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POLICY REPORT

Financing the green transition

Increasing bankability, phasing out carbon investments and funding 'never-bankable' activities

[tra:ce]
International Center for Sustainable and Just Transformation
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Abbreviations

ABS	Asset-Backed Securities
CLO	Collateralized Loan Obligations
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CSRD	Corporate Sustainability Reporting Directive
CWT	Carbon Wealth Tax
EBA	European Banking Authority
ECB	European Central Bank
EIB	European Investment Bank
EIOPA	European Insurance and Occupational Pensions Authority
ESG	Environmental, Social, and Governance
ESMA	European Securities and Markets Authority
ESRB	European Systemic Risk Board
EU	European Union
EU ETS	European Union Emissions Trading System
GHG	Greenhouse Gas
IEA	International Energy Agency
IFD	Investment Firms Directive
IFR	Investment Firms Regulation
MDB	Multilateral Development Bank
NBFI	Non-Bank Financial Institutions
PV	Photovoltaic
RRF	Recovery and Resilience Facility
SFDR	Sustainable Finance Disclosure Regulation
SPV	Special Purpose Vehicle
TLTRO	Targeted Longer-Term Refinancing Operation

Executive Summary

The environmental and climate crisis is one of the greatest challenges of our time. Limiting the consequences will only be possible through a fundamental restructuring of state, economy, and society in a socially just and ecologically sustainable manner, a process that will require a massive redirection of financial flows from high greenhouse gas (GHG) emitting activities to green activities. The ***global green financing gap is immense:*** By 2030, it will cost between USD 8 trillion and USD 9 trillion to advance the transformation towards a sustainable world (Climate Policy Initiative 2023). Over the next five years, additional investments of EUR 370 billion will be needed in the EU alone. This shortfall is all the more glaring in view of the massive amount of capital still flowing into activities that generate high GHG emissions.

This policy report is based on research conducted between 2022 and 2025 by a team of researchers from Witten/Herdecke University and the Institute for Ecological Economy Research (Institut für ökologische Wirtschaftsforschung, IÖW). The project ***aimed to propose financial policy instruments and strategies that would enable and accelerate the transition towards a net zero economy by 2050***. The research team interviewed 88 experts from policy making and administration, the financial sector, and civil society. Insights were also gained through the analysis of 330 relevant documents as well as participation in specialist events and informal bilateral meetings with various stakeholders.

Why does this green financing gap exist despite intensified efforts in recent years to mobilize resources, particularly at the European level? The analysis shows that ***the problem lies not in the lack of capital, but in the lack of bankable green projects. Bankability*** refers to the capacity of an asset to secure funding. It involves assessing whether an investment in the productive economy or financial assets is profitable enough to meet the investor's expectations and whether it presents an acceptable level of financial risk. Contrary to what the term suggests, bankable investments are not limited to private and public banks. Investors can also be non-bank financial institutions (NBFIs), or so-called shadow banks, such as investment banks, hedge funds, asset managers, pension funds or (re)insurance companies.

Increases in green lending and investments by banks and other financial institutions remain negligible because ***green assets fail to meet the desired risk-return profiles*** of these lenders. In other words, they view the assets of many green companies and projects as "non-bankable". ***High-GHG-emitting investments are considered profitable and low risk.*** To date, climate-related and environmental risks have not been adequately factored into the investment decisions of banks and investors.

In current demands for more private financing of the green transformation there is an implicit assumption that all sustainable activities have the potential to become bankable. This, however, is not the case. ***Many activities necessary for the green transformation are unlikely to ever become bankable***.

Based on our analysis, we propose a classification that considers two criteria:

a) Is the activity green or does it generate high GHG emissions?

b) Is it bankable, not yet bankable, or never bankable?

This taxonomy, which results in six categories, makes it possible to systematically assign activities to specific financing challenges. Accordingly, it forms the basis for targeted monetary and financial policy recommendations. The fields highlighted indicate activities with a particularly urgent need for action.

Table. Different types of activities in the green transition according to their bankability

	Green (sustainable)	**Harmful to the climate (high GHG emissions)**
Bankable	Investments that are already privately financed	Investments that must be phased out such as oil and gas exploration and production
Not yet bankable	Investments that are not yet bankable but can become so with political intervention such as offshore wind farms	Investments that no longer receive private funding
Never-bankable	Investments that will never be bankable such as biodiversity conservation	Investments that do not receive private funding

In order to close the financing gap, it is crucial to influence financial investments so that they lead to significantly more green investments and fewer investments that generate high GHG emissions. Accordingly, the project developed recommendations for a future-fit finance policy framework:

1. Targeted support to increase the bankability of green projects

Green activities that are not yet bankable require targeted political support. Examples of such support include reducing investment risks and increasing returns. This would make investments more attractive for private financial market actors. However, such interventions always involve the risk of privatizing profits and socializing risks or costs.

Taking this into consideration, we recommend the following course of action:

- *Creation of green targeted longer-term refinancing operations (TLTROs)*: The European Central Bank (ECB) should provide green credit facilities with interest rates below the key interest rate.
- *Expansion of financial guarantees*: The European Investment Bank (EIB) and national development banks should offer targeted guarantees for green investments.
- *Strengthening the EIB's risk-taking capacity*: EU Member States should allow for higher risk tolerance and credit margins for green projects.
- *Purchase of EIB green bonds by the ECB*: This would significantly increase the EIB's financial scope to support not yet bankable but necessary green activities.

- *Setting minimum quotas for green loans*: The EU should create a legal basis for introducing mandatory lending quotas to require financial institutions to allocate a set share of their financing to green initiatives.

2. Measures to disincentivize high-GHG-emitting investments

To divert capital flows away from emission-intensive sectors, risks must be increased and returns must be reduced. To this end, we propose the following interventions:

- *Steps should be taken to curb carbon capital mobility*. Analogous to "Know Your Customer" (KYC) policies, relevant regulatory bodies should introduce "Know Your CO_2" principles ($KYCO_2$) and comprehensive emissions reporting requirements (including indirect emissions covered under Scope 3).
- *Higher capital requirements should be adopted* and incorporated into microprudential banking and NBFI regulations to address high-GHG-emitting activities.
- *Climate-related maximum exposure limits and systemic risk buffers* should be integrated into macroprudential banking and NBFI regulation and supervision.
- *Mandatory transition plans* should be integrated into macroprudential regulation and supervision.
- *High-GHG-emitting assets should be progressively excluded* from the ECB's collateral framework.
- *High-GHG-emitting assets should no longer be eligible for securitization.*

3. Provision of public funds for never-bankable green investments

Activities such as peatland protection, infrastructure for non-motorized mobility or flood protection cannot be financed by private funds or only to a very limited extent. Therefore, they must be financed with public funds. We recommend:

- *The establishment of a European climate fund.* With a conservative estimate of at least €200 billion by 2030, EU member states should finance green activities that will never be bankable.
- *A Green Golden Rule:* Investments in climate and environmental protection should not be counted towards fiscal rules.

Financial policy as part of a broad policy mix

There is no quick fix for financing sustainable transformations. None of the recommended policy measures would be sufficient on their own to significantly increase the necessary green financing or to substantially reduce the financing of high-GHG-emitting activities. Instead, the measures should ideally be combined and understood as part of a broader policy mix that also includes other instruments such as the European emissions trading system.

