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The Role of the European Central Bank in the Fight Against Climate Change

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List of Abbreviations

ABS	Asset-Backed Securities
APP	Asset Purchase Programme
CCC	Climate Change Centre
CJEU	Court of Justice of the European Union
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CSPP	Corporate Sector Purchase Programme
CSRD	Corporate Sustainability Reporting Directive
ECB	European Central Bank
EMAS	Eco-Management and Audit Scheme
EMU	Economic and Monetary Union
ESA	European Supervisory Authority
ESCB	European System of Central Banks
ESFS	European System of Financial Supervision
ESG	Environmental, Social, and Governance
ETS	Emissions Trading System
EU	European Union
GDP	Gross Domestic Product
HLEG	High-Level Experts Group
IPCC	Intergovernmental Panel on Climate Change
NCA	National Competent Authority

NFC	Non-Financial Corporation
NGFS	Network for Greening the Financial System
NGO	Non-Governmental Organisation
PEPP	Pandemic Emergency Purchase Programme
PPI	Payment Protection Insurance
SREP	Supervisory Review and Evaluation Process
SSM	Single Supervisory Mechanism
TEU	Treaty on European Union
TFEU	Treaty on the Functioning of the European Union
US	United States

Introduction

In the contemporary world, climate change looms as a crisis of unprecedented magnitude and scope, fundamentally reshaping the fabric of our existence. Its pervasive consequences extend across every facet of society, touching ecosystems, economies, and individual livelihoods alike. This Thesis embarks on a comprehensive exploration of the crucial role undertaken by the European Central Bank (ECB) in the battle against climate change, a crisis that demands an innovative and concerted response.

Climate change is unmistakably characterised by a relentless escalation of global temperatures, an upsurge in extreme weather events, and disruptive ecological changes. Unlike conventional financial crises or economic downturns, the ramifications of climate change transcend the confines of finance or economics, casting an expansive shadow across borders and sectors. This crisis permeates ecosystems, communities, and economies on a global scale, evoking a profound and unique challenge.

The appropriateness of central bank engagement in the climate change arena becomes undeniably evident when one considers its profound implications for financial stability. As climate-related risks intensify, they cast a direct shadow over the stability of financial systems. The gamut of risks spans physical, transition, and litigation risks, all intrinsically linked to climate change. These risks pose tangible threats, capable of inflicting substantial financial losses, disrupting markets, and eroding the resilience of financial institutions. Consequently, central banks, as the vigilant guardians of financial stability, find themselves cast in a pivotal role, charged with responding to this multifaceted crisis.

My connection to this Thesis stems from the confluence of two pivotal factors. Firstly, my personal interest regarding a crisis that deviates markedly from the crises of yesteryears, and thus raises new interesting questions. It demands a repertoire of innovative measures and strategies, unique to its unparalleled challenges in mitigation and adaptation. Secondly, my current professional position within the ECB has endowed me with a privileged vantage point. It has allowed me to actively engage in discussions and collaborate with experts within

the institution who are deeply immersed in the discourse surrounding climate change.

This dual perspective, straddling the roles of both student and employee, has endowed me with a distinctive capacity to bridge the schism between the academic and practical dimensions of climate change. It has bequeathed invaluable insights into the inner workings of the ECB and its evolving stance on climate action, rendering me well-equipped to subject the central bank's role in addressing this crisis to rigorous analysis.

Therefore, in order to comprehensively probe *the role of the ECB in the fight against climate change*, this Thesis adopts a structured tripartite approach, with each Chapter contributing a distinct factor to this multifaceted exploration.

Chapter 1 embarks on an expedition through the recent trends in climate change. It is a journey that underscores the incontestable linkage between human activities and the inexorable ascent of global temperatures. This Chapter delves deep into the ramifications of climate change for the economy, laying bare the burgeoning risks that have begun to surface. Among these are the perils of physical, transition and litigation risks, each posing unique challenges to the financial sector and, by extension, financial stability.

Chapter 2, pivoting on the ECB's mandate as enshrined in the European Union (EU)'s Treaties, casts a spotlight on the powers vested in the central bank within the global context of climate change mitigation. This Chapter elucidates how the ECB can seamlessly weave environmental considerations into the fabric of its two core competencies: monetary policy and prudential supervision.

Chapter 3 ventures into the realm of practical action. It elucidates the tangible measures that the ECB can institute, as underscored in its 2021 Strategy Review. Drawing from my direct engagement within the institution, this Chapter also peels back the layers to unveil how the ECB is actively and progressively reducing its carbon emissions in the course of its day-to-day operations and activities. In this, the ECB not only aligns its practices with its resolute commitment to combat climate change, but also sets a compelling precedent for the harmonisation of financial stability and environmental sustainability.

As the Thesis embarks on this expedition through the heart of the ECB's role in addressing climate change, the mission is clear: to offer an all-encompassing perspective that elucidates the central bank's commitment to marrying financial stability with environmental sustainability, thus forging a path towards a more resilient and sustainable future.

Chapter 1: Climate Change and the Impact on the Economy

1.1 Introductory remarks

In the ever-evolving discourse surrounding climate change, an urgent and compelling narrative has emerged — one that not only underscores the pressing need to mitigate its impacts, but also delves deeper into the intricate web of consequences that reverberate through various facets of society. This Chapter embarks on a comprehensive exploration of the latest trends in climate change and the profound implications it holds for both the natural environment and global economy.

The signing of the Paris Agreement in 2015 marked a pivotal moment in the global effort to combat climate change, and the ambitious targets set forth not only represent a collective commitment to safeguarding the planet's future, but they also serve as a stark reminder of the escalating threat posed by climate change.

First, the Chapter delves into the latest scientific evidence, which unequivocally affirms that human activities are the primary drivers of global warming. Greenhouse gas (GHG) emissions, resulting primarily from the combustion of fossil fuels and deforestation, have led to an alarming rise in global temperatures. This unprecedented increase of rate of temperature since 1970 has outpaced any other 50-year period in the past two millennia.

The consequences of these emissions are multifaceted and extend beyond the mere increment of temperature. They manifest in the form of natural disasters, including extreme weather events, causing widespread damage to ecosystems and human populations. Moreover, the economic damages and inequities resulting from climate change are increasingly pronounced.

Second, this Chapter reveals how climate change engenders a complex interplay between the natural world and the global economy, emphasising the need for a comprehensive understanding of its implications. It proceeds to examine the profound economic ramifications of climate change, including physical risks,

transition risks, and liability risks, and elucidates the challenges they pose to financial stability. In doing so, this Chapter underscores the urgency of aligning financial systems, policies, and investments with climate resilience and sustainability, transcending the boundaries between environmental science and economics.

1.2 Climate change and latest trends

In December 2015, 196 Parties ratified the Paris Agreement aiming to restrict global warming to below 2°C above pre-industrial levels, with an additional target of limiting the increase to 1.5°C.[1] The complexities of climate change, the extent of human influence, and the potential economic ramifications pose intricate questions that draw upon the realms of natural and economic sciences. The latest Synthesis Report (2023) by the Intergovernmental Panel on Climate Change (IPCC) serves as a valuable tool for analysing divergent viewpoints and enabling individuals to form their own conclusions.[2]

The report unequivocally affirms that human activities have undeniably led to global warming. During the period of 2011-2020, the global surface temperature was 1.09°C higher than the baseline of 1850-1900, with land temperatures exhibiting greater increases (1.59°C) than oceanic temperatures (0.88°C). From 2001-2020, the global surface temperature surpassed the pre-industrial baseline by 0.99°C. Notably, the rate of global surface temperature increases since 1970 has outpaced any other 50-year period in the past 2000 years (Figure 1). The estimated human-induced rise in global surface temperature from 1850-1900 to 2010-2019 falls within the range of 0.8°C to 1.3°C, with the most probable estimate at 1.07°C. Throughout this period, well-mixed GHGs[3] likely contributed to a warming effect of 1.0°C to 2.0°C, while other human factors, primarily aerosols, resulted in a cooling effect of 0.0°C to 0.8°C. Natural factors influenced global surface

[1] Paris Agreement (2015), Art. 2(1)(a). For further information, see the webpage of the Paris Agreement on the website of the United Nations Framework Convention on Climate Change, available at https://unfccc.int/process-and-meetings/the-paris-agreement (accessed 23 June 2023).
[2] IPCC (2023).
[3] GHGs include water vapour (H2O), carbon dioxide (CO_2), methane (CH4), nitrous oxide (N2O), Ozone (O3), and Chlorofluorocarbons (CFCs).

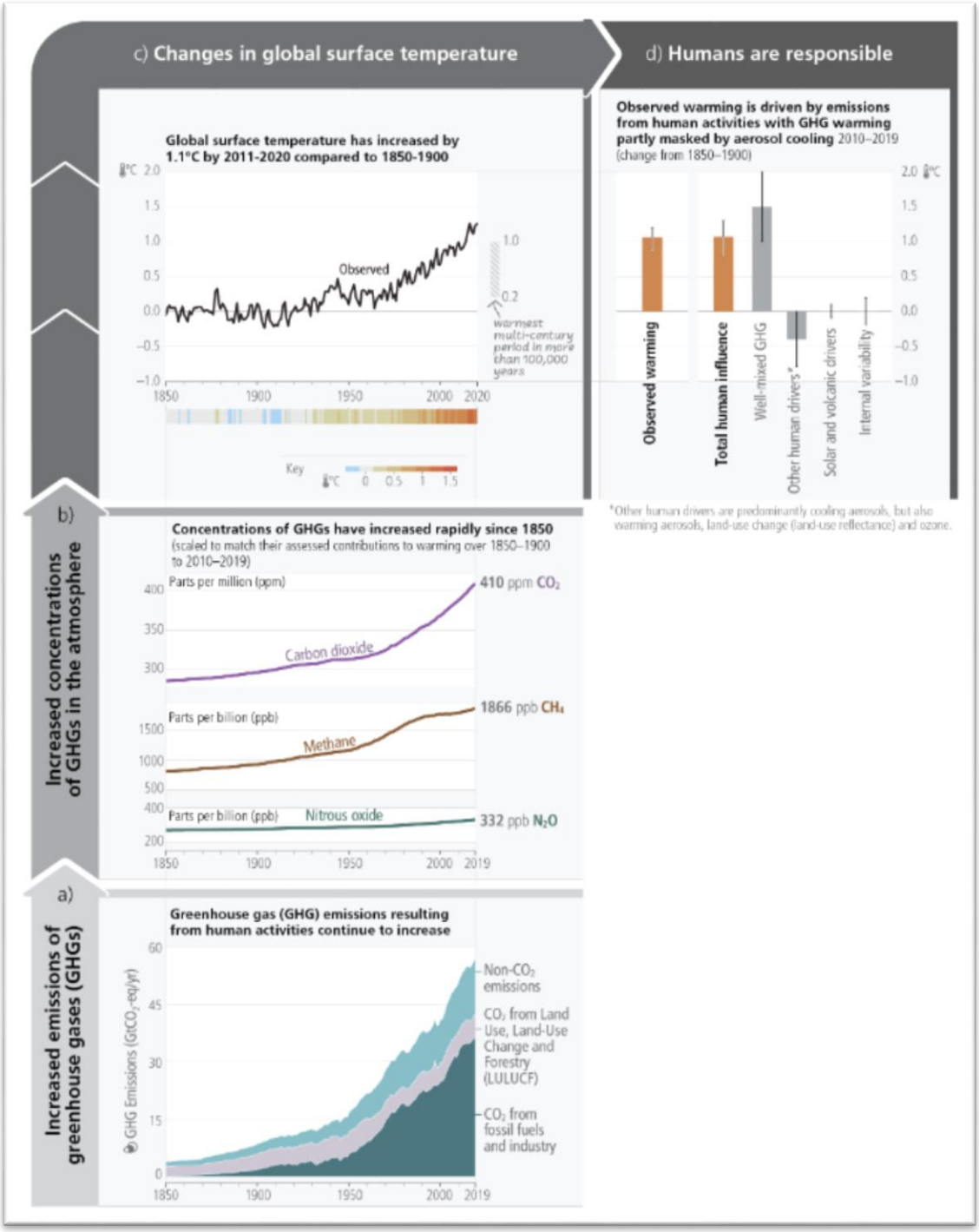
temperature within the range of -0.1°C to +0.1°C, and internal variability accounted for changes between -0.2°C and +0.2°C (Figure 1).

The emission of global GHGs into the atmosphere represents another significant pathway through which human activities impact the climate.[4] Carbon dioxide, the primary GHG emitted by humans, accounts for approximately 75% of total GHG emissions. Its release is predominantly associated with the combustion of fossil fuels, such as coal, oil, and natural gas. Global GHG emissions continue to escalate, driven by unsustainable energy consumption, land-use changes, production and consumption patterns, and individual lifestyles. Historical and ongoing contributions to emissions have been inequitable across regions, countries, and individuals.

More than half of the cumulative net CO_2 emissions occurred between 1850 and 1989, with around 42% occurring between 1990 and 2019. By 2019, atmospheric CO_2 concentrations exceeded levels observed in the past two million years, while concentrations of methane and nitrous oxide surpassed levels seen in the past 800,000 years (Figure 2).

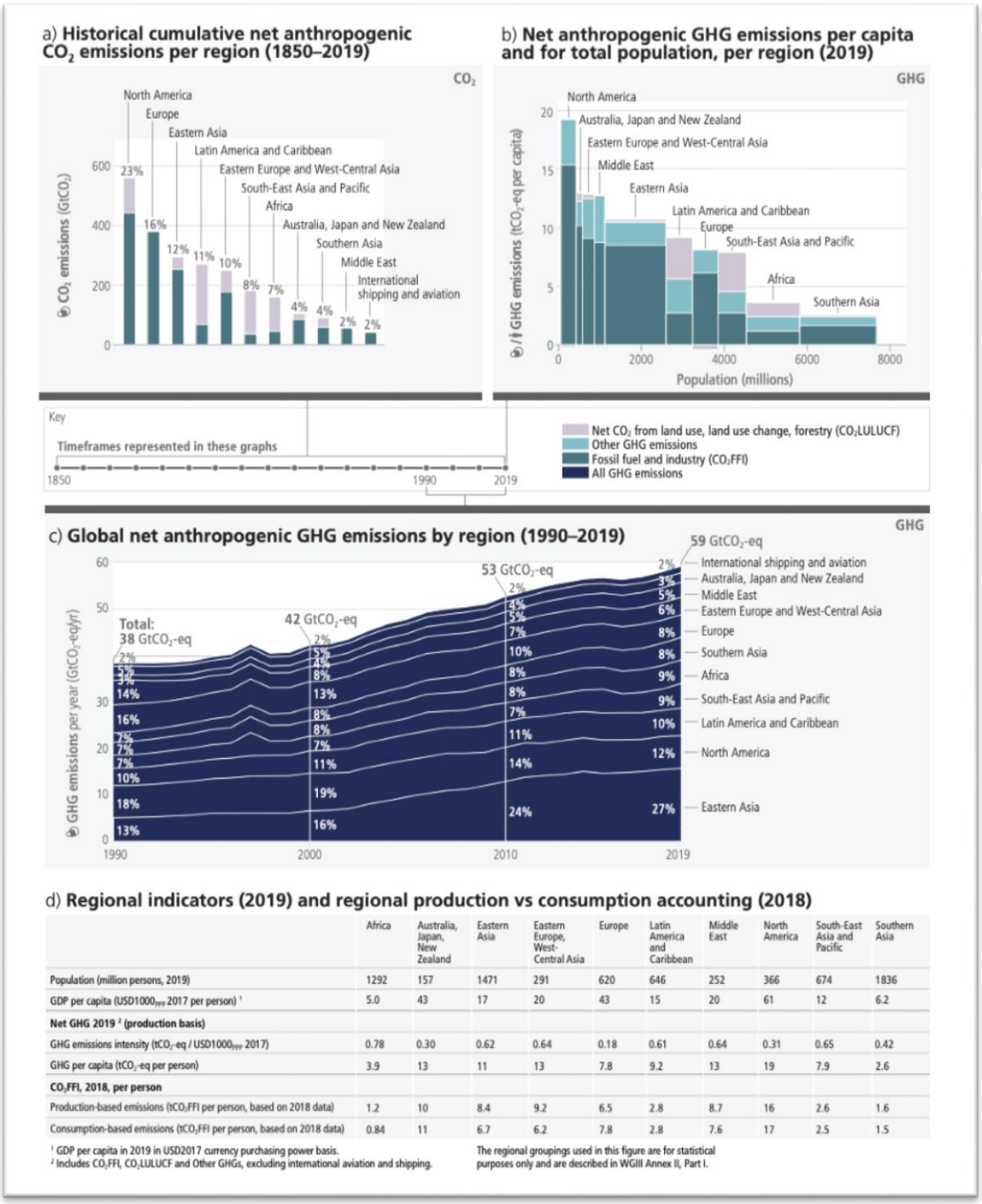
[4] The latest report from the IPCC establishes that it is "unequivocal that human influence has warmed the atmosphere, oceans and land"; see IPCC (2023), p. 46.

Figure 1: The human impact on global warming



Source: IPCC (2023a), p. 43

Figure 2: The growth (and uneven distribution across regions) of emissions



d) **Regional indicators (2019) and regional production vs consumption accounting (2018)**

	Africa	Australia, Japan, New Zealand	Eastern Asia	Eastern Europe, West-Central Asia	Europe	Latin America and Caribbean	Middle East	North America	South-East Asia and Pacific	Southern Asia
Population (million persons, 2019)	1292	157	1471	291	620	646	252	366	674	1836
GDP per capita (USD1000$_{PPP}$ 2017 per person) [1]	5.0	43	17	20	43	15	20	61	12	6.2
Net GHG 2019 [2] (production basis)										
GHG emissions intensity (tCO_2-eq / USD1000$_{PPP}$ 2017)	0.78	0.30	0.62	0.64	0.18	0.61	0.64	0.31	0.65	0.42
GHG per capita (tCO_2-eq per person)	3.9	13	11	13	7.8	9.2	13	19	7.9	2.6
CO_2FFI, 2018, per person										
Production-based emissions (tCO_2FFI per person, based on 2018 data)	1.2	10	8.4	9.2	6.5	2.8	8.7	16	2.6	1.6
Consumption-based emissions (tCO_2FFI per person, based on 2018 data)	0.84	11	6.7	6.2	7.8	2.8	7.6	17	2.5	1.5

[1] GDP per capita in 2019 in USD2017 currency purchasing power basis.
[2] Includes CO_2FFI, CO_2LULUCF and Other GHGs, excluding international aviation and shipping.

The regional groupings used in this figure are for statistical purposes only and are described in WGIII Annex II, Part I.

Source: IPCC (2023a), p. 45

The continuous escalation of GHGs emissions, although vital for maintaining the Earth's average temperature, has significant consequences for the climate, particularly in terms of energy balance and feedback effects related to cloud formation, wind patterns, water flows, and the melting of ice sheets.[5] These effects have resulted in widespread detrimental impacts and losses to both natural systems and human populations, with vulnerable communities, who have historically contributed the least to climate change, experiencing disproportionate consequences. Approximately 3.3 to 3.6 billion people reside in highly climate-vulnerable contexts. The vulnerability of humans and ecosystems is intricately intertwined, with regions facing developmental constraints exhibiting heightened susceptibility to climatic hazards. The escalation of extreme weather and climate events has exposed millions of individuals to acute food insecurity and reduced water security, with the severest impacts witnessed in Africa, Asia, Central and South America, Least Developed Countries, Small Islands, the Arctic, and among Indigenous Peoples, small-scale food producers, and low-income households worldwide. Between 2010 and 2020, regions highly vulnerable to climate change encountered human mortality rates from floods, droughts, and storms that were 15 times higher compared to regions with low vulnerability (Figure 3).

Climate change has inflicted substantial damages and irreversible losses on terrestrial, freshwater, cryospheric, coastal, and open ocean ecosystems. Escalating heat extremes have precipitated the local extinction of numerous species on land and in the ocean. Certain ecosystems, such as those affected by glacier retreat and permafrost thaw in mountainous and Arctic regions, are approaching a state of irreversibility (Figure 3).

Food security and water security have been compromised by climate change, impeding progress towards achieving the Sustainable Development Goals.[6] Although there has been an overall increase in global agricultural productivity, climate change has impeded this growth, particularly in mid- and low-latitude regions, while some high-latitude regions have experienced positive effects. Ocean

[5] Breckenfelder et al. (2023), p. 6.

[6] Further information on the UN Sustainable Development Goals are available at https://sdgs.un.org/goals (accessed 23 June 2023).

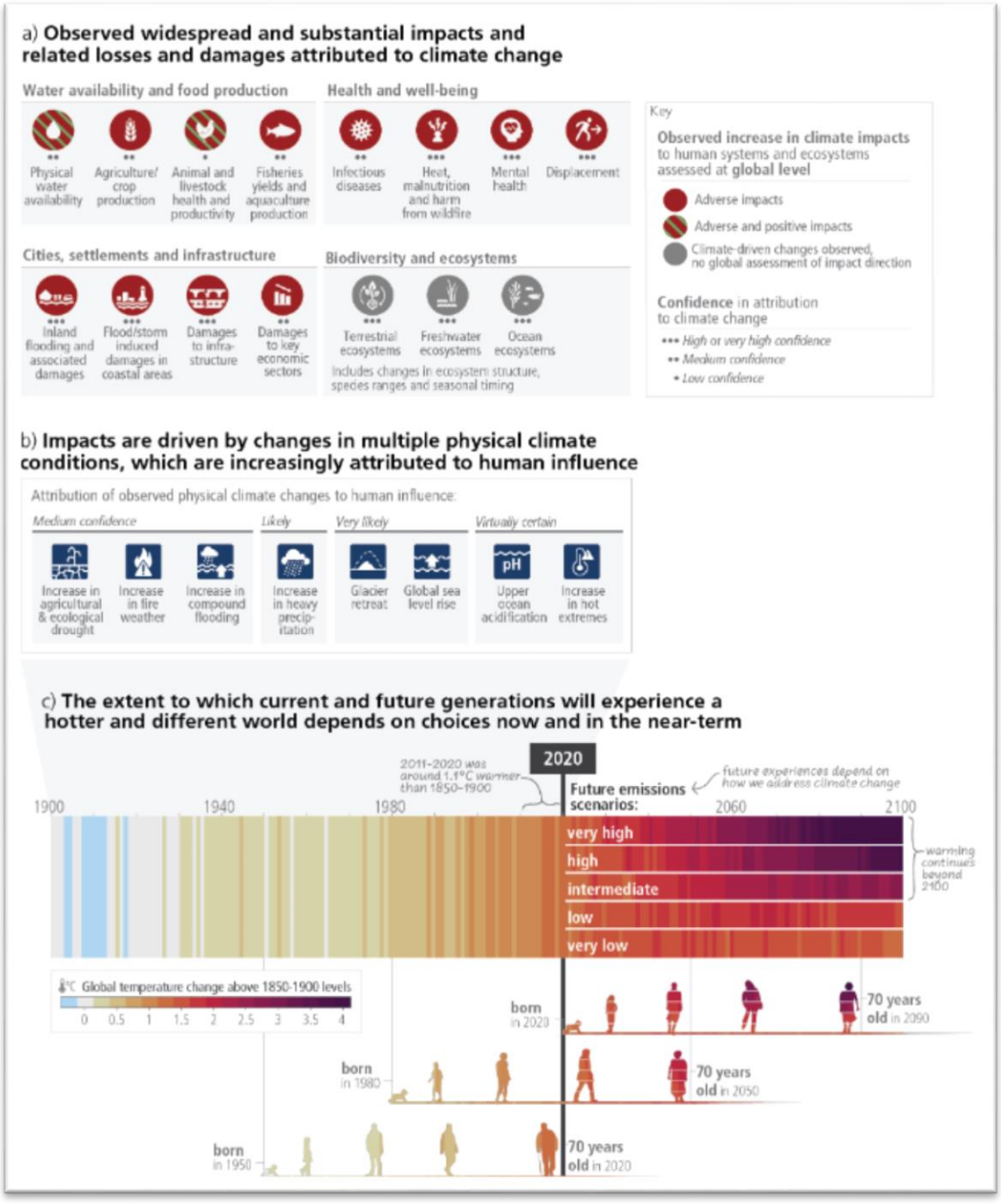
warming and acidification have adversely impacted food production from fisheries and shellfish aquaculture in specific oceanic regions. Approximately half of the global population currently grapples with severe water scarcity due to a combination of climatic and non-climatic factors (Figure 3).

The intensification of extreme heat events has resulted in heightened human mortality and morbidity across all regions. Climate-related food-borne, water-borne, and vector-borne diseases have become more prevalent. Rising temperatures, trauma from extreme events, and the loss of livelihoods and cultural heritage contribute to mental health challenges. Climate and weather extremes have spurred displacement, with regions in Africa, Asia, North America, Central and South America, and small island states in the Caribbean and South Pacific experiencing disproportionate effects relative to their population size (Figure 3).

Climate change has generated extensive adverse impacts and losses that are unevenly distributed across various systems, regions, and sectors. Economic damages resulting from climate change have been observed in climate-exposed sectors, such as agriculture, forestry, fishery, energy, and tourism. Individuals' livelihoods, encompassing homes, infrastructure, property, income, human health, and food security, have been affected, exacerbating gender and social inequities. In urban areas, climate change has adversely impacted human health, livelihoods, and critical infrastructure. Cities have encountered intensified heat extremes, undermining transportation, water and sanitation systems, energy supply, resulting in economic losses, disruptions of services, and adverse effects on well-being.

These adverse impacts are concentrated among economically and socially marginalised urban residents (Figure 3).

Figure 3: The intensification of human impact on climate change



Source: IPCC (2023b), p. 7

1.3 Climate-related risks and financial stability

Despite the intricate and uncertain nature of the impact of climate change on the economy, three distinct categories of risk factors arising from climate change and climate change policies have emerged and gained recognition: physical risks, transition risks, and liability risks. These risk factors have been thoroughly studied and understood over time.[7]

1.3.1 Physical risks

Physical risks encompass the hazards associated with climate-related events such as hurricanes, floods, and droughts, and their interaction with the vulnerability and exposure of human and natural systems. These risks manifest in various ways, including the direct impacts of these events on physical assets.

Consequently, there may be destruction of infrastructure, reduced productive capacity and output for businesses, and a decline in the value of financial contracts held by firms. The value of the portfolio of financial actors, such as banks, insurance companies, and pension funds, can be negatively affected by these consequences. For example, if a firm's productive capital is destroyed by severe floods and it has borrowed from a bank, it may struggle to meet the loan's interest and principal payments, thereby impacting the recovery rate and the bank's balance sheet.

1.3.2 Transition risks

As previously mentioned, during the 21st UN Conference of the Parties (COP21) held in Paris, the objective of limiting global warming was established. Since GHGs are responsible for climate change, in order to achieve this goal it is necessary to stabilise their concentrations in the atmosphere since. Unless there are significant advancements in GHG extraction technologies, the only way to achieve such stabilisation is through zero net-emissions.[8]

[7] In this sense, the Bank of England has acted as pioneer; see Bank of England (2015); Carney (2015); Batten, Sowerbutts and Tanaka (2016).

