. The European Banking Authority (EBA) plays a crucial role in implementing the Basel III regulatory framework in the European Union.

- *The first pillar - minimum capital requirements - defines how banking institutions calculate their regulatory capital requirements to cover credit risk, market risk, operational risk, and credit valuation adjustment (CVA)⁴.*
- *The second pillar - supervisory review - provides the European regulators acting under the Single Supervisory Mechanism (SSM) with a framework to help them in assessing the adequacy of banks' capital to be used to cover either risk identified in the first pillar but not sufficiently covered by the Pillar 1, or other risks such as among others concentration or interest rate risks⁵.*
- *The third pillar - market discipline - develops a set of qualitative and quantitative disclosures allowing market participants to assess better capital, risk exposure, risk assessment processes, and hence the institution's capital adequacy⁶.*

This framework plays a vital role in improving the ability of the banking sector to absorb shocks resulting from financial and economic stress. It also improves risk management and governance and enhances banks' transparency and disclosure. Pillar 3 attests to the importance given to climate change as it aims to promote transparency on environmental, social, or governance (ESG) risks, encouraging financial institutions to strengthen their risk management and promoting awareness of their crucial role in the transition to a green economy.

3.2.3 Global Awareness

People are taking to the streets to advocate for climate change. Events are taking place daily to inform the world about the ecological crisis. Climate activists undertake actions to shake up leaders and politicians. Moreover, significant media events move things forward. They highlight gaps in the transition and bring up new ideas.

For example, the 2021 United Nations Climate Change Conference (COP26) was recently held at the SEC Centre in Glasgow from 31 October to 13 November 2021. During the COP26, the emphasis was placed on the fact that finance must be mobilized. Every company, financial firm, bank, insurer, and investor will need to change to achieve climate goals. As stated during the conference, the Public finance for infrastructure development needs to transition to a greener

⁴ Belfius. (2020). *RISK REPORT 2020*. Belfius Bank and Insurance.

⁵ Op.cit

⁶ Op.cit.

and more climate-resilient economy. On the other side, Private finance need to fund technology and innovation

3.2.4 Investment opportunities

There is a growing demand for capital to finance long-term projects in emerging markets where economic growth and carbon intensity reduction are the primary objectives. There is an everyday awareness among investors about the urgent need to build climate resilience. Adjustment to climate change creates demand for new and different products and services, representing tremendous opportunities for banks. This tendency is on the right path as the European Investment Bank Investment Survey (EIBIS) has highlight that most EU firms see the transition as an opportunity (European Investment Bank, 2021).

There are numerous different investments to be made to succeed in the ecological transition. Here are the main investment opportunities to lead the change.

- Energy efficiency: with increasingly stringent efficiency standards, industries will continue to modernize and upgrade processes and facilities. These processes require significant capital expenditure but are indispensable.
- Green construction: the population growth coupled with urbanization has resulted in a significant increase of new buildings, which has directly resulted in increased greenhouse gas emissions. The demand for green construction finance is expanding and will not stop doing so. The same goes for other non-urban constructions. For example, investments will have to be made to build resilience in infrastructure, water-intensive industries, and agriculture. Investments in climate-resilient technologies and agriculture and food security practices include drought-tolerant seeds, improved irrigation systems, and more sustainable land management practices.
- Renewable energy: financial institutions have many opportunities to support renewable energy innovation and pollution prevention.
- Green Bonds: green bonds are becoming increasingly popular in the corporate finance practice. The European Investment Bank was the first issuer of a climate awareness bond in 2007. It was quickly followed by the World Bank's first labeled green bond in 2008. According to JRC research (European Commission, 2020), Green bond financing effectively promotes more sustainable, less carbon-intensive activities in the EU.

- Risk management: As we have seen in a previous section, the insurance world is strongly impacted by the risks brought by climate change. Investments in disaster risk reduction, vulnerability assessments, climate information, and early warning systems will have to be made.

This non-exhaustive list shows many investment opportunities for banks and other investors.

3.2.5 Technological progress

Technology offers many opportunities for banks in terms of communication, risk management and other aspects necessary for an effective environmental change. Technology is helping to work smarter, providing better ways to analyze data, improve workflow, identify problems faster, and more.

AI performs practical computation and makes accurate predictions. By developing robust models for weather forecasting and environmental monitoring, AI better understands the impact of climate change in various geographic locations.

AI can also be used to address the ESG data challenges. AI could indeed provide more accurate and timely ESG data. This would result in helping to improve the various ESG indices and enable investors to make more informed investment decisions needed for the green transition.

Technological innovation in artificial intelligence has the potential to undermine the traditional approach to ESG ratings. Traditionally, ESG rating agencies relied on company information and human analysis to produce ratings. However, this method was not optimal due to data deficiencies. The transition of ESG rating calculation by AI will have a positive impact on reporting. However, initially, it will still need to be supervised to avoid damaging banks' reputations due to not yet optimal artificial help.

3.2.6 Green recovery

In contrast to being considered a threat, banks may also find opportunities in the management of the COVID-19 crisis. In fact, the pandemic offers an excellent opportunity to accelerate the transition to a climate-neutral economy through a “green” recovery.

According to the World Bank's report on COVID-19 and climate-smart health care (World Bank, 2021), countries that have successfully integrated their response to COVID-19 and the

climate crisis have been able to develop lower-carbon, more climate-resilient solutions that are beneficial not only to health systems but also to the environment.

As a result of COVID-19, financing costs are relatively low due to low-interest rates, making sustainable investments more attractive. The pandemic has resulted in a significant reduction in the amount of CO₂ emissions worldwide. Research in Belgium shows that sustainable investment is more beneficial than ever before at this time. SRI investments have indeed exploded in the last year and reached a record high.

4. Conclusion

As the consequences of climate change are specific and long-term, it is time for the economic actors to do the necessary to ensure an optimal ecological transition. Climate change is a systemic risk, and everyone should be concerned.

It is important to note that the threats discovered in the literature review affect the banking system as a whole. These threats are defined in particular through shortcomings in terms of reporting, poor risk management, and greenwashing trends. In the second part of the paper, these risks will be reviewed in the Belgian context, and other risks will be discussed.

As seen, the risks linked to the ecological transition are numerous, but it also offers opportunities that are mostly translated into green investments. New technologies and innovations will be needed to ensure environmental change, and these will have to be significantly financed by financial institutions.

III. Empirical Part

1. Question of research

To avoid the worst possible scenario, the economic actors mentioned above will have to adapt to climate change and rising temperatures constantly. The role of banks will be crucial in the ecological transition. However, it seems that their adaptation to climate change is not yet optimal.

In the first part, the focus was put on the different economic actors and the European regulations that European banks have to comply with in terms of climate management. Some sub-sections were uniquely devoted to the Belgian context to introduce the work's second part. The literature review has highlighted which threats the banking world could face and which opportunities are to be seized in the ecological transition.

Using the information found during the literature review, the second part of this paper will focus on the Belgian banking system specifically and the elements discovered in the previous sections will be analyzed in a Belgian context.

New specific risks will be uncovered thanks to a careful analysis of the Belgian banks. The empirical part represents the analytical part of this work and will also allow to expose what opportunities are to be found in this transition.

2. Methodology

2.1. Sample selection

The research question focuses on the Belgian banks. Therefore, it is logical to focus on the most prominent players in the Belgian banking landscape to analyze the Belgian banking sector. Five banks stand out: the Belgian National Bank, BNP Paribas Fortis, Belfius, ING, and KBC. The last four listed banks represent 68,22% of the Belgian market share (The Banks, 2021). The analysis of these different banks will highlight which risks they face and which ecological opportunities are to be seized on the Belgian market.