A key finding of the project concerns the limits of sustainable finance. It is crucial for the green transformation to increase the available financial resources for green projects and companies, as well as to reduce the financing of high-GHG-emitting projects and companies. However, financial policy approaches have limitations (Aguila/ Wullweber 2024). Financial and monetary policy should therefore be complemented by fiscal, sectoral, innovation, and industrial policies aimed at sustainably transforming the state, economy, and society.

Foreword: Financing the Future

by Anna-Katharina Hornidge

Bonn, 11 June 2025. Transforming our economic and social systems in ways that stabilise our global climate, halt biodiversity loss, and sustainably ensure life within our planetary boundaries is a major undertaking. And it is conditional on political will, societal support, and the finance required to leverage the change.

The direction of transformation for ecological, economic, and socially sustainable development is laid out in the 2030 Agenda with its seventeen Sustainable Development Goals decided on by the international community of states in 2015 at the United Nations General Assembly in New York. Yet, progress in reaching these seventeen goals is far from realizing the self-set ambitions. Instead, as asserted by the community of states at the Agenda's halftime point in 2023: We are substantially off track! The Global Sustainable Development Report 2023 speaks of 'stagnation in the face of multiple crises' (p. 1). In 2024, the UN assessed 17% of the 169 targets as overall on track. An estimated 18% showed moderate progress, 30% marginal progress, 18% stagnation and 17% regression. So 'off track' and yet there is progress (even though marginal) with regard to about 65% of the targets. And this despite a global pandemic that led to lockdowns and substantial economic and political disruptions on all continents; a war of aggression by Russia in Ukraine; open conflicts and war in Israel and Gaza, Sudan, Ethiopia, and Congo; hurricanes and floods in Hawaii, Bangladesh, and Pakistan; and heatwaves and droughts in South Asia and Sub-Saharan Africa, just to name a few of the crises facing our world.

Our world is indeed in crisis. While in terms of climate change, 2024 was the first year in which average global temperatures exceeded the 1.5°C warming limit, as the 'super election year', the same period witnessed a further global shift towards authoritarian and nationalistic policy-making. Liberal democratic values and an open, rules-based international order are increasingly being questioned and systematically undermined. Disruptive and divisive policy-making, which is pushing our multipolar world into situations of (destructive) competition, seems to trump constructive cooperation, while being connected with and enabled by a rule-based international order and the universal multilateral structures of the United Nations.The global ecological and indeed planetary challenges that are now facing humanity go hand in hand with geopolitical rivalries that threaten to further weaken, if not fully undermine, the multilateral structures so desperately needed to jointly deal with these challenges.

Joscha Wullweber and colleagues address this dire geopolitical situation by firmly arguing their position: The transformation of our production and consumption systems towards sustainability is an absolute must. It is the 'conditio sine qua non' for the future of our planet and for us all. From among the different levers and fields of transformation identified by the Independent Group of Scientists and presented to the Secretary General of the United Nations in the Global Sustainable Development Report 2019, the team focuses on finance. More concretely they focus on sustainable finance, on the 'bankability' of transformational processes, and on the phasing out of ecologically unsustainable investments.

By doing so, their study targets 'where it hurts': In order to move forward on stabilising our global climate, investments in climate stabilising technologies, energy systems, and consumer products have to become financially viable. Public funds alone are simply not anywhere near sufficient to finance the shift.

These public funds must be increased significantly. At the same time, private capital, the banking sector, and market forces must be held much more accountable. The state can and should support and guide this process by providing incentives and guarantees, while also imposing strong regulations and bans to make climate-damaging investments unprofitable. How to make that happen, Joscha Wullweber and colleagues lay out below. A must read for academics, policy-makers, and practitioners for sustainable futures!

Anna-Katharina Hornidge is Director of the German Institute of Development and Sustainability (IDOS) and Professor of Global Sustainable Development at the University of Bonn. She is chair of the Sustainable Development Solutions Network (SDSN) Germany and co-chair of the German Advisory Council on Global Change (WBGU).

1 Introduction

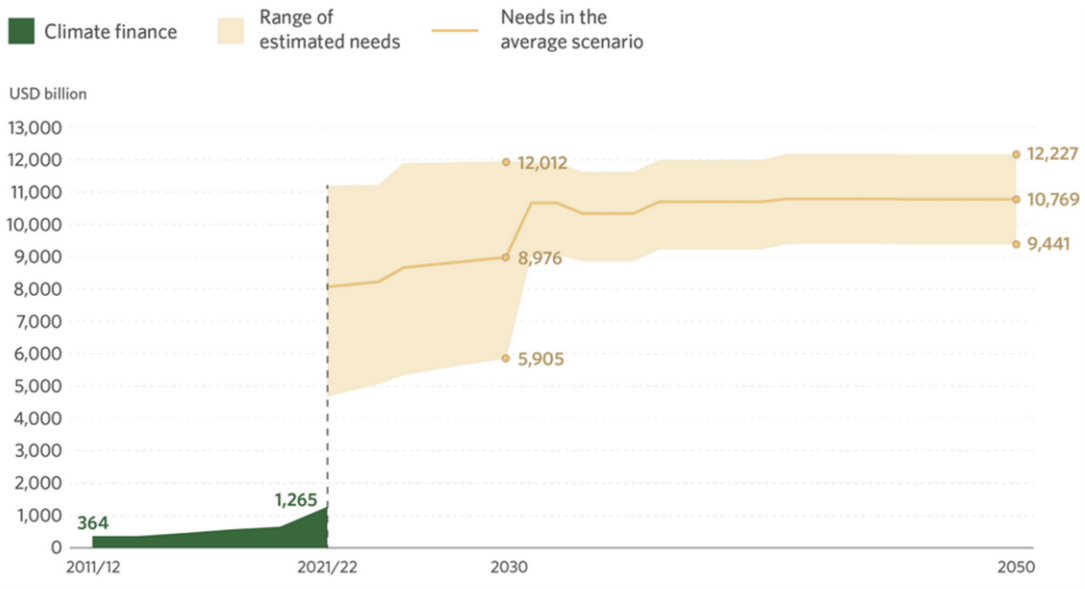
'I don't actually think we have a lack of funding out there. I think we have a lack of bankable [...] projects´(interview 49).

We are already in the midst of the climate crisis: The warming of the atmosphere and the world's oceans is leading to an increase in destructive storms, floods, and hurricanes. Rising summer temperatures are causing droughts and crop failures while accelerating forest dieback, amplifying wildfires, and making rivers unnavigable. Under current policies, the world is on course for a global average temperature rise of 2.7 to 4 degrees Celsius by 2100 (IPCC 2023). Temperature surges of this magnitude will have severe economic, social, and environmental impacts that threaten the destruction of livelihoods and biodiversity. Over the past decade, climate damages due to extreme weather events have already cost the global economy more than USD two trillion Newman and Noy 2023; Oxera 2024). The longer effective measures to curb greenhouse gas emissions are delayed, the more expensive the necessary transformation will be (IPCC 2023).