[8] See the Paris Agreement (2015), Art. 4.1, which calls for rapid reductions in GHG emissions to achieve "a balance between anthropogenic emissions by sources and removals by sinks of

Implementing the agreed-upon reductions in emissions necessitates widespread and decisive climate policy actions, particularly in countries with substantial emissions. However, these actions entail a trade-off and give rise to what is known as transition risk.

Transition risks refer to the economic dislocation and financial losses associated with the shift towards a low-carbon economy. It is important to note that failing to undergo this transition would likely result in an increase in physical risks from climate change over time. Nevertheless, an abrupt and delayed tightening of carbon emission policies could lead to the devaluation, or "stranding", of investments in carbon-intensive industries.[9] Hence, a smooth transition to a low-carbon economy is contingent on the expectation of future policy adjustments regarding carbon emissions, which would incentivise an early and orderly shift of private investments towards low-carbon technologies.

A substantial reduction in CO_2 emission can be essentially achieved in three ways:[10]

(i) by reducing the *production* and *consumption* of high carbon products, especially energy produced using fossil fuels;

(ii) by improving the energy efficiency of existing products and processes, i.e. reducing the ratio of energy used per unit of output (energy intensity of Gross Domestic Product (GDP)); and

(iii) by moving to low-carbon energy production, i.e. reducing the amount of carbon emissions per unit of energy produced (carbon intensity) by switching to low-carbon energy sources.

The first option involves implementing various behavioural adjustments on the demand side, while the second and third options rely on technological innovations on the supply side. The reduction in energy intensity of GDP can be accomplished through several means, including changes in energy consumption behaviour and lifestyles, modifications in economic incentives for energy consumption, and the

greenhouse gases in the second half of this century", commonly interpreted as reaching zero net-emissions.

[9] Batten, Sowerbutts and Tanaka (2016), p. 12. See also Leaton (2011), p. 25; Ploeg (2020); Cahen-Fourot et al. (2021).

[10] Andersson (2020), p. 27.

widespread availability of cost-effective energy-efficient technologies. Given the increasing importance of technological innovations, the ultimate objective should be to decarbonise the economy, which necessitates a shift in investments from high-carbon energy production technologies to low-carbon and ultimately zero-carbon energy production.[11]

However, it is crucial to ensure that investments in low-carbon energy production occur on a significant scale. If such investments are insufficient and carbon emission policies are abruptly tightened, the transition to a low-carbon economy could result in substantial declines in asset prices, particularly for fossil fuels and companies heavily reliant on them.[12-13]

This scenario would lead to the emergence of "carbon stranded assets".[14] These stranded assets, associated with high-carbon firms, would incur elevated costs and diminished revenues, potentially leading to significant adjustments in asset prices and posing implications for economic and financial stability.[15]

1.3.3 The impact of physical and transition risks on financial stability

1.3.3.1 The transmission channels of climate physical risks to the financial sector

In 2019, the Euro area experienced notable economic losses amounting to 1% of its GDP due to extreme climate and weather events.[16] These events, including floods, wildfires, and hurricanes, exerted adverse effects on the economy by inflicting damage upon property, physical capital utilised for production, and impacting investments and financial institutions.[17] Furthermore, hazards such as water stress and heat stress resulted in decreased labour and agricultural productivity, disrupted logistics, and even prompted the relocation of economic

[11] Fankhauser (2013), pp. 352-259.
[12] Carney (2015).
[13] Policies designed to decrease carbon emissions can focus on either limiting a specific volume of emissions, as seen in systems like the EU Emission Trading Scheme (ETS), or regulating their cost through carbon taxes. See Stern (2007); Burniaux et al. (2008).
[14] Cahen-Fourot et al. (2021).
[15] Gros et al. (2016), pp. 11 ff; Battiston et al. (2017); Stolbova, Monasterolo and Battiston (2018), p. 240.
[16] European Central Bank (2021a), p. 103.
[17] See Faiella and Natoli (2018), p. 8.

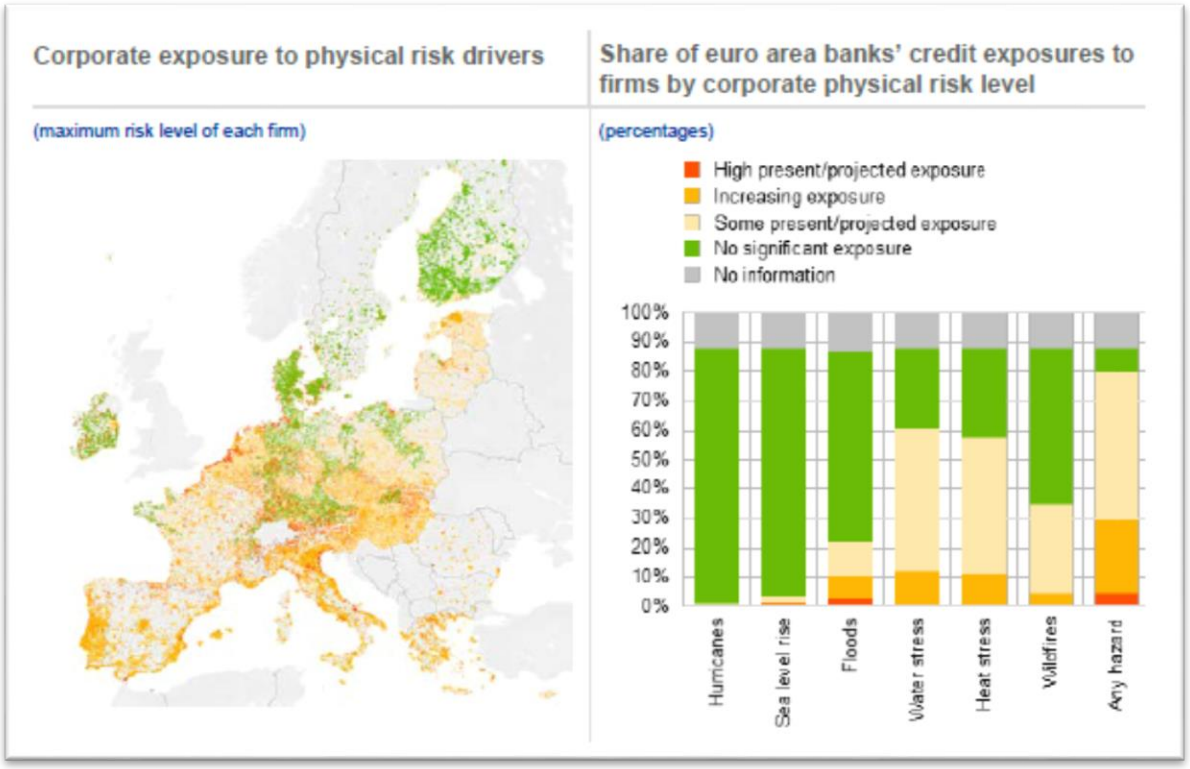
activities.[18] Consequently, the consequences of these physical hazards endure in the form of sustained production losses and necessitate the allocation of capital towards reconstruction and replacement endeavours. As climate change advances, the frequency and intensity of these hazards are projected to escalate, exacerbating the associated physical risks.

The ECB Financial Stability Review, published in May 2021, reveals that specific firms already face substantial exposure to physical risks, with concentration primarily observed within distinct geographic areas.[19] Figure 4 (left panel) demonstrates the prevalence of floods in central and northern regions of Europe, while heat-related hazards dominate in southern Europe. These findings underscore the importance of comprehending and addressing the geographical distribution of physical risks faced by firms, particularly within the context of climate change.

Approximately 30% of credit exposures in the Euro area banking system linked to non-financial corporations (NFCs) are associated with firms exposed to high or escalating physical risks driven by several factors. Figure 4 (right panel) illustrates that approximately 10% of loan exposures are specifically linked to firms encountering heightened risks of floods, heat stress, or water stress. Collectively, roughly 80% of loan exposures exhibit varying degrees of exposure to physical risks. This trend assumes heightened significance if efforts to reduce emissions prove insufficient in the long term and if firms and economies fail to effectively adapt to climate change impacts. Additionally, nearly 10% of loan exposures to NFCs are subjected to multiple high or increasing physical risk drivers. The occurrence of interconnected or compound events may amplify the effects of these risks, leading to clustering and limited opportunities for risk diversification.

[18] Network for Greening the Financial System (2020a), p. 8.
[19] European Central Bank (2021a), pp. 103 ff.

Figure 4: The impact of climate change hazards to Euro area banks' credit exposures



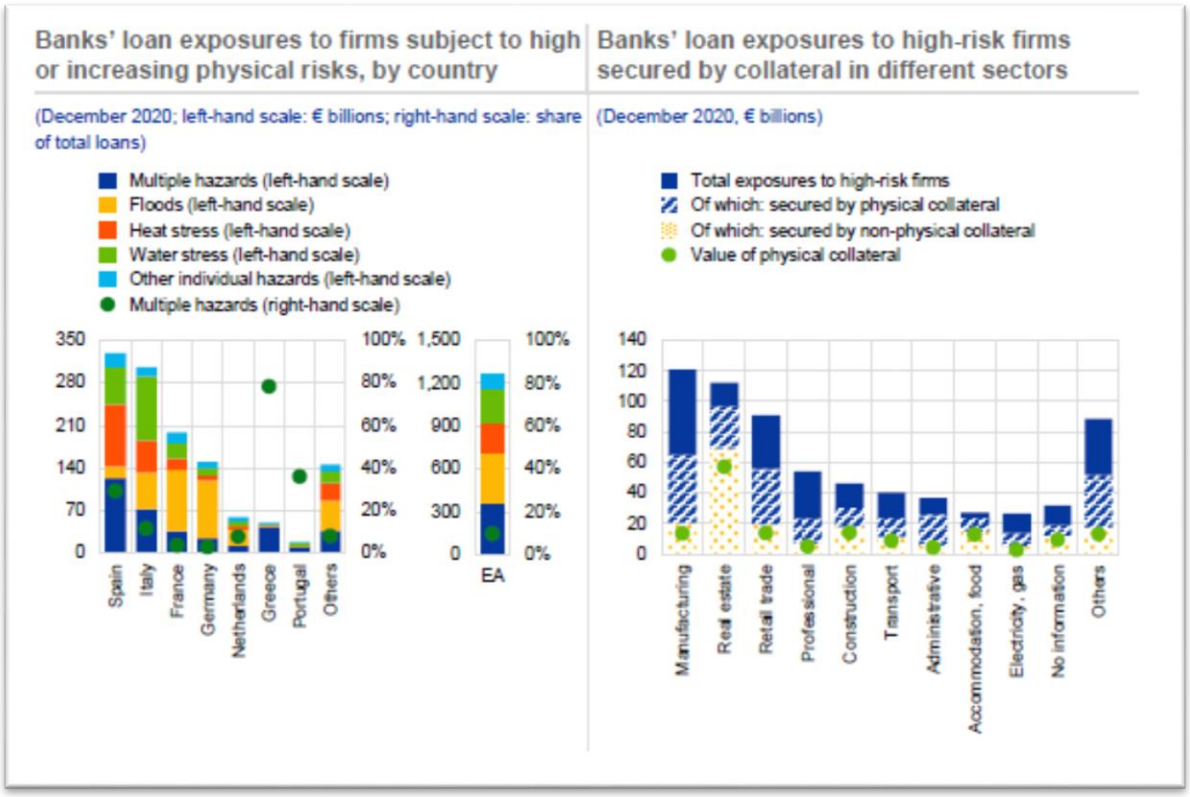
Source: European Central Bank (2021a), p. 104.

A massive portion of credit exposures to firms highly or increasingly exposed to physical risks is backed by collateral, serving as a vital measure to mitigate potential losses for banks. However, it is crucial to acknowledge that climate-related damage affects both the firms themselves and the physical collateral securing the credit exposures. In cases where collateral is not adequately insured, its capacity to mitigate losses diminishes, thereby increasing potential losses for banks. This underscores the interconnectedness of climate-related risks, the financial sector, and the effectiveness of collateral as a risk management tool. Recognising and addressing this relationship is imperative for banks to effectively assess and manage the potential impacts of climate change on their loan portfolios and overall financial stability.

Approximately half of the value of collateral used to secure credit exposures to firms facing high or escalating physical risks comprises physical assets. Nevertheless, the extent of collateralisation varies across sectors, as depicted in

Figure 5 (right panel). Banks exhibit particularly high exposure to firms operating in the manufacturing and real estate sectors, with over two-thirds of credit exposures, notably within real estate activities, construction, and accommodation and food sectors, backed by collateral, primarily in the form of physical assets. The significant reliance on physical collateral in these sectors raises concerns regarding the potential devaluation of collateral in the event of disruptions caused by physical hazards or operation in regions with expected intensification of risks. Such considerations underscore the significance of sector-specific characteristics and the potential implications of climate-related physical risks for collateral value and overall credit exposures.

Figure 5: Physical collateralisation of loan exposures in some sectors



Source: European Central Bank (2021a), p. 105

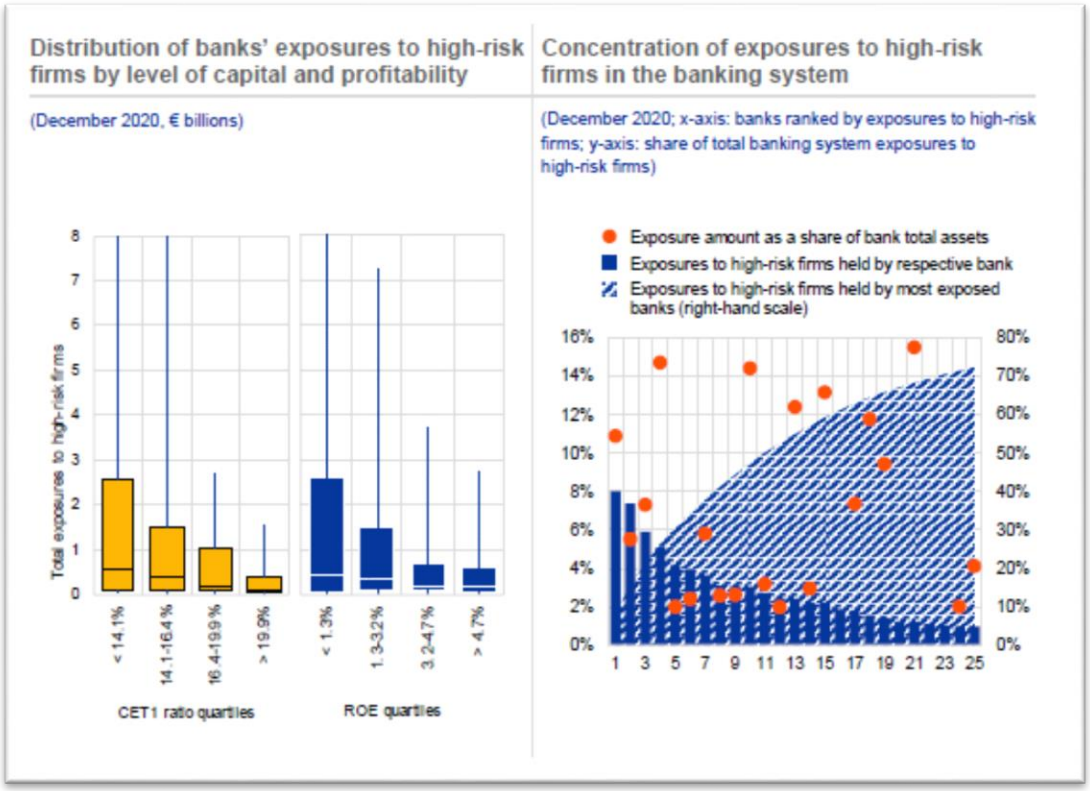
The concentration of physical risk exposures and their association with less capitalised and less profitable banks pose broader risks to financial stability. Figure 5 (left panel) demonstrates that, when not considering collateral or other mitigating

factors, the exposure to firms facing high or escalating physical risks is significantly higher for the 25% least well-capitalised banks, with six times the exposure compared to the 25% most well-capitalised banks, as measured by the Common Equity Tier 1 ratio. Similarly, the quartile of banks with the lowest return on equity holds a median exposure at risk that is twice as large as that of the 25% most profitable banks. These findings highlight the potential vulnerability of less capitalised and less profitable banks to the impact of physical risks, underscoring the importance of robust capitalisation and profitability in mitigating financial stability risks associated with such exposures.

Approximately 70% of credit exposures to high-risk firms within the banking system are concentrated in 25 banks, as depicted in Figure 6 (right panel).[20] Among these banks, ten institutions hold more than 3% of the total exposures to high-risk firms individually. These banks tend to be large and exhibit diversified portfolios across various asset classes and geographic regions. Additionally, due to their designation as global or other systemically important banks, they possess supplementary capital buffers. While exposures to high-risk firms typically account for approximately 5% of total assets for these banks, seven out of the 25 banks have exposures ranging from 10% to 15% of their total assets. These findings underline the significance of the identified group of banks in terms of their exposure to high-risk firms and the potential implications for their overall asset portfolios.

[20] These twenty-five banks collectively account for 64% of the banking system's total assets, indicating that climate-related risk exposures tend to be more concentrated compared to general exposures. For further information, see European Central Bank (2021a), pp. 106 ff.

Figure 6: The concentration of physical risk exposures



Source: European Central Bank (2021a), p. 106

The concentration of climate-related physical risks within a small number of vulnerable banks carries potential ramifications for financial stability. When evaluating credit and market risks, it is essential to consider the escalating frequency, severity, and interconnectedness of physical hazards associated with climate change. This is particularly pertinent for banks with limited lending activities confined to specific geographic areas. Employing medium and long-term scenario-based analyses is recommended to comprehend the interplay between these risks and the transition risks across different sectors. To mitigate losses to the financial system, it is imperative to facilitate a smooth transition towards a sustainable economy, implement climate change adaptation measures to alleviate the impact of physical hazards, and diversify risks among financial institutions through the utilisation of loss-absorbing capacity, financial instruments, or insurance coverage. Additionally, greater investments are needed in meticulous,

forward-looking data collection and risk quantification methodologies to facilitate comprehensive and forward-thinking analyses.

1.3.3.2 The exposures of Euro area financial institutions to transition risks

By comparing the data presented by the ECB in the Financial Stability Review published in November 2020 and the ones available in the May 2021 version, it is evident that the price of carbon within the EU Emissions Trading System (ETS) has risen by approximately 60%.[21] This upward trajectory is predicated on the anticipation of forthcoming reviews of pertinent EU policies, including the EU ETS itself.[22]

The financial system is exposed to transition risk resulting from exposures to companies with substantial carbon emissions throughout their value chains.[23] Carbon emissions from NFCs can be classified into three categories: direct emissions ("scope 1"), energy-related emissions ("scope 2"), and indirect emissions ("scope 3"), encompassing emissions associated with all other stages of the value chain, such as the utilisation of sold goods.[24] However, it is important to note that the reporting of GHG emissions by NFCs is primarily limited to large listed corporates, and disclosures regarding scope 3 emissions have the lowest coverage among all the categories.

Banks' loan portfolios exhibit varying degrees of exposure across various sectors with the highest emissions, with notable significance placed on the manufacturing sector, which is simultaneously associated with high scope 3 emissions. Firms operating in the mining and energy sectors comprise approximately 5% of banks'

[21] European Central Bank (2020a), pp. 72 ff.

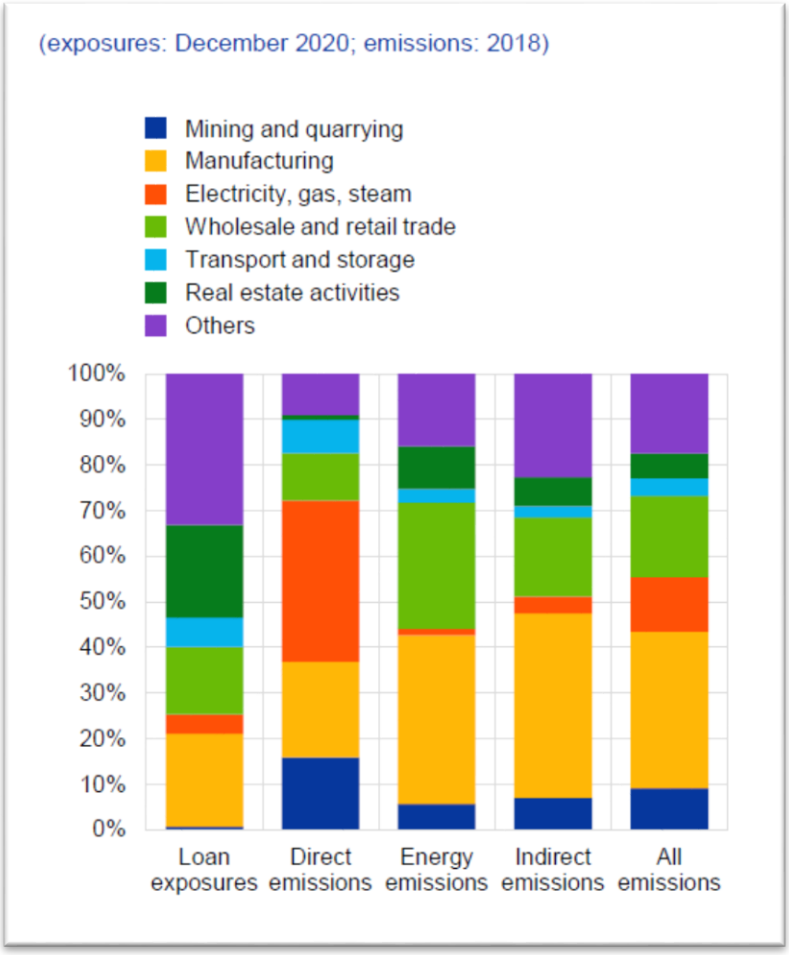
[22] Further information on the EU Emissions Trading System are available at https://ec.europa.eu/clima/policies/ets_en (accessed 23 June 2023).

[23] European Central Bank (2021a), pp. 101 ff.

[24] In its May 2021 Financial Stability Review, the ECB categorised emissions into various "scopes" to provide a clearer view of the various pathways through which transition risk can transform into financial risk. Scope 1 and 2 emissions are instrumental in assessing the negative consequences of carbon taxes and policies discouraging fossil fuel usage. Scope 3 emissions centre on the effects of alterations in the transportation of supplies or finished products, as well as shifts in consumer demand for goods. For instance, a sudden decrease in demand for products with high carbon intensity can be detrimental to companies producing less environmentally friendly goods, potentially stranding their assets.

loan exposures. While these entities are recognised as some of the most carbon-intensive counterparties within banks' loan portfolios, the relatively low share of loans suggests a modest risk for banks (Figure 7). However, manufacturing constitutes a considerably larger proportion, around 20% of banks' loan portfolios. Given that the emissions from the manufacturing sector predominantly fall within scope 3, it is reasonable to infer that alterations in consumer preferences would introduce substantial transition risks.

Figure 7: The share of corporate emissions in some sectors

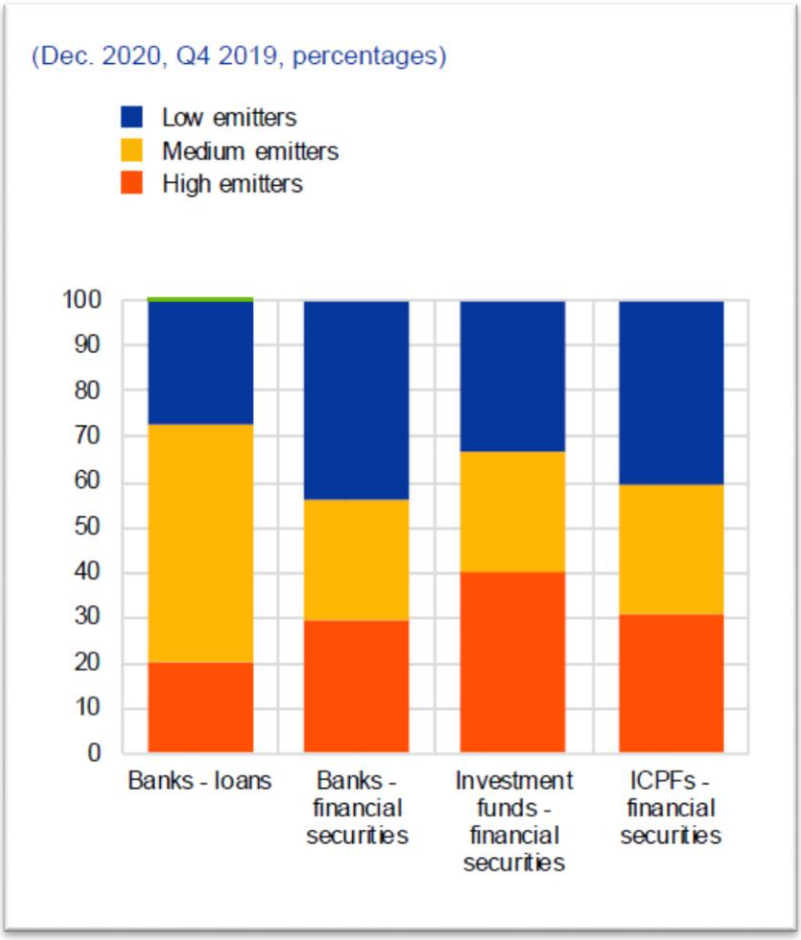


Source: European Central Bank (2021a), p. 102

Consequently, exposures to manufacturing firms constitute a significant source of climate-related credit risk within banks' corporate loan portfolios. However, this risk only becomes apparent upon thorough examination of the carbon footprint

across the entire value chain, owing to the presence of scope 3 emissions. Transition risk exposure stemming from holdings of securities follows a similar pattern, with approximately 30% of banks' equity and corporate bond portfolios consisting of NFCs with high emissions (Figure 8).