Other players, not less important, also have their role to play. AION Banking, Argenta, AXA, Degroof Petercamp, CPH Bank, Nagelmackers Bank, Bpost Bank, Crelan, Delen Private Bank, NewB, VAN DE PUT & CO, Vdk Bank, MeDirect Bank, Euroclear, Dierickx Leys Private Bank, Centrale Kredietverlening, Bank J.Van Breda & Co and Van Lanschot Kempen were also chosen to carry out the analysis. The main reason why they were chosen is that the vast majority of these banks are of Belgian origin. Some of them have a significant market share compared to other banks on this list (AXA, Crelan, Argenta, Delen Private Bank), while others have an innovative and different character. AION banking, for example, is a full-service digital bank founded in October 2019 in Belgium. On the other hand, NewB offers banking activities intended to be ethical, transparent, and 100% focused on the energy transition.

All Belgian banks have a role to play in the ecological transition. The consequences of climate change will impact small as well as large banks. That's why it was relevant to analyze a consequent number of banks with different characteristics. All of the banks listed above represent the size of the analysis sample.

2.2. Method of analysis

A predominant qualitative approach was chosen to answer the research question: analyze the documents publicly published by Belgian banking institutions. This method was favored because it allows being close to the field and gathering information revealed by the banks themselves. This approach has enabled to generate qualitative paths of responses.

The answer to the research question has been developed through analyzing the Financial Stability Reports of the Belgian National Bank. In 2018, the term climate change was used for

the first time in the different reports. Over the years, the notion of climate change has gained momentum, and the analysis of the 2018, 2019, 2020, and 2021 reports have been an essential first source to answer the research question.

Another part of the answer could be found by analyzing the different reports published by the various banks mentioned above (2018-2021). Sustainability information can be found in multiple reports that can take various forms. These reports are mainly divided into annual reports (where a section is dedicated to sustainability information), sustainability reports, and climate reports. However, it is still impossible for many banks to find any reports dealing with sustainability information. Table 1 in the Appendix details which reports could and couldn't be found in 2020 for the different banks analyzed. To date, the large banks are the ones that provide the most detail on their activities and their adaptation to the ecological transition. That is why, to answer the research question with numerical examples and environmental initiatives, the four major Belgian banks mentioned above were used as examples.

To conclude, the risk reports of the different banks were analyzed to find the last elements of answers.

In total, more than 150 reports from 23 different banks were investigated to answer the research question (detailed list of reports in table 2 in the Appendices).

3. Treats & Opportunities - NBB's Financial Stability Reports

3.1. Introduction

As a central bank, one of the National Bank of Belgium's main tasks is to ensure the efficiency and stability of the financial system. Climate change and the ongoing transition to a more sustainable economy constitute a risk for the financial system's stability. The NBB is working continuously to integrate climate-related risks such as natural disasters and abrupt ecological transitions into its prudential supervision. A detailed analysis of the various Financial Stability Reports published in previous years (2018, 2019, 2020, 2021) was the first important source to highlight the threats and opportunities of climate change on Belgian banks.

3.2. Threats

3.2.1 Physical Risks

The physical risks associated with climate change primarily affect the insurance business, as their liabilities are directly exposed to these risks through their property and vehicle insurance activities. In the context of a climate crisis, insurance contracts may be subject to increasing claims expenses in the event of extreme weather-related events. As the environmental crisis is likely to make such events more frequent in the future, this is more than likely to represent a significant risk to the overall stability of the Belgian insurance sector. As stated before, Belgium will potentially be impacted by significant changes in temperature levels, extreme weather conditions, and more frequent and heavier precipitation in winter and heatwaves in the summer. The Belgian banks must consider these forecasts as stipulated by the NBB to establish long-term solutions.

Physical risk can also affect the balance sheets of Belgian financial institutions. Banks hold portfolios of investments or loans in regions of the world that could be severely damaged by climate change. If these investments were to be drastically affected by ecological factors, the financial stability of the banking system could be impacted.

To expose all the other consequences related to physical risk, the Belgian National Bank has created a graph representing the physical risk transmission, found in figure 4.

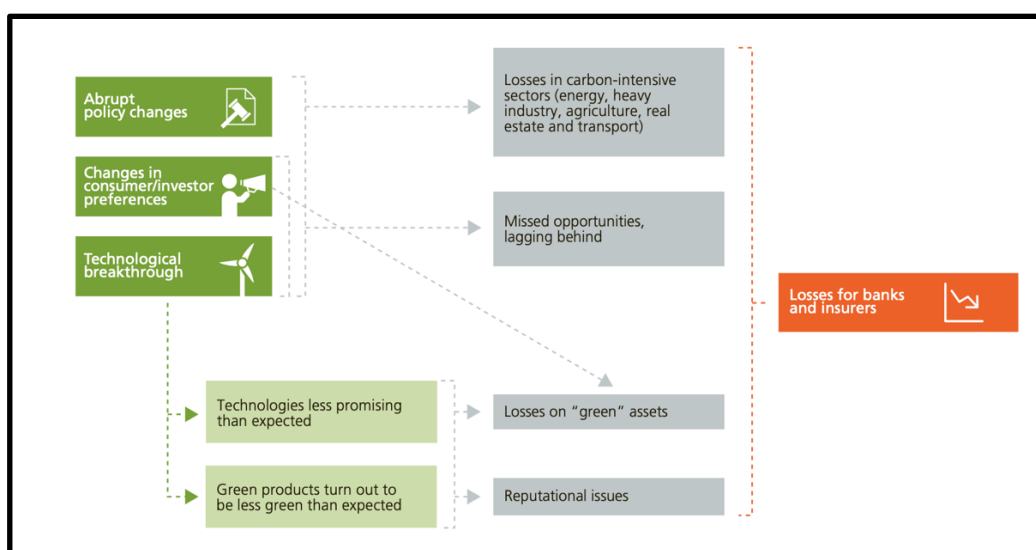
3.2.2 Transition Risks

Banks and insurance companies could be exposed to a deterioration in their asset quality due to transition risks. Green reforms and new regulations on energy intensity calculated as total greenhouse gas emissions could disrupt banks' and insurers' investment in corporate bonds, equity instruments, and loans based on the sector's energy intensity. Banks and insurers need to be doubly vigilant as it is not always easy to calculate their exposures to the new regulations due to the lack of data accuracy.

Similarly, banks may be exposed through their mortgage loan portfolio. Households living in energy-intensive housing could see their heating costs increase due to fluctuations in energy prices or the introduction of punitive taxes that impact their ability to repay mortgage debt.

Other risks associated with the ecological transition are presented in the following diagram, shown in figure 5.

Figure 5: risks associated with the ecological transition⁸



The transition to a more sustainable future will likely provide opportunities to meet this changing demand. However, this change must happen quickly to meet the targets set by the Paris Agreement. This time factor can be problematic and represents a threat to banks and investors. Indeed, sudden changes in investor or consumer preferences, available technologies, and policy measures increase the risk of missed opportunities. In the changing context of the

⁸ National Bank of Belgium. (2019). *Financial Stability Report 2019*. Eurosystem.

environmental crisis, it is difficult to predict which types of products and technologies will be winners. New technologies may suddenly emerge and make previous ones obsolete. Similarly, rapidly changing investor preferences can impact the value of investments.