Green gap financing

Sustainable and socially just transformation of state, economy and society is essential to prevent the climate crisis from spiralling into ever more severe disasters. This, however, requires extensive investments. Despite growing awareness of the severity of the sustainability crisis, there is still an enormous gap between the estimated investments needed to drive the green transition and current spending: Germany alone is estimated to require an additional amount of at least EUR 60-100 billion annually in green investments through 2034 Agora Think Tanks 2024; Dullien et al. 2024). On a wider scale, the European Commission estimates that by 2030 financing the green transition in the European Union will require an additional annual amount of at least EUR 370 billion (Lagarde 2023; EC n.d.). Estimates on global green investment needs by 2030 have been placed at between USD 8 and USD 9 trillion, an enormous figure USD 1.265 trillion (CPI 2023, see Figure 1).

Figure 1. Estimated financing needs for the global green transition



Source: Climate Policy Initiative (2023)

At the same time, financial investors have not decreased financial flows to high greenhouse gas (GHG)-emitting firms and projects. On the contrary, they have been backing away from their promises to shift financial flows from high-GHG-emitting to green sectors. This is evidenced, for example, by the increasing pattern of withdrawals from climate initiatives such as the Glasgow Financial Alliance for Net Zero (Buller 2025; Mack 2023; Mundy 2025).

In this report, we define "high-GHG-emitting" firms and projects as those that are inconsistent with a 2050 net zero GHG emissions target and above the threshold defined by widely used climate and transition policy scenarios. Conversely, we define "green" activities as those that are consistent with a net zero GHG emissions target for 2050 and in line with the threshold defined by widely used climate policy scenarios. Ultimately, the question of what is considered "green" and "high-GHG-emitting" is part of a social negotiation process and therefore a political issue.

Current policy and legislation are not closing the gap

Since sustainable finance became a topic of debate, the assumption has tended to prevail in many European policy circles that it is primarily the lack of information that prevented investors from correctly assessing climate-related and environmental risks, the belief being that the misallocation of capital can be mitigated by improving the production of data and modelling techniques (Baioni et al. 2025; Christophers 2017). Against this background, the European Commission has proposed a wide range of regulations to increase the availability and quality of information for investors. Proposals that have meanwhile been adopted by the European Parliament include, among others, the EU taxonomy for sustainable activities, the Sustainable Finance Disclosure Regulation (SFDR), the Corporate Sustainability Reporting Directive (CSRD) and the EU Green Bond Standard. Several green policies have also been implemented by the institutions responsible for monetary and financial policy, including the European Central Bank (ECB) and the European supervisory authorities, i.e. the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA), and the European Insurance and Occupational Pensions Authority (EIOPA).

Despite this wave of regulations, our research shows this approach to be far from sufficient. There has been no significant narrowing of the huge gap in green financing or reduction in the high volume of high GHG investments. Not only is the pace of green lending far too slow, (Altavilla et al. 2023; EBA 2021; ECB 2024a), but financing of high-GHG-emitting activities by banks, institutional investors, and other financial actors is on the rise (Ameli et al. 2020; Christophers 2019, 2024; Kedward et al. 2020; RAN et al. 2024).

Against this backdrop, our research project aims to identify policy instruments, strategies, and regulatory approaches that can effectively redirect financial flows from unsustainable to green investments, and to explore options to generate additional funds for climate adaptation and mitigation measures that are not attractive to private funding.

Bankability and beyond – the report's outline and argument

This policy report is based on a three-year research project (for details see section 2). In the course of our research, we found that the main reason for the lack of investment in sustainable transformation is strongly related to the issue of 'bankability', that is, considerations on the part of financial investors about the risk-return profile of loans, bonds, and other financial assets (see section 4). Bankability is not confined to the realm of banks, but extends to other financial investors as well. In this report, the term bankability therefore also refers to what is sometimes known as 'investability'. Green firms and projects often lack bankability, as they fail to meet the risk-return

profiles sought by private capital, either because they are not sufficiently profitable, or because they are considered too risky (section 5). At the same time, high-GHG-emitting firms and projects, which need to be phased out in order to meet climate targets, continue to be bankable. Because they remain highly profitable and have not experienced the expected increases in risk, they are still being funded by banks and other financial institutions (see section 6). In addition, at least for the foreseeable future, there is no bankable potential in a large number of green activities that are absolutely necessary for the green transition.

Our findings reveal shortcomings in the current policy and regulatory frameworks and suggest avenues for future policymaking efforts. Most existing sustainable finance regulations have neither a positive impact on the bankability of green activities nor a negative impact on the bankability of those that generate high GHG emissions. Therefore, if financial flows are to be influenced so as to increase green investments, it is essential to create policies or regulations that improve the bankability of green firms and projects while making high-GHG-producing firms and projects less bankable.

Moreover, there is no basis for the assumption implicit in contemporary calls for more private finance that all sustainable activities are potentially bankable. Many activities necessary for the green transition will never be bankable. As current policies do not sufficiently address this problem, we also offer suggestions for effectively financing never-bankable activities. We focus on three fields that we consider crucial for steering financial flows in more sustainable directions and discuss each in turn in the following sections. In our estimation, these three fields, which are highlighted in grey in Table 1 below, require additional policy action. The Policy Report addresses the following questions:

A. What possibilities exist to make green investments bankable (section 5)?

B. How can investments in high-GHG-emitting firms and projects be phased out (section 6)?

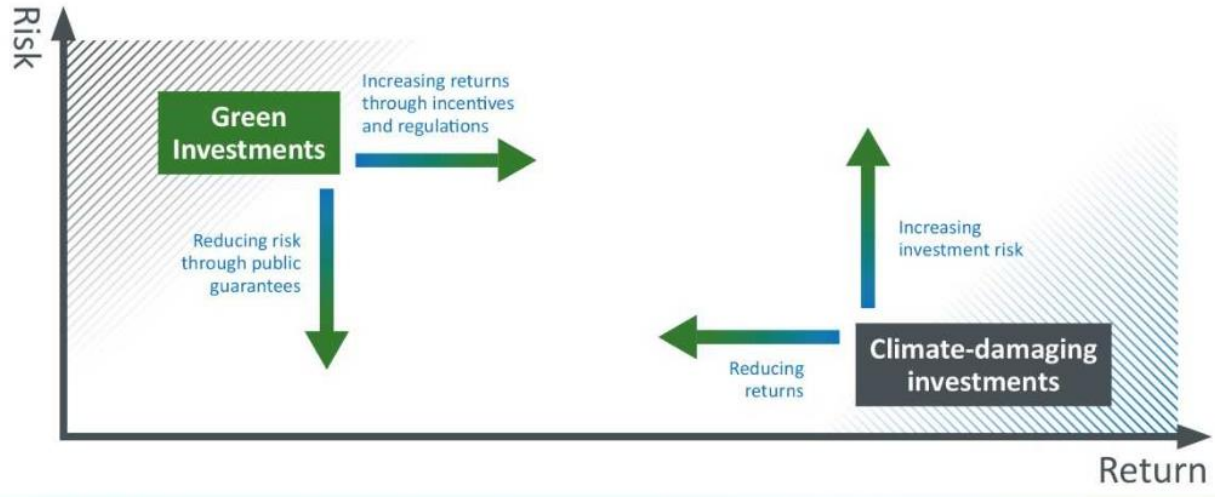
C. How can investment in never-bankable activities be financed (section 7)?