Figure 8: Banks' and non-banks' exposure to transition risk in loan and securities portfolios

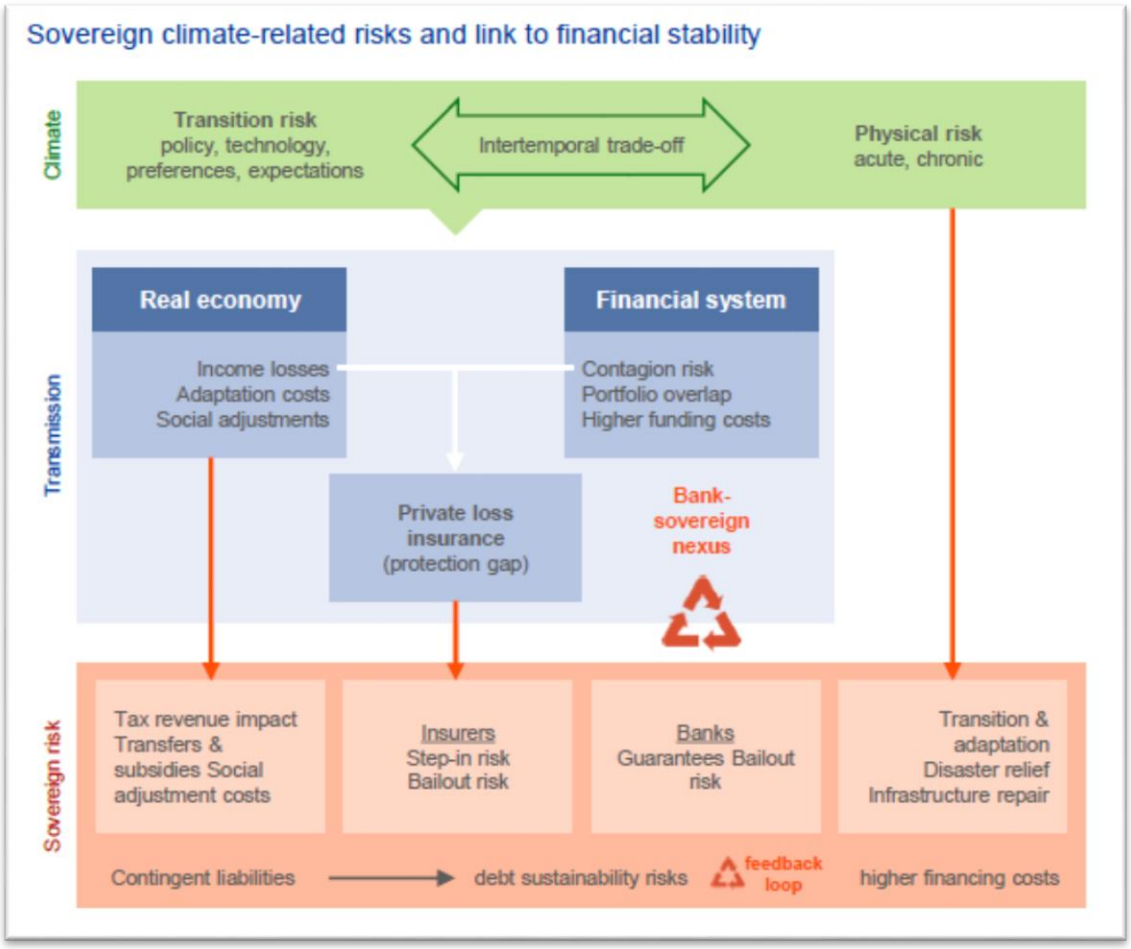


Source: European Central Bank (2021a), p. 13

Lastly, concluding thoughts shall be devoted to emphasising the need to consider climate-related fiscal risks, which have received less attention compared to other climate-related financial stability risks. While progress has been made in assessing the impact of climate change on financial stability for non-financial firms, financial markets, and intermediaries, there is a lack of examination for sovereigns in advanced economies.

Indeed, as highlighted in the latest ECB Financial Stability Review (May 2023), both physical and transition risks can directly impact sovereign debt sustainability.[25] This includes the substantial investments required for the transition to a net-zero economy and adaptation, as well as the increased fiscal costs resulting from disasters (Figure 9).

Figure 9: Climate-related fiscal risks and financial stability



Source: European Central Bank (2023a), p. 120.

Furthermore, climate policies such as carbon pricing may indirectly affect public finances by reducing tax revenues as risks materialise in the real economy.[26] Areas affected by physical risks, such as increased disaster losses and reconstruction

[25] European Central Bank (2023a), p. 119.
[26] For an overview of EU fiscal policies and instruments related to climate change, see Avgousti et al. (2023).

costs for companies, may experience lower fiscal revenues. Governments may also face demands for subsidies, social adjustments, compensation packages, and potential contingent liabilities through the financial sector, including credit losses and sovereign guarantees.

Overall, these factors can have implications for a sovereign's credit quality and debt financing rates.

1.3.4 Liability risks

Parties that have incurred loss and damage as a result of physical or transition risks stemming from climate change may seek compensation from those they believe to be responsible. If such claims are upheld, the parties against whom the claims are successful will either have to bear the losses themselves or attempt to pass on some or all of the losses to their liability insurance providers. Liability and other legal risks primarily deal with the allocation of losses arising from physical and transition risks among different parties.

There are three main lines of argument commonly acknowledged for establishing liability:[27]

(i) failure to *mitigate*: the claimant can assert that the defendant (e.g. an oil company) has contributed to adverse climate changes by releasing greenhouse gases, thereby harming the claimant;

(ii) failure to *adapt*: the claimant can argue that the defendant, with whom they have a contractual or direct relationship, has exposed them to increased losses caused by extreme weather events due to the provision of unsatisfactory goods or services that are unfit for their intended purpose. Alternatively, the claimant may argue that the defendant has exposed them to greater financial losses by failing to consider the possibility of stricter regulations on carbon emissions; and

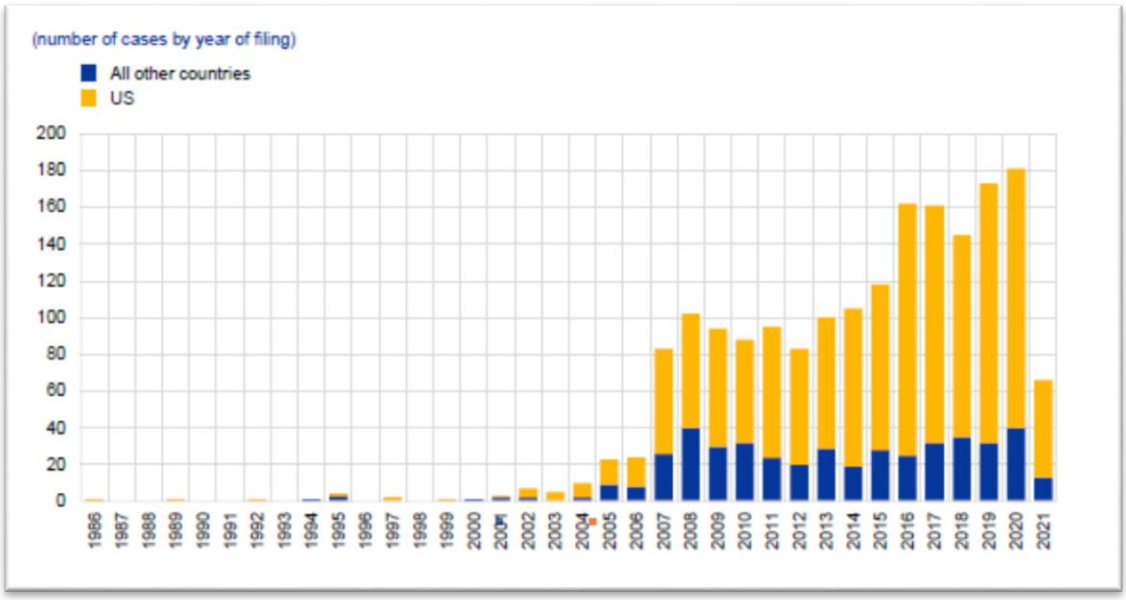
(iii) failure to *disclose* or *comply*: the claimant can allege that the defendant has not adequately disclosed relevant information regarding climate

[27] Bank of England (2015), pp. 59-60.

change, has done so in a misleading manner, or has failed to comply with climate change-related legislation or regulations.

As underscored by the Technical Document of the Network for Greening the Financial System (NGFS),[28] there has been a discernible increase in the number of climate-related lawsuits worldwide, particularly following the adoption of the Paris Agreement in 2015.[29] The cumulative count of climate-related cases has more than doubled since 2015 (Figure 10).[30] While the majority of these cases were filed in the United States (US), litigation has also been initiated in at least 39 other countries and before international courts and tribunals (Figure 11).[31]

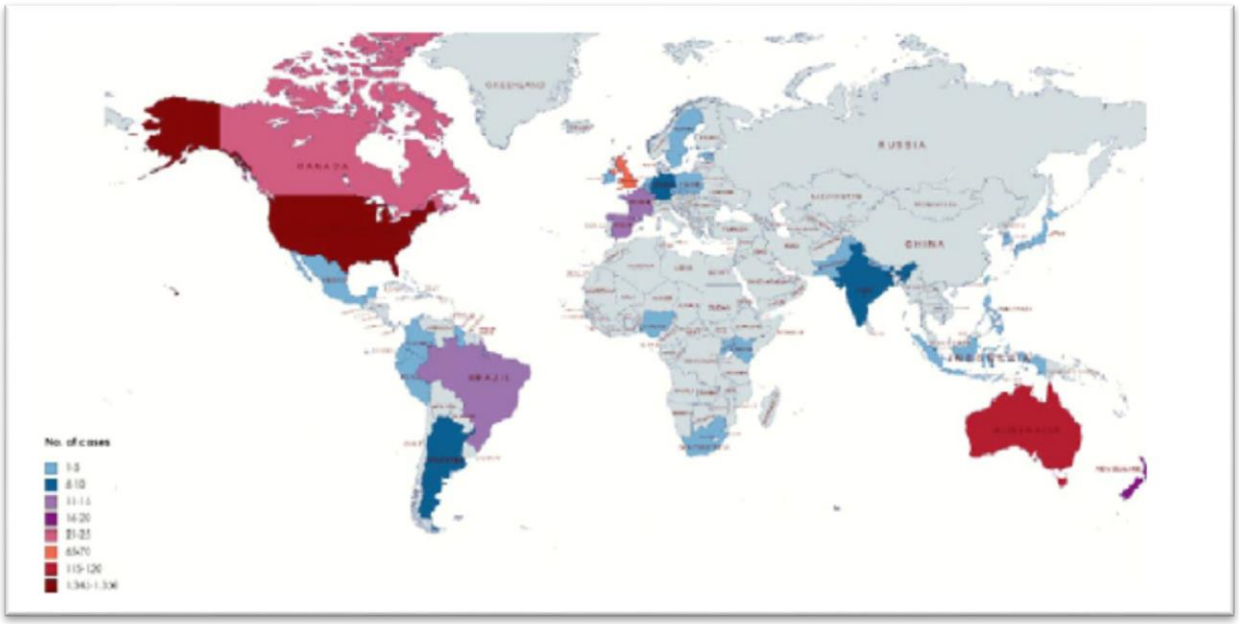
Figure 10: Climate-related litigation over time



Source: Setzer et al. (2021), p. 8

[28] Further information on the NGFS are available at https://www.ngfs.net/en (accessed 23 June 2023). It is interesting to note that while European central banks joined the NGFS rather early, the Federal Reserve initially refrained from joining; see DiLeo, Rudebusch and van 't Klooster (2023).
[29] Network for Greening the Financial System (2021a), p. 8.
[30] Setzer and Higham (2021), p. 4. See also UNEP (2020), p. 13.
[31] Setzer and Higham (2021), p. 5.

Figure 11: Number of cases per jurisdiction



Source: Setzer et al. (2021), p. 9

NB: grey = no data available

Based on a survey conducted by the NGFS among its member jurisdictions to gather information on climate-related litigation, 58% of respondents anticipate a general rise in such litigation in the future. However, there is considerable variation regarding the current prevalence of climate-related cases. 52% of respondents confirmed the existence of climate-related litigation in their jurisdiction, while 46% were unaware of any such lawsuits.[32]

In 2021, several ground-breaking cases have been decided by courts in different jurisdictions, concluding that both states and corporations have violated their environmental obligations under national and international law.[33]

Although the majority of cases target governments,[34] the aforementioned survey has identified a noteworthy trend of non-governmental organisations (NGOs) initiating litigation against public and private actors.[35] These NGOs may either be

[32] Network for Greening the Financial System (2021a), p. 8.
[33] See, for instance, Network for Greening the Financial System (2021a), Annex I.
[34] Setzer and Higham (2021), p. 5.
[35] ibid., p. 12.

direct parties to the litigation or provide support to individual litigants. In some instances, these NGOs openly acknowledge that they employ litigation as a catalyst to raise awareness and exert pressure, rather than as an end in itself. This rise of strategic litigation, where plaintiffs utilise legal action as an activist strategy to drive societal transformation beyond the interests of the parties involved in the case, has also been recognised in academic literature.[36]

Furthermore, NGOs are beginning to emulate litigation strategies employed by NGOs in other jurisdictions and engage in cross-border cooperation. This is particularly evident in Europe, where the successful *Urgenda* case in the Netherlands[37] has led to litigation being initiated on similar grounds in France, Ireland, Germany, Italy, and before the CJEU and the European Court of Human Rights.[38]

1.3.4.1 Climate-related litigation as a financial risk

The increasing prevalence of climate-related litigation supports the notion that climate change poses financial risks. Financial markets are not immune to this trend, and various types of climate-related claims have been identified in general, including:[39]

(i) claims alleging violations of fundamental rights, particularly those related to the protection of life, home and family life, a safe and healthy environment, human dignity, and due process rights by a financial decision;

(ii) claims questioning the extent to which supporting climate change mitigation and adaptation falls within the mandate of specific entities such as central banks, trustees, and fund managers;

(iii) claims based on the need for environmental assessments in the decision-making processes of public and private institutions;

[36] ibid.

[37] Judgment of the Supreme Court of the Netherlands of 20 December 2019, *The State of the Netherlands and Stichting Urgenda*, No 19/00135, ECLI:NL:HR:2019:2007.

[38] See, for instance, Network for Greening the Financial System (2021a), Annex I.

[39] Solana (2020a).

(iv) allegations of breaches of disclosure obligations, both in primary and secondary markets;

(v) claims for breach of contract, specifically concerning green financial products like green bonds and sustainability-linked loans;

(vi) claims for breach of fiduciary duties by directors and trustees of financial institutions;

(vii) negligence claims seeking compensation for loss and damage resulting from the failure of public authorities to address the climate crisis; and

(viii) public nuisance claims in tort against financiers as "indirect polluters", particularly in the context of project finance transactions.

Climate-related litigation can give rise to various costs. The existing academic literature on the costs of corporate litigation generally distinguishes between direct and indirect costs. Direct costs refer to those explicitly imposed by court orders or administrative decisions, such as settlement payments, damages, and legal fees. Indirect costs encompass broader implications, including damage to a firm's credibility, increased uncertainty about its prospects, loss of customers and suppliers, and diversion of managerial resources.[40]

However, this classification fails to fully capture the systemic effects of litigation, particularly the costs imposed on entities that are not directly involved in the proceedings. Therefore, the approach undertaken by Solana appears to be more beneficial as it proposes a slight modification to the cost categorisation.[41] Under this approach, direct costs are incurred by an institution when it is a party to the litigation, irrespective of whether those costs are explicitly mandated by court orders or administrative decisions. Indirect costs are incurred by the same institution when a third party is involved in the litigation.

Direct costs

Pay-outs and fines

[40] See, *inter alia*, Arena and Ferris (2017), p. 13.

[41] Solana (2020b), p. 349.

Financial institutions incur costs in the form of court-ordered payments or fines imposed by administrative authorities.[42] The nature of these costs depends on the relief sought by claimants, such as compensating clients for damages or compensating third parties in nuisance claims.[43] To meet these obligations, financial institutions allocate resources by setting aside provisions or securing necessary cash resources once payment amounts are determined. However, the implications of pay-outs and fines extend beyond the immediate costs. Provision allocations can impact profitability, leading to adjustments in investor expectations and potential declines in market valuation.[44] This underscores the financial risks faced by institutions involved in climate-related litigation and emphasises the importance of addressing and mitigating these risks. By understanding potential costs and taking proactive measures, financial institutions can effectively manage their obligations and navigate the evolving landscape of climate-related legal challenges.

Legal and administrative fees

Financial institutions encounter various costs throughout the litigation process. They engage external legal counsels to represent them in court, as their internal legal departments typically handle compliance and transactional matters.[45] Additional personnel may be hired to handle increased workloads, including back-office staff for case preparation and customer service representatives for managing complaints.[46] Moreover, depending on the nature and outcome of the proceedings, unsuccessful defendants may be responsible for covering litigation costs, including court fees and the opposing party's legal fees. Conversely, if claimants are unsuccessful, they may be required to bear the defendant's legal representation costs. It is important to note that court cost orders may not fully cover the

[42] Arena and Ferris (2017), p. 6.
[43] Solana (2020a), p. 132.
[44] For instance, Gompertz remembers the decline in CYBG's stock, which included Clydesdale Bank, Yorkshire Bank, and Virgin Money. The shares plummeted by as much as 22.6% after the group announced a provision of £450 million to cover possible expenses related to payment protection insurance claims. This provision amounted to over 20% of the group's total stock market value at that time. See Gompertz (2019); Press Association (2019).
[45] Langevoort (2012), p. 496; Schwarcz (2007), p. 46.
[46] Makortoff and Kollewe (2019).

defendant's legal fees, even in successful defences, leaving them partially responsible for their own expenses.[47] These costs compound the financial burden and complexity faced by financial institutions involved in litigation cases.

Insurance costs

Financial institutions often obtain liability insurance to manage their risks. This insurance safeguards them against potential legal liabilities and associated pay-outs arising from actions causing losses or damages to others. However, the impact of climate change has prompted adjustments in the terms of liability insurance policies by insurance and reinsurance companies.[48] These adjustments involve the exclusion of certain claims related to damages from extreme weather events, thereby limiting the insurers' liability.[49] Additionally, existing policy exclusions may apply to claims arising from climate-related litigation. As climate litigation continues to rise, insurers may explicitly exclude climate change claims or reduce coverage by lowering policy limits and insured amounts. This exposes policyholders to a greater risk of bearing a larger share of potential pay-outs using their own resources. Insurers have responded by increasing premiums to reflect the heightened vulnerability of companies to climate-related litigation.[50] Premium increases are typically implemented during policy renewals, enabling insurers to promptly adapt to changing circumstances.[51] If climate litigation volumes continue to grow, more insurance companies are likely to adopt these adjustments. Companies facing frequent litigation or significant claims will be particularly susceptible to these changes and the associated costs. A loss in a precedent-setting case could increase the likelihood of success for future claimants, leading to higher

[47] Haslem, Hutton and Smith (2017).

[48] During the announcement of the collaboration between the United Nations Environment's Finance Initiative (UNEP FI) and 16 of the world's largest insurance companies "to develop a new generation of risk assessment tools designed to enable the insurance industry to better understand the impacts of climate change on their business", Erik Solheim, the Chief of UN Environment, raised concerns about the increasing challenge of 'uninsurability' for numerous risks as climate change continues to intensify. See UNEP FI (2018).

[49] Bank of England (2015), p. 28.

[50] This seems to be prevalent in North America, Asia, and Europe, and there has been a notable rise in its occurrence after the Paris Agreement was established. See Bolton and Kacperczyk (2020), p. 5; Reeves and Umbert (2019).

[51] Bank of England (2015), p. 38. See also Ranger and Surminski (2013).

potential pay-outs and triggering claims under liability insurance policies. In order to mitigate their heightened exposure, insurance companies may revise policy terms to exclude specific claims or raise premiums charged to defendant companies. These developments underscore the evolving landscape of liability insurance and its implications for companies involved in climate-related litigation.[52]

Financing costs

Climate-related litigation can have a profound impact on the financing costs associated with various financial products. This effect is evident in sustainability-linked financial products like sustainability-linked loans, where loan terms are linked to a borrower's environmental performance.[53] Climate-related litigation can hinder a borrower's ability to meet sustainability targets, potentially influencing their financing conditions, including the interest rates applicable to their loans.[54] Additionally, climate-related litigation can raise the overall cost of financial products that are unrelated to sustainability performance. If litigation costs significantly affect a company's creditworthiness,[55] credit rating downgrades may occur. These downgrades can result in higher interest rates being imposed on the company, similar to the impact observed in sustainability-linked financial products.[56] Moreover, credit rating downgrades may trigger contractual provisions that impose stricter financing conditions on the borrower.[57] Furthermore, evidence

[52] Bank of England (2015), p. 64.
[53] Linklaters (2019).
[54] For instance, the Sustainability Linked Loan Principles, jointly developed by the Loan Market Association, the Asia Pacific Loan Market Association, and the Loan Syndications and Trading Association, outline ten typical categories of sustainability performance targets. One of these pertains to "Global ESG assessment", encompassing enhancements in the borrower's ESG rating and/or attainment of a recognised ESG certification. In fact, some of the world's foremost ESG rating firms consider lawsuits associated with critical ESG matters as incidents that could influence a company's ESG performance. They include litigation risk as one of their primary indicators to gauge the potential impact that an ESG issue might exert on a company's financial performance. See Loan Market Association (2019).
[55] For instance, in 2019 Moody's revised the outlook for the long-term deposit and senior unsecured debt ratings (when applicable) of eight banks from stable to negative. This adjustment was made to mirror a deteriorating operating environment primarily influenced by the fluctuations in charges related to payment protection insurance (PPI). See Moody's (2019).
[56] European Central Bank (2020b), p. 37.
[57] Brunnermeier and Pedersen (2009), p. 31.

suggests that banks may modify loan contract terms in response to an increase in a borrower's litigation risk, even if it does not directly impact their credit rating.[58] This illustrates the broader implications of climate-related litigation on financial products beyond those explicitly tied to sustainability performance.

Reputational costs

Litigation can have severe consequences for the reputation of financial institutions, as exemplified by recent financial scandals.[59] The US subprime mortgage crisis of 2007 resulted in lawsuits against major financial institutions for the mis-selling of subprime mortgage-related investments.[60] The impact of such scandals on the reputation of the industry is widely recognised, requiring significant efforts to restore public trust. Reputational damage arises from both the underlying questionable business practices and formal court decisions imposing fines or compensation obligations. Reputational costs can manifest in numerous ways,[61] traditionally affecting customer relationships.[62] In the context of climate-related litigation, environmentally conscious customers may opt to switch to alternative providers, leading to a loss of market share for financial institutions. Similarly, lawsuits related to false advertising of sustainable finance products can result in diminished market share as customers seek out more reliable providers.[63] Recent studies suggest that reputational costs extend beyond customer relationships to increased contracting costs with suppliers, employees, and shareholders following

[58] Deng and Willis (2014), p. 1110 ff, which demonstrates that after a class action lawsuit under US securities law is initiated, companies being sued observe an uptick in loan spreads, elevated initial borrowing costs, and stricter financial covenants and collateral demands. See also Yuan and Zhang (2015), p. 25, which indicate that banks impose interest spreads on loans to companies involved in class action lawsuits after litigation, which are 19% higher on average.

[59] For instance, in 2013 a couple of years following the emergence of the PPI scandal, Mr. Antony Jenkins, who was the CEO of Barclays at the time, stated that it would likely require "between 5 to 10 years" for the bank to regain public trust following the PPI scandal. See Monaghan (2013).

[60] Braithwaite, Scannell and McCrum (2011).

[61] Karpoff, Lott and Wehrly (2005), p. 660.

[62] Klein and Leffler (1981), p. 629.

[63] For instance, Haslem, Hutton and Smith show that market share can experience significant declines due to factors such as deceptive advertising, product recalls, safety concerns, misleading bidding practices, and financial misrepresentation. See Haslem, Hutton and Smith (2017), p. 350.

litigation.[64] Investors may react to news of litigation by selling shares or bonds,[65] anticipating reputational losses. Banks may tighten loan contract terms for borrowers deemed to have high litigation risk, reflecting the perceived reputational costs associated with such associations.[66] However, this response may also stem from concerns regarding the borrower's creditworthiness, taking into consideration the potential impact of future litigation on the financial resources of the company.

Reputational costs indirectly affect companies through investors' decisions to reduce their exposure. Investment funds employ internal Environmental, Social, and Governance (ESG) scoring systems as well as external sustainability indexes, and an adverse outcome in climate-related litigation can lead to a decrease in the defendant's ESG score or their exclusion from sustainability indexes, prompting investors to divest from the company.[67] Employees may respond to negative environmental reputations by leaving the organisation for more environmentally positive firms or by venturing into entrepreneurship. However, the competitive salaries offered by the industry often enable affected firms to quickly replace employees, mitigating reputational costs.[68]

Lastly, reputational costs may prompt defendants to take remedial actions, such as removing key managers, which can result in costly compensation packages.[69] Increased investments in corporate social responsibility initiatives are also common in attempts to enhance corporate image.

Direct costs in the litigation process

The process of litigation can be divided into three main stages:

(i) pre-filing (the time period preceding the initiation of the proceedings);

[64] ibid., pp. 350-351.
[65] Gu, Hasan and Lu (2018), pp. 18-19.
[66] Deng, Willis and Xu (2014), p. 1103.
[67] Riding (2019).
[68] Hutton and Smith (2017), p. 331.
[69] Solana (2020b), p. 356.

(ii) the legal proceedings themselves (the time period between the filing of the claim ad the issuance of the judgment, award or decision by a court, tribunal or administrative authority); and

(iii) the final stage (the time period following the judgment, award or decision).