3.2.2.1 Transition risk related to real estate exposures

In Belgium, residential and commercial buildings are among the main contributors to greenhouse gas emissions because their energy performance is very low (National Bank of Belgium, 2020). The European Union has set Europe-wide energy and climate targets for 2030 to impact national energy performance targets strongly. These targets will have to be met, and actions will have to be taken on climate and energy in the coming years. The new targets and emerging energy policies will strongly impact financial institutions and households. Improving the energy level of the entire Belgian building stock would require significant investments. Therefore, public and private financing mechanisms may be needed. Subsidies for the renovation of rented houses are already distributed in Belgium. Others will require additional investment that could be double-edged for the banks.

On the one hand, energy-saving renovations through energy taxes could provide significant opportunities for banks, as loans can be offered to finance these renovations. After completing the necessary renovations, households will save on their energy bills. These savings could improve mortgage repayment capacity and thus reduce credit risk. On the other, the extra investment required for renovation may hurt borrowers' repayment capacity. In any case, if these renovations are not done, it will significantly impact Belgium's real estate markets and mortgage loans.

The recent rise in energy prices in Belgium during 2021 may also push up the credit risk of mortgage loans. A surge in energy prices could reduce the reimbursement capacity of certain families and businesses occupying these low energy-efficient buildings.

The transition risk on the Belgium real estate market represents a significant threat for the Belgium banks, as shown in the arguments above. This threat is long-term as it will evolve according to the new measures taken by the European Commission to meet the 2030 targets and the increasing prices of energy consumptions.

3.2.3 Investment uncertainties

To achieve this transition, many ecological investments will be needed. Unfortunately, these investments pose many challenges which slow down the change.

- Slight competitive advantage or none at all: due to the failure of the carbon price market (under-pricing, government subsidies, abundance of quotas), companies that take climate change into account in their investment strategy may so far have little or no competitive advantage over polluting companies.
- Short-term issues: Climate change is a long-term crisis. The green transition will not happen quickly. Therefore, it is difficult for sustainable and green investment projects to create sufficient financial rewards for their environmental efforts in the short term. Green investments represent a high cost of capital resulting from higher technological risk and the lack of a stable investment policy.
- Long investment period: sustainable investments involve a long investment period, which increases investors' risk.
- Lack of transparency: The lack of definition of a green financial product is an obstacle to green investing. In addition, the current lack of transparency and sustainable information about companies' investment strategies leaves investors in the dark. Asymmetrical information, insufficient reporting, and difficulties in comparison do not highlight the climate risks associated with green projects. Fortunately, recent initiatives like the EU taxonomy and the TFCF recommendations have emerged to address these issues.

3.2.4 Climate change as a threat on the whole risk taxonomy

Considering climate risk independent of the bank's other risk categories would be a big mistake. It is more than likely that climate change will drive all traditional threats, such as credit risk, market risk, operational risk, liquidity risk, and insurance risk.

- Credit risk: future drought and floods could increase the risk of failure in the agricultural sector and decrease the value of buildings serving as collateral. Farmers and individuals suffering from droughts or flooding might become unable to repay loans. New energy performance policies may reduce properties value not meeting new standards, negatively impacting the value of a bank's collateral.
- Market risk: the emergence of new technologies or the greenwashing associated with specific sustainable projects could lead to sudden asset revaluations, sudden repricing, market bubbles, or stranded assets.

- Operational risk / Insurance risk: institution's infrastructure may be damaged by climate events, increasing operational risk. Higher and more frequent claims for insurers may disrupt business and even make certain risks uninsurable.
- Liquidity risk: Assets impacted by climate-related events may become less liquid.

3.2.5 Reputational Risk

The growing demand for green investments may pose some reputational challenges. Some new technologies and innovations may turn out to be less green than expected. The benefits of some innovations may not be valid after review and some other measures. Developers could mislead some investors by describing certain products or activities as greener than they are. The greenwashing trend could lead to losses on green assets and reputational risk. Lately, on the financing side, investors are becoming more sustainability-oriented. They may demand that their bank become so, which could impact their reputation if they do not adapt. Reputational risk may arise from the passivity of banks to act upon the importance of the green transition.

3.2.6 COVID-19 and other temporary crises

NBB's 2018, 2019, and 2020 Financial Stability Reports gave a prominent place to climate change and its consequences on the financial sector's stability. Conversely, in its most recent report (2021), this focus was given to COVID-19 and its effects. In its latest report, the BNB barely mentions climate change at the expense of COVID-19.

All efforts cannot be put aside when a new crisis breaks out. Unlike COVID-19, climate change impacts the earth and consequently also human health. The ecological crisis will potentially be the greatest crisis humanity has ever known. Nothing should undermine the efforts to prevent the harmful effects of climate change.

3.3. *Opportunities*

3.3.1 Green bond

Green bonds meet the growing demand from institutional investors to meet their environmental goals. In 2017, the Belgian Green OLO was launched with a 15-year maturity and a rate of 1.25%. The issue amount was €4.5 billion, which is expected to grow to €10 billion within four years (Ministry of Finance, 2018). The allocations of the green bonds are tracked and reported to ensure sustainability. Indeed, they are often associated with rigorous reporting and directly

link to identifiable sustainable projects. This improves transparency and increases the information on the underlying asset and the issuer's strategy.

Green bonds have other benefits. First, they raise capital to implement the country's climate and environmental policies and support the development of the green bond market. Green bonds also support economic growth and employment in strategic green sectors and diversify the investor base. The investor base often includes asset managers, banks, pension funds, insurers, central banks, and official institutions. On its side, issuers can choose green bond financing instruments to diversify their investor base and attract green and long-term investors.

3.3.2 Working together

In the 2020 Financial Stability Reports, the NBB realizes that the reporting and sustainable data disclosure are not optimal. To solve this problem, it insists on the collaboration of all. Financial institutions, supervisors, regulatory authorities, and climate experts must jointly improve the data and methods to best capture and mitigate climate-related risks. The BNB is convinced that the mutual support of these different mechanisms could positively impact the risk assessment and, in a second stage, promote green financing.

To prevent the transition risk related to real estate exposures, the NBB is also convinced that cooperation is the best solution. The NBB insists that financial institutions should have access to the regional databases containing information on the energy performance of residential and commercial buildings. After gathering this information, banks must start analyzing to what extent the energy efficiency of their real estate exposures may impact their current and future credit risk.

3.4. Conclusion

It is worth noting that the NBB is more concerned with the various threats that the banking sector might face than with the potential opportunities.

Regarding threats, the NBB is very worried about the real estate risk exposure to the new and future regulations in terms of the energy efficiency of buildings. After analyzing the different reports, this risk seems to concern the NBB the most for the financial stability of Belgian banks.

4. Treats & Opportunities - Belgian Banks reports

4.1. Introduction

This section comes logically after the NBB section. The previous section has highlighted the threats and opportunities underlined by the Belgium National Bank these last four years. This section will allow to confront the field and see how the large, medium, and small Belgian banks have integrated these risks and opportunities into their daily management and strategy.