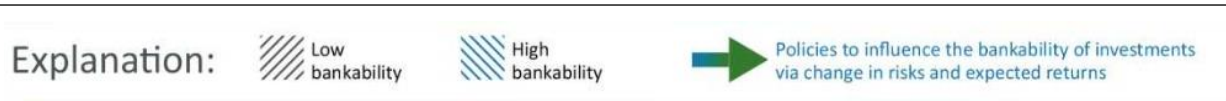
Table 1. Different types of activities based on their bankability and GHG emissions

	Green (sustainable) activities	High-GHG-emitting activities
Bankable	Investments that already receive private funding	C. Investments that must be phased out
Not yet bankable	A. Investments that can become bankable with the support of policy instruments	Investments that no longer receive private funding
Never-bankable	B. Investments that will never be bankable	Investments that no longer receive private funding

The following Figure 2 shows how policies in the sense of A and B can influence the bankability of investments.

Figure 2. Financing the green transition. How policy can influence the bankability of investments.





Source: Authors' own elaboration

Although the principal focus of this policy report is on financial and monetary policies with a positive impact on green investments on the one hand, and a negative impact on GHG producing activities on the other, it is not our intention to imply that such policies alone would suffice on their own to drive the green transition. On the contrary, we believe that to be effective, strategies toward carbon neutrality must coordinate financial and monetary policy with fiscal, innovation, and industrial policy in a synergetic combination.

As one interviewee from the banking sector stated: 'I think the idea of going through the financial sector is the right one. … The idea of solving it exclusively through this is wrong' (interview 9). In this sense, we use boxes throughout the report to also call attention to policy instruments beyond traditional financial policy measures that can contribute to maximizing the overall impact.

2 Context of the research and methodology

This policy report was developed within the framework of the research project Climate change and global finance at the crossroads: Policy challenges, politico-economic dynamics, and sustainable transformation, which was funded by German Federal Ministry of Research, Technology and Space (BMFTR) under the project line Climate Protection and Finance (KlimFi). Prof. Dr. Joscha Wullweber also received support from the German Research Foundation (Deutsche Forschungsgemeinschaft DFG) under the Heisenberg Professorship Programme.

Research was conducted from autumn 2022 to summer 2025, in a joint partnership between teams of researchers from the Witten/Herdecke University and the German Institute for Ecological Economy Research (Institut für ökologische Wirtschaftsforschung IÖW). The project objective was to examine the connections between the financial system and climate change through an interdisciplinary and multimethod approach focusing mainly on developments in the area of European and German sustainable finance. Based on analyses of opinions expressed by financial experts about regulatory, fiscal, monetary, and societal pressures, the project has developed a number of proposals for policies and policy mixes that align financial market dynamics with climate policy objectives in an effort to accelerate the transition to a Paris-aligned economy. The policy recommendations based on the project's key research findings are detailed below.

Our study drew on data gathered in a combination of qualitative data collection techniques and a variety of other methods, including semi-structured interviews and in-depth document analysis. To complement the research, the analysis was informed by participation in a series of events and informal bilateral meetings with a wide range of diverse stakeholders. The combination of research approaches and data sources provided the project with deep insight into the challenges and opportunities that exist in aligning the financial sector with climate and environmental goals.

A core component of the research involved conducting semi-structured interviews with financial practitioners, public sector officials, and representatives from civil society organizations (CSOs) active in the sphere of sustainable finance. Over the course of the project, we conducted interviews in Europe and the United States with 88 stakeholders, including 48 practitioners from private financial institutions in divisions related to sustainability (21 of whom work for banks), 16 public sector professionals from areas related to finance (including, among others, representatives of central banks and the European Commission), and 24 staff members of civil society organizations (including, among others, social movements, think tanks, and lobby groups) with a focus on the environmental and/or financial topics. A list of interviewees is appended to this report (see Appendix 1). In the interest of confidentiality, interviewees are identified only by their position, the type of institution or organization they work for, and the country in which it is located. The interviews were transcribed and analyzed using inductive content analysis, supported by the qualitative analysis software MAXQDA.

To complement the interviews, the project analyzed over 330 documents issued by European advisory and legislative bodies, central banks, financial industry associations, and

CSOs. These documents provided critical context for gaining insight into regulatory and institutional dynamics, including the role of the European Central Bank (ECB), the European Banking Authority (EBA), and other key actors in the field of sustainable finance. To obtain a comprehensive, in-depth understanding of the strategies and discourses used within the current regulatory framework, we also analyzed official communications from the European Commission and the ECB, including action plans, board member speeches from the past decade, and progress reports on the Capital Markets Union and the EU sustainable finance agenda. Moreover, we triangulated our findings with relevant literature from the fields of (international) political economy, economics, economic geography, and transition studies, as well as from other branches of the social sciences and the financial press. The project also incorporated insights from three Policy Innovation Lab meetings, a collaborative initiative among stakeholders from academia, civil society, the financial sector, and public institutions that served to guide and advise the research process.[1]

A series of academic publications constitute a key output from our research (Aguila/ Haufe/ Wullweber 2024; Aguila/ Wullweber 2024, 2025; Aguila et al. 2025, Baioni et al. 2025; Fichtner et al. 2025; Schairer et al. 2025; Urban et al. 2025). This report contains a synthesis of the findings gained from these articles and the research project more broadly, and provides recommendations based on these findings for advancing green investment and the transition to a decarbonized economy.

[1] Policy Innovation Lab members were involved in the development of the project from its inception and provided critical advice throughout. In this way, the group played a central role in providing practical and theoretical knowledge and expertise to the project as a whole. As a result, the project was guided in its research by an ongoing process of experienced expert commentary, evaluation, and revision. This ensured that each stage of the research process was informed by the knowledge and expertise of non-academic practitioners.

3 Overview of relevant current policies and regulations in the context of sustainable finance

With the establishment of the High-Level Expert Group on Sustainable Finance in 2016, the European Union initiated a substantive regulatory effort in the field of sustainable finance. At its core, the sustainable finance agenda aims to address the misallocation of capital among companies that conduct green and non-green activities. Such misallocation is thought to stem from market failure due to the lack of information that leads to asset mispricing and thus to investment preferences for carbon-intensive activities (Christophers, 2017; interviews 19, 22, 27, 38). One interviewee stated that 'SFDR is [...] a disclosure and transparency regime versus a regime aimed at redirecting flows' (interview 27). Similarly, a European Commission official explained that 'there's very little in terms of really prudential rules or other kinds of rules to change the behaviour of companies. [...] It's all about transparency, reporting data, all of that. [...] We want to leave it to the markets, in the end, to decide which activities to change or phase out' (interview 19). As the report shows, this approach is problematic insofar as it has failed to close the green finance gap or, to any substantial degree, to divert money away from climate-damaging investments.

Within the scope of its sustainable finance regulatory initiative to build awareness and increase transparency, the EU took the following steps (Busch/ Ferrarini/ Grünewald 2021; Ahlström/ Monciardini 2022): First, it introduced an EU Taxonomy to establish criteria for activities that significantly contribute to climate change mitigation, adaptation, and other environmental goals. Second, it implemented measures including the SFDR and the CSRD together with the European Sustainability Reporting Standards (ESRS) in a disclosure framework designed for financial and non-financial institutions to provide investors with sustainability-related information. Third, it established a standardized voluntary approach to green bond issuance to increase its credibility. Fourth, it developed sustainability guidelines including the EU Climate Transition Benchmark and the EU Paris-Aligned Benchmark to serve as reference indices to help investors align their portfolios with climate objectives. Fifth, it introduced a regulation to enhance the transparency and reliability of Environmental, Social, and Governance (ESG) ratings. Finally, it integrated sustainability considerations into existing EU financial regulations, most notably into the prudential frameworks for banks (Capital Requirements Regulation [CRR III] and Capital Requirements Directive [CRD VI]) and for insurance and reinsurance undertakings (Solvency II).