The majority of costs associated with litigation predominantly occur during the stage of legal proceedings, encompassing various costs such as pay-outs, fines, lawyers' fees, administrative fees, and potential increases in the cost of capital. However, it is important to note that the commencement of litigation takes place if an administrative authority issues a decision in the first instance and the affected financial institution proceeds to appeal. Consequently, certain costs, such as pay-outs or fines, may not materialise if the decision is not upheld by a higher court or authority. Nevertheless, expenses such as lawyers' fees will continue to accrue until a final judgment, award, or decision is reached. The duration of the litigation process is a critical determinant of the overall procedural costs.[70]

The determination of the specific stage at which a borrower's financing conditions may be impacted poses a challenging task. The provisions outlined in the loan agreement may specify the conditions that trigger an increase in the interest rate, such as specific judgments, awards, or decisions. However, in practical terms, the actual effect of this interest rate adjustment may not be immediately felt by the borrower until a later point, such as when the subsequent instalment becomes due. The true impact on financing conditions may only become apparent after the conclusion of the legal proceedings. Furthermore, in cases where the contractual provisions do not explicitly address climate-related litigation, the influence of the litigation on the borrower's financing conditions may only manifest through a revision of their credit ratings, a process that could occur after the completion of the legal proceedings.[71]

Identifying the stage at which insurance costs are influenced is further complicated by the specific terms of the insurance contract. For instance, a judgment against a

[70] Lee and Willging (2010), p. 5.
[71] Solana (2020b), p. 357.

financial institution may not automatically trigger modifications to the insurance policy terms. However, if the case sets a precedent that motivates other potential claimants to file similar claims, the insurer may reassess its exposure to the risk of additional claims from the defendant. This reassessment could result in an increase in the defendant's premium for liability insurance, occurring either during the post-filing stage of the original case or the pre-filing stage of subsequent cases.[72]

Reputational costs can arise at any phase of the litigation process. While the announcement of an unfavourable judgment or decision directly impacts the defendant's reputation, investors may also react to reputational risks before a decision is rendered.[73] The public disclosure of the initiation of court proceedings, which can become widely known at an early stage, can establish a connection between the entity's actions and the climate emergency, potentially causing reputational harm. Mere speculation regarding the possibility of a lawsuit or investigation can lead the public to prematurely form opinions about the entity's role in contributing to the climate emergency, further damaging its reputation.[74]

Lastly, an adverse decision against a financial institution can set a precedent, potentially triggering similar claims from other claimants. This creates a feedback loop that presents the risk of escalated direct costs in litigation. For instance, a precedent against a financial institution can result in higher costs during the initial and middle stages of litigation, primarily in the form of lawyer fees and reputation-related expenses. If new claimants achieve favourable outcomes, additional costs may arise in subsequent stages, including pay-outs or fines and further reputation-related expenses. The greater the number of precedents against a financial institution, the stronger the incentive for new claimants to pursue claims, intensifying the feedback effect.[75]

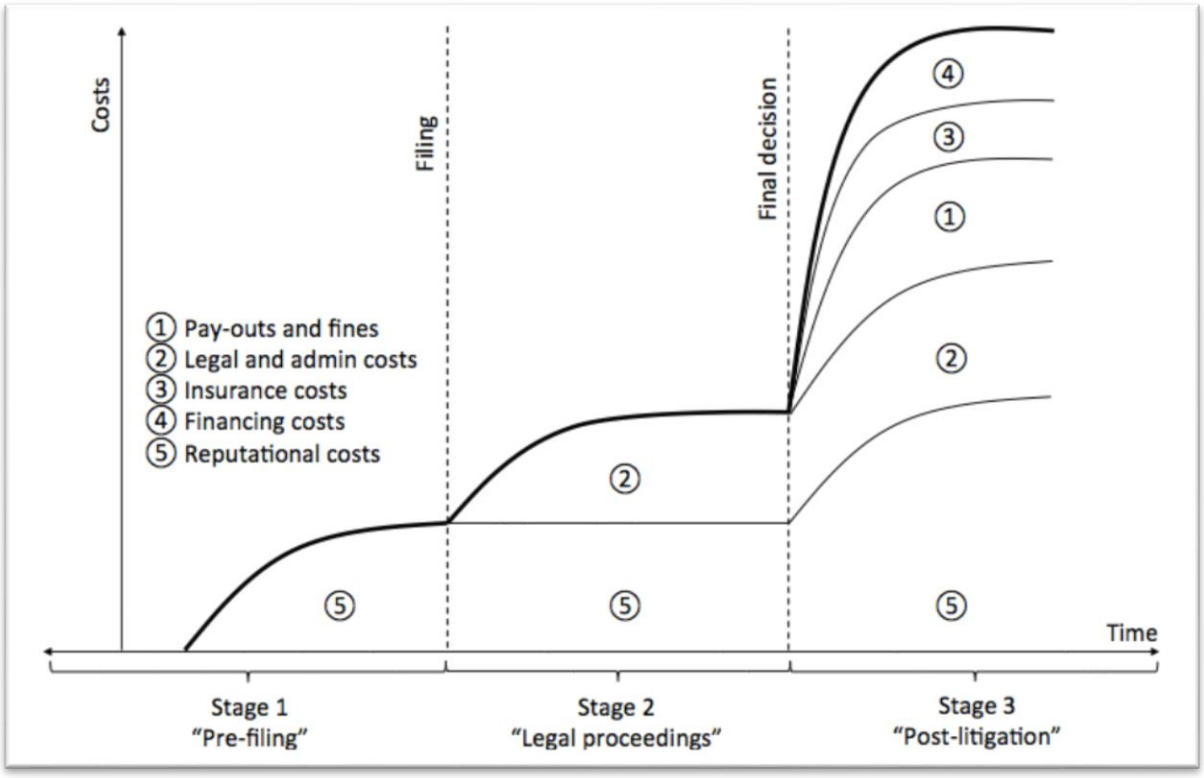
[72] ibid.

[73] Hutton and Smith reveal that media coverage exacerbates the decrease in a company's market value around the time when the lawsuit is officially submitted. See Hutton and Smith (2017), p. 336.

[74] Bauer and Braun (2010).

[75] Hutton and Smith (2017), p. 445.

Figure 12: Direct costs during each stage of the litigation process



Source: Solana (2020b), p. 358.

Indirect costs

Financial institutions encounter not only direct claims but also the ramifications of claims filed against third parties. For financiers, comprehending the potential expenses faced by their client debtors in litigation, particularly in climate change-related cases, is of paramount importance.[76] This necessitates an assessment of the client's exposure to litigation risk and the associated costs, often requiring expert evaluations. Should the client's expenses stemming from climate-related litigation endanger their financial stability, the financier may face counterparty credit risk. Consequently, effective management and monitoring of these potential financial implications assume great significance.

[76] Euro area banks may soon be "expected to conduct a proper climate-related and environmental due diligence, both at the inception of a client relationship and on an ongoing basis", which "may take into consideration the quality of the clients' own management of climate-related and environmental risks". See European Central Bank (2020a), pp. 73 ff.

Furthermore, an unfavourable decision against an oil company, for instance, not only impacts its own reputation but also reverberates to its financiers. The public's perception of the financier's activities being linked to those of its clients can result in reputational harm.[77] Creditors and investors may respond by withdrawing deposits, divesting from investment funds, or selling securities issued by the financial institution. Such reactions inevitably influence the firm's financing costs.

Negative decisions targeting financial institutions can also serve as "wake-up calls"[78] for investors and banks[79] to re-evaluate the litigation risk confronting similar firms. This sets off a feedback effect, whereby successful precedents heighten the likelihood of similar claims being pursued against other institutions providing analogous services. Discerning whether investor reactions stem from anticipated reputational costs or the expectation of direct expenditures, such as pay-outs, fines, and legal fees, poses a considerable challenge.[80]

Insurance companies that offer liability coverage to firms in analogous circumstances as the defendant also confront repercussions resulting from detrimental decisions. Such decisions may compel insurance companies to reassess the likelihood of comparable claims arising. In response to heightened perceived litigation risk, insurance companies may modify policy terms by excluding specific claims, reducing coverage limits, or increasing premia as previously explained.

Comprehending the timing and occurrence of indirect costs presents inherent complexity. Investors' reactions to negative shocks, including adverse decisions, exhibit considerable variation. The annals of financial crises exemplify scenarios where negative shocks had limited market impact alongside instances where they generated substantial repercussions. Investor responses often hinge on the accumulation of negative shocks, yet predicting the threshold at which widespread market reactions ensue remains elusive.

[77] Mooney and Nauman (2020).

[78] The notion of a "wake-up call" effect was initially introduced by Goldstein as a potential explanation for the financial contagion that occurred from Thailand to other Asian nations during the late 1990s Asian crisis. See Goldstein (1998).

[79] Yuan and Zhang (2015), p. 1315.

[80] Karpoff (2012), p. 364.

1.3.4.2 The challenges posed by liability risks

The ECB, as a banking supervisor, faces both direct[81] and indirect costs associated with climate-related litigation, where the latter can arise in light of the risk of climate-related litigation faced by various third parties (e.g. issuers of assets purchased or held as collateral by the ECB, or counterparties in monetary policy operations).

However, climate-related litigation is a multifaceted phenomenon influenced by several factors that determine whether a lawsuit will be filed before a court or an arbitral tribunal, or whether a supervisory authority will initiate an investigation. Moreover, the outcome of such proceedings is not pre-determined, as the legal rules and standards applied by these entities evolve alongside social and political sentiments. In the specific context of climate change, these rules also develop in response to advancing scientific knowledge.[82]

Therefore, the current relatively low incidence of climate-related litigation targeting financial institutions should not be seen as an assurance against the possibility of a sudden surge in such cases, particularly as the adverse impacts of climate change continue to intensify. The empirical evidence highlighting substantial costs incurred by financial institutions due to non-climate-related litigation serves as a clear indication of the potential risks associated with climate-related litigation.[83] However, the limited number of legal precedents in this specific area presents a formidable challenge for financial supervisors like the ECB. Relying on retrospective analysis of past precedents proves unreliable in assessing the future risk of climate-related litigation, thereby impeding the ECB's comprehensive understanding of the potential costs entailed by such litigation for the institutions under its purview.[84]

[81] For a selection of interesting cases, see Network for Greening the Financial System (2021a), Annex I. for a more comprehensive overview, see the Climate Change Laws of the World database (available at https://climate-laws.org/) or the Climate Litigation Database (available at https://climatecasechart.com/) (accessed 23 June 2023).
[82] Marjanac and Patton (2018).
[83] ibid.
[84] The Bank for International Settlements has recently acknowledged the significance of evaluating the risks and expenses linked to climate change litigation within the insurance sector. However, it

In this regard, employing forward-looking methodologies would be more appropriate for comprehending this intricate landscape.[85] Nonetheless, even such an approach would confront the additional hurdle of assessing the likelihood of a claim being lodged or an investigation being launched. The factors governing the decision of a claimant to pursue legal action or a supervisory body to initiate an inquiry are multifaceted and, often, highly subjective in nature.[86]

Compounding the issue, the paucity of requisite data necessary for quantifying the direct and indirect expenses associated with climate-related litigation presents several obstacles for the ECB in accurately calculating the specific costs entailed in mounting legal defences against climate change cases or any potential settlements reached outside of court.

Therefore, it becomes evident that climate-related litigation, as a financial risk, entails numerous implications for the ECB itself. This direct and indirect exposure creates a compelling incentive for the ECB to enhance its comprehension of this form of litigation as a source of financial risk.

1.4 Conclusive remarks

As we navigate the turbulent waters of the 21st century, one paramount challenge looms large on the horizon: climate change. This Chapter has provided a comprehensive exploration of the latest trends in climate change and has delved into the intricate net of climate-related risks that pose significant challenges to financial stability, particularly within the Euro area.

The first part of this Chapter has shed light on the latest trends regarding climate change. It has unequivocally demonstrated that human activities are the driving force behind global warming, with GHG emissions precipitating unprecedented

also cautioned about the challenges of precisely gauging litigation costs when there are no established legal precedents. See Cleary et al. (2019).

[85] For instance, see Bank of England (2019). The Network for Greening the Financial System has recently released a series of physical and transition pathways aimed at calibrating various scenario variables. These pathways are designed to provide data for conducting assessments that will evaluate the influence of climate-related financial risks on financial institutions. See Network for Greening the Financial System (2020b).

[86] Solana (2020a), p. 133.

increases in global surface temperatures. These climatic shifts, in turn, have led to a surge in natural disasters, economic damages, and disparities, impacting societies and economies worldwide. It is increasingly evident that climate change is not just an environmental concern but a multidimensional challenge that extends its tendrils into the realms of economics, finance, and policy.

The second part has offered insights into the transmission channels of climate physical risk to the financial sector, emphasising the vulnerabilities and exposures of Euro area financial institutions to transition risks. It has underscored the notion that climate risks, once considered emerging trends, now represent a *bona fide* financial risk. The potential repercussions of these risks on the stability of financial markets and institutions cannot be understated.

Amidst this backdrop, the ECB emerges as a pivotal institution capable of addressing climate change risks within the Euro area. As one of the continent's financial powerhouses, the ECB holds the mandate and the resources to spearhead efforts to integrate climate change considerations into monetary policy and prudential supervision. It is uniquely positioned to harmonise financial stability and sustainability, forging a path that acknowledges the inherent interdependence between environmental well-being and economic prosperity.

The upcoming Chapter will delve deeper into the mandate of the ECB. Specifically, it will elucidate how this institution can incorporate environmental considerations into its monetary policy and prudential supervision functions.

Chapter 2: Climate Change and the ECB's mandate

2.1 Introductory remarks

The role of central banks in the global effort to address climate change has come forcefully to the forefront, and in this sense the ECB is no exception. The appropriateness of central bank involvement in addressing climate change is not only debated among economists,[87] as much of this discussion is conducted also in legal terms. In fact, the question what central banks can do with regard to the environment is often a debate based on their mandate.[88] Certain commentators see the mandate of the ECB as broad enough to cover almost any monetary policy action necessary to further environmental objectives. Others read the ECB's mandate in narrow terms, claiming that environmental considerations have nothing to do with an independent central bank focusing on price stability.[89]

The aim of the present Chapter is precisely to contribute to this debate, focusing specifically on the two most significant aspects of the ECB's mandate: monetary policy (Part 1) and prudential supervision (Part 2).

2.2 ECB's environmental considerations in monetary policy

Central banks across the globe are currently meticulously evaluating diverse courses of action to address the intricacies posed by the phenomenon of climate change. These contemplative measures encompass the prospect of amending collateral regulations to mandate a heightened level of disclosure concerning environmental risks for collateral eligibility. Additionally, another approach involves 'tilting' corporate bonds purchases towards sectors in the economy exhibiting lesser carbon-intensive attributes, or favouring companies that

[87] See, for instance, Dietz (2022), pp. 413 ff.
[88] Dikau and Volz (2021).
[89] See, *inter alia*, Solana (2019); Fischer (2019); Smits (2021); van Tilburg and Simic´ (2021).

demonstrate superior environmental performance relative to their counterparts within the same sector.[90]

The scope of authority vested in the ECB must find its legal basis within the confines of competences stipulated in the Treaty on the Functioning of the European Union (TFEU), adhering strictly to the principles of conferral[91] and institutional balance.[92] Consequently, this necessitates that any interpretation of the ECB's mandate refrain from effectuating a situation wherein the ECB is burdened with responsibilities that the Treaties have not explicitly transferred to the Union or assigned to other EU institutions, particularly the Union legislature.

2.2.1 Climate change and the ECB primary mandate

In contrast to its counterparts, the ECB is singularly dedicated to the core objective of maintaining price stability. The paramountcy of this pursuit signifies (i) that it holds precedence as the primary focus of the ECB, and (ii) in the event of conflicting objectives, price stability takes precedence. Indeed, in the very first press release on monetary policy strategy, the ECB clearly mentioned that "[a]s mandated by the Treaty establishing the European Community, the maintenance of price stability will be the primary objective of the ESCB. Therefore, the ESCB's monetary policy strategy will focus strictly on this objective".[93] The importance of price stability has also been underlined by the Court of Justice in *Gauweiler*:

> *[t]he Protocol on the ESCB and the ECB is thus characterised by a clear mandate, which is directed primarily at the objective of ensuring price stability. The tightly drawn nature of that mandate is further reinforced by*

[90] See, for instance, the ECB's announcement in July 2021 on the reassessment of its rules on climate-performance of bond issuers, available at https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708_1~f104919225.en.html (accessed 18 July 2023).

[91] Art. 5(2) TEU states as follows: "Under the principle of conferral, the Union shall act only within the limits of the competences conferred upon it by the Member States in the Treaties to attain the objectives set out therein. Competences not conferred upon the Union in the Treaties remain with the Member States".

[92] Art. 13(2) TEU states as follows: "Each institution shall act within the limits of the powers conferred on it in the Treaties, and in conformity with the procedures, conditions and objectives set out in them. The institutions shall practice mutual sincere cooperation".

[93] European Central Bank (1998).

the procedures for amending certain parts of the Statute of the ESCB and of the ECB.[94]

Regarding any potential grounds for environment-related actions by the ECB, a starting point can be found in the initial clause of Article 127(1) of the TFEU.[95] At first glance, the environment appears to have little bearing on the maintenance of price stability. However, as ruled by the CJEU, while pursuing its primary objective, the ECB is also entitled to consider prerequisites necessary for fulfilling this objective. For instance, the ECB may strive to safeguard the proper functioning and reliability of the transmission mechanism, which is essential for conveying monetary policy signals and ensuring the singleness of the monetary policy. According to the Court's interpretation, measures aimed at preserving the transmission mechanism may be deemed relevant to the primary objective outlined in Article 127(1) TFEU and thus fall within the ECB's mandate.[96]

Interviewed by the Financial Times on 8 July 2020, President Lagarde talked about climate change as an aspect to be included in policy setting, specifying that "as we have this price stability mandate that I described for you early on, climate change actually has an impact on price stability".[97] Few days later, ECB Executive Board member Isabel Schnabel delivered a remarkable speech mentioning the "material risks to price stability in the medium to long term". Stressing the necessity to incorporate environmental considerations within the ECB's primary mandate,

[94] Case C-62/14, *Gauweiler*, ECLI:EU:C:2015:400, para. 44.

[95] Art. 127(1) TFEU states as follows: "The primary objective of the European System of Central Banks (hereinafter referred to as 'the ESCB') shall be to maintain price stability. Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union. The ESCB shall act in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources, and in compliance with the principles set out in Article 119".

[96] Case C-62/14, *Gauweiler*, ECLI:EU:C:2015:400, paras. 49–50.

[97] Khalaf, R. (2020). President Lagarde further clarified that "[…] even without changing our mandate, climate change has an impact. I'll tell you, it has an impact on how we model the economy going forward, how we forecast, how we measure risk, how we stress test institutions, how we value the collaterals that we receive, how we link and join forces with other national central banks to explore together what policies can actually have a decisive impact on fighting climate change. This clearly will be part of our strategy but I wouldn't want you to think that we're suddenly discovering it".

Schnabel outlined two potential ways in which climate change could undermine the efficacy of monetary policy:

> *[…] large and persistent shocks to output and inflation [due to delayed response to climate change and the limitations on central banks' ability to tackle the climate disruptions caused by] rising temperatures and an increased frequency of natural disasters may further suppress potential output growth and hence the real equilibrium interest rate around which central banks have to calibrate their policies. […] [T]his argument is not about weighing secondary objectives, which may provide additional justifications for monetary policy taking into account climate change. It is about protecting the primary objective*.[98]

Hence, to the extent that actions related to climate change may pertain to the primary objective,[99] for instance, if the economic and financial risks arising from climate change need to be considered in the economic analysis underlying monetary policy decisions, the ECB would be obliged to take such actions into account under Article 127(1) TFEU. Analogously to the CJEU's reasoning on the transmission mechanism, one could argue that measures considering other aspects that inherently impact the ECB's ability to ensure price stability might be justified as falling within its mandate, provided they are instrumental to the primary objective stated in Article 127(1) TFEU.

The analysis conducted by the ECB in the context of the 2021 strategy review accentuated that

> *[c]limate change has profound implications for price stability through its impact on the structure and cyclical dynamics of the economy and the financial system. […] Within its mandate, the Governing Council is committed to ensuring that the Eurosystem fully takes into account, in line with the EU's climate goals and objectives, the implications of climate change and the carbon transition for monetary policy and central banking.*

[98] Schnabel (2020a). The impact of climate change into the economy has been a recurring theme in the majority of subsequent speeches; for instance, see – at the time of writing – the most recent speech delivered by Schnabel in 2023 (Schnabel (2023)).
[99] Schnabel (2020a).

> *Accordingly, the Governing Council […] will adapt the design of its monetary policy operational framework in relation to disclosures, risk assessment, corporate sector asset purchases and the collateral framework.*[100]

For such measures to fall within the ambit of Article 127(1) TFEU, their ultimate objective must be the preservation of price stability. Under this condition, monetary policy measures that incorporate climate change considerations should not be regarded as tantamount to environmental policy measures, even if they indirectly impact the realm of environmental policy. In such instances, the ECB would not be directly pursuing environmental objectives but rather its primary objective of maintaining price stability. Hence, the effect of the ECB's measures on climate change would qualify as an "indirect effect" falling within its mandate to ensure price stability.[101]

2.2.2 Climate change and the ECB "secondary mandate"

The second sentence of Article 127(1) TFEU establishes a mandate for the ECB to "support the *general economic policies in the Union* with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union (emphasis added)".[102] This secondary objective complements the ECB's primary mission of safeguarding price stability.[103] However, it is crucial to differentiate between the primary objective and the scope of the ECB's action concerning the secondary objective. While the first sentence of Article 127(1) TFEU grants the ECB the exclusive role of policymaker in

[100] European Central Bank (2021b).

[101] As per the Court of Justice's ruling, the fact that ECB measures, designed to ensure price stability, could have "indirect effects" that may also align with objectives in other policy areas, such as economic or environmental policies, does not alter the fundamental nature of the measure. In other words, it remains categorised as a monetary policy measure rather than being classified as an economic policy measure, despite these secondary impacts. See Case C-62/14, *Gauweiler*, ECLI:EU:C:2015:400, paras. 51, 52 and 57–59.

[102] Art. 127(1) TFEU, Art. 119(2) TFEU, Art. 282(2) TFEU and Art. 2 of Protocol (No 4) on the statute of the European System of Central Banks and of the European Central Bank (OJ C 326, 26.10.2012, p. 230) (the 'ESCB/ECB Statute').

[103] Smits (2021), pp. 19–20.

matters of price stability, the second sentence confers a "supportive" role for the ECB in relation to "general economic policies".[104]

This clearly implies that there is no such requirement to support "the economic policies of the Union", mostly because such policies do not exist. When the Economic and Monetary Union (EMU) was established, monetary policy was centralised, but economic policy remained primarily within the hands of individual Member States. This is evident in Articles 2(3) TFEU,[105] which grant the Union coordinating authority over Member States' economic policies. Aside from specific prohibitions such as monetary financing of the public sector, [106] preferential access of the public sector to the financial sector,[107] the so-called 'no bail-out clause'[108] as well as some broadly worded obligations,[109] the economic union provisions mainly focus on coordination. While these provisions have been supplemented by the Stability and Growth Pact[110] and further detailed in economic governance rules,[111] the fundamental approach remains centred on the competence of Member States in the realm of economic policy.

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[104] It is worth mentioning that the second sentence of Art. 127(1) of the TFEU does not confer upon the ECB the authority to independently create policies related to "general economic policies", and its interpretation should not establish the ECB as the primary entity responsible for these policies.

[105] Art. 2(3) TFEU states as follows: "The Member States shall coordinate their economic and employment policies within arrangements as determined by this Treaty, which the Union shall have competence to provide".

[106] Art. 123 TFEU.

[107] Art. 124 TFEU.

[108] Art. 125 TFEU.

[109] See, for instance, the first sentence of Art. 120(1) TFEU.

[110] Resolution of the European Council on the Stability and Growth Pact Amsterdam (OJ C 326, 02.08.1997, p. 1); Council Regulation (EC) 1466/97 of 7 July 1997 on the strengthening of the surveillance of budgetary positions and the surveillance and coordination of economic policies (OJ L 209, 2.8.1997, p. 1) (the 'preventive arm'); Council Regulation (EC) No 1467/97 of 7 July 1997 on speeding up and clarifying the implementation of the excessive deficit procedure (OJ L 209, 2.8.1997, p. 6) (the 'dissuasive arm').

[111] The 2011 'six pack' is composed of: Regulation (EU) No 1173/2011 of the European Parliament and of the Council of 16 November 2011 on the effective enforcement of budgetary surveillance in the euro area (OJ L 306, 23.11.2011, p. 1); Regulation (EU) No 1174/2011 of the European Parliament and of the Council of 16 November 2011 on enforcement measures to correct excessive macroeconomic imbalances in the euro area (OJ L 306, 23.11.2011, p. 8); Regulation (EU) No 1175/2011 of the European Parliament and of the Council of 16 November 2011 amending Council Regulation (EC) No 1466/97 on the strengthening of the surveillance of budgetary positions and the surveillance and coordination of economic policies (OJ L 306, 23.11.2011, p. 12); Regulation (EU) No 1176/2011 of the European Parliament and of the Council of 16 November 2011 on the prevention and correction of macroeconomic imbalances (OJ L 306, 23.11.2011, p. 25); Council Regulation (EU) No 1177/2011 of 8 November 2011 amending Regulation (EC) No 1467/97 on

This constrained scope of the ECB's competence regarding the secondary objective is fortified when the second sentence of Article 127(1) TFEU is analysed in light of the fundamental principles of EU constitutional law. The principle of institutional balance dictates that the ECB exercises its powers while duly considering the powers of other institutions.[112] Hence, the ECB's responsibilities should not overlap with those allocated to other Union institutions. Indeed, the domain of the compliance with the allocation of responsibilities delineated in the Treaties concerning environmental matters falls within the competence of the Council, the European Parliament, and the Member States as outlined in Articles 4(2)(e) and 191-193 TFEU. At the Union level, Article 192 TFEU designates the legislature, namely the European Parliament and the Council, as competent to determine the actions necessary to achieve the objectives of preserving, protecting, and improving the quality of the environment and to address environmental challenges, including combatting climate change. Unlike price stability, which is intentionally removed from direct political control and entrusted to independent central banks, "general economic policies" fall within the domain of political institutions, including the legislatures and governments of Member States, and the EU institutions, namely the Council and the European Parliament.

A broad interpretation of "general economic policies" in the Union suggests that it encompasses all EU and Member State policies with a general economic dimension, including economic, environmental, and social objectives.[113] Article

speeding up and clarifying the implementation of the excessive deficit procedure (OJ L 306, 23.11.2011, p. 33); Council Directive 2011/85/EU of 8 November 2011 on requirements for budgetary frameworks of the Member States (OJ L 306, 23.11.2011, p. 41).
The 2013 'two pack' is composed of: Regulation (EU) No 472/2013 of the European Parliament and of the Council of 21 May 2013 on the strengthening of economic and budgetary surveillance of Member States in the euro area experiencing or threatened with serious difficulties with respect to their financial stability (OJ L 140, 27.5.2013, p. 1); Regulation (EU) No 473/2013 of the European Parliament and of the Council of 21 May 2013 on common provisions for monitoring and assessing draft budgetary plans and ensuring the correction of excessive deficit of the Member States in the euro area (OJ L 140, 27.5.2013, p. 11).

[112] See, for instance, Case C-73/14, *Council v Commission*, ECLI:EU:C:2015:663, para. 61; Case C-425/13, *Commission v Council*, ECLI:EU:C:2015:483, para. 69.

[113] They encompass a broader scope than "fiscal policies", which pertain to taxation and government spending, typically managed through budgetary means. Furthermore, these economic policies also include regulatory measures, especially those related to the internal market. As a result, specific policy areas falling under the category of "general economic policies" may be subject to more specific competencies outlined in sections outside of Chapter I of Title VIII of the TFEU (Economic policy; Economic and monetary policy), such as Title I (Internal market) or Title

120 TFEU explicitly supports this view, as they require Member States to conduct their economic policies "with a view to contributing to the achievement of the objectives of the Union", including those related to sustainable development based on economic, social, and environmental considerations.[114]

However, a preliminary question arises: what exactly shall the ECB "support"? This aspect pertains to clarifying the object of the secondary objective. Herein lies a crucial juncture that highlights the significance of Article 3(3) of the Treaty on European Union (TEU) for the ECB. Article 3(3) TEU outlines, among other aspects, that the Union shall strive for "the sustainable development of Europe based on balanced economic growth and price stability, *a highly competitive social market economy,* aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment (emphasis added)". However, although – as a Union institution – the ECB is bound by the overarching objectives set forth in Article 3 TEU, it does not possess the competence to proactively pursue the multitude of objectives contained therein. The Union's objectives can only be pursued by appropriate means commensurate with the competences bestowed upon the Union in the Treaties.

Furthermore, the wording of the second sentence of Article 127(1) TFEU does not explicitly require the ECB to directly support the Union's objectives as laid down in Article 3 TEU. Instead, the ECB's does so indirectly by endorsing the policies through which competent institutions have formulated these objectives. This constitutes a pivotal point. It implies that neither Article 3(3) TEU nor Article 127(1) TFEU impose an obligation upon the ECB to proactively pursue environmental objectives or establish environmental policies. The ECB's role is to contribute to the attainment of environmental objectives by endorsing the relevant economic policies within the Union. Therefore, the secondary objective under the second sentence of Article 127(1) TFEU is singular in nature: to support the general economic policies in the Union. The indirect nature of the ECB's contribution to the Union's objectives signifies that the specific implementation

IX (Employment). This approach allows "economic policies" to cover regulatory measures closely linked to establishing the internal market and may be based on shared competencies in economic and other policy fields.