4.2. Reports main trends in Belgium Banks

This section only compares the different Belgian banks reporting features and sustainable disclosure. It provides a link to the literature review that exposed the shortcomings of global reporting. A detailed list of the different reports published by the Belgian banks in 2020 and their main characteristics are presented in table 1 in the Appendices. Some interesting and significant remarks are direct to be underlined:

- There are considerable differences in the Belgian banking market regarding climate-related disclosures. These differences can be found in the format and depth of the disclosures.
- The size of the bank plays a significant role. The big Belgian banks are much more advanced in sustainable disclosure. It is sometimes impossible for some small banks to find a document that mentions any sustainable information. It is not always easy or even impossible for banks belonging to larger groups to find information at the Belgian entity level. The reporting of these banks refers to the reporting of the whole group, which leads to assuming that climate initiatives are managed at the group level.
- The majority of the large Belgian banks disclose sustainable information in their annual reports and an additional sustainable report. However, one noticeable difference between these large banks is that very few use the same method to disclose information. There are differences in the sections, their size, and how the information is presented. For example, some banks will include information that another bank does not consider relevant. As a result, there is no homogeneity between the different banks' reports.
- As mentioned above, the information contained in the annual report is usually detailed in a supplementary report (not for all banks). This additional report usually takes the form of

sustainability, climate, or biodiversity report. Again, we find significant differences in the structure, length and information presented. However, one common feature of these additional reports is that most banks acknowledge their support of the Paris Agreement and their ambition to become a net-zero bank.

- Only four analyzed banks (BNP Paribas, ING Group, Van Lanschot Kempen, and AXA) explicitly support the TCFD. However, the use of TCFD recommendations are not used and presented in the same way by these four banks. Figure 6 details these different characteristics.

Figure 6: TCFD recommendations presented by the banks

BNP Paribas Group	TCFD Report (66 pages)
ING Group	Task Force on Climate-related Financial Disclosures (TCFD) in Annual Report (5 pages) + TCFD recommendations in the appendix of the climate report
Van Lanschot Kempen	TCFD report (5 pages)
AXA	Climate report in line with TCFD guidelines (82 pages)

- Belgian banks are generally more advanced in describing climate-related risks than in describing opportunities.
- In most cases, banks describe their climate strategy as part of a broader sustainability strategy, detailing how they position themselves concerning Sustainable Development Goals. The strategy is often explained in initiatives, priority actions, and SRIs. From a climate perspective, most banks describe their ambitions regarding the positive impact they can have in the transition to low-carbon economies, including their net-zero banking ambitions.
- One point that banks should be aware of is that only a tiny minority define climate risk as a risk that influences the whole risk taxonomy. Indeed, many banks disclose environmental-climate information separate from other risk categories.
- The banks do not always disclose the methods and data sources used to measure. In addition, there are significant differences in the strategies deployed by banks in this area. There is an urgent need for increased convergence and harmonized results between the different banks.

- Banks that publish a sustainability report disclose the GHG emissions associated with their operations. Often, they are limited to Scope 1 and 2, but some large banks (notably the big 4) are beginning to develop methods to quantify financed emissions (Scope 3). This observation is likely to change in the future as methods for quantifying these emissions are created, and more data becomes available from third parties.

These different points highlight several things. First of all, the analysis allows to assert that sustainability reporting in Belgium follows the global trend. Indeed, it is not optimal and many adjustments need to be made. Furthermore, very few Belgian banks use the TCFD framework, although it is becoming a significant part of sustainable global disclosure. As we have already mentioned, there is a need to harmonize the different reports to make it easier for investors to follow the ecological tradition. Another remark is that too few banks publish quantitative information. Banks need improved robust metrics and targets to quantify exposure to climate risks.

Another point to highlight is that in 2021 improvements were made to the disclosures of large and medium-sized banks. It is expected that the disclosures will continue to evolve throughout 2022. However, as far as the smaller banks are concerned, they need to get moving towards sustainability disclosure if they don't want to be left behind in the future.

The entry into force of several regulations (such as the EU Taxonomy Regulation) will affect sustainable disclosure. It will likely bring significant changes in the type of information banks report. With the arrival of these new regulations, it can be expected that disclosures harmonize with the broader adoption of common reporting principles.

4.3. Threats to find in reports

The NBB had already laid a good foundation for identifying the present and future risks that Belgian banks face. However, the analysis of the different reports has highlighted some risks not yet mentioned in the previous section. Therefore, this part of the work will be dedicated to identifying these additional threats that could impact the Belgian banking system.

- The risk associated with carbon taxation: to reach the targets set during the Paris Agreement, global CO₂ emissions will have to decrease. This decrease will be achieved through government initiatives such as implementing a carbon tax. The Belgian National Bank is already advocating for a CO₂ tax in Belgium (Scharff, 2021). This would have many positive

consequences but could bring risks for the Belgian banks. Such a tax would increase the price of gas, diesel, and petrol, which would directly impact the purchasing power of the poorest and the competitiveness of the weakened sectors. For the most impoverished, this risk could translate into declining their solvency. At the same time, some companies that generate high GHG emissions could lead to write-downs of carbon-intensive assets that could quickly become unusable or reduced in value. Water and land-use restrictions are other examples in the same style that could positively impact the environment but conversely have challenging impacts on the banking sector.

- Remain humble and realistic: It is not disputed that most banks are implementing several solutions to mitigate the risks of climate change. Initiatives have been in place for several years, and some banks are developing programs to impact the environment positively. However, they must remain realistic and humble when announcing plans and ensure that their implementation and realization remain possible and financeable. This risk could therefore be associated with a chance of greenwashing. Exposing many climate actions to the light of day without ever implementing them could mislead investors in their choices and benefit banks in a dishonest way.
- Different risk considerations: Banks share the same vision of reducing CO₂ emissions. However, not all banks consider the risks associated with specific sectors in the same way and allocate the same means to find green solutions in these sectors. Some focus on reducing their real estate risk exposure, while others assign most of their investment to innovative technologies. Therefore, there are some differences between Belgian banks, where some will be known for their sustainable investments and others for their focus on the ecological transition by adapting the energy efficiency of their buildings.
- Inflation: The implications of climate change on inflation have received surprisingly little attention in banks' sustainable reports. However, climate change will undoubtedly affect price stability through at least three channels (European Central Bank, 2021):
 1. Losses resulting from the damages of physical risks could weigh on the balance sheets of financial institutions, reducing the flow of credit to the real economy. Banks may be exposed to potential losses on securities purchased under asset purchase programs and on collateral provided by counterparties in monetary policy operations.

2. Second, climate change could further reduce the scope for conventional monetary policy by lowering the equilibrium real interest rate, which balances savings and investment. For example, higher temperatures due to global warming could lower labor productivity or higher morbidity and mortality rates. Productive resources could be reallocated to assist adaptation measures, while climate-related uncertainty may increase prudential savings and reduce investment incentives. Together, these factors may reduce the equilibrium and thus increase the likelihood that a central bank's policy rate will be constrained.

3. Third, climate change and policies to mitigate its effects can directly impact inflation dynamics. As discussed above, even mitigation policies, such as a carbon tax, can affect price stability, potentially precipitating significant and lasting trends in relative prices.

4.4 Opportunities to find in reports

The analysis of the different reports of the Belgian banks also allowed to see what concrete actions and opportunities exist to achieve the ecological transition and lower the banks' risk exposures. A detailed list with concrete examples of the big 4 banks is exposed below to highlight what can be done to fight climate change.