The ECB, for its part, has introduced sustainability considerations into its supervision and monetary policy (see Aguila/ Wullweber 2025). With respect to supervision, in 2020, the ECB published a comprehensive guide on climate-related and environmental risks outlining expectations on how they should be dealt with by European banks. Climate-related and environmental financial risks affect real and financial economy assets through physical risks, when sudden and long-term effects of climate change materialize, through transition risks, when policies, technological change or consumer preferences shift, or through litigation risks, when firms are sued for climate-related corporate misconduct (Carney, 2015). After a self-assessment exercise for banks on the basis

of this guide fell short of expectations (ECB 2021), the ECB continued to monitor banks' compliance and published supervisory reports. The strategy review published by the ECB in 2021 focused on strengthening analytical capacities (e.g. with the establishment of the ECB climate change centre). In 2022, the ECB conducted a stress test analysis to assess the physical and transition risks faced by European banks (ECB 2022). Regarding monetary policy, the ECB began accepting sustainability-linked bonds as collateral in 2021 and from October 2022 to December 2024 tilted its corporate bond purchase programme to decarbonize its monetary policy portfolio.

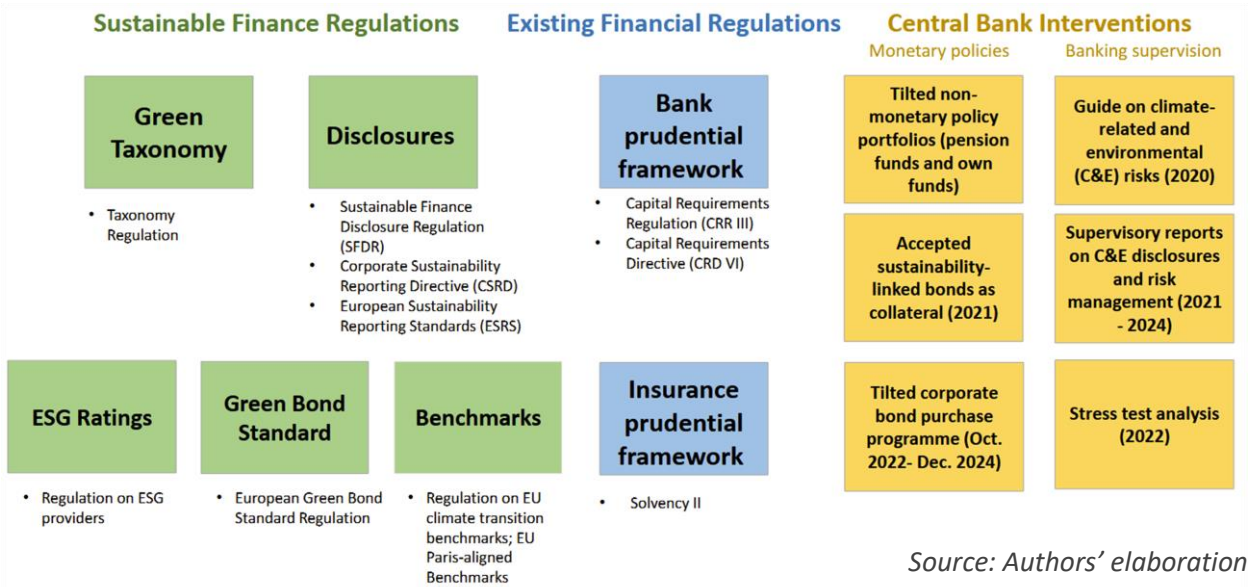
Figure 3 summarizes the various sustainable finance policies and regulations that have been introduced at the EU level.

Considering that the measures introduced so far have not succeeded in directly affecting the risk-return profiles of green and high-GHG-emitting investments, nor in mobilizing the funds necessary for non-bankable activities, we argue that the current EU sustainable finance policy framework has little if any impact on shifting financial flows away from climate-damaging investments, and is far from sufficient to adequately incentivize green investments. This conclusion was confirmed in numerous interviews that we conducted with EC public officials who acknowledged the difficulty faced under current policies to achieve the ambitious decarbonization targets set by the EU for 2030 and 2050. As expressed by one senior public official:

I think we will not be able to achieve the goals that we've set ourselves [...] for 2030 at least. [...] I think there will be a major question when we realize that we're simply not going to get where we need to get. And that will be a huge, huge political question (interview 19).

In anticipation of a window of opportunity to address this political question, the report offers suggestions to supplement the current framework with research-based policies specifically developed to stimulate progress in the reallocation of funds toward decarbonization targets.

Figure 3. Relevant sustainable finance policies and regulations



Source: Authors' elaboration

Box 1. Decarbonization policies aimed at the productive economy

There is a broad mix of policy instruments outside the realm of finance that is aimed at decarbonizing the productive economy. In various ways, such instruments interact with and support the sustainable finance policies discussed in the foregoing section. One of the most important of these is the pricing of carbon emissions in an effort to shift the social cost of emissions to the entity responsible for producing the emissions, a process called 'internalizing the externalities'. Carbon pricing can take the form of a carbon tax or an emission trading scheme (Stiglitz et al. 2017). In 2005, opting for the latter strategy, the EU introduced the Emissions Trading System(EU ETS), that has since become a cornerstone of EU climate policy (Skjærseth/ Wettestad 2009).

The core idea of a trading system is that overall emissions from the included sectors are capped, and that the cap declines over time in line with climate policy targets. Companies that reduce their emissions below their allocated allowances can sell the unused part of their allowance to other companies that find it more difficult or costly to decrease their emissions. This lowers the overall cost of meeting the cap in comparison to an arrangement in which every company would have to reduce emissions by the same amount (Grubb/ Hourcade/ Neuhoff 2014). While the EU ETS directive has contributed to reducing EU carbon emissions in the covered sectors, the allowance prices have so far been too low to make investments in high-carbon assets or industries unprofitable (Grubb/ Hourcade/ Neuhoff 2014). From a political economy perspective, the core problem of very high carbon prices that push up energy prices for industry and consumers is that they are politically challenging: They increase inflation, are socially regressive, and face resistance by both consumers as well as industry (interviews 26, 28, 75).

Moreover, research also confirms that emissions trading schemes alone would not suffice to achieve decarbonization of the entire economy in line with EU net-zero goals (Rosenbloom et al. 2020; Nerlich et al. 2025). There are several reasons for this: (1) Carbon pricing frames climate change as a market failure rather than as a fundamental systemic problem. (2) It is more of a quick fix strategy that fails to address the root causes of the problem, placing undue weight on economic efficiency rather than environmental effectiveness (Patt/ Lilliestam 2018). (3) Rather than driving transformation, it tends, in practice, to stimulate the optimization of existing systems, e.g., by not providing incentives for radical innovation, or by continuing to enable investments in long-lived carbon-intensive infrastructures such as natural gas. (4) Instead of context-sensitive policies, it suggests a universal approach that is unrealistic and problematic. (5) To regard carbon pricing as the main or only climate policy tool capable of achieving global climate goals fails to reflect political realities, considering the strong resistance that decarbonization faces from incumbent industry players (Rosenbloom et al. 2020).