[114] In addition to the Treaty provision, see European Commission Recommendation for a Council recommendation on the economic policy of the euro area, COM(2020) 746 final.

and realisation of these objectives lie within the purview of the competent authorities responsible for shaping the general economic policies within the Union.

A subsequent critical issue to address is the extent to which environment-related policies can be deemed "general economic policies" for the purposes of Article 127(1) TFEU. When Article 127(1) TFEU references "general economic policies in the Union", it encompasses all Union and Member State policies with a general economic dimension. This interpretation finds support in various arguments. Firstly, the ordinary meaning of the term "general" denotes policies with wide-ranging applicability. Secondly, the Treaties do not maintain a strict dichotomy between economic and environmental policies. Lastly, the notion that "general economic policies" encompass policies with both economic and environmental objectives is explicitly reinforced by Articles 120 and 121(2) TFEU.[115] These provisions indicate that the reference to "general economic policies" covers policies with environmental and social dimensions, in addition to economic aspects, aiming for sustainable development.

A final yet crucial aspect of interpreting the second sentence of Article 127(1) TFEU concerns the relationship between the primary and secondary objectives. According to this provision, the ECB shall pursue its secondary objective "[w]ithout prejudice to the objective of price stability". In situations where supporting the Union's policies for achieving environmental objectives clashes with price stability, the Treaties require that priority be given to the latter. The hierarchy of objectives does not permit an equal weighing of contributions to the primary and secondary objectives. In practice, this implies that if, among several policy options equally contributing to price stability, one option more effectively supports the general economic policies in the Union, the ECB must favour the latter, provided all other relevant factors remain equal.

[115] Zilioli and Ioannidis (2022), p. 373.

2.2.3 The integration of environmental protection requirements into the definition and implementation of monetary policy under Article 11 TFEU

Article 11 TFEU holds a prominent position among the horizontal clauses within the TFEU, aiming to ensure the coherence of EU actions across various policy domains. The development of this article reflects the Treaty makers' intention to extend environmental considerations to areas of EU competence beyond the dedicated Treaty Title devoted to the environment.[116]

According to Article 11 TFEU, environmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, with a specific focus on promoting sustainable development. According to the jurisprudence of the Court of Justice, the protection of the environment is deemed "one of the essential objectives" of the Union,[117] while for Advocate General Jacobs Article 11 "is not merely programmatic; it imposes legal obligations".[118] The Court of Justice has consistently affirmed the obligatory nature of Article 11 TFEU on multiple occasions, considering it to reflect "the principle whereby all [Union] measures must satisfy the requirements of environmental protection".[119] The Court's rulings have underscored the relevance of Article 11 TFEU across various areas of Union policy, indicating that environmental protection requirements are, in principle, to be integrated into the Union's monetary policy as well.[120]

The expression "environmental protection requirements" is not explicitly defined in the Treaty, but it is commonly understood to encompass the environmental policy objectives outlined in Article 191(1) TFEU, and potentially also those in Article 191(2) and (3) TFEU.[121] Article 191 TFEU lays out the objectives, aims, and principles guiding Union policy on environmental protection, along with the considerations that the Union should take into account when formulating its

[116] Nowag (2017), pp. 15 ff.
[117] Case C-176/03, *Commission v Council*, ECLI:EU:C:2005:542, para. 41.
[118] Opinion of Advocate General Jacobs in Case C-379/98, *PreussenElektra v Schhleswag*, ECLI:EU:C:2000:585, para. 231.
[119] This was already affirmed by the Court of Justice in 1993; see Case C-405/92, *Établissements Armand Mondiet and Armement Islais*, ECLI:EU:C:1993:906, para. 27.
[120] See, for instance, Case C-62/88, *Greece v Council*, ECLI:EU:C:1990:153, para. 20 (common commercial policy).
[121] Jans (2011), p. 1542.

environmental policy. Additionally, environmental protection requirements may be inferred from the detailed specifications of these objectives through policies and activities devised and implemented by the competent Union institutions. Measures aimed at addressing or mitigating the impact of climate change align with the environmental policy objectives of Article 191(1) TFEU and can thus be construed as "environmental protection requirements" for the purposes of Article 11 TFEU.

What is however rather clear from the Court's statements is that Article 11 TFEU permits Union institutions to consider environmental factors when operating within other Union policies.[122] However, measures predominantly geared towards environmental protection must be based on Title XX TFEU (Environment).[123] For the ECB, Article 11 TFEU may be invoked to support the environmental dimension of measures falling under the ECB's competence as defined in Article 127(1) TFEU. Nonetheless, Article 11 TFEU does not confer autonomous competence upon the ECB to enact environmental measures, whose responsibility lies – as explained above – with the Union's legislature.

2.2.4 The consistency clause connected to climate change

Finally, one could reasonably assert that Article 7 TFEU, which mandates the EU to "ensure consistency between its policies and activities", provides a compelling rationale for the ECB to align its policies and actions with those of the broader EU context. This alignment is particularly pertinent given the endorsement of the Green Deal and the commitment to achieving a carbon-neutral economy by

[122] See, for instance, Case C-440/05, *Commission v Council*, ECLI:EU:C:2007:625, para. 60 (Common Transport Policy).
[123] Case C-281/01, *Council v Commission*, ECLI:EU:C:2002:761, paras. 34 ff.

2050[124] by the Commission,[125] the European Parliament,[126] and the European Council.[127]

Box 1: Treaties' provisions on the ECB's mandate regarding climate change (emphasis added)

Article 127(1) TFEU

The primary objective of the European System of Central Banks (hereinafter referred to as "the ESCB") shall be to maintain price stability. Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union *with a view to contributing to the achievement of the objectives of the Union* as laid down in Article 3 of the Treaty on European Union. The ESCB shall act in accordance with the principle of an open market economy

[124] Fischer (2019), p. 173.

[125] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on The European Green Deal (COM(2019) 640 final, 11.12.2019).

[126] European Parliament Resolution of 10 February 2021 on the European Central Bank on annual report 2020 (2020/2123(INI)), paras. 19-23 (the European parliament "notes […] the impact of climate change on inflation dynamics and transmission risks in monetary policy", "recalls that the ECB […] is bound by the Paris Agreement", "calls on the ECB to align its collateral framework with climate change-related risks and to disclose its level of alignment with the Paris Agreement, as well as examining such alignment in the banking sector", "calls for a proactive and qualitative risk management approach which integrates climate change-related systemic risks", [and] encourages efforts to increase research capabilities regarding the impact of climate change on financial stability and the euro area").

[127] European Council Conclusions of 20 June 2019 (EUCO 9/19) ("[t]he EU can and must lead the way, by engaging in an in-depth transformation of its own economy and society to achieve climate neutrality. This will have to be conducted in a way that takes account of national circumstances and is socially just. The climate transition will afford us a real opportunity to modernise and at the same time to become a global leader in a green economy. Our policies should be consistent with the Paris Agreement." […] "The EU and its Member States remain committed to scaling up the mobilisation of international climate finance from a wide variety of private and public sources."); European Council Conclusions of 12 December 2019 (EUCO 29/19) ("the European Council endorses the objective of achieving a climate-neutral EU by 2050, in line with the objectives of the Paris Agreement Agreement"); European Council Conclusions of 10-11 December 2020 (EUCO 22/20) ("[t]o meet the objective of a climate-neutral EU by 2050 in line with the objectives of the Paris Agreement, the EU needs to increase its ambition for the coming decade and update its climate and energy policy framework. To that end, the European Council endorses a binding EU target of a net domestic reduction of at least 55% in greenhouse gas emissions by 2030 compared to 1990. It calls on the co-legislators to reflect this new target in the European Climate Law proposal and to adopt the latter swiftly").

with free competition, favouring an efficient allocation of resources, and in compliance with the principles set out in Article 119.

Article 11 TFEU

Environmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, in particular with a view to promoting sustainable development.

Article 3 TEU

1. The Union's aim is to promote peace, its values and *the well-being of its peoples*.

2. […]

3. The Union shall establish an internal market. It shall work for *the sustainable development of Europe* based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and *a high level of protection and improvement of the quality of the environment*. It shall promote scientific and technological advance.

It shall combat social exclusion and discrimination, and shall promote social justice and protection, equality between women and men, *solidarity between generations and protection of the rights of the child*.

[…]

4. […]

5. In its relations with the wider world, the Union shall uphold and promote its values and interests and contribute to *the protection of its citizens*. It shall contribute to peace, security, *the sustainable development of the Earth*, solidarity and mutual respect among peoples, free and fair trade, eradication of poverty and *the protection of human rights*, in particular the rights of the child, as well as to *the strict observance and the development of international law*, including respect for the principles of the United Nations Charter.

6. […]

Article 7 TFEU

The Union shall *ensure consistency between its policies and activities*, taking all of its objectives into account and in accordance with the principle of conferral of powers.

2.2.5 Final remarks

Although the Treaties could not have anticipated all the challenges faced by a complex entity like the EU, especially in rapidly evolving times,[128] upon closer examination, it becomes evident that the EU's normative framework does delineate the scope within which decision-makers must operate. In the case of the ECB, this framework also defines the limits of its responsibility regarding climate change.

The primary objective assigned to the ECB is the preservation of price stability. However, the Treaties allow (i) the ECB's monetary policy to consider environmental factors while pursuing this objective, and (ii) to support the general economic policies in the Union to achieve the overall objectives of the Union, which encompass a high level of protection and enhancement of the environment.

It is crucial to recognise that there are definitive constraints on the actions of the ECB. Its role can only be contributory, as the ECB is not authorised to formulate environmental policies. Moreover, the ECB must not compromise the priority of maintaining price stability. Determining what qualifies as "green" or environmentally sustainable falls under the purview of the two branches of the EU legislature, guided by environmental experts.

2.3 ECB's environmental considerations in prudential supervision

As discussed in the preceding Chapter, climate-related physical and transition risks have direct implications on financial stability. In particular, physical risks give rise to credit risk, entailing potential losses and defaults for banks, as well as

[128] Lagarde (2021).

underwriting and liquidity risks for insurers who may face challenges in meeting short-term debt obligations due to the risks they insure.[129] Conversely, transition risks primarily entail market and liquidity risks. Notably, the market valuation of fossil fuel producers has experienced a decline in recent years, signifying emerging market risks. Additionally, the oil flash crash during the Covid-19 pandemic in April 2020[130] further underscores the potential market risks posed by climate change. Confronting climate change demands supervisory action, and regulatory authorities increasingly recognise the financial risks arising from climate-related factors.[131]

Following the acknowledgment of climate risks as a source of financial risks in the first report of the NGFS, the EU legislature mandated the European Supervisory Authorities (ESAs) to incorporate environmental risks in their assessment of systemic risk.[132] This incorporation process has been relatively smooth, considering that EU law on prudential supervision is formulated in a broad manner, encompassing all risks identified as material by supervisory authorities. As climate risks manifest in potential credit risk, market risk, liquidity risk, operational risk, and liquidity risk, they fall within the ambit of EU prudential regulation. Indeed, within the framework of the Supervisory Review and Evaluation Process (SREP), supervisory authorities possess the discretion to review and assess the risks to which banks are exposed, allowing them to adjust requirements accordingly.[133] Article 97 of the Capital Requirements Directive IV, based on the second pillar of the Basel Accords, specifically mandates supervisory authorities to conduct such reviews and evaluations and, if necessary, enhance requirements when banks face

[129] Jenkins (2019).
[130] Ambrose (2020).
[131] For further information on the translation of climate-related risks into financial risks, see ESRB (2020).
[132] Regulation (EU) 2015/847 of the European Parliament and of the Council of 20 May 2015 on information accompanying transfers of funds and repealing Regulation (EC) No 1781/2006 (OJ L 141, 5.6.2015, p. 1) ('ESAs Review Regulation'), Arts. 1(19), 2(20) and 3(20).
[133] Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC (OJ L 176, 27.6.2013, p. 338) ('CRD IV'), Arts. 97–104.

climate-related or environmental risks.[134] The SREP may also be utilised to impose higher requirements on financial institutions exposed to climate risks.[135]

However, the obligations of supervisory authorities concerning green finance and climate change, in general, have not been extensively assessed, despite the fact that financial supervision bears principal and direct responsibility for the proper functioning of the financial system.[136] Thus, given the recent enactment of a legislative package related to green finance within the EU and the reform of the ESAs,[137] which now obliges them to consider ESG in their duties, a comprehensive analysis of this subject becomes pertinent.

The EU's perspective is especially intriguing not only due to recent legislative changes, but also considering the growing importance of Union law in financial regulation and supervision over the past decade. The establishment of the Single Rulebook, comprising a vast corpus of EU primary and secondary legislation, has extensively harmonised and expanded financial regulation at the Union level.[138] Oversight of the application of the Single Rulebook and coordination of EU financial supervision are entrusted to three ESAs, responsible for banking, insurance, and financial markets, respectively.[139] Additionally, the creation of the

[134] Kern (2014).

[135] In the context of the *Crédit Mutuel Arkéa* case, the General Court conceded the wide latitude accorded to the ECB in its evaluation of risks (Case T-52/16, *Crédit Mutuel Arkéa v ECB*, ECLI:EU:T:2017:902, paras. 177–179, 187 and 199–201). According to the General Court's ruling, the SREP can be employed to increase regulatory requirements based on the anticipation of a "potential occurrence of a future event" (para. 175). This legal precedent paves the way for supervisory authorities, including the ECB and NCAs, to duly consider climate risks as integral components of their supervisory duties.

[136] Armour et al. (2016), pp. 51–79.

[137] Regulation (EU) 2019/2175 of the European Parliament and of the Council of 18 December 2019 amending Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority), Regulation (EU) No 1094/2010 establishing a European Supervisory Authority (European Insurance and Occupational Pensions Authority), Regulation (EU) No 1095/2010 establishing a European Supervisory Authority (European Securities and Markets Authority), Regulation (EU) No 600/2014 on markets in financial instruments, Regulation (EU) 2016/1011 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds, and Regulation (EU) 2015/847 on information accompanying transfers of funds (OJ L 334, 27.12.2019, p. 1.) ('ESAs Review Regulation').

[138] See European Commission, "Banking and financial services", available at https://commission.europa.eu/strategy-and-policy/policies/banking-and-financial-services_en (accessed 18 July 2023).

[139] Regulation (EU) No 1093/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Banking Authority), amending

Single Supervisory Mechanism (SSM) has granted the ECB an "exclusive competence," as defined by the Court of Justice, over prudential banking supervision within the Euro area and direct supervisory responsibility for significant banks.[140] Consequently, determining whether Union law mandates the consideration of climate change in the conduct of financial supervision bears significant implications for the entire European System of Financial Supervision (ESFS).[141]

2.3.1 Green financial supervision between primary and secondary law mandate

2.3.1.1 Primary law

EU primary law offers valuable insights into the existing obligations of supervisory authorities concerning environmental protection, despite its predominantly silent stance on financial supervision.

Indeed, supervisory authorities are unequivocally bound by EU primary law. The ECB derives its supervisory competence from Article 127(6) TFEU and the SSM Regulation.[142] Similarly, the ESAs are EU bodies established by secondary law, rooted in Article 114 TFEU.[143] As a result, their actions are directly subordinate to the principles enshrined in primary law. This also extends to other entities within the ESFS. While National Competent Authorities (NCAs) operate under national law, governed by the principle of national institutional autonomy,[144] they are

Decision No 716/2009/EC and repealing Commission Decision 2009/78/EC (OJ L 331, 15.12.2010, p. 12) (EBA Regulation); Regulation (EU) No 1094/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Insurance and Occupational Pensions Authority), amending Decision No 716/2009/EC and repealing Commission Decision 2009/79/EC (OJ L 331, 15.12.2010, p. 48) (EIOPA Regulation); Regulation (EU) No 1095/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Securities and Markets Authority), amending Decision No 716/2009/EC and repealing Commission Decision 2009/77/EC (OJ L 331, 15.12.2010, p. 84) (ESMA Regulation) (ESA Regulations).

[140] Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions (OJ L 287, 29.10.2013, p. 63) (SSM Regulation), Art. 4(1).

[141] ESAs Regulations (n 139), Art. 2(5).

[142] SSM Regulation (n 140).

[143] ESAs Regulations (n 139), Art. 5(1).

[144] Verhoeven (2010), p. 26.

integral parts of the ESFS and are thus bound by EU law, as stipulated in Article 2 of the ESAs Regulations. Notably, NCAs responsible for banking supervision in the Euro area are also subject to the oversight responsibility of the ECB under the SSM.[145] Additionally, national competent authorities must comply with EU law when entrusted with the application of the Single Rulebook.[146]

EU primary law provides various avenues for integrating environmental considerations into financial supervision.

The EU's Treaties

Subsequent to the Court's acknowledgment of environmental protection as "one of the Community's essential objectives,"[147] this objective was subsequently enshrined in both the Preamble and Article 3(3) TEU:

> *[t]he Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance.*

Article 3(3) TEU holds significant importance for European financial supervision. As the Treaties do not encompass a general competence for regulating and supervising finance, EU law on financial regulation and supervision heavily relies on provisions related to the internal market.[148] Consequently, the legal bases for

[145] SSM Regulation (n 140), Art. 6(1).
[146] ESAs Regulations (n 139), Art. 2(5).
[147] Case 240/83, *Procureur de la République v ADBHU*, ECLI:EU:C:1985:59, para. 13.
[148] It is worth mentioning that the entirety of the directives and regulations that make up the Single Rulebook are primarily based on legal foundations stemming from internal market provisions (Directive 2014/57/EU of the European Parliament and of the Council of 16 April 2014 on criminal sanctions for market abuse (OJ L 173, 12.6.2014, p. 179). To be more specific, these legal foundations predominantly revolve around either Article 114 TFEU (e.g. Regulation (EU) No 600/2014 of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Regulation (EU) No 648/2012 (OJ L 173, 12.6.2014, p. 84), or Article 53(1) (e.g. Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU (recast) (OJ L 173, 12.6.2014, p. 349).

EU financial regulation and supervision derive primarily from internal market Treaty provisions. Nonetheless, alongside its wide-ranging applicability and comprehensive wording, Article 11 TFEU also constitutes another pertinent provision in this context. It provides that:

> *[e]nvironmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, in particular with a view to promoting sustainable development.*

Article 11 TFEU entails a duty to incorporate environmental protection requirements into the definition and implementation of the Union's policies and activities, regardless of the policy field or competence involved, rather than introducing an additional objective for the Union to pursue. This obligation applies not only to EU institutions in the formulation of Union policies,[149] but also extends to EU institutions, bodies, offices, and agencies during the execution of the Union's policies and activities.

Of particular significance are the ESAs, which pursue internal market objectives as per their establishing regulations based on Article 114 TFEU.[150] Consequently, when considering constitutional principles laid down in Article 11 TFEU in conjunction with Article 3(3) TEU, the ESAs should be compelled to integrate environmental considerations in a manner that goes beyond the narrow scope outlined in the ESAs review Regulation, to ensure their actions remain in compliance with the law.

The ECB is also bound by the same obligations when exercising supervisory functions in the SSM. Despite the SSM Regulation being based on Article 127(6) TFEU, deriving from the Union's competence in relation to the Economic and Monetary Union, this distinct legal basis does not exempt the ECB from its responsibilities concerning environmental protection. As an EU institution, the ECB is entrusted with both defining and implementing the Union's policies and activities. In the context of the SSM, the ECB is directly responsible for executing the Union's policies and activities related to banking supervision, making the principle of integration under Article 11 TFEU particularly pertinent. Moreover,

[149] With respect to the ECB, see Art. 127(2) TFEU and Art. 34 ESCB/ECB Statute (n 102).
[150] ESAs Regulations (n 139), Art. 1(5)(a).

in its supervisory role, the ECB is tasked with applying the Single Rulebook, specifically EU banking regulation: the Capital Requirements Directive (CRD IV) and Regulation (CRR),[151] with legal bases in Articles 53(1) and 114 TFEU, respectively. As such, the ECB's competences derive from the internal market competences of the Union, necessitating consideration of the internal market objectives outlined in Article 3(3) TEU. This responsibility is emphasised in the mandate of the SSM, which explicitly refers to the ECB's "*duty of care* for the unity and integrity of the internal market based on equal treatment of credit institutions (emphasis added)".[152] Within this duty, the ECB is further tasked with ensuring that environmental protection pursuits do not disrupt the internal market, especially given its responsibility for overseeing supervisory consistency in the SSM.[153]

The Charter of Fundamental Rights of the European Union

The obligation to incorporate environmental considerations is additionally strengthened by Article 37 of the EU Charter for Fundamental Rights (hereafter the Charter),[154] which obtained binding force in 2009, predating the implementation of the ESAs Regulations and the Single Rulebook. Article 37 of the Charter provides:

> *[a] high level of environmental protection and the improvement of the quality of the environment must be integrated into the policies of the Union and ensured in accordance with the principle of sustainable development*.

This provision reflects the principle of integration as stipulated in Article 11 TFEU and may be deemed to elevate it to the status of a fundamental right. The

[151] Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC (OJ L 176, 27.6.2013, p. 338) (CRD IV); Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 (OJ L 176, 27.6.2013, p. 1) (CRR).
[152] SSM Regulation (n 140), Art. 1(1).
[153] SSM Regulation (n 140), Art. 6(1).
[154] Sikora (2016).

significance of Article 37 in the context of EU financial law was recently emphasised by the European Commission during the introduction of the review of the ESAs regulations.[155]

2.3.1.2 Secondary law

The inclusion of sustainability in the mandate of the ESAs was first proposed by the High-Level Experts Group (HLEG) on sustainable finance [156] in July 2017.[157] This proposal was later incorporated into the review of the ESAs Regulations by

[155] Proposal for a Regulation of the European Parliament and of the Council, Amending Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority); Regulation (EU) No 1094/2010 establishing a European Supervisory Authority (European Insurance and Occupational Pensions Authority); Regulation (EU) No 1095/2010 establishing a European Supervisory Authority (European Securities and Markets Authority); Regulation (EU) No 345/2013 on European venture capital funds; Regulation (EU) No 346/2013 on European social entrepreneurship funds; Regulation (EU) No 600/2014 on markets in financial instruments; Regulation (EU) 2015/760 on European long-term investment funds; Regulation (EU) 2016/1011 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds; and Regulation (EU) 2017/1129 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market (COM(2017) 536 final, 20.09.2017), p. 16.

[156] For further information, see European Commission, "High-Level Expert Group on sustainable finance (HLEG)", available at https://finance.ec.europa.eu/publications/high-level-expert-group-sustainable-finance-hleg_en (accessed 18 July 2023).

[157] High-Level Expert Group on Sustainable Finance (2017), p. 59.

the European Commission.[158-159] Despite facing some controversies,[160] the amendment was adopted and expanded during the legislative process. This reform is noteworthy as it introduces general obligations for supervisory authorities to promote the sustainability of the financial system. The amendment is found in Article 8 of the ESAs Regulations, which outlines the tasks of the ESAs, as well as in Article 1, which specifies the scope of action and objectives of the ESAs.

The new provision, Article 8(1a) of the ESAs Regulations, requires the ESAs to "take account of technological innovation, innovative and *sustainable business models, and the integration of environmental, social and governance related*

[158] Proposal for a Regulation of the European Parliament and of the Council, Amending Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority); Regulation (EU) No 1094/2010 establishing a European Supervisory Authority (European Insurance and Occupational Pensions Authority); Regulation (EU) No 1095/2010 establishing a European Supervisory Authority (European Securities and Markets Authority); Regulation (EU) No 345/2013 on European venture capital funds; Regulation (EU) No 346/2013 on European social entrepreneurship funds; Regulation (EU) No 600/2014 on markets in financial instruments; Regulation (EU) 2015/760 on European long-term investment funds; Regulation (EU) 2016/1011 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds; and Regulation (EU) 2017/1129 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market (COM(2017) 536 final, 20.09.2017).

[159] It is worth mentioning that, in addition to the ESAs review, the EU has implemented prudential measures that specifically address financial institutions. These measures are designed to guide prudential regulation in the direction of promoting green finance. To clarify further, both the CRD V (Directive (EU) 2019/878 of the European Parliament and of the Council of 20 May 2019 amending Directive 2013/36/EU as regards exempted entities, financial holding companies, mixed financial holding companies, remuneration, supervisory measures and powers and capital conservation measures (OJ L 150, 7.6.2019, p. 253)) and the CRR II (Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 575/2013 as regards the leverage ratio, the net stable funding ratio, requirements for own funds and eligible liabilities, counterparty credit risk, market risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures, reporting and disclosure requirements, and Regulation (EU) No 648/2012 (OJ L 150, 7.6.2019, p. 1)) place a mandatory requirement on significant financial institutions, along with the regulations governing investment firms (Regulation (EU) 2019/2033 of the European Parliament and of the Council of 27 November 2019 on the prudential requirements of investment firms and amending Regulations (EU) No 1093/2010, (EU) No 575/2013, (EU) No 600/2014 and (EU) No 806/2014 (OJ L 314, 5.12.2019, p. 1) ('IFR'); Directive (EU) 2019/2034 of the European Parliament and of the Council of 27 November 2019 on the prudential supervision of investment firms and amending Directives 2002/87/EC, 2009/65/EC, 2011/61/EU, 2013/36/EU, 2014/59/EU and 2014/65/EU (OJ L 314, 5.12.2019, p. 64) ('IFD'). This requirement compels them to publicly share details regarding their ESG-related and climate risk exposure, as well as the steps they are taking to mitigate these risks (CRR II introducing Art. 449a to the CRR (n 151); IFR, Art. 53).

[160] Maxwell (2018).

factors" (emphasis added).[161] This amendment reflects a comprehensive understanding of sustainability, encompassing environmental, social, and governance dimensions. The amendment of Article 1(3) of the ESAs Regulations states as follows:

> *[t]he Authority shall also act in the field of activities of credit institutions, financial conglomerates, investment firms, payment institutions and e-money institutions in relation to issues not directly covered in the acts referred to in paragraph 2, including matters of corporate governance, auditing and financial reporting, provided that such actions by the Authority are necessary to ensure the effective and consistent application of those acts.*[162]

The examined amendments represent a novelty in the ESAs' mandate, as they provide a legal basis for considering environmental, social, and governance factors as part of their obligations.[163] This goes beyond a narrow climate-oriented view to embrace a comprehensive understanding of sustainability. The amendments may have significant implications for future regulatory requirements. They empower the ESAs to draft technical standards encouraging market actors to integrate sustainability considerations into their business strategies.[164] Moreover, the amendments emphasise a forward-looking approach to risks, integrating all three ESG factors, and focus on the contribution of investments and businesses to sustainability. Overall, these changes promote sustainable finance and strengthen the connection between finance, society, and the environment.