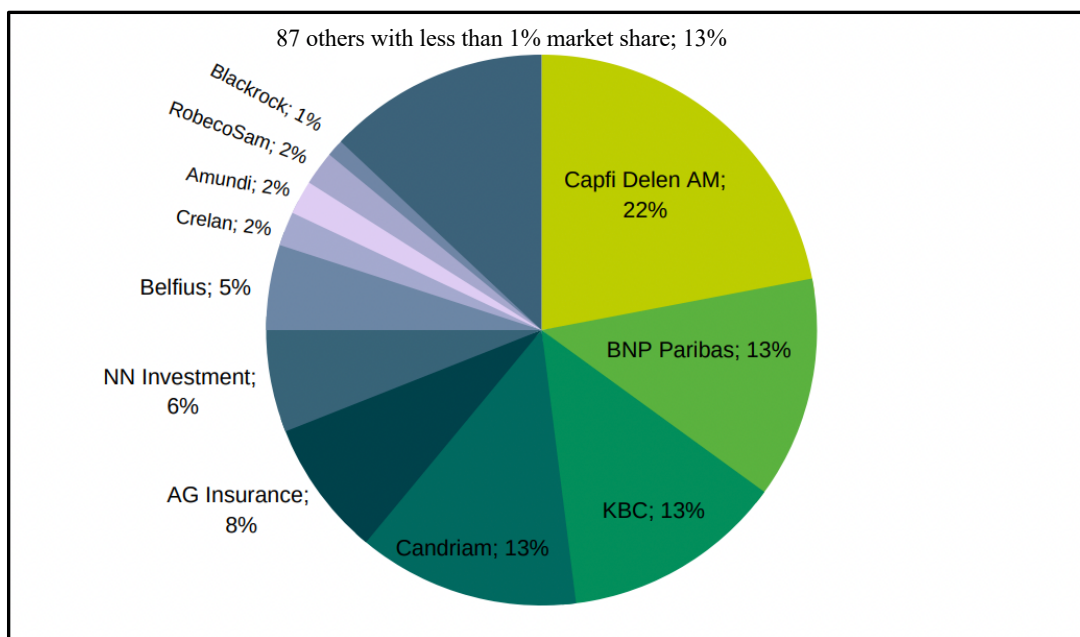
- Reducing financed emissions: Belgian banks have noted their strategic direction to reduce emissions from the third parties they finance by 2050. Many recent initiatives have been put in place within banks to measure these financed emissions and then decide which strategies to adopt. PACTA is a good example. Launched in 2018, PACTA was developed by the 2° Investing Initiative (2DII). The Paris Agreement Capital Transition Assessment (PACTA) is a free, open-source methodology and tool, which measures financial portfolios' alignment with various climate scenarios consistent with the Paris Agreement. Before the launch in 2020, the toolkit was road-tested by 17 leading global banks, including BNP Paribas, ING, and KBC. Sectors covered by PACTA include power, coal mining, upstream oil and gas, auto manufacturing, cement, steel, aviation, and marine. Together, these climate-related sectors are responsible for approximately 75% of global greenhouse gas emissions (2i Investing

Initiative, 2019). The PACTA is also helping the banks to prepare for potential portfolio disruption arising from risks associated with the transition to a low-carbon economy.

- Reducing operational emissions: All intend to reduce their carbon footprint in their operations, and most aim to achieve net-zero emissions by 2030. Often these strategies are translated into concrete actions. To give an example, Belfius encourages its customers to avoid using their cars as often as possible by offering a premium reduction based on CO₂ emissions and the number of kilometers driven. To give another example, ING joined in June 2021 the UN Climate Neutral Now pledge. Through this partnership, the company aims to accelerate its efforts towards a net-zero future through its operations.
- Reducing financing exposure to fossil fuels (Coal, Oil & Gas): the banks have understood that to achieve the ecological transition, there must be an absolute reduction in the size of their upstream oil & gas and thermal coal mining portfolios. ING's exposure to thermal coal mining has decreased by more than 90% from €316 million in 2017 to €30 million at year-end 2020 and set a new target to reduce their funding to upstream oil & gas by 12% by 2025 (ING, 2021). For its part, Belfius do not provide finance for companies involved in the extraction of coal and unconventional oil and gas sources (Belfius, 2021). KBC accelerated its planned exit from existing direct coal-related financing in 2021 and introduced a comprehensive policy on biodiversity in 2020. KBC also firmly abstain from financing oil-based electricity generation, exploration, and development of unconventional oil and gas companies. For its part, BNP Paribas is among the top 15 most prominent fossil fuels financiers over the period 2016-2019 (Bayot B. , Chennoufe, Cayrol, & Provost, 2021). In this respect, they are not following the example set by other banks. While banks reduced their overall financing of oil and gas companies by almost 9% last year, BNP Paribas increased its financing (Kishan S. , 2020). BNP Paribas provided \$41.1 billion to fossil-fuel companies through loans and debt- and equity underwriting services in 2020 (Kishan S., 2020). However, in its latest sustainability report, the bank says it is committed to reducing its credit exposure to upstream oil and gas activities by 10% by 2025 (BNP Paribas, 2020).
- Increasing investment in innovation and climate solutions (SRI): Banks invest in green solutions. In 2020, total SRI assets in Belgium significantly increased to a new record of €104.77 billion (+€48.74 billion compared to 2019) (Bayot B. , Chennoufe, Cayrol, & Provost, 2021). The banks' strategy is obvious; they all claim to invest massively in climate solutions (especially renewable energy). Several players are involved in this increase and the

achievement of this new record. The SRI market is dominated by Delen Private Bank (22% market share), which takes the first place thanks to the transformation of some of its funds to SRI, containing about 19 billion euros (Bayot B. , Chennoufe, Cayrol, & Provost, 2021). The market is followed by the major Belgian banks, including BNP Paribas, KBC, and Candriam (partner with Belfius). The different market shares can be found in figure 7.

Figure 7: SRI Belgium market in 2021⁹



- **Green bonds:** More and more Belgian banks issue green bonds. These bonds are used to finance green projects, such as mortgages on energy-efficient homes or renewable energy projects. The European Commission aims to make the EU the dominant leader in climate-friendly finance. Although the United States is the leading green bond issuance, EU countries are clear frontrunners. Germany, France, the Netherlands, Sweden, and Spain are among the top 10 issuers of green bonds. Last year, these five European countries together issued \$120 billion in green bonds, representing more than 40% of the global total (Liboreiro, 2021). Belgium has already raised funds for its domestic projects using green bonds, but to a much lesser extent than the top five EU countries. Green bonds will continue to grow in the coming years in Belgium and will finance the sustainable future. The following figure 8 summarizes

⁹ Bayot, B., Chennoufe, L., Cayrol, A., & Provost, C. (2021). *SYNTHÈSE DU RAPPORT ISR 2021*. Financité.

the green bonds issued in 2020 by the Belgium big 4 (data to be found in their respective sustainable reports).

Figure 8: green bonds issued in 2020 by the Belgium big 4

Belfius	Walloon Region: Sustainability Bonds of EUR 200 million and EUR 500 million	Flemish Community: Sustainability Bond of EUR 1.25 billion	Ghelamco Invest: Green Bond of EUR 47.5 million	Fluvius: Green Bond of EUR 600 million
ING Group	Social and Sustainability EUR Bond Issuance: more than €3.8bn in bonds issued			
BNP Paribas Group	BNP Paribas was the world's No. 2 player on the green bond market according to Bloomberg, totaling €10.8 billion.			
KBC	KBC has so far issued two green bonds to finance or refinance assets in the area of renewable energy and green buildings. In 2018, KBC was the first Belgian financial institution to issue a green bond, worth 500 million euros, for institutional and professional investors.		In June 2020, KBC returned to the market and successfully issued its second 500-million-euro green bond.	

- **Green loans:** Banks offer green loans to their customers to manage the ecological transition. In Belgium, these loans primarily represent reduced rates when engaging in green projects (banks offer bike loans and eco-car loans to make mobility more sustainable) or buying/renovating houses with a certain level of energy efficiency. The banks are aware of the risks concerning Belgium real estate and are taking initiatives to mitigate this risk. The green loans strategies and the initiatives to collect real estate data by the largest Belgian banks are summarized in figure 9 below.