Other relevant areas of decarbonization policy beyond the scope of finance include intervention approaches in support of renewable energy as well as measures to advance the development and deployment of low carbon technologies (such as green hydrogen production and use as well as necessary infrastructure related to production and distribution). In addition, as repeatedly argued in existing research studies, alongside incentives to support low carbon innovation, policy agendas are also necessary to promote the proactive phase-out of high carbon activities (e.g. Kanger/ Sovacool/ Noorkõiv 2020; Kivimaa/ Kern 2016). Another important policy area covers emission targets as set out in the strict EU vehicle fleet emission standards that require the drastic reduction by 2035 of conventional internal combustion engine-powered vehicles. Insofar as such policies provide serious incentives for companies in the productive economy to step up their decarbonization efforts, they complement the financial policy instruments discussed in this report.

4 Understanding 'bankability'

Banks, institutional investors, and other financial actors continue to refrain from providing sufficient levels of green investment. By 2030, their failure to do so is projected to result in a staggering global gap in green financing of between USD 7 and USD 8 trillion per year (Altavilla et al. 2023; EBA 2021; ECB 2024a; Nerlich et al. 2025). What is more, they continue to finance high-GHG-emitting activities, with some even increasing their amount of investment in carbon-intensive sectors (Mack 2023; RAN et al. 2024; Rickmann et al. 2024). This raises the questions: Why are these actors providing insufficient funding for the green transition? And why do they continue to finance carbon-intensive firms and projects? According to our research, the reason is clear: **The problem lies in the fact that high-GHG-emitting investments continue to be considered bankable while many green firms and projects are not**.[2]

***Bankability** has many dimensions, but ultimately it is about whether an investment in the productive economy or financial assets is profitable enough to meet an investor's expectations with an acceptable level of financial risk.*

Financial risk can include political risk (planning certainty), credit (or default) risk, currency risk, interest rate risk, and liquidity risk.[3] As one interviewee from a large UK bank noted:

They [the investors] are going to look at the sustainable finance investment and think, okay, is this going to contribute to our firm's sustainability targets and is it going to drive profit? Does it have the right level of risk? (interview 45).

In this connection, for the sake of clarity, it merits mention that investors can be private or public banks, but also non-bank financial institutions (NBFIs) such as investment banks, hedge funds, asset managers, pension funds or reinsurance companies.

In the context of traditional activities of commercial banks, a firm or project is considered bankable if the bank is confident that the client will be able to repay the loan in due time at the agreed interest rate. Financial actors want to know as precisely as possible how much income the borrowers will generate, and over what period of time, in order to assess their debt-servicing capacity (Christophers 2024). Proper repayment is expected if the borrowers plan to invest the money in a highly profitable and low risk undertaking that is expected to create the stream of funds necessary for repayment, and/or if they have sufficient equity or can post enough quality collateral to ensure repayment.

Most bank loans to business firms are so-called general-purpose corporate loans that are used for general firm expenses. Loans for specific projects are less frequent. When financing green activities, banks can either provide green loans or underwrite green bonds, proceeds of which in both cases are tied to a specific purpose. However, at the overall corporate level, banks may also issue sustainability-linked loans or underwrite sustainability-linked bonds (SLBs) that are not tied to a specific use, but that require the borrowing firm

[2] For a definition of green and high-GHG-emitting investments see page 2.

[3] The bankability of a project is influenced by other factors as well, including degree of planning certainty, particularly with regard to the regulatory framework, and sometimes also social and environmental considerations. Ultimately, however, it is always the project's risk-return profile that is the determining factor.

to improve its results on certain key performance indicators. Banks and other financial investors apply creditworthiness analysis to both green and conventional investments, but additional reporting, disclosure, scrutiny, and monitoring makes these forms of green-labelled debt more costly to issue than their conventional counterparts (interviews 9, 21, 23, 26, 27, 31, 35, 36, 37, 41, 72/73, 74, 80, 81).

The case is slightly different for other financial instruments held by NBFIs. One of these is equity, which is particularly relevant in the context of this report. When buying stocks, long-term investors (such as pension funds or insurers) pay attention to the potential profitability of the stock-issuing firm in order to assess the probability of future dividends or capital gains. As a stock purchase makes investors part owners, they must also consider the prospect of bankruptcy. Gauging the likelihood of bankruptcy and the profitability potential of the stock-issuing firm are important factors in determining the willingness of investors to purchase stock. The same holds true for the private equity sector where it is common for private equity firms to buy out businesses in order to restructure them and sell them at a profit (Sissoko 2023). In contrast to long-term investors, short-term investors (such as hedge funds) focus on the expected evolution of the asset's price. In financial parlance, financial assets that meet investors' desired risk-return profiles are called 'investable'. However, for the present analysis we have chosen to use the term bankability instead in order to indicate clearly that our focus is on the financial sector, as 'investability' is a term that is only used for productive investments. In our analysis bankability refers both to the analysis of banks with regard to loans and debt instruments as well as that of banks and NBFIs concerning other financial assets.

Green firms and projects often fail to meet the risk-return profiles expected by the financial sector (interviews 8, 21, 26, 28/29, 31, 38, 39, 41, 42, 45, 46, 47, 49 54, 75, 79, 80, 81, 85, 87/88). This is because many green activities are considered either not sufficiently profitable or are too risky, due, for example, to their use of immature technologies or to their long-term investment horizon. One of our interviewees from a large UK bank neatly summarized the problems of financing green firms and projects in these words: 'So you have something quite low profitability, high risk, uncertainty. It's a lot of issues' (interview 39). In contrast to green activities, high-GHG-emitting firms and projects continue to remain bankable due to their higher profits and lower risks (interviews 68, 79, 80, 81, 82, 85, 87/88).

Sustainable investing: lower profits and higher risks

When evaluating the profitability of a green investment, one of the first aspects that investors consider is the expected returns. Estimates place the share of climate mitigation projects that meet the expected risk-return profile at only 40%. For adaptation projects the number falls to just 20% (Finance Watch 2024).

But even firms and projects with a favourable profit potential are plagued by a variety of risks that tend to discourage investors. Although renewable energy sources like solar photovoltaic systems (PV) and wind power have low operating costs and are meanwhile considered mature technologies, the financial returns of such projects are subject to market dynamics and policy decisions. This creates uncertainty with regard to the future profitability of renewable energy projects (Egli 2020). Retroactive changes in policies or regulations (such as feed-in tariffs or taxation) can also pose policy and regulatory risks that are mainly driven by policy credibility and future policy trajectory (Egli 2020).