These amendments introduced in the review of the ESAs Regulations further enhance the significance of the changes made to the ESAs' mandate. Alongside the newly added obligation for the ESAs to consider ESG factors in their actions, there are additional general requirements of proportionality and better regulation that the ESAs must adhere to during their activities. This means that the ESAs' capacity to impose broad and constraining obligations concerning climate-related

[161] ESAs Review Regulation (n 132), Arts. 1(5)(c), 2(6)(b) and 3(6)(b).
[162] ibid., Arts. 1(1)(a), 2(1)(a) and 3(1)(a).
[163] Indeed, some supervisory authorities have initiated efforts toward this objective; however, they currently operate without a dedicated legal framework tailored explicitly for this goal. Instead, they depend on existing legal foundations. See Dikau and Volz (2021), pp. 9-12.
[164] ESAs Regulations (n 139), Arts. 10-16.

risks might be constrained by a principle of proportionality tailored to the "nature, scale and complexity of risks, business practices, business models and size of financial sector operators and of markets".[165] Additionally, the ESAs are now obligated to conduct public consultations and cost-benefit analyses, which may further shape their actions.[166]

However, the amendment does not radically change the ESAs' mandate. While it highlights the importance of sustainable business models and ESG factors, it lacks hierarchisation between priorities.[167] Moreover, the absence of specific objectives or benchmarks for considering sustainability and the lack of an accountability framework raise concerns about the effective integration of sustainability in the ESAs' actions.

Despite these amendments, it is essential to note that they do not reflect a "think sustainability first" principle as advocated by the HLEG.[168] Although the ESAs are required to consider sustainable business models and integrate ESG factors in their activities, these obligations do not fully extend to the integration of sustainability considerations into the ESAs' regulatory policies and supervisory practices. The legislation lacks a clear accountability framework, as it does not specify specific objectives or benchmarks for sustainability considerations, nor does it assign the ESAs precise tasks related to sustainability.

As a result, while the importance of the three ESG dimensions of sustainability is acknowledged, the amendments do not adequately address the specific challenges posed by climate change. The absence of direct changes to the core objectives of the ESAs and the careful balancing in the drafting of the amendments reflect a "business-as-usual" approach that is not in line with the scientific reality.[169] Moreover, this approach is increasingly at odds with the evolving market reality,

[165] ESAs Review Regulation (n 132), Arts. 1(1)(b) and (c), 1(3), 1(5)(e), 2(1)(b)(iv) and (c), 2(6)(d), 3(1)(c)(iv) and (d) and 3(6)(d).
[166] ESAs Review Regulation (n 132), Arts. 1(5)(e), 2(6)(d) and 3(6)(d).
[167] As per the newly incorporated Art. 8(1a), the ESAs are obliged to give due regard to technological innovation on par with sustainability matters, in addition to "take fully into account the different types, business models and sizes of financial institutions".
[168] High-Level Expert Group on Sustainable Finance (2018), p. 61.
[169] Tollefson (2019).

where all financial sectors are experiencing significant transformations due to the influence of climate change and the rise of green finance.[170]

Ending this section on a more positive note, what appears to be remarkable are the specific legislative provisions pertaining to certain tasks of the ESAs is a notable development. Particularly noteworthy is the legal recognition of climate change as a potential systemic risk for the financial system in the ESAs review Regulation.[171] Article 23 now encompasses the identification of "potential environmental-related systemic risk" in the measurement of systemic risk and related stress-testing exercises for financial institutions.[172] This empowers supervisory authorities to assess the resilience of banks against climate-related risks. To facilitate this assessment, the ESAs are required to adopt standardised methodologies to evaluate the impact of environmental risks on financial institutions.[173] By doing so, not only does the amendment acknowledge environmental risks as potential sources of systemic risk,[174] but it also urges all supervisory authorities in the EU to integrate these risks into their risk assessment and stress-testing exercises, given the ESAs' role in coordinating such stress tests.[175] Additionally, the ESAs are tasked to "put in place a monitoring system to assess material environmental, social and governance-related risks, taking into account the COP 21 Paris agreement".[176] Collectively, these amendments enhance the scope of risk assessment in European financial supervision, leading to a more comprehensive evaluation of potential risks.

[170] Henderson (2019); Nauman (2019); Fletcher (2019).
[171] See, for instance, Regulation (EU) 2019/2176 of the European Parliament and of the Council of 18 December 2019 amending Regulation (EU) No 1092/2010 on European Union macro-prudential oversight of the financial system and establishing a European Systemic Risk Board (OJ L 334, 27.12.2019, p. 146), Recital (6).
[172] ESAs Review Regulation (n 132), Arts. 1(19), 2(20) and 3(20).
[173] ESAs Review Regulation (n 132), Arts. 1(26)(c)(ii) and (v), 2(26)(c)(ii) and (iv), and 3(27)(c)(ii) and (iv).
[174] WSJ Editorial Board (2019).
[175] ESAs Regulations (n 139), Arts. 21(2)(b), 23 and 32(2).
[176] ESAs Review Regulation (n 132), Arts. 1(21)(a)(iv), 2(21)(a)(iv) and 3(22)(a)(iv).

2.3.2 Conclusive remarks

Through mandating the ESAs to consider sustainable business models and the integration of ESG factors in their operations, the 2019 revision of the ESAs Regulations brought about a distinct alteration in the realm of financial supervision. While it is true that the overall review did not lead to a comprehensive transformation of the mandate for European financial supervision, it has nonetheless bestowed upon the supervisory authorities significant opportunities – and corresponding responsibilities – to evaluate and address climate and environmental risks that have the potential to pose systemic risks to the financial system.

2.4 Other areas of competence related to climate change

Before the conclusive remarks, this Chapter devotes a final section to address additional responsibilities within the ECB's jurisdiction that incorporate considerations related to climate change: the issue of euro banknotes[177] and oversight over payment systems.[178]

Banknotes, which are crafted from cotton, represent a domain where environmental and climate change considerations hold significant importance. In its 2020 update of the ECB's Environmental Statement,[179] it explicitly outlined its evaluation and actions regarding these concerns. Manufacturers are required to furnish ISO certifications demonstrating the quality management, environmental management, and health and safety standards in banknote production. Moreover, certified organic cotton is reportedly employed for more than half of the produced banknotes, with a goal of achieving a 100% utilisation rate.[180] Additionally, there

[177] Art. 128(1) TFEU; Art. 16 ESCB/ECB Statute (n 102).
[178] Art. 127(2), fourth indent, TFEU; Art. 3.1, fourth indent, ESCB/ECB Statute (n 102).
[179] European Central Bank (2020c).
[180] For further information, see the 'Banknote manufacturer accreditation' section of the ECB's website, available at https://www.ecb.europa.eu/euro/cashprof/accreditation/html/index.en.html (accessed 18 July 2023).

is no legal basis to argue against the ECB fully incorporating environmental and climate considerations into its responsibility for banknote issuance.[181]

Regarding the oversight of payment systems, the directive "to promote the smooth operation of payment systems" has been interpreted as involving the Eurosystem's oversight of national payment systems and the provision of TARGET[182] infrastructure payment services for processing financial transactions. When contemplating further advancements in payment system infrastructure and oversight, it may be beneficial to consider aspects related to the challenge of climate change. The effectiveness and efficiency of payment system oversight can contribute to their environmental sustainability. Additionally, the potential introduction of the Digital Euro raises concerns about the energy consumption associated with blockchain technology. Regardless of the choices made, it is clear that climate and environmental considerations are to be incorporated into this aspect of the mandate. Just like in the case of monetary policy and prudential supervision, the secondary mandate provides a legal basis for integrating climate change considerations into the execution of the ECB's duties. In other simplified words, the ECB is mandated to do so.

2.5 Conclusive remarks

The ECB has joined the global effort of central banks in responding to the urgent need to tackle climate-related risks. This Chapter has been primarily dedicated to examining the ECB's mandate and determining whether it possesses the authority to address climate change, with a specific focus on its core functions of monetary policy and prudential supervision.

Regarding monetary policy, it has been demonstrated that the ECB, while maintaining its primary objective of ensuring price stability, can incorporate environmental considerations into its decision-making process. Moreover, the

[181] The ECB retains exclusive competence over the authorisation for the issue of euro banknotes (the issue of the notes themselves is reserved for the ECB and NCBs). Euro coins are issued by the Member States, prior authorisation granted by the ECB as to their volume. See Art. 128(2) TFEU.
[182] TARGET stands for Trans-European Automated Real-Time Gross settlement Express Transfer-system. It is worth mentioning that on 20 March 2023, the ECB has launched the new TARGET2 wholesale payment system. For further information, see European Central Bank (2023b).

ECB is empowered to support the Union's general economic policies that encompass environmental protection. It is crucial to note, however, that the implementation of any policy decision must remain within the scope defined by the EU legislature, which maintains the ultimate authority in this regard.

When it comes to prudential supervision, the ECB's sphere of action is somewhat more limited. Although the recent amendment to the ESAs Regulations have granted supervisors certain tools and powers to assess and address climate-related risks, there is still room for improvement and further empowerment in this area.

The ECB's commitment to considering environmental factors within its operations is in line with the growing recognition of climate change as a systemic risk that necessitates action across the financial sector. Climate considerations must be integrated thoughtfully and strategically into the ECB's framework to ensure effective and coherent action. The forthcoming Chapter will delve deeper into the specific instruments that the ECB can deploy in its contribution to climate change within the financial system.

Chapter 3: The ECB's Concrete Measures in Addressing Climate Change

3.1 Introductory remarks

In view of the substantial economic implications stemming from financial losses induced by climate change occurrences,[183] and considering that heat waves, windstorms and floods are going to increase in the near future,[184] the Eurosystem embarked upon a comprehensive endeavour during the period of 2020-21. The core objective of this initiative was to meticulously examine all facets of its monetary implementation framework, with the principal aim of discerning and evaluating areas within which climate change could wield financial influence. The operational purview of the Eurosystem primarily encompasses two distinct categories of monetary policy pursuits: collateralised lending operations and outright asset purchases. Each of these categories bears discrete risks, and the ECB, in the course of its review, conducted a comprehensive analysis of the potential implications of climate change on these operations.[185]

While the primary mantle of responsibility for addressing climate change squarely rests upon the shoulders of the EU legislature, as expounded in Chapter 2, this Chapter underscores the potential of the ECB – and by logical extension of the entire Eurosystem – to contribute substantively to fortifying the EU's collective response to climate change. This contribution is to be actualised through the endorsement of four specific measures.

Firstly, drawing inspiration from prominent publicly traded corporations that have conspicuously augmented their disclosure practices vis-à-vis climate-related metrics, the Eurosystem is poised to stipulate climate change reporting as an indispensable criterion for determining collateral eligibility. This stipulation is to be applied to assets whose issuers or debtors fall within the purview of the

[183] See, for instance, European Environment Agency (2023), "Economic losses from climate-related extremes in Europe", available at https://www.eea.europa.eu/ims/economic-losses-from-climate-related (accessed 3 September 2023).
[184] Alogoskoufis et al. (2021), pp. 100-114.
[185] European Central Bank (2022a).

Corporate Sustainability Reporting Directive (CSRD), thus effectuating an expanded ambit of economic entities obligated to adhere to these rigorous reporting standards.

Secondly, the ECB conducted an exhaustive climate stress test of its own balance sheet. The overarching objective of this undertaking was to establish a meticulous framework for quantifying the risks inherently linked with climate change. Such climate risk stress tests are anticipated to be instituted as a periodic exercise in the future, thereby facilitating an enduring evaluation of the system's susceptibility to contingencies arising from climate-related factors.

Thirdly, the Eurosystem underwent a comprehensive recalibration of its collateral framework by adapting valuation practices for marketable assets and effecting recalibrations of haircut methodologies. This adaptation was undertaken to more effectively assimilate climate-related risks into the evaluative process. This augmentation was further buttressed by the imposition of specific limits on collateral pools affiliated with counterparties.

Fourthly, the Eurosystem astutely adjusted the composition of corporate bonds featured within its monetary policy portfolios. This recalibration involved an expanded allocation of bonds emanating from enterprises that manifest robust disclosures, exhibit low emissions profiles, and evince steadfast commitment to credible and ambitious decarbonisation objectives.

Preceding a detailed exposition of the intricate modalities governing these measures, the Chapter initiates with a comprehensive overview of the innovative framework introduced during the 2020-21 ECB's strategy review. In a concluding vein, the Chapter culminates with a dedicated segment expounding on how the ECB continues to spearhead affirmative environmental transformations by curbing its own carbon footprint.

3.2 The ECB's new strategy towards climate change

In the strategy review[186] unveiled on 8 July 2021, the ECB devised its initiatives related to climate change. The press release[187] along with the comprehensive action plan distinctly communicate the ECB's unwavering dedication:

> *[t]he ECB's Governing Council is strongly committed:*
>
> - *to further incorporating climate change considerations into its monetary policy framework;*
> - *to expanding its analytical capacity in macroeconomic modelling, statistics and monetary policy with regard to climate change;*
> - *to including climate change considerations in monetary policy operations in the areas of disclosure, risk assessment, collateral framework and corporate sector asset purchases;*
> - *to implementing the action plan in line with progress on the EU policies and initiatives in the field of environmental sustainability disclosure and reporting.*[188]

Before delving into the action plan, the press release specifies that

> *the Governing Council underlines its commitment to more systematically reflect environmental sustainability considerations in its monetary policy. The decision follows the conclusion of the strategy review of 2020-21, in which the reflections on climate change and environmental sustainability were of central importance.*[189]

Additionally, the communiqué is not free from political considerations, as it is mentioned that

> *[a]ddressing climate change is a global challenge and a policy priority for the European Union. While governments and parliaments have the primary responsibility to act on climate change, within its mandate, the ECB*

[186] For further information on the strategy review, see the section "Strategy review" on the ECB's website, available at https://www.ecb.europa.eu/home/search/review/html/index.en.html (accessed 3 September 2023).
[187] European Central Bank (2021c).
[188] ibid.
[189] ibid.

> *recognises the need to further incorporate climate considerations into its policy framework.*[190]

The press release eloquently also explains how climate change affects price stability.

> *Climate change and the transition towards a more sustainable economy affect the outlook for price stability through their impact on macroeconomic indicators such as inflation, output, employment, interest rates, investment and productivity; financial stability; and the transmission of monetary policy. Moreover, climate change and the carbon transition affect the value and the risk profile of the assets held on the Eurosystem's balance sheet, potentially leading to an undesirable accumulation of climate-related financial risks.*[191]

Legal obligations are not forgotten ("[w]ith this action plan, the ECB will increase its contribution to addressing climate change, in line with its obligations under the EU Treaties"[192]), whereas on the actual measures contained in the action plan, it is indicated that

> *[t]he design of these measures will be consistent with the price stability objective and should take into account the implications of climate change for an efficient allocation of resources.*[193]

This new approach clearly involves a thorough evaluation of the need to implement measures focused on addressing climate change, in line with the monetary policy goals outlined by the Eurosystem according to Article 127 TFEU. Recognising that the Eurosystem's efforts to introduce measures aimed at reducing the possibility of financial losses are deeply integrated into the design and implementation of monetary policy,[194] it is apparent that a weak risk management approach could potentially weaken the trustworthiness and autonomy of the

[190] ibid.
[191] ibid.
[192] ibid.
[193] ibid.
[194] Art. 18.1 of the ESCB/ECB Statute (n 102).

Eurosystem. Such a scenario, in turn, has the potential to curtail its capacity to effectively anchor price stability and support the general economic policies in the Union.

In light of these considerations, the areas of climate change action announced by the ECB are:

1. Macroeconomic modelling and assessment of implications for monetary policy transmission, to understand how climate change and 'related policies'[195] affect the economy, businesses, and individuals;
2. Statistical data for climate change risk analyses, crafting "new experimental indicators, covering relevant green financial instruments and the carbon footprint of financial institutions", and assessing their vulnerability to physical risks. These efforts are closely aligned with EU policymaking and are intended to be "in line with progress on the EU policies and initiatives in the field of environmental sustainability disclosure and reporting";
3. Disclosures as a requirement for eligibility as collateral and asset purchases. The ECB aimed to outline its plans for this requirement for private assets by 2022, whether "as a new eligibility criterion or as a basis for a differentiated treatment for collateral and asset purchases". Once again, the impact of EU policymaking on sustainability disclosure is notable in this context. Furthermore, proportionality, a critical factor in the legal evaluation of central bank actions,[196] is highlighted as a mechanism for accommodating small and medium-sized enterprises;
4. Enhancement of risk assessment capabilities, developing climate stress tests to the Eurosystem's balance sheet, utilising the existing climate stress methodology applied to the entire economy.[197] Credit rating agencies had to undergo examination to determine if they effectively integrate climate change risks into their credit evaluations;

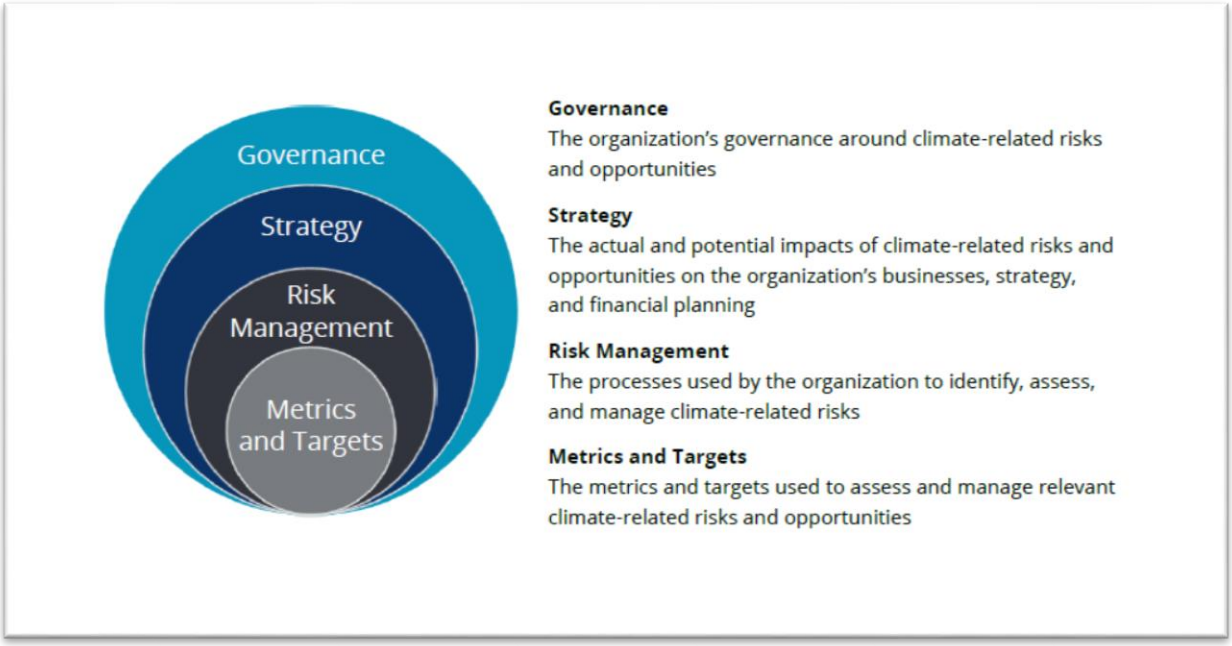
[195] With 'related policies', the ECB generally refers to the climate change policies which fall under the primary responsibility of governments and parliaments, both at national and European level.
[196] Case C-62/14, *Gauweiler*, ECLI:EU:C:2015:400; Case C-493/17, *Weiss*, ECLI:EU:C:2018:1000; Judgment of the Second Senate of the German Federal Constitutional Court of 5 May 2020, 2 BvR 859/15.
[197] de Guindos (2021).

5. Collateral framework,[198] factoring in climate risks when evaluating the sufficiency of collateral posted. There was also the surveillance of "structural market developments in sustainability products", and unexpected commitment "to support innovation in the area of sustainable finance within the scope of its mandate". This is in reference to the press release from 22 September 2020 which discussed the acceptance of sustainability linked bonds as collaterals;[199] and
6. Corporate sector asset purchases.[200] The Eurosystem's purchases of corporate sector assets within the Asset Purchase Programme (APP) and the Pandemic Emergency Purchase Programme (PEPP), collectively known as the CSPP, were required to "incorporate climate change criteria, in line with its mandate". This meant that issuers needed to align themselves "with, at a minimum, EU legislation implementing the Paris agreement through climate change-related metrics or commitments of the issuers to such goals". Climate-related information disclosure for the CSPP commenced in 2023, having already been undertaken for non-monetary policy portfolios.[201] Based on a "common stance for climate change-related sustainable and responsible investment principles for euro-denominated non-monetary policy portfolios", the ECB and the NCBs of the Euro area initiated climate-related disclosures in early 2023. They began with the "Recommendations of the Task Force on Climate-related Financial Disclosures" as the initial framework.[202] This task force was commissioned by the Financial Stability Board "to develop climate-related disclosures that 'could promote more informed investment, credit [or lending], and insurance underwriting decisions' and, in turn, 'would enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risks'.[203] Within the four categories of disclosures, which include governance, strategy, risk management, metrics and targets (Figure 13), the

[198] European Central Bank (2020d).
[199] ibid.
[200] European Central Bank (2021d).
[201] ibid.
[202] Task Force on Climate-related Financial Disclosures (2017).
[203] ibid., p. 2. See also Financial Stability Board (2015).

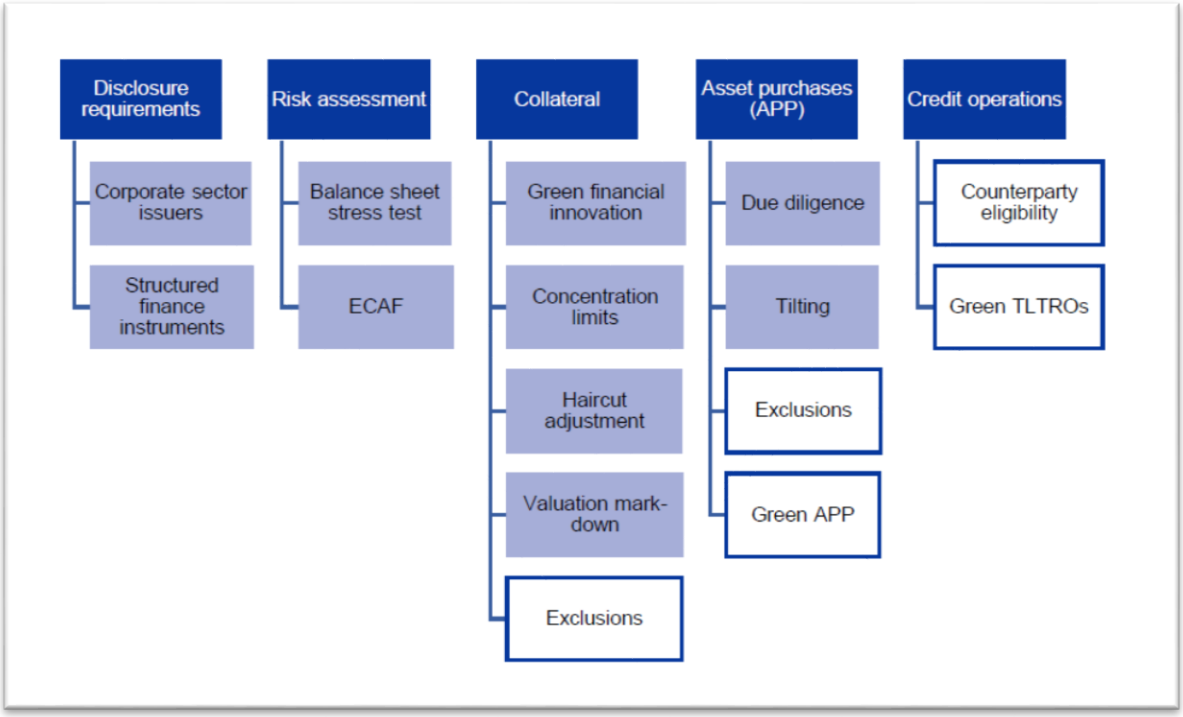
Eurosystem was obligated to report "as a minimum in the category of metrics and targets".

Figure 13: Core elements of recommended climate-related financial disclosures



Source: Task Force on Climate-related Financial Disclosures (2017). p. 5

Figure 14: Climate change-related measures considered in the strategy review[204]



Source: Aubrechtová et al. (2023), p. 14

In tandem with these discernible strides, the ECB affirmed its unequivocal commitment to periodically disseminate a suite of comprehensive climate-related financial disclosures. These disclosures transcend mere surface-level insight, instead delivering a nuanced and comprehensive portrayal of the carbon footprint and the intricacies of climate risk encompassing the spectrum of financial assets held under the aegis of the Eurosystem. Furthermore, these disclosures extend their purview to encompass the dimensions of climate-related governance, the strategic underpinnings therein, and the meticulous orchestration of risk management

[204] Measures highlighted in light blue were included in the roadmap of climate change-related actions (Action Plan). APP stands for Asset Purchase Programmes, ECAF stands for Eurosystem Credit Assessment Framework, TLTRO stands for Targeted Long Term Refinancing Operations.

protocols.[205-206] Conspicuously, these disclosures represent a laudable advancement toward the overarching objective of enhancing the transparency engendered by the Eurosystem with respect to the multifaceted gamut of climate-associated risks and the ensuing ecological imprint, particularly within the context of the monetary policy portfolios that encompass corporate sector holdings.

3.2.1 Climate-related disclosures

Harmonised and dependable disclosures pertaining to climate change in financial products emerge as a requisite aspect for both precise risk identification and accurate valuation of climate-linked perils, alongside facilitating the transition towards a more sustainable economic paradigm. Currently, climate metric data remains disjointed, frequently bereft of standardisation, and often confined from public purview. In response to this evident gap, and with a view to establishing a robust foundation for impactful and efficacious endeavours, the ECB took a significant stride in early 2022 by opting to procure climate-related data from external data providers.[207]

Consonant with its 'secondary mandate' of supporting the general economic policies in the EU while concurrently advancing the goal of environmental protection, the ECB assimilated two distinct categories of measures centred on disclosures within its comprehensive climate action plan.

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[205] European Central Bank (2023c). The disclosures were presented in two reports, covering the Eurosystem's corporate security holdings under the corporate sector purchase programme (CSPP) and the pandemic emergency purchase programme (PEPP) (European Central Bank (2023d)), as well as the ECB's euro-denominated non-monetary policy portfolios (NMPPs) (European Central Bank (2023e)), including its own funds portfolio and its staff pension fund, respectively. The ECB's NMPP disclosures are part of a concerted effort by all Eurosystem central banks to publish climate-related financial disclosures on their euro-denominated NMPPs using a common framework that defines minimum reporting requirements based on the recommendations of the Task Force on Climate-related Financial Disclosures; see European Central Bank (2021d). In this sense, a dedicated page is available on the ECB's website listing the disclosures of all Eurosystem central banks, available at https://www.ecb.europa.eu/ecb/climate/climate-related-financial-disclosures/html/index.en.html (accessed 3 September 2023).

[206] All disclosures are prepared in line with a Eurosystem common minimum disclosure framework based on the recommendations of the Task Force on Climate-related Financial Disclosures and the Partnership for Carbon Accounting Financials; see Task Force on Climate-related Financial Disclosures (2017) and further information on the Partnership for Carbon Accounting Financials, available at https://carbonaccountingfinancials.com/ (accessed 3 September 2023).