Figure 9: the green loans strategies and the initiatives to collect real estate data by the Belgium big

	Belfius	ING Group	BNP Paribas Group	KBC
Green Loans	<p>Green Renovation Loan: Belfius offers a green credit formula to improve home energy efficiency. Renovations include insulation, installing double or triple glazing, replacing old boilers with high-efficiency versions, ...</p> <p>The Energy-efficient Housing Loan: This loan is granted when a home is intended to be constructed with an E-level ≤ 30 (high energy-efficient buildings). Between 2013 and 2020, Belfius granted more than 1,900 residential loans for green construction, amounting to a total of nearly EUR 414 million.</p>	<p>Across the EU, the energy intensity of homes is not the most efficient. ING has a long-term vision to have an energy-positive mortgage portfolio by 2050; this means that they expect that the houses in their portfolio will generate more energy than they consume by 2050.</p> <p>Globally, ING is a large provider of Green Investment loans based on international energy standards (total €800m).</p>	<p>In 2020, BNP Paribas Real Estate launched EIPF. EIPF is the first European institutional real estate fund aligned with the climate goals of the Paris Agreement. It totals more than €160 million and aims to reduce GHG emissions in its European real estate portfolio by 40% over the next ten years.</p> <p>BNP Paribas also offers home loans and consumer loans to help households fund energy renovations to make homes more energy-efficient. In Belgium, BNP Paribas Fortis offers preferred-rate green energy loans to fund renovations, issuing a total of €3.75 billion at the end of 2020.</p>	<p>To improve the energy efficiency of the housing stock, ING issued mortgage loans, representing 39.7% of their total outstanding loan portfolio at year-end 2020 (71.8 billion euros).</p> <p>As strict energy efficiency standards have already been imposed by law for newly built houses, apartments and buildings, ING will focus initially on the older real estate stock.</p>
Data	<p>In 2021, Belfius developed an internal Belfius database (Real Estate Repository or RER) in which energy efficiency data can be integrated with other real estate climate information.</p> <p>Since 2020 Belfius has begun to collect energy certificates from residential properties as it became an obligation as part of new mortgage applications from 2021. These certificates are a move forward to assess the energy performance of their portfolio.</p>	<p>In Belgium, ING was able to map 100% of their portfolio for the first time on the energy intensity thanks to their partnership with Rockestate, a Belgian real estate valuation company.</p>	<p>For their data collection process for energy-efficient mortgages, BNP Paribas Fortis joined two parallel projects, the “Energy efficient Mortgages Action Plan” (EeMAP) and the “Energy efficiency Data Protocol and Portal” (EeDaPP). These initiatives develop a performant data collection infrastructure for energy-efficient mortgages (Energy efficient Mortgages Initiative, 2019).</p>	<p>KBC Group participates in several pilot projects to implement new measuring instruments like UNEP FI, PCAF, and Trucost. In 2020, they tested PCAF intensively on their loan portfolio, and it is now covering all of their core countries (notably Belgium). The Partnership for Carbon Accounting Financials (PCAF) offers a valuable tool for identifying, measuring, and tracking down the GHG emissions of KBC’s loan and investment portfolios.</p>

- Offsetting: Banks offset their carbon emissions to meet their commitment to the 2030 targets by financing equivalent carbon dioxide savings elsewhere. These investments are shared among banks and other high-emitting companies. These offsets can take various forms. Belfius, for example, finances climate projects certified by Gold Standard, Verified Carbon Standard, Plan Vivo, or the United Nations Framework Convention on Climate Change (UNFCCC). In 2020, their offsetting projects were numerous, and in total, it allowed them to offset 15,870 tons of CO₂. In collaboration with Professor Muhammad Yunus (Nobel Peace Prize winner), BNP has since 2018 launched 34 internationally certified projects in areas such as forest conservation, reforestation, energy efficiency, renewable energy, community projects, and waste and water management in 23 different countries. For its part, ING, to improve its environmental performance, has been offsetting its carbon emissions since 2007 through real reforestation projects. KBC is now a climate-neutral company regarding its footprint, as it neutralizes all its emissions.
- Scenario analysis: Scenario analysis has become an essential and valuable tool for understanding and measuring the strategic implications of climate-related risks and opportunities. Through the research, it could be noticed that most Belgian banks have conducted a scenario analysis for climate change in 2020. All are not using the same scenarios, but although the lack of harmonized methodologies, two scenarios' analyses were the most frequently used:
 1. IPCC: The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body responsible for assessing the science of climate change. It provides policymakers with regular scientific assessments of climate change, its implications, and potential future risks. These risks are described in future scenarios that project the greenhouse gas emissions associated with these developments. This IPCC Special Report is the most comprehensive and up-to-date greenhouse gas emission scenarios assessment. It provides critical information for numerous actors of climate change: industry, policymakers, environmental organizations, researchers in global change, technology, engineering, and banks.
 2. SDS (Sustainable Development Scenario) of the International Energy Agency (IEA): The Sustainable Development Scenario describes the evolution of the energy sector that would be required to reach the critical energy-related goals of the United Nations. It sets exit deadlines, intensity targets, and energy metrics to follow to achieve the purposes of the Paris Agreement on climate change.

5. Threats & opportunities - Risk Reports

Risk reports identify the risks that will potentially impact an organization's business processes. Regarding financial risk, each bank described each risk independently. Concerning climate risks, not all banks proceeded in the same way.

- The majority of the banks declare their risk report in accordance with the Basel III regulatory framework, as imposed by the European law. Pillar 3 implies that banks must be transparent on environmental, social, or governance (ESG) risks. However, in most reports, little emphasis is placed on this type of disclosure.
- Some banks take very little (or no) care to describe environmental risks in their risk report but instead refer to find this information in other published reports (sustainable reports, climate reports, ...). However, in these other reports, the information is primarily qualitative, and these banks lack quantitative elements (neither measurements nor targets, ...) to describe the risks related to climate change.
- Some banks have a section dedicated to climate risk. Nevertheless, as already pointed out earlier in the work, these sections are individualized and do not specify that climate change will impact the banks' whole risk taxonomy. This risk is individualized like the others. In addition, the climate-related risks sections contain the least amount of quantitative information compared to the other sections (financial risks). These are, in fact, mainly dedicated to listing what governance mechanisms and strategies are used to manage this risk.
- A fourth general remark can be defined as a lack of concreteness. In these reports, it is often possible to find explanations such as; next steps are, in the near future, to gain further insights,... However, as already pointed out, reporting faces many shortcomings, and these need to be overcome quickly to ensure relevant, robust, and usable information. There is no time to lose, and new methods and techniques to improve reporting cannot be delayed.

To conclude, after analysis, it appears that risk reports are not the best place to find information on climate risks that may impact a company. On the contrary, they present robust financial information should serve as a guide for sustainable reporting measures and information disclosure.

6. Limits

This section will be dedicated to the limits of the work. It will put forward some shortcomings in terms of available data and other limitations to consider when reading this thesis.

10.1. Data collection

First of all, as explained above, the analytical part is based on publicly published reports by banks. This aspect of the quantitative analysis does have some shortcomings.