The financial viability of a renewable energy project is also influenced by technology risks related to the maturity of a technology type, its design characteristics, and its stage of development as well as its resource capacity. While certain renewable energy technologies

such as onshore wind turbines and PV systems are considered relatively mature, emerging green technologies are riskier because, as one interviewee commented, they 'are often not well established or let's say, younger, less mature' (interview 39). Emerging solutions such as advanced energy storage, floating offshore wind turbines, and next-generation geothermal systems lack extensive real-world performance data, causing hesitancy among investors to finance them (Egli 2020; Gumber/ Egli/ Steffen 2025). Lithium-ion batteries, for instance, are expected to enhance grid stability, but concerns remain over their long-term durability and efficiency (Onabowale 2025). Technology risks generally decrease as markets are created and mature. More mature markets attract competition, leading to quality improvements (Egli 2020). As quality improves, the investment ecosystem expands, which, in turn, fosters relationships of trust among investors (Egli 2020; Gumber/ Egli/ Steffen 2025). This tendency can be seen in the case of solar PV systems and wind turbines. As assessment tools and data availability have improved, resource risks stemming from inaccurate estimates of solar irradiation and wind speed have generally become lower.

Green firms and projects that are small scale or confined to a local area tend to lack the minimum investment values required to justify transaction costs (Ameli et al. 2020; Gabor et al. 2019; Kedward/ Ryan-Collins/ Chenet 2020). Moreover, green projects carry risks due to their relatively longer time horizons that make their ability to generate sufficient profits uncertain. They are generally long-term commitments that exceed the time horizon in which most investors are willing to conduct business. The typical bank lending horizon, for example, is five to seven years, whereas the time frame for some green investments can extend beyond 15 or 25 years (interviews 26, 39).

The energy sector is one area where green investments are urgently needed. Conditions in this sector illustrate why green projects are less bankable than fossil fuel ventures. With renewables projects (primarily wind and solar PV) costs are mostly borne up front, while revenues are spread over a period of 20 years or more. In addition, renewable energy projects are more capital-intensive (Egli/ Steffen/ Schmidt 2018). These costs are rarely financed using cash holdings, partly because renewable energy firms are relatively new and have yet to generate large sources of cash inflows or accumulate the necessary capital. They accordingly have to be financed, whether by debt, equity, or a combination of both. Developers generally prefer debt financing because it is cheaper and its costs (the interest rate) are easier to assess. Considering that debt represents between 70% and 80% of wind energy finance, developers in this area are consequently highly leveraged (Christophers 2024). Given that renewable energy projects have very low operating costs, this means that debt servicing generally accounts for the main part of their expenditures. This, in turn, makes green projects particularly sensitive to interest rate increases (Aguila/ Wullweber 2024). It is estimated, in fact, that renewable energy projects are at least five times more sensitive to an increase in interest rates than fossil fuel projects (Voldsgaard/ Egli/ Pollitt 2022). Therefore, unless sufficient debt can be raised, a renewable energy project is unlikely to proceed, making financing the 'ultimate chokepoint' (Christophers 2024).

As a result, only banks with a high-risk tolerance are willing to finance renewable energy projects, and they charge high interest rates to compensate for the risk (Christophers 2024). In other words, they only lend if they believe the investment will be profitable. As one interviewee explained: ‘Our investor group is not [composed of] activist investors. They're interested, but they're more interested from the perspective of how are you going to make sure that these commitments don't interfere with your returns’ (interview 41). A similar observation was made by another interviewee: ‘Most of the financial industry infrastructure is built around risk and return. And I think that there

it's really hard to insert net-zero or climate impact into this bilateral framework' (interview 46).

Even in cases where green investments are considered bankable, their profitability for investors is rapidly declining as a result of increasing competition for green finance. This is because the increase in competition among banks and other financial actors to green their portfolios has been decreasing the pool of available profitable green projects (interviews 28/29, 31, 37). The decline in bankable green projects has resulted in squeezed profits for financial investors. Whereas investors once earned a green premium due to the higher risks of renewable projects, they now may even have to pay a green discount to gain more exposure to green assets. Increased competition among lenders has also given more bargaining power to borrowers, who paradoxically have been able to force banks to fund projects with high GHG emissions in return for financing their green projects. In the words of one interviewee: 'We see more and more clients coming to us and saying, if you want my green project, then you will first finance my ten other brown projects' (interviews 28/29).

The problem is that there are not enough green projects and firms characterized by a risk-return profile that is considered acceptable by banks and other financial investors. As even projects that might be expected to be profitable are plagued by risks, as long as they do not have to, banks and other financial investors are only willing to lend them funds, or invest in them, at a high interest rate or a premium over alternatives, making them unaffordable for most firms.

The conclusion from this, according to our interviewees, is that the challenge of financing the green transition does not lie in the lack of money, but rather in the lack of bankable activities.

High emission investments: low risk, high profits

Our research shows that unlike activities carried out by green firms and projects, high-GHG-emitting activities continue to be bankable for various reasons. First, high-GHG-emitting undertakings remain more profitable than green activities. One interviewee from a public asset owner that encourages banks to divest from fossil fuels shared that they had failed in their efforts to mobilize sufficient finance in the direction of decarbonization because 'the reality is that the bank shareholders, their general view is, this [referring to new fossil fuel exploration financing] is a profitable line of business. It's going to make you money. You should keep doing it' (interview 68). An interviewee from an asset manager observed: 'We're going to keep financing renewables [...], but we're not going to stop financing [fossil] because it is a fiduciary concern to your shareholders, a fiduciary concern to your private clients as an asset manager' (interview 75).

Second, in terms of financial risks high-GHG-emitting activities are generally considered less risky than green projects. As one interviewee from a large US bank stated: 'Right now, if you're a bank that is lending money to gas and oil where those prices have been post Russia-Ukraine, your credit risk looks great because these companies are throwing off money, and so it's a no brainer' (interview 80). One interviewee from a financial regulation authority similarly stated that more often than not, 'brown' companies have much better financial standing than the green projects that are startups that have actually much higher probability to fail within the near future (interviews 87/88).

This might seem surprising at first glance, given that activities of high-GHG-emitting firms and projects are exposed to what is known as climate and environmental risks, which should effectively make them riskier than green activities. Even though markets

have been shown to take some environmental information such as GHG emissions into account, overall evidence suggests that they fail to price in climate-related risks sufficiently, including to anticipate the stranding of assets[4] (Campiglio et al. 2023; Hansen 2022; Semieniuk et al. 2022). Studies estimate that by 2050, as progress is made toward meeting the Paris Agreement goals, stranded assets from the energy sector could reach a global amount of USD 927 billion (Saygin et al. 2019). In addition, sudden devaluations of these assets could trigger defaults and destabilize the broader financial system (Monasterolo 2020; Campiglio et al. 2023; Semieniuk et al. 2022). Despite the gravity of such prospects, banks remain heavily invested in high-GHG-emitting assets (ECB 2024a).

Our research identified four reasons why there has not (yet) been a rise in the risks of financing high-GHG-emitting activities significant enough to decrease the bankability of carbon-intensive firms and projects: 1) microprudential bias in regulation and supervision (Urban et al. unpublished); 2) an approach to stranded assets that stretches the time horizon; 3) the use of risk diversification strategies, including offloading such assets to the shadow banking sector (Schairer et al., 2025); 4) policy uncertainty about the future path of decarbonization.

1) The first reason is the fact that the microprudential approach to climate-related and environmental risks takes prevalence over a macroprudential supervisory approach, leaving it entirely up to the banks to decide what to finance and how much risk to take. As one official from the EU supervisory authorities observed: '[W]hat we are here for is actually that the banks have [...] the risk management tools in place to assess the risk related to these investments [with high GHG emissions]' (interview 83). A microprudential approach is limited to fully incorporating climate and environmental risks, as from such a perspective, activities of firms and projects with high GHG emissions do not seem riskier than those of green firms and projects (interviews 82, 85, 87/88). By contrast, a macroprudential approach that takes systemic risks into account could lead all institutions to take appropriate measures to manage climate and environmental risks beyond their individual assessment of exposure.