[207] Deutsche Bundesbank (2022).

Primarily, the Eurosystem is poised to align the eligibility criteria for collateral with compliance parameters stipulated by the CSRD for marketable assets and credit claims extended by debtors encompassed within the domain of the CSRD architecture. This particular measure, exerting substantial influence over significant corporations and issuers of unsecured bank bonds, is slated for operational initiation in tandem with the general chronology governing the implementation of the CSRD, effectively commencing in 2026.[208]

Subsequently, the Eurosystem is primed to endorse nascent regulatory initiatives intended to formulate standardised reporting protocols for climate-linked data germane to structured finance assets of eligibility, encompassing asset-backed securities (ABSs) and covered bonds.[209] Assets structured through securitisation mechanisms epitomise a cornerstone asset category utilised as collateral for Eurosystem credit operations.[210] However, a conspicuous absence of harmonised and cohesive data, particularly encompassing climate considerations, emerges as a critical deficiency within these asset classes. To bridge this knowledge chasm, the Eurosystem has proactively embarked on an intensive engagement with pertinent regulatory entities, encompassing the European Securities and Markets Authority, the European Commission, and the European Banking Authority. This proactive engagement endeavours to achieve confluence in forthcoming reporting mandates, aligning not solely with the Eurosystem's requisites for streamlined collateral management but also serving to galvanise the harmonisation of reporting norms across the financial milieu.[211]

3.2.2 Risk assessment

The Eurosystem has meticulously crafted an encompassing framework for climate stress testing with the explicit aim of evaluating the repercussions stemming from climate risks.

[208] European Central Bank (2022b).
[209] ibid.
[210] For further information on ABSs, see the section "Asset purchase programmes" in the ECB's website, available at https://www.ecb.europa.eu/mopo/implement/app/html/index.en.html (accessed 3 September 2023).
[211] See, for instance, European Supervisory Authorities (2023).

Following the financial crisis, stress tests have emerged as a crucial component of the supervisory and financial stability arsenal. They serve to evaluate the ability of financial institutions to withstand unfavourable scenarios. Specifically, stress testing has evolved into a potent instrument for identifying inherent systemic risk arising from the complex interactions among various institutions and markets within the financial system.[212]

A pivotal juncture in this ongoing initiative materialised in 2022, wherein the ECB orchestrated a climate risk stress test targeting the Eurosystem's balance sheet.[213] This rigorous evaluation encompassed an expansive gamut of financial exposures, encapsulating collateralised credit operations as well as holdings encompassing corporate bonds, covered bonds, and ABSs. Notably, this scrutiny encompassed a comprehensive evaluation of both physical and transition risks inherent in these financial instruments.[214-215] The primary imperatives underpinning this enterprise comprised two-fold objectives: (i) meticulous scrutiny into the vulnerability of the Eurosystem's financial risk profile to the intricacies of climate change, and (ii) the augmentation of the Eurosystem's prowess in the meticulous assessment of climate-induced risks.

The outcomes that emerged from this exhaustive undertaking distinctly underscore the discernible ramifications precipitated by both distinct strands of climate risk – transition risk and physical risk – upon the intricate mosaic of the Eurosystem's balance sheet's risk landscape (Table 1). Evidently, estimations stemming from scenarios simulating an abrupt and disorderly transition alongside an intensively hostile climatic milieu underscore risk magnitudes that transcend those observed under the aegis of an orderly transition scenario, with the risk estimates invariably ranging between 20% and 30% higher. This starkly underscores the palpable influence exerted by the scenario depicting a hostile climatic environment, effectively revealing the marked prominence of physical risk, which seemingly

[212] See, *inter alia*, Anderson (2016); Anderson et al. (2018); Dees, Henry and Martin (2017).
[213] European Central Bank (2022c), p. 65.
[214] This climate risk stress test used scenarios developed by both the NGFS and the ECB, which project macro-financial and climate variables over a 30-year horizon. For further information, see Network for Greening the Financial System (2021b).
[215] For further information on the methodology and scope of the exercise, see European Central Bank (2022c); Alogoskoufis et al. (2021).

overshadows the influence of transition risk upon the risk dynamics of the Eurosystem's balance sheet.[216]

The climate risk associated with the Eurosystem's holdings of corporate bonds is comparable to the climate risk present in the overall market volume of eligible securities for purchase. In both adverse scenarios, the resulting increases in risk are quite similar to the findings for the Eurosystem's balance sheet. However, this was rather expected, considering that, until the specified date, the Eurosystem's acquisitions of corporate bonds were guided by a market capitalisation benchmark.[217] Indeed, it was only starting from October 2022 that climate change factors began to be integrated into such purchasing decisions.

In comparison to the disorderly transition scenario, the hot house world scenario shows a more pronounced relative risk increase for both covered bonds and ABSs. This heightened sensitivity of these assets to physical risk is evident when examining the flood risk scenario. In this specific scenario, the increase in risk estimates for covered bonds and ABSs surpasses that of corporate bonds and even exceeds the increases seen in long-term scenarios. Consequently, under this scenario, covered bonds make a notably substantial contribution to the overall risk increase, which is not the case for ABSs due to their considerably smaller portfolio size.[218]

Despite the substantial exposure in collateralised credit operations, they have a limited impact on the overall increase in risk. This assessment pertains to credit operations secured by corporate bonds, covered bonds, ABSs, and unsecured bank bonds. The relatively lower risk per unit of exposure in these lending operations can be attributed to their dual default nature. In this context, climate risk stress affects both the counterparty and the collateral, but it only materialises in scenarios where the counterparty defaults and the collateral's value drops below the protection level provided by relevant valuation adjustments. This usually occurs when the issuer of the collateral also defaults.[219]

[216] European Central Bank (2022c), pp. 48 ff.
[217] Germann, Kusmierczyk, and Puyo (2023), p. 81.
[218] ibid.
[219] ibid.

Table 1: Overview of the scenarios and main results of the 2022 climate risk stress test of the Eurosystem balance sheet

Scenario	Projections	Horizon	Risk type	Results
Long-term scenarios	Orderly transition	30 years (2020-50)	Both transition and physical risk	Transition and physical risk have a material impact. Corporate bonds are the main risk contributor. The impact of transition risk on corporate bonds is concentrated in specific sectors, while physical risk impact is concentrated in certain geographical areas. Covered bonds, ABSs and credit operations contribute less to total risk.
	Disorderly transition			
	Hot house world			
Short-term disorderly scenario	Baseline	Three years (2022-24)	Transition risk	Transition risk has a material impact. Corporate bonds are the main risk contributor. The risk for corporate bonds is concentrated in specific sectors.
	Stress			
Flood risk scenario	Baseline	One year (2022)	Physical risk	Physical risk has a material impact. Corporate bonds are the main risk contributor. The risk for corporate bonds is concentrated in certain geographical areas. Covered bonds are significant risk contributors.
	Stress			

Source: Germann, Kusmierczyk and Puyo (2023), p. 80

3.2.3 Collateral framework

Examination of climate change considerations extended to the parameters of the collateral framework, encompassing adaptations to valuation practices and haircut methodologies, in conjunction with the establishment of a climate-oriented collateral ceiling designed for deployment by Eurosystem counterparties.[220] However, before delving into the comprehensive delineation of measures presented by the ECB, a succinct exposition elucidating the role and inherent limitations of the collateral framework is provided.

[220] It is worth mentioning that the Eurosystem's collateral framework already included some climate change considerations prior to the decisions announced in July 2022, as it accepted a significant share of European green bonds and sustainability-linked bonds as eligible collateral. For further information, see the FAQ on sustainability-linked bonds in the ECB's website, available at https://www.ecb.europa.eu/paym/coll/standards/marketable/html/ecb.slb-qa.en.html (accessed 3 September 2023).

3.2.3.1 The Eurosystem's collateral framework

Within the framework of standard Eurosystem monetary policy, the provision of liquidity through credit operations assumes a pivotal role. Regulated under Article 18.1 of the ESCB/ECB Statute, the disbursement of Eurosystem funds to eligible counterparts is contingent upon the demonstrable mobilisation of adequate collateral to underpin credit operations. Marketable securities, encompassing government and private sector entity bonds, along with non-marketable assets including credit claims, comprise the purview of Eurosystem-recognised collateral. This collateral architecture operates as a secondary defensive layer in scenarios of counterparty default. In circumstances where normal operations of a counterparty are sustained, the collateral harnessed for the security of Eurosystem credit is maintained by the Eurosystem on a cautious basis. Nevertheless, in instances characterised by counterparty default, the Eurosystem is vested with the authority and obligation to effectuate the sale of collateral assets within financial markets, thereby forestalling potential losses stemming from credit operations.

When addressing climate-related risks, it is crucial to factor in risk protection and ensure the availability of collateral. Any actions taken to integrate climate change considerations into the collateral framework should primarily facilitate the evaluation and reduction of climate-related financial risks. This is an essential element of monetary policy in alignment with the Eurosystem's primary goal of keeping prices stable. This implies that collateral measures should be adjusted to guarantee risk protection while maintaining an adequate supply of collateral across various economic conditions and throughout the Euro area regions. This, in turn, ensures a uniform transmission of monetary policy.[221]

Furthermore, collateral measures can serve as a signalling mechanism to counterparties and align with overall economic policies within the EU, with the intention of advancing environmental protection goals.[222]

3.2.3.2 Valuation and haircuts

At the core of the risk management framework lie two fundamental pillars: the application of valuation rules and the imposition of haircuts on the collateral employed in Eurosystem refinancing operations.

[221] Bindseil et al. (2017), p. 15.
[222] ibid., p. 24.

Concerning valuation rules, the Eurosystem undertakes daily market-to-market valuation of all mobilised collateral assets. This practice ensures the timely incorporation of updated pricing data, particularly in cases of counterparty default, thereby facilitating the liquidation process. Notwithstanding, certain assets lack daily market prices. In such instances, the Eurosystem resorts to an internal pricing model predicated on the attributes shared by securities exhibiting similar characteristics, particularly aligned risk profiles.[223] A comprehensive examination was conducted to assess the validity of the valuation methodology for such assets, ultimately culminating in the determination that prevailing evidence does not substantiate the need for additional adjustments to theoretical pricing models to account for climate risk considerations.

Subsequent to the valuation process, the application of valuation haircuts ensues. Valuation haircuts encompass the adjustment made to the assessed value of a collateral asset – such as a fixed income instrument – mobilised by a bank as mandated by ECB directives to secure the repayment of credit. This calibration of haircuts is meticulously designed to furnish a judicious level of risk coverage for the ECB, operating in its capacity as the lender. Concurrently, this calibration serves to mitigate the necessity for frequent and substantial recalibrations that might otherwise give rise to a proclivity for procyclical tendencies in the implementation of the monetary policy stance. The determination of appropriate haircut levels is grounded in the intrinsic risk attributes of the asset and the prevailing liquidity conditions inherent to the given asset class. This calculus essentially encapsulates the ease with which a potential buyer could be identified should the Eurosystem opt for divestiture of the asset within the market.[224]

Likewise, a comprehensive scrutiny was administered by the Eurosystem to discern whether environmentally conscious attributes spanning the spectrum from low-emitting to high-emitting assets warranted distinct calibration of haircut parameters. This inquiry, upon meticulous examination, did not yield substantial deviations in the financial risk context within the tail of the loss distribution between assets issued by entities embodying varying emission profiles. As a result, the cumulative evidence underscores the existing conservative nature of the extant

[223] Bindseil, Gonzalez and Tabakis (2009), p. 117.
[224] Adler et al. (2022), p. 13.

haircut regimen, which inherently affords appropriate risk coverage against the gamut of climate-induced risks.

3.2.3.3 Collateral pool limits

In spite of the counterparty framework established by the ECB, alongside the daily assessment of collateral, the application of valuation haircuts, and the integration of supplementary risk control mechanisms, the Eurosystem may still encounter latent financial risks that elude reflection within credit ratings and remain unabated by haircut provisions. Furthermore, the realm of transition risks can elicit the devaluation of collateral assets, stemming from shifts in investor perceptions regarding the profitability of carbon-intensive holdings, thus potentially leading to abrupt declines in their market worth.

It is in light of these circumstances that the ECB, in its exploration of avenues to curtail climate-induced risks within counterparties' collateral holdings, has elected to institute limitations on collateral pool concentrations to address concentration risk. The ECB will harness GHG emissions, a metric ubiquitously employed within financial markets to gauge the perils associated with climate change transitions, as the principal yardstick for the identification of entities grappling with pronounced climate-related risks, which will then be subject to these predefined limits. This very metric will also find application within the context of the CSPP, as delineated in sub-section 3.2.4. However, a multitude of questions remain pending comprehensive resolution. Among these are inquiries concerning the optimal threshold percentage to be employed, strategies for entities currently devoid of climate-related data disclosure, and the appropriate economic sector classification in instances where sectoral averages are invoked. These nuances are anticipated to be clarified prior to the culmination of 2024, aligning with the slated implementation period for these specified limitations.

3.2.4 Tilting of corporate bond holdings

The Eurosystem possesses substantial portfolios held for the explicit purpose of advancing its primary objective of preserving price stability. Among these monetary policy portfolios, the corporate bond holdings within the ambit of the

APP and the PEPP, collectively referred to as the CSPP, emerge as notably exposed to both financial and climate-related risks.[225] Given the Eurosystem's direct exposure to the financial risk emanating from the transition and physical risks associated with various corporate issuers, especially considering its possession of senior unsecured debt of these entities, these holdings warrant particular attention. Consequently, the Eurosystem has assigned paramount importance to the infusion of climate change considerations into this particular portfolio.[226]

In pursuit of this objective, the Eurosystem has devised a distinctive approach to the integration of climate change considerations into the CSPP, tailored to align with the portfolio's overarching monetary policy objectives while adhering to the precepts of optimal market practices. Given that the CSPP presently encompasses approximately 30% of its eligible universe, alterations in the CSPP investment framework possess the potential for substantial market repercussions. Thus, the ECB executed adjustments to its corporate bond purchasing framework with a judicious approach, meticulously safeguarding the preservation of the CSPP's monetary policy aim and efficacy, while concurrently fortifying it against the longer-term climate-related risks associated with its outright purchases.

Specifically, the Eurosystem's stratagem for incorporating climate change factors revolves around a deliberate shift in CSPP purchases, predicated on an internally formulated climate score assigned to each qualifying issuer (Figure 15).[227] The operationalisation of climate change considerations within the CSPP implementation entails the strategic skewing of purchases in favour of bonds emanating from issuing companies distinguished by superior "climate performance",[228] while concurrently diverting from bonds issued by entities exhibiting inferior climate performance. This analytical tool assigns diverse

[225] For further information on the APPs and the PEPP, see the respective webpages on the ECB's website, available at https://www.ecb.europa.eu/mopo/implement/app/html/index.en.html and https://www.ecb.europa.eu/mopo/implement/pepp/html/index.en.html (accessed 3 September 2023).
[226] Reichlin et al. (2021), p. 69.
[227] For further information on climate scores, see European Central Bank (2023d), pp. 12 ff.
[228] Climate performance relates to a company's carbon impact and in particular to transition risk; physical risks are not yet incorporated into the design of the climate score due to their insufficient data quality, availability and methodologies.

climate scores to all eligible corporate issuers within the realm of the CSPP and PEPP universe, thereby infusing a climate-oriented dimension into decisions relating to asset purchases that bear pertinence to monetary policy objectives. The evaluation of climate performance traverses three essential dimensions: the emission intensities of corporate sector issuers, the ambit of ambition encapsulated by their stated emission reduction targets, and the quality of their authenticated climate-related disclosures.

This approach of "tilting" signifies that the proportion of assets featured on the Eurosystem's balance sheet issued by companies emblematic of superior climate performance would be associated with purchase limits surpassing those corresponding to neutral benchmark weights. This is orchestrated at the expense of the purchase limits allocated to issuers with subpar climate scores. Additionally, the framework integrating this "tilting" methodology envisages maturity constraints for issuers evaluated as carrying a heightened climate risk (and hence, reflecting a lower climate score). Further provisions encompass preferential treatment accorded to green bonds fulfilling rigorous criteria, alongside a heightened Eurosystem bid during the primary issuance of bonds from issuers demonstrating superior climate performance.[229]

In this context, the ECB has the potential to utilise its influence in market activities to encourage the development of new environmentally friendly asset categories, breaking away from the traditional standard of market neutrality.[230] While market neutrality might appear reasonable initially, it has a significant flaw: when externalities are in play, adhering to market neutrality can undermine market efficiency. If polluting companies enjoy an advantage over clean ones due to their failure to bear the full cost of their environmentally harmful production, the market fails to allocate resources efficiently.[231] Consequently, the market becomes

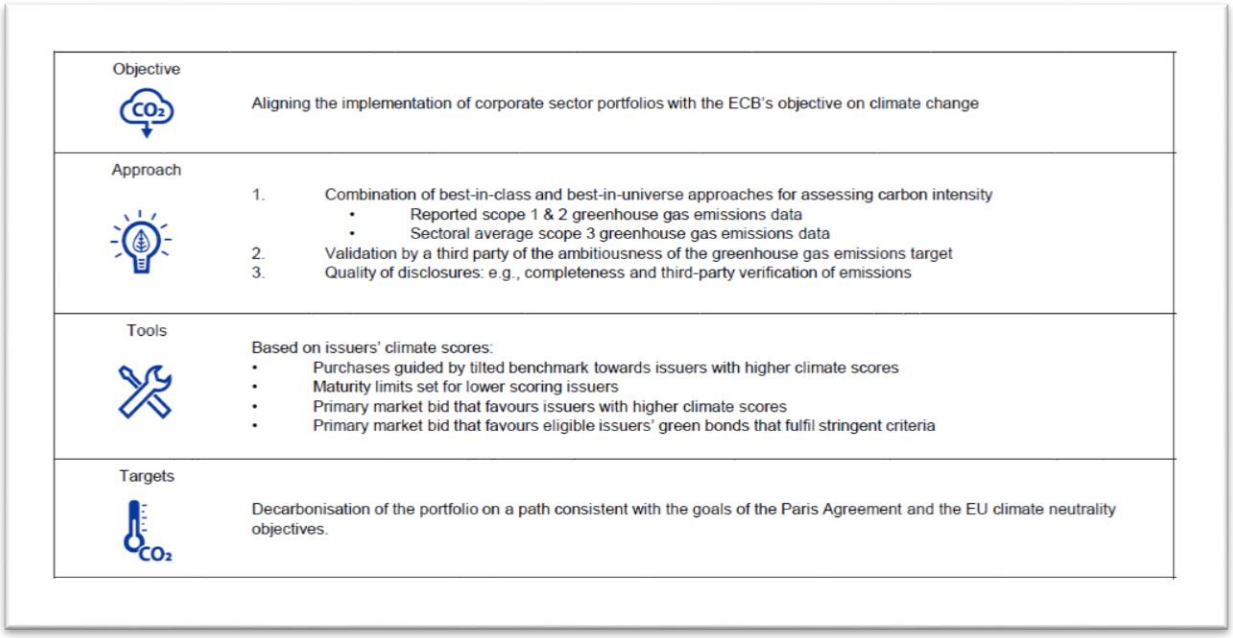
[229] See the FAQ on the integration of climate-related considerations into the CSPP on the ECB's website, available at https://www.ecb.europa.eu/mopo/implement/app/html/ecb.faq_cspp_climate_change.en.html (accessed 3 September 2023).

[230] Market neutrality entails purchasing assets in alignment with their current market proportions. The concept behind market neutrality is that central banks should refrain from introducing any bias into the relative prices of assets through their monetary activities.

[231] Schnabel (2020b); Schnabel (2021). See also Papoutsi, Piazzesi and Schneider (2022), pp. 9-16.

dominated by polluting companies with only a few environmentally conscious ones. This is precisely why the ECB's intervention in this direction is deemed particularly important.

Figure 15: Overview of the Eurosystem's framework for incorporating climate considerations into the corporate sector portfolio



Source: European Central Bank (2023d), p. 11

3.3 The ECB's own impact on the environment

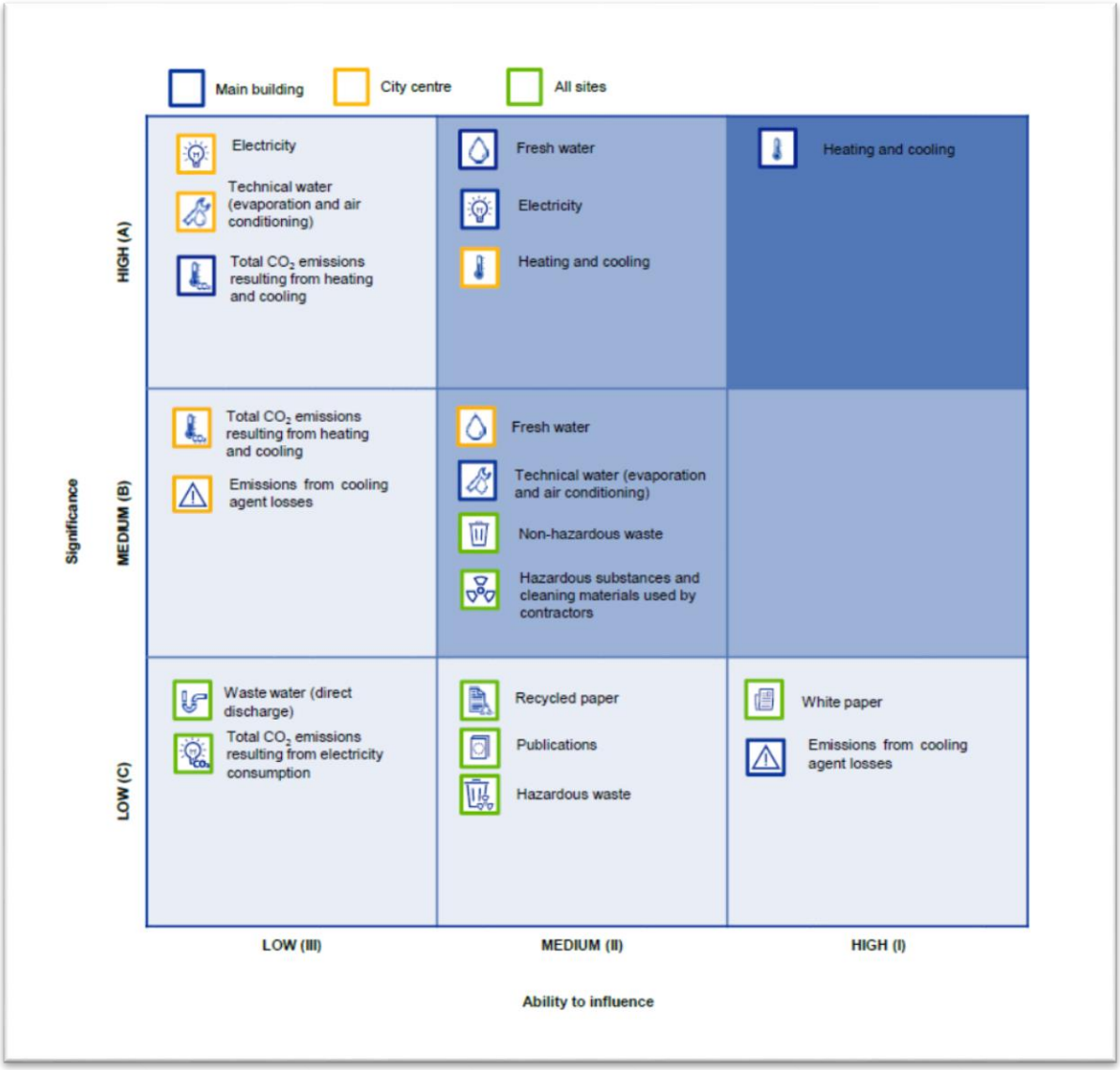
3.3.1 The ECB's actions in its day-to-day activities

The ECB is taking action on many fronts, including in its day-to-day activities, to bring the institution closer to fulfilling the commitment to reducing its carbon emissions in line with the 1.5°C trajectory outlined in the Paris Agreement.[232]

[232] For further details on how the ECB is improving its environmental performance, see https://www.ecb.europa.eu/ecb/climate/green/html/index.en.html#:~:text=Environmental%20protection%20at%20the%20ECB&text=To%20improve%20our%20environmental%20performance,Scheme%20(EMAS)%20since%202010.

In the recently updated ECB's Environmental Statement,[233] the ECB assessed several direct and indirect environmental aspects (Figures 16 and 17) and measured the impact of its activities. The following sub-sections provide further details in this respect.

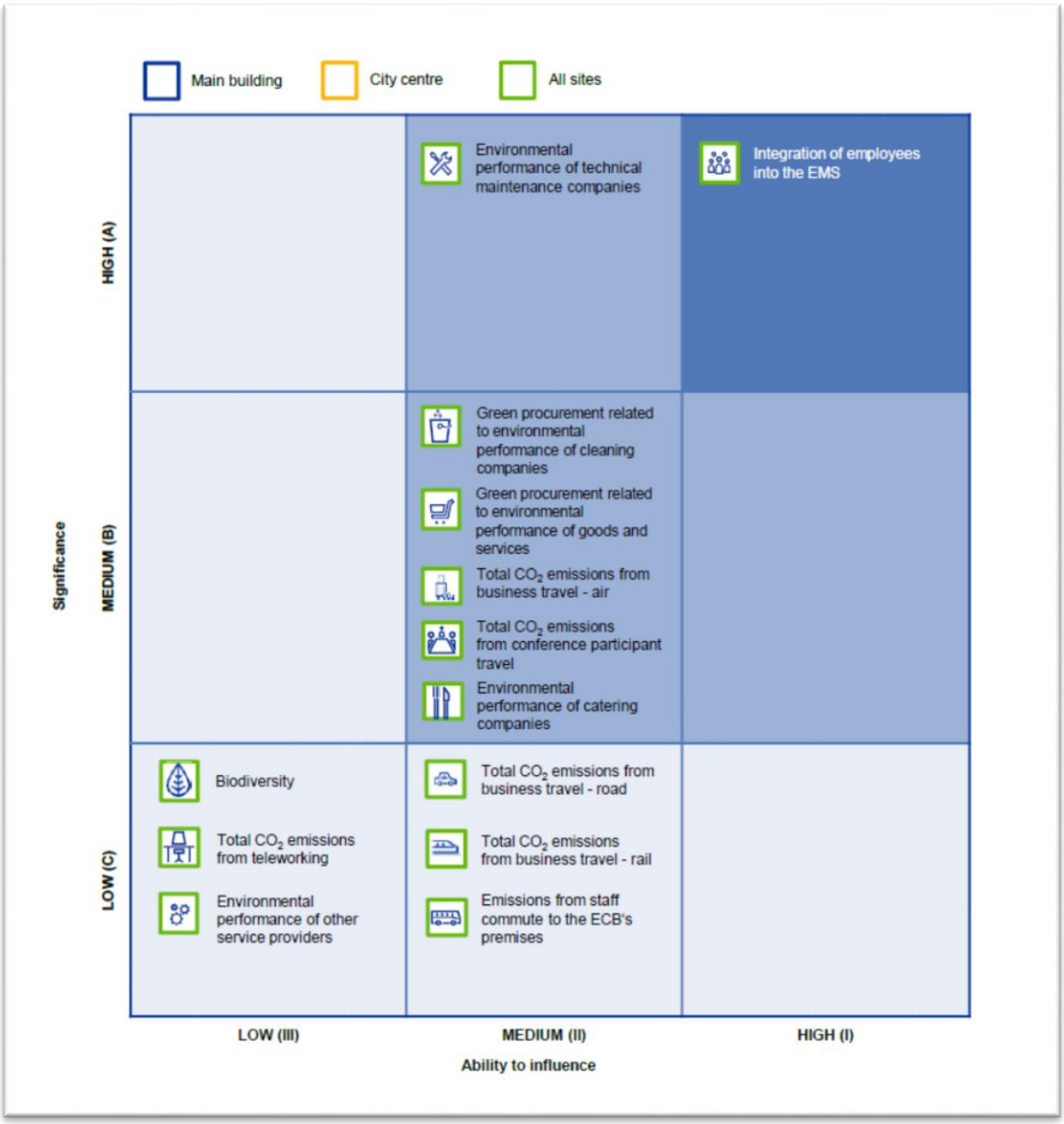
Figure 16: Assessment of the ECB's direct environmental aspects



Source: European Central Bank (2023f), p. 17

[233] European Central Bank (2023f).