- In general, Belgian banks and other financial institutions publish their reports at the end of the year to have a complete representation of the year that has just passed. This tendency has influenced the writing of the thesis because, as for most banks, the sustainable reports 2021 were not yet published publicly at the time of writing. In these, some information would certainly have been relevant and valuable in the work writing.
- For the large banks that dominate the Belgian banking landscape (notably BNP Paribas Fortis and KBC), reporting is done at the group level. Therefore, finding information at the Belgium entity level was not always easy.
- As mentioned earlier in the paper, small banks are exceptionally behind in reporting. This information is manifested in the documents that these banks publish. Often it is impossible to find detailed information about their environmental management in reports or even directly on the bank's website.
- As already mentioned earlier, the greenwashing aspect could also have impacted the writing of this paper as it was mainly based on internally produced reports. There are still very few verification committees for sustainable reports; these could be influenced by a desire to hide certain information and thus mislead its readers.

10.2. Regulations

National and international regulations strongly impact the ecological management of the different banks. Climate change is current trouble, but we know that it is also a crisis of the upcoming future. To adapt, regulations are changing at a high rate, and banks need to be flexible and adaptive. There is significant uncertainty about which policy measures will be taken or not. Those who do not consider these new regulations in their daily management will be quickly dropped in the ecological transition. Climate change is a race against time, and its temporal

nature implies that unknown risks and opportunities will emerge speedily and may not have been identified in this work at the time of reading.

7. Recommendations

After analyzing the context of climate change in the banking and economic system, several aspects were appealing. This section describes which recommendations can be made to economic actors in the fight against climate change.

- Generally speaking, there is still very little documentation in the literature on the implication of climate change on inflation in the economic framework. However, it is visible that climate change is already impacting price stability and will affect monetary policy in the future. In no bank report was this risk to be found, yet it constitutes a real danger to the financial stability of the financial world.
- The effects of climate change impact the physical world and the digital one. More and more disasters in terms of floods and fires highlight the severity of climate change and its impact on our society. For businesses, physical damage to infrastructure can create opportunities for cyber-criminals to hack company data. This risk has not yet been identified by the Belgian banks either. With the technological revolution and the constant demand for relevant data, it is time for banks to address this risk.
- Another general point to note in the literature or the bank reports is that ecological management is much more risk-oriented than opportunity-oriented. It was often difficult to find out what solutions were implemented within banks to impact the environmental transition positively. For small banks, their only disclosed sustainable information described how they integrate climate risk into their management. Still, often no information was to be found on what opportunities they had in the face of the crisis. To move forward, banks need to highlight the positives in the transition and open their eyes on short and long-term solutions that exist to mitigate the risks of climate change.

The ecological transition will not happen overnight, so it should be unthinkable that some organizations neglect it. All economic actors must be deeply concerned about the crisis society is going through and work together towards a better sustainable future.

8. Conclusion

The economic actors are numerous in order to ensure an effective ecological transition. All of them have a key role to play in this transition, which has already begun. Indeed, these last years have been marked by the growing importance brought to environmental, social, or governance (ESG) matters. It seems that the dangers of climate change have been understood and that these actors begin to perceive the gravity of the situation.

The economic sector will be impacted by two different risks: physical risks and transitional risks. These are not risks to be considered individually because their consequences will impact the whole risk taxonomy. Nevertheless, the literature review and the analytical part have highlighted that today the banking system still considers these risks as separate. This represents a major threat and will need to be addressed quickly.

This is not the only threat to the banking system as a whole. Sustainable reporting, considered indispensable for effective transition, suffers from many shortcomings. These deficiencies impact the speed of ecological adaptation as it negatively impacts investment opportunities. Investors complain of a lack of decision-useful ESG information which slows them down in their investment decisions. Fortunately, recent initiatives, notably the TCFD and the EU taxonomy, have emerged to rectify these gaps. Only a close follow-up will allow to judge in the coming years if their contribution to the ecological transition has been significant.

The risks outlined above obviously also apply to the Belgian system. On the other hand, other threats are more specific to Belgian banks. As mentioned in the work, the gap between the big banks and the smaller ones is becoming apparent. In order not to be left behind quickly, the smaller banks will have to integrate more ecological considerations in their activities.

In Belgium, residential and commercial buildings are among the main contributors to greenhouse gas emissions because of a very low energy performance. This common characteristic of Belgian buildings creates a growing risk regarding climate change. Many investments, mainly financed by the banks, will have to be made in order to revolutionize the sector. These investments will mainly be coupled with a solvency risk of the borrowers.

Moreover, the rising energy prices are increasing this risk, which will have to be closely monitored by the financial institutions.

Opportunities often present themselves in the form of green investments. These will obviously be crucial in the ecological transition. Abrupt policy changes, changes in investors' preferences, and technological breakthroughs may however negatively impact these and could lead to sudden asset revaluations, sudden repricing, market bubbles, or stranded assets. Greenwashing is also a threat to green investment because it could mislead investors in their decision and thus distort the ecological transition.

In general, banks focus more on the description of risks than on the identification of opportunities. Their adaptation is not yet optimal, even if the biggest banks show that they are on the right track. Achieving the CO₂ emission targets set by the Paris Agreement will not happen easily. Banks must be prepared to go a long way towards a net-zero target and face daily challenges.

9. Further work

The climate crisis has been a current issue and will be for many years to come. Banks will have to constantly adapt to new measures and regulations that challenge their current strategy and management. Climate change will become even more critical in the coming years, affecting all different industries.

The year 2022 will be a challenge for banks. As seen during this thesis, the EU taxonomy will come into play during the year, and the European Commission hopes it will be a game-changer in the ecological transition. Other national or international regulations will be added to all the other banks are already facing. They will have to be vigilant and adaptive in a fast-changing context.

Banks must get things moving to achieve significant new steps in the ecological transition. They can make things change through their expertise, knowledge, and adaptability by proposing individual initiatives. They, therefore, have a responsibility to push the ecological transition in the right direction. They must individually impact the banking system by sharing their innovations and environmental solutions in the future.

The climate crisis is a subject that will not stop anytime soon. Scientific studies to estimate its future consequences will have to continue to be done. New tools to measure the risk exposure will also have to be designed. For risk managers, much work will need to be done in the coming years to mitigate the consequences of climate change.

The same goes for opportunities. Innovations and new technologies will have to be developed to combat this crisis to ensure an optimal transition. In many other areas, such as construction, past lessons will have to be learned to build a greener future. As we can see, there is still much work to be done as the ecological crisis may be the most significant modern challenge facing human beings.

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Appendices

15.1. Table 1 - Publicly available publication in 2020

Bank name	Annual report : (sustainability mention) + (number of dedicated pages)	Sustainable report (which form + number of dedicated pages)	Risk report (which form)
Belfius	Yes (yes) (46)	Yes (TAP and GRI standards) (53)	(Yes) Pillar 3 report
ING Group	Yes (yes) (5)	Yes (TERRA report (88) + Integrated report (44))	(Yes) TCFD and Pillar 3 report
BNP Paribas	Yes (yes) (5)	Yes (TCFD Report (66) + integrated report (129))	(Yes) Pillar 3 Disclosure
KBC/CBC	Yes (yes) (sustainability mentioned through the whole report)	Yes (CCCA review (91) + CSR report (145))	Yes (Pillar 3 Guidelines)
AION Banking	No (only 2019) (No)	No	No
ARGENTA	Yes (no)	Yes (GRI standards)	Yes (Pillar 3 disclosures)
AXA	Yes (yes) (45)	Yes (TCFD (82))	Risk Report (climate oriented) + (Pillar 3 disclosure)
Degroef Petercamp	Yes (yes) (6)	Yes (SRI standards (128))	Yes (Pillar 3 Disclosure)
CPH Bank	Yes (no)	No	Yes (Pillar 3 disclosures)
Nagelmackers Bank	No	No	Yes (Pillar 3 disclosures)
Bpost Bank	Yes (yes) (10)	No	No
Crelan	Yes (yes) (3)	Yes (No standards (33))	Yes (Pillar 3 Disclosure)
Delen Private Bank	Yes (no)	Yes (GRI (33))	No
NewB	Yes (no)	No	No
Van de PUT & CO	Yes (no)	No	Yes (Pillar 3 Disclosure)