2) Interest on the part of market players to secure currently high profits for as long as possible is the second reason why the financing of high-GHG-emitting sectors remains highly bankable. The current risk of stranded assets is viewed as still very low due to projections that it will take from 20 to 30 years before such assets result in write-offs (Christophers 2019; Interviews 81, 82). As one interviewee from an EU supervisory authority pointed out:

   One thing [...] the economy doesn't want to capture is the certainty of the impact of climate change. Whether we phase out combustion engine cars in 2035 depends on who is in the government in 2035. But the fact that we will have in Europe billions of losses [from] flood is undisputable (interview 85).

   Not everyone, however, shares the same degree of certainty about climate-related risks and their growing role. Another senior supervision official perceived 'stranded assets' to be 'a buzzword, a catch phrase', adding: 'If we are talking about risks within the 20, 30 years' time horizon, does it

[4] According to Caldecott et al. (2021) stranded assets are 'assets [that] suffer from unanticipated or premature write-offs, downward revaluations or are converted to liabilities, [..] caused by a range of environment-related risks'. Alternatively, Semieniuk et al. (2022) describe 'asset stranding' as 'the process of collapsing expectations of future profits from invested capital (the asset) as a result of disruptive policy and/or technological change.'

make sense to hold the capital right now? Not really' (interview 87). These two very different accounts by senior officials underscore the limitations of the current regulatory approach.

3) The third reason why unsustainable projects remain highly bankable is that banks see their diversification as sufficient from a risk management standpoint to ensure that even if one of their inherent risks were to materialize, it would not significantly affect their overall financial standing (interviews 26, 32, 45, 46, 80). A common perception in some EU supervisory circles is reflected in the following remark by one interviewee: Who's going to have those stranded assets? Those big [financial] companies that have a super diversified business? They don't really care. Okay, this asset will fail. The other one will thrive. That's fine. ... This is part of their business (interview 87).

4) Finally, a number of interviewees pointed out that uncertainty over future policy potentially exposes financial institutions to transition risks (interviews 26, 37, 45, 47, 80). As one interviewee clearly stated:

If you do not know at what pace the world will transition, companies can't plan appropriately. They're taking too much risk so that it means they need to have more certainty in terms of policies. [...] If they know that in 5, 10 years' time it's going to cost high polluting businesses a lot of money to continue to run their business, then they will be like, okay, we really need to provide alternatives. If there is no certainty that there will ever be a carbon price, they can continue to pollute. There's no [...] incentive for those companies to pollute less. So [there is] less innovation for companies who would be willing to come up with an alternative [...]. The banks that provide loans need to know at what pace this is going to happen as well to make sure the companies repay them. Investors need to know that as well, to have the confidence that they will get a good return on their investments (interview 79).

Overall, projects and assets with high GHG emissions remain highly bankable. Apart from the negative impact they have on the climate and environmental crisis, their high bankability also poses a dilemma for banks that must be taken seriously. Individual banks and financial actors would place themselves at a competitive disadvantage if they were to stop financing high-GHG-emitting projects or firms. This would only leave someone else to invest in such ventures because of their continued profitability. In other words, early divesting in unsustainable activities would lead to a 'first-mover' disadvantage (interviews 31, 39, 41, 45, 46, 70, 80, 82).

Activity types based on bankability

To summarize our main finding: While financing falls significantly short of what green firms and projects require, funds continue to be channelled into high-GHG-emitting activities. As its key takeaway, our research demonstrates that this is **because green activities fail to meet financiers' expected risk-return profiles while carbon-intensive projects remain bankable**. As one professional asset manager remarked: 'Well, but that's the thing, that's the part where we need to be really cautious when we talk about greening the economy. How much of this is actually making money on its own? How much of this needs a subsidy?' (interview 75).

Our analysis allows us to classify activities into six different categories according to whether they are green or high-GHG-emitting, and whether they are bankable, not yet bankable, or never-bankable (see Table 1):

Table 1. Different types of activities based on their bankability and GHG emissions

	Green (sustainable) activities	High-GHG-emitting activities
Bankable	1. Investments that already receive private funding: Not covered in this report	**4. Investments that receive private funding but must be phased out (see section 6): e.g. oil and gas exploration and pro-duction**
Not yet bankable	**2. Investments that can become bankable through support of policy instruments (see section 5): e.g. most offshore wind parks**	5. Investments that no longer receive private funding: not covered in this report
Never- bankable	**3. Investments that will never be bankable (see section 7): e.g. biodiversity protection**	6. Investments that no longer receive private funding: not covered in this report

1. ***Green bankable activities***[5] are those that are both environmentally sustainable and already financially viable. Raising the capital needed for projects in this category is generally not a problem. Therefore, our report does not cover this group of activities.[6]

2. ***Not yet bankable green activities*** include green investment projects that, while environmentally beneficial, are not yet financially viable and therefore require public support to become bankable such as most offshore wind farms (see section 5).

3. ***Never-bankable green activities*** are green activities that are essential for reducing GHG emissions or adapting to climate change. Examples include reforestation, rewetting of swamps, raising of dikes, and restoration of rivers. Although by their very nature they are socially beneficial, there is little likelihood that they will ever be considered financially viable for private investors (see section 7).

4. ***High-GHG-emitting bankable activities*** are carbon-intensive activities that remain financially viable for the time being but need to be gradually phased out if climate targets are to be met such as oil and gas exploration and production. As such activities continue to be (very) profitable and low risk, market forces alone will not suffice to reduce their GHG emissions or to phase out those that hinder progress towards climate goals (see section 6).

The two final categories (5. ***not yet bankable activities with high GHG emissions*** and 6. ***never-bankable activities with high GHG***

[5] Although further distinguishing between fully green projects and transition activities that increase sustainability incrementally would be possible, the same financial policies apply to both types of activities. Therefore, they have been grouped together for discussion in this report.

[6] Note that the impact of private sustainable finance (such as ESG funds) for the green transition is currently still limited; see Fichtner et al. (2025) for how the use of various 'channels of influence' could make it more effective.

emissions) do not require specific financial policy as they do not receive any private funding (i.e. they are not bankable). Thus, they are not covered in the report.

The foregoing classification allows us to distinguish among activities that face different financial problems and thus require different financial policies. Our research has identified a number of false notions that have arisen on how transformation financing works and what drives investments. One such case was described by an interviewee as follows:

The narrative that has been created, and I think it has been catalysed around COP26 [...], is that you have a wall of green capital. Investors who are willing to invest are going to invest in the real economy, and we're going to see changes in public policy. For us, it is the complete opposite. The order should be completely reversed, because ultimately, when you think about what an investor does, if it's not an impact investor and philanthropic investor, they will have to have the right risk-return profiles (interview 45).

In a similar vein, an interviewee from a large bank stated:

The role of finance [...] is not to replace government incentives by asking people to take credit risk on things that make no sense, or flow finance to things that are never going to make a return. Sometimes there's a misunderstanding, and I see this repeated at every level of the system. If only banks would