Figure 17: Assessment of the ECB's indirect environmental aspects



Source: European Central Bank (2023f), p. 18

Energy efficiency at the ECB

In 2022, the ECB achieved a 6.7% reduction in energy consumption across its buildings compared to the previous year, with an 18% decrease from 2019 levels. Despite the return of staff post COVID-19 restrictions, the ECB managed to lower energy consumption due to energy-saving measures aligned with the German

federal government's regulations. These measures included adjusting heating points and extending lighting switch-off timings.

To further curtail energy use, the ECB implemented additional energy efficiency steps, such as modifying heating setpoints and expanding automatic lighting schedules during non-working hours. Engaging in local energy efficiency networks and collaborating on energy-saving strategies at the Eurosystem level also contributed to this effort.

Within the ECB's premises, the Main Building saw a 3.5% rise in electrical energy consumption in 2022 compared to the previous year. However, heating and cooling energy use decreased by 17.9%. With more employees working on-site, biogas consumption for cooking in the main building's kitchen surged by 76.1% compared to 2021.

In city centre premises, electrical energy consumption grew by 3.1% from 2021, but heating and cooling energy demand dropped by 19%. Notably, the Eurotower transitioned from natural gas to biogas for heating in 2022, resulting in a 20.08% reduction in biogas usage compared to the previous year.

District heating consumption dipped by 15.8% in the Japan Centre, while electricity use saw a minor 1.2% increase. The ECB's continuous focus on energy efficiency led to the replacement of conventional lighting with LEDs and the installation of more energy-efficient cooling equipment, promising substantial energy savings.[234]

Material efficiency

The ECB is actively progressing towards its goal of eliminating single-use plastic in customer outlets and kitchens by 2024. Collaborating with catering services led to successful reduction in packaging, including the removal of plastic take-away containers. In 2022, an in-house print centre was established to enhance printing sustainability by offering on-demand services, reducing waste from larger orders. QR-codes on permanent business cards curbed paper usage, while the removal of

[234] European Central Bank (2023f), pp. 20-21.

100 on-floor printers across ECB buildings, about 30% of the total, aimed to minimise printing-related materials.[235]

Water and wastewater

Water consumption at the ECB's premises comprises technical and non-technical usage. Technical water serves building processes, while non-technical water originates from kitchens, canteens, and sanitation.

In 2022, the main building witnessed a 41.4% rise in fresh water use due to increased on-site staff presence. Technical and non-technical water consumption surged by 179.0% and 13.2% respectively. Despite this, total freshwater consumption fell 58.7% from 2019 levels due to water-saving practices like tree irrigation bags and reduced lawn watering. In city centre locations, 2022 saw a 5.2% rise in freshwater use, with technical water down 1.9% and non-technical up 8.3%. Overall, city centre freshwater consumption dropped 29% compared to 2019.[236]

Waste and recycling

The ECB is actively working to reduce its environmental waste impact by prioritising waste avoidance and reduction. In 2022, efforts were made to achieve a 5% decrease in residual waste per workplace compared to 2018 levels through staff and service provider collaboration and awareness-raising measures.

Due to increased building occupancy in 2022, waste generation rose by 50.3% compared to 2021. Non-hazardous waste constituted 90.3% of the total, including plastic packaging, organic waste, residual waste, confidential paper waste, and paper/cardboard. Hazardous waste made up 9.7%, totalling 51 tonnes, consisting of electronic waste and other hazardous waste, primarily batteries. The ECB reduced IT waste by participating in equipment re-use programs.

[235] ibid., p. 24.
[236] ibid., p. 29.

Despite a 34.2% increase in total waste at the main building in 2022, compared to the previous reporting period, the ECB managed to decrease its waste by approximately 42.5% from 2019. At city centre premises, waste generation surged by 85.1% in 2022 versus 2021, with varying changes in waste categories – decreases in confidential paper and packaging, and increases in paper/cardboard, residual waste, and organic waste due to heightened demand from kitchens. Nevertheless, compared to 2019, total waste at city centre premises decreased by 47.5%.[237]

Biodiversity

The ECB has intensified its efforts to enhance biodiversity on its premises, including replanting 2,000 m² of lawn with regional wildflowers in 2022. These meadows provide a habitat for wild bees and other species, with mowing occurring only after natural flower cycles end. Measures like a mobile compost container for leaves and water collection from roofs bolster habitat and sustainability.

Activities were conducted to raise staff awareness about biodiversity, including guided garden tours. The urban gardening project continued, and for World Environment Day, the Green ECB team initiated the Road to Paris campaign, encouraging staff to reduce personal footprints and compete for sustainability points. This demonstrates the ECB's commitment to biodiversity and environmental goals.[238]

Banknotes

The ECB is committed to enhancing the safety and sustainability of euro banknotes within the cash cycle as part of the Eurosystem's cash strategy. It holds the exclusive authority, alongside NCBs, to authorise euro banknote issuance in the Euro area. Around 29.5 billion euro banknotes were in circulation by the end of 2022.

[237] ibid., pp. 32-34.
[238] ibid., pp. 35-36.

The ECB oversees the design, production, and circulation of euro banknotes, emphasising environmental management and health and safety of the public and workers involved. Manufacturers and raw material suppliers must provide ISO certifications and declarations of compliance. The ECB and Eurosystem NCBs are implementing policies to minimise the environmental impact, including sourcing about 85% of banknote paper's cotton fibres sustainably in 2022.

Research and development projects are ongoing to enhance the environmental sustainability of euro banknotes by extending their lifespan and reducing their environmental impact from raw material production to end-of-life treatment.[239]

Green public procurement

In 2022, the ECB executed 307 new procurement procedures, including 54 "green procurement procedures" that integrated environmental considerations, making up 18% of all new procurements. These ecologically conscious procedures constituted 27% of the total value of new procurements, marking a 6% increase from 2021.

All 64 public tender procedures and 97 three-five quote procedures were electronically conducted, leading to notable environmental benefits like reduced paper consumption, packaging materials, and shipping emissions. Supplier meetings were mainly held virtually to minimise travel-related emissions, while electronic signatures were extensively used for contracts, promoting material efficiency and energy reduction.

Training and awareness initiatives on green procurement were offered to staff, and the ECB participates in a joint Green Public Procurement Helpdesk with other European institutions for sharing best practices and market knowledge.[240]

Travel

[239] ibid., pp. 36-37.
[240] ibid., pp. 38-39.

In 2022, travel activities rebounded due to eased pandemic-related restrictions, but travel-related emissions remained lower than before the pandemic. To manage the increase, the ECB integrated travel objectives and actions into its Environmental Management Programme, prioritising rail over air travel on specific routes.

Conference activities resumed, and efforts to mitigate their impact included a 50% reduction target for physical meetings and conferences with external participants over two years (2023-24), achieved partly by enhanced hybrid technology installation. The ECB introduced a guideline for sustainable events.

Although there is uncertainty surrounding staff commuting and teleworking data due to changing work patterns, refined calculations showed a 22.7% emission reduction from teleworking and commuting in 2022 compared to 2021, partly due to more accurate on-site presence calculations and fewer teleworking days under a new policy.[241]

Communication, engagement and awareness-raising

In 2022, the ECB executed a dynamic and successful environmental communication strategy, conducting various awareness-raising activities both online and on-site. Celebrating the 2022 Interinstitutional EU Eco-Management and Audit Scheme (EMAS) days in February, the ECB hosted diverse environment-related events. During the World Wildlife Fund's Earth Hour in March, the ECB joined for the eleventh consecutive year, switching off non-essential lights across its locations to spotlight climate change challenges.

The Road to Paris campaign was a highlight, launched on World Environment Day in June. This initiative encouraged staff engagement and environmentally-friendly behaviour to support emissions reduction objectives. The campaign's completion of over 3,100 challenges across business areas led to saving 92.2 tonnes of CO_2.

In September, the ECB championed sustainable mobility options during European Mobility Week, emphasising "Better connections." The European Week for Waste

[241] ibid., pp. 39-41.

Reduction in November centred on circular economy and sustainable textiles, fostering recycling efforts.

The network of Environmental Representatives played a vital role in ECB's EMS-related activities, conducting awareness-raising actions on energy saving, green challenges, and sustainable practices.

Interinstitutional collaboration with other European institutions and Eurosystem central banks remained a priority through networks like GIME and ENCB, along with bilateral exchanges to share environmental management best practices and expertise. The year underscored the ECB's commitment to environmental responsibility and collaboration for sustainability.[242]

3.3.2 Climate Change Centre

To demonstrate a serious commitment, the ECB initiated the establishment of the Climate Change Centre (CCC) in January 2021.[243] Consisting of approximately ten staff members, the CCC operates under direct oversight from the ECB's President, who supervises the ECB's work on climate change and sustainable finance. Serving as a focal point for the ECB's climate change strategy, the CCC guides and supports initiatives across various departments while disseminating climate developments to colleagues and fostering connections both within and beyond the ECB. It regularly informs the ECB's Executive Board and engages in frequent discussions with staff members to share insights and stimulate conversations on climate-related matters. Furthermore, the CCC collaborates with stakeholders, including the Eurosystem Climate Change Forum, the NGFS steering committee, civil society organisations, and academics, and it played a pivotal role in crafting the ECB climate agenda.[244]

The CCC's responsibilities are delineated through six distinctive workstreams.

Primary among these is financial stability and prudential policy. Under this umbrella, a comprehensive climate-related risk monitoring framework is established, encompassing climate risk metrics and forward-looking assessments of climate risks on financial intermediaries, such as top-down climate stress tests. On the supervisory front, a wide-ranging spectrum of actions is undertaken to ensure banks adopt strategic and forward-

[242] ibid., pp. 42-44.
[243] European Central Bank (2021e).
[244] European Central Bank (2022a).

looking approaches to assess and manage climate-related and environmental risks. Periodic horizontal exercises are conducted to gauge the progress of banks through mechanisms like bottom-up stress tests and focused thematic reviews. Additionally, the CCC contributes actively to the formulation of regulatory standards, in tandem with the financial stability aspect.

The second workstream focuses on macroeconomic analysis and monetary policy. It consolidates efforts to evaluate macroeconomic risks and implications stemming from climate change and its policies. This workstream examines the effects on macroeconomic staff projections, emphasising the structural ramifications of the green transition on the economy. Within this context, it addresses the integration of climate risks into macroeconomic models and their impact on the transmission of monetary policy.

Financial market operations and risk constitute the third workstream. Here, policies are designed and executed to incorporate climate change considerations into monetary policy operations. Additionally, an examination of climate-related financial risks to the Eurosystem arising from monetary policy exposures takes place, including climate stress tests for the Eurosystem's balance sheet. This workstream extends its coverage to incorporate climate change-related factors in non-monetary policy portfolios, including the ECB's proprietary funds and staff pension fund.[245] Moreover, it oversees the annual climate-related financial disclosures concerning the ECB's portfolios.

The fourth workstream revolves around EU policy and financial regulation. It coordinates the ECB's input on climate topics within international forums (such as G7 and G20) and broader EU climate initiatives, including the European Green Deal, disclosure, and taxonomy frameworks. Furthermore, it addresses climate-related financial regulations, participating in the review and amendment of existing Regulations and Directives, and ensuring coherence with other European priorities and policies.

Corporate sustainability constitutes the fifth workstream, encompassing the ECB's internal environmental goals and disclosures. Collaborating closely with the Green ECB team, this workstream drives the development and maintenance of the ECB's environmental management system. It monitors and quantifies the ECB's organisational

[245] For more information on financial assets held by the Eurosystem that are not related to monetary policy, see the section "What is ANFA?" on the ECB's website, available at https://www.ecb.europa.eu/ecb/educational/explainers/tell-me-more/html/anfa_qa.en.html#:~:text=The%20Agreement%20on%20Net%20Financial,which%20together%20form%20the%20Eurosystem (accessed 3 September 2023).

carbon footprint and persistently explores avenues to curtail the institution's environmental impact.

The sixth workstream pertains to climate change-related data. Its mandate includes the development of climate indicators and the assurance of the availability of climate-related data throughout the ECB. Recognising data's pivotal role, this workstream places a premium on cross-collaboration between business areas. Additionally, it monitors external developments in climate data within European and international contexts, ensuring the ECB's voice is heard in relevant discussions while maintaining alignment with global standards.

3.4 Conclusive remarks

The recently introduced climate-related measures within the Eurosystem's monetary policy implementation framework mark a significant initial stride along a more extensive path. In this regard, the Eurosystem is resolute in its dedication to persistently infuse climate change considerations into its monetary policy operations, ensuring that its operational framework aptly factors in climate change risks.

Analysing the trajectory adopted by the ECB, it becomes apparent that the Eurosystem will systematically re-evaluate its decisions, seeking to curtail climate-related risks while fostering a seamless transition to a carbon-neutral economy without compromising price stability.

The anticipated enhancements in climate-related disclosures across the EU are poised to substantially enhance the accessibility and calibre of climate-related data. This, in turn, will facilitate a more precise discernment and measurement of climate change risks by the Eurosystem, particularly in terms of its balance sheet.

In light of the swiftly evolving landscape, it is plausible that distinct or novel measures might gain prominence in the near future. An example of such measures could be the ECB's green targeted lending operations, as alluded to by President Lagarde.[246] These operations are designed to provide financing to banks in the Euro area with the explicit aim of ensuring that this financing is used for lending

[246] Caswell, G. (2022).

to the real economy, hence the term ‘targeted’. When banks report on how they use this financing, they would receive a more favourable interest rate on their borrowing. Greening these operations would mean expanding the criteria for the ECB’s subsidy to include a sustainability element, specifically focusing on lending that supports ‘green’ activities or contributes to the transition to a carbon-free economy. Commercial banks would need to demonstrate that individual loans to households and businesses for construction, renovation, and energy-saving measures comply with sustainability criteria for such lending to be considered in the context of green TLTROs.[247] Nevertheless, preliminary assessment underscores the necessity for thorough contemplation, as several pivotal aspects await comprehensive elucidation. This begins with the absence of a standardised definition for what qualifies as green lending.

In conclusion, it is imperative to underscore that the ECB’s implementation of measures internally demonstrates an unwavering commitment to amplifying its endeavours in sustainability and climate safeguarding.

[247] Smits (2021), p. 42.

Conclusions

In the midst of navigating the turbulent challenges of the 21st century, one prominent and formidable issue stands before us: climate change. Throughout this Thesis, a comprehensive exploration of the most recent developments in climate change has been conducted, delving into the intricate network of climate-related risks that present formidable challenges to financial stability, particularly within the Euro area. The latest trends have been illuminated, leaving no doubt that human activities are the driving force propelling global warming. Furthermore, insights have been provided into the channels through which climate-related physical risk affects the financial sector, emphasising the vulnerabilities and exposures of financial institutions in the Euro area to transition risks. This Thesis has underscored the transformation of climate risks, once considered emerging trends, into established financial risks. In this context, the ECB emerges as a pivotal institution well-equipped to address climate change risks within the Euro area.

When examining the ECB's mandate, it has been established that it possesses the authority to address climate change in two of its core areas of competence: monetary policy and prudential supervision. Regarding monetary policy, it has been shown that the ECB, while maintaining its primary objective of ensuring price stability, can incorporate environmental considerations into its decision-making process. Furthermore, the ECB is empowered to support the broader economic policies of the Union, which encompass environmental protection. However, it is crucial to note that the implementation of any policy decision must remain within the confines defined by the EU legislature, which holds ultimate authority in this regard.

In the realm of prudential supervision, the ECB's sphere of action is somewhat more restricted. Although recent amendments to the European Supervisory Authorities Regulations have bestowed supervisors with certain tools and powers to assess and address climate-related risks, there is still room for improvement and further empowerment in this area. The ECB's commitment to considering environmental factors within its operations aligns with the growing recognition of climate change as a systemic risk that necessitates action across the financial

sector. Thoughtful and strategic integration of climate considerations into the ECB's framework is crucial to ensuring effective and coherent action.

The investigation has also delved into the recently introduced climate-related measures within the Eurosystem's monetary policy implementation framework. The unwavering dedication of the Eurosystem to infusing climate change considerations into its monetary policy operations reflects its commitment to mitigating climate-related risks while facilitating a seamless transition to a carbon-neutral economy, all without compromising price stability.

Anticipating improvements in climate-related disclosures across the EU, expectations are that a substantial enhancement in the accessibility and quality of climate-related data will empower the Eurosystem to more precisely identify and quantify climate change risks, particularly concerning its balance sheet.

In the face of a rapidly evolving landscape, it is acknowledged that distinct or innovative measures might gain prominence in the near future, such as green targeted lending operations. The implementation of these operations would involve expanding the criteria for the ECB's subsidy to include a sustainability element. However, it is essential to underscore the need for careful consideration, as several critical aspects await comprehensive clarification, beginning with the absence of a standardised definition for what qualifies as green lending.

As this Thesis concludes, it becomes evident that the battle against climate change is a collective responsibility that demands cooperation and commitment from various entities and institutions. The ECB, as a key player in the financial realm of the Euro area, holds a vital role in this endeavour. By acknowledging and addressing climate change risks within its mandate, the ECB can make a substantial contribution to building a resilient and sustainable financial system that can effectively navigate the challenges presented by our changing climate. The road ahead may be complex, but with determination, collaboration, and the strategic integration of climate considerations, progress can be made toward a more sustainable and stable future.

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Executive summary

The Paris Agreement set ambitious targets to limit global warming to below 2°C above pre-industrial levels, with a 1.5°C goal. The latest scientific evidence reaffirms the undeniable role of human activities in global warming, noting that the rate of temperature increase has exceeded any 50-year period in the past 2000 years. Human-induced global surface temperature rise is mainly due to GHG emissions, where carbon dioxide constitutes the primary factor.

These escalating GHG emissions disrupt energy balance, impact cloud formation, wind patterns, and water flows, and melt ice sheets, leading to widespread adverse impacts. Vulnerable communities, often the least responsible for climate change, suffer the most. Extreme weather events expose millions to food insecurity and water scarcity. Climate change inflicts extensive damages on ecosystems, including local species extinctions, and ecosystems like glaciers and permafrost nearing irreversible states.

The impact of climate change is evident on financial stability too, characterised by three main categories of risk factors: physical risks, transition risks, and liability risks.

Physical risks, arising from climate-related events like hurricanes, floods, and droughts, can lead to the destruction of infrastructure, reduced business productivity, and a decline in the value of financial contracts. Financial actors like banks can see their portfolios negatively affected when businesses struggle to meet loan payments due to climate-related damage.

Extreme climate events in the euro area led to significant economic losses in 2019, affecting property, production, investments, and financial institutions. Water and heat stress reduced labour and agricultural productivity, disrupted logistics, and forced economic activities to relocate. These hazards result in sustained production losses and capital allocation for reconstruction.

Studies conducted by the ECB reveals that certain firms are highly exposed to physical risks, with concentration in specific geographic areas. An important amount of credit exposures in the euro area banking system are linked to firms facing high or escalating physical risks. Collateral is a crucial tool to mitigate

potential losses for banks. However, climate-related damage affects both firms and their collateral. Inadequately insured collateral may not effectively mitigate losses, increasing potential risks for banks. This highlights the interconnectedness of climate-related risks, the financial sector, and collateral as a risk management tool.

Transition risks arise from the shift to a low-carbon economy. This transition involves reducing high-carbon product production and consumption, improving energy efficiency, and adopting low-carbon energy sources. Implementing emission reductions poses trade-offs and introduces transition risks. Failing to transition would increase physical climate risks over time. Conversely, abrupt policy changes could devalue investments in carbon-intensive industries, creating "carbon stranded assets". These stranded assets, mainly associated with high-carbon companies, could incur higher costs and reduced revenues, impacting asset prices and economic stability.

A successful transition depends on substantial investments in low-carbon energy production. Insufficient investments, coupled with abrupt policy changes, could lead to significant asset price declines, particularly for fossil fuels and related companies. Managing these transition risks is crucial for economic and financial stability during the shift to a low-carbon economy.

The rise in climate-related litigation underscores the financial risks associated with climate change. Various types of climate-related claims have emerged, including those alleging violations of fundamental rights, questioning the roles of specific entities in climate action, demanding environmental assessments in decision-making, asserting breaches of disclosure obligations, pursuing breach of contract claims related to green financial products, and seeking damages for alleged negligence and public nuisance.

Climate-related litigation gives rise to direct and indirect costs. Direct costs, incurred when an institution is directly involved in litigation, encompass pay-outs, fines, legal and administrative fees, insurance costs, financing costs, and reputational costs. Indirect costs occur when third parties are involved in the litigation, impacting institutions through potential client exposure to litigation risk.

The ECB, as a banking supervisor, faces both direct and indirect costs linked to climate-related litigation. However, the complexity of climate-related litigation,

its evolving legal landscape, subjective factors influencing legal actions, and the lack of historical data make it challenging for the ECB to accurately assess future risks. Forward-looking methodologies are considered more appropriate for understanding this intricate landscape, but they too face hurdles in predicting the likelihood of claims or investigations. The relatively low incidence of climate-related litigation targeting financial institutions does not guarantee immunity from future cases, especially with the increasing severity of climate change impacts.

Central banks are exploring strategies to address climate change complexities, and in this sense the ECB must operate within its Treaties-defined competences, ensuring it does not take on responsibilities beyond those explicitly transferred or assigned to other EU institutions, especially the Union legislature.

The ECB's primary mandate is maintaining price stability above all else, even in cases of conflicting objectives. This is reinforced by the TFEU and the Court of Justice. However, while the environment may not seem directly related to price stability, the CJEU has ruled that the ECB can consider factors necessary for its primary objective while pursuing it.

President Lagarde and ECB Executive Board members have highlighted the impact of climate change on price stability. Climate change-related actions may be justified under Article 127(1) TFEU if they relate to the primary objective of price stability. Just as preserving the transmission mechanism falls within the ECB's mandate, actions that affect its ability to ensure price stability could also be justified, provided they serve the primary objective. The ECB's actions on climate change would have an "indirect effect" on the environment while still falling within its mandate for price stability.

Article 127(1) TFEU outlines the ECB's primary mission of maintaining price stability while also mentioning its secondary objective of supporting "general economic policies in the Union".

The wording of Article 127(1) TFEU does not obligate the ECB to directly support the Union's objectives, including environmental ones. Instead, the ECB indirectly supports these objectives by endorsing the relevant economic policies formulated by competent institutions. Thus, the ECB's role is limited to contributing to the Union's objectives indirectly through economic policies, with the actual

implementation and realisation of these objectives being the responsibility of competent authorities.

Article 11 TFEU requires the integration of environmental protection requirements into the Union's policies and activities, emphasising sustainable development. The Court of Justice considers this provision obligatory and relevant across various areas of Union policy. While Article 11 TFEU allows Union institutions to consider environmental factors in various policies, it does not grant the ECB autonomous competence to enact environmental measures. The ECB's actions related to environmental protection must align with its primary objective of maintaining price stability.

Furthermore, Article 7 TFEU underscores the need for consistency between the EU's policies and actions, providing a rationale for the ECB to align its policies with broader EU objectives, such as the Green Deal and carbon-neutrality commitments.

Climate-related risks directly impact financial stability by causing credit risk, underwriting and liquidity risks for financial institutions. Acknowledging these risks, regulatory authorities are increasingly recognising their significance in the financial sector. In the EU, legislative changes and the reform of the ESAs mandate the consideration of environmental factors, specifically climate change, in financial supervision.

EU law, which governs financial supervision, makes supervisory authorities, including the ECB and the ESAs, directly subordinate to EU primary law. While financial supervision primarily focuses on monetary and economic stability, recent changes have mandated the integration of environmental considerations into financial supervision.

These amendments require the ESAs to consider technological innovation, sustainable business models, and the integration of ESG factors, empower the ESAs to draft technical standards encouraging market actors to integrate sustainability considerations into their strategies, and promote sustainable finance, contribute to a forward-looking risk assessment, and strengthen the connection between finance, society, and the environment. However, they still lack specific objectives, benchmarks, or an accountability framework for sustainability.

The Eurosystem conducted a thorough review of its monetary implementation framework in its 2021 strategy review. This review aimed to assess how climate change might impact its operations. Specifically, the Eurosystem looked into collateralised lending operations and outright asset purchases, both of which carry distinct risks. While the primary responsibility for addressing climate change falls on the EU legislature, the Eurosystem aims to contribute to the EU's response to climate change through several key measures:

One significant measure involves making climate change reporting a mandatory criterion for determining collateral eligibility. This requirement will apply to assets issued by entities falling under the CSRD, thereby expanding the range of economic entities obligated to adhere to stringent reporting standards.

Additionally, the Eurosystem conducted a comprehensive climate stress test on its own balance sheet. The objective of this exercise was to establish a framework for quantifying the risks associated with climate change. These climate risk stress tests are expected to become a recurring exercise in the future, ensuring a continuous evaluation of the system's vulnerability to climate-related factors.

The Eurosystem also recalibrated its collateral framework by adjusting valuation practices for marketable assets and revising haircut methodologies. This adaptation aimed to better integrate climate-related risks into the assessment process. It was complemented by the imposition of specific limits on collateral pools linked to counterparties.

Furthermore, the composition of corporate bonds in the Eurosystem's monetary policy portfolios underwent adjustments. This involved increasing the allocation of bonds issued by companies with strong disclosure practices, low emissions profiles, and a clear commitment to ambitious decarbonisation objectives.

Finally, the ECB remains committed to reducing its carbon footprint, contributing to positive environmental transformations.

These measures collectively illustrate the Eurosystem's dedication to addressing climate change and its recognition of the financial implications of climate-related factors within its operations. While the primary responsibility for climate action

lies with the EU legislature, the Eurosystem seeks to actively contribute to the EU's collective response to this critical challenge.