Vdk Bank	Yes (no)	Yes (GRI (52))	Yes (Pillar 3 Disclosure)
MeDirect Bank	Yes (yes) (small mentions in different parts)	No	Yes (Pillar 3 Disclosure + ESG Risk)
Euroclear	Yes (yes) (10)	Yes (GRI (76))	Yes (Pillar 3 Disclosure)
Dierickx Leys Private Bank	Yes (no)	No	No
Centrale Kredietverlening	Yes (no)	No	No
Bank J.Van Breda & C^o	Yes (yes) (17)	Yes (No standards (2))	Yes (Pillar 3 Disclosure)
Van Lanschot Kempen	Yes (yes) (mentions through the whole report)	Yes (TCFD ans GRI standarts (23))	Yes (Pillar 3 Disclosure)

15.2. Table 2 - Analyzed documents

Bank name	
National Bank of Belgium	Financial Stability Report 2018, 2019, 2020, 2021 / Corporate Report 2018, 2019, 2020 / Economic and financial developments 2019, 2020
Belfius	Half Yearly report 2021 / Annual Report 2017, 2018, 2019, 2020 / Risk Report 2017, 2018, 2019, 2020 / Sustainability Report 2020 / UNEP FI Principles for Responsible Banking 2021 Reporting / Integrating sustainability risks into Belfius Insurance's investment process 2021
ING	Terra progress report 2020 / Climate report 2021 / Additional Pillar Report 2020 / Annual report 2017, 2018, 2019, 2020 / Climate Risk report 2020 / ING policy and disclosures on sustainability risks Report 2021 / Risk Report 2017, 2018, 2019, 2020 / ING Non-Financial Data Reporting Protocol 2017
BNP Paribas Fortis	Additional Pillar Report 2020 / Annual Report 2017, 2018, 2019, 2020 / INTEGRATED REPORT 2019, 2020 / BNP PARIBAS CSR STRATEGY 2020 / Consolidated Interim Financial statement Statements 2021 / PILLAR 3 DISCLOSURES FOR THE YEAR 2019, 2020 / TCFD REPORT 2020 / Sustainable report 2019, 2020
KBC/CBC	Annual Report 2017, 2018, 2019, 2020 / Collective Commitment to Climate Action 2020 / Sustainable report 2020 / Risk Report 2017, 2018, 2019, 2020 / KBC Group Sustainability framework 2020
AION Banking	Annual Report 2019 / Special Regulations Securities, Financial Instruments and Insurance 2019
ARGENTA	Activities and sustainability Report 2019, 2020 / IFRS Annual Financial Statements 2018, 2019, 2020 / Capital adequacy & risk report 2018, 2019, 2020 / Risk Report 2021 Q1, Q2, Q3
AXA	Integrated Report 2018, 2019, 2020 / ANNUAL FINANCIAL REPORT 2018, 2019, 2020 / AXA Future Risk Report 2020, 2021 / Risk Disclosure Report 2019, 2020 / Climate report: the decisive decade 2021 / Half Year Financial Report 2021
Degroef Petercamp	Risk report 2020 / Non-financial Report 2020 / Sustainable and Responsible Policy 2018 / Annual Report 2018, 2019, 2020 / DPAM Sustainable and Responsible Investments Policy / Sustainable and Responsible Investment
CPH Bank	Risk Report 2019, 2020 / Annual Report 2019, 2020
Nagelmackers Bank	Risk Report 2020
Bpost Bank	Annual report 2019, 2020
Crelan	Annual report 2019, 2020 / Rapport de durabilité 2020 / Risk Report 2019, 2020
Delen Private Bank	Annual Report 2019, 2020 / Non-financial reporting, Sustainability Report 2019, 2020
NewB	Annual Report 2020

Van de PUT & CO	Annual Report 2019, 2020 / Risk Report 2020
Vdk Bank	Annual Report 2019, 2020 / Risk Report 2019, 2020 / Duurzaamheidsfilosofie en rapport 2021
MeDirect Bank	Annual Report 2020 / Risk Report 2020
Euroclear	Annual Report 2019, 2020 / Risk Report 2019, 2020 / GRI Report 2020
Dierickx Leys Private Bank	Annual report 2019, 2020
Centrale Kredietverlening	Annual report 2019, 2020
Bank J.Van Breda & Co	Annual Report 2019, 2020 / BASE PROSPECTUS - Risk factors 2018 / Risk Report 2019, 2020 / Sustainability Report 2019
Van Lanschot Kempen	Annual Report 2019, 2020 / Risk Report 2019, 2020 / Sustainability Supplement 2020
ECB	Annual Report 2017, 2018, 2019, 2020 / 2021 update of the ECB's Environmental Statement / Study on the Non-Financial Reporting Directive 2020 / Reform of the EU Non-financial Reporting Directive 2020 / Sustainability reporting standards roadmap 2020 /

15.3. Table 3 – Glossary

IPCC	The Intergovernmental Panel on Climate Change
NAP	The Belgian National Adaptation Plan
GDP	Gross domestic product
UNEP FI	United Nations Environment Programme Finance Initiative
EBF	European Banking Federation
NACE	Nomenclature of Economic Activities
EBF	European Banking Federation
NFRD	Non-Financial Reporting Directive
CSRD	Corporate Sustainability Reporting Directive
ESG	Environmental, Social and Governance
TCFD	Task-Force on Climate Related Financial Disclosure
ECGI	European Corporate Governance Institution
GRI	Global Reporting Initiative
SASB	Sustainability Accounting Standards Board
GGP	Greenhouse Gas Protocol
ECB	European Central Bank
EBA	the European Banking Authority
CSR	Corporate Social Responsibility
NGFS	Network for Greening the Financial System
CVA	credit valuation adjustment
SSM	Single Supervisory Mechanism
EIBIS	The European Investment Bank Investment Survey
NBB	National Bank of Belgium

SRI	Socially Responsible Investment
GHG	Greenhouse Gas
PACTA	The Paris Agreement Capital Transition Assessment
2DII	2° Investing Initiative
EIPF	Paribas Real Estate launched EIPF
RER	Real Estate Repository
EeMAP	Energy efficient Mortgages Action Plan
PCAF	The Partnership for Carbon Accounting Financials
UNFCCC	the United Nations Framework Convention on Climate Change
SDS	Sustainable Development Scenario
IEA	International Energy Agency
SDG	Sustainable Development Goal
SFDR	Sustainable Finance Disclosure Regulation
NACE	Nomenclature of Economic Activities

Abstract:

Climate change threatens the stability of financial institutions through physical and transitional risks. These will impact the whole risk taxonomy of banks. Indeed, the dramatic consequences of climate change will translate mainly into credit risk, operational risk, liquidity risk, market risk, and reputational risk. Banks will have to adapt quickly and be foreseeable to ensure an effective ecological transition. However, some elements are holding back this transition. A lack of sustainable data creates reporting challenges and hinders investors' investment choices due to unreliable information. It will be essential to correct these shortcomings in the future because the ecological transition will require massive investments in Socially Responsible Investments.

In Belgium, the large banks seem to be on the right track to ensure an optimal ecological transition. On the contrary, as has been pointed out in this work, smaller banks are lagging behind. To not be left behind, they must quickly integrate economic factors into their activities.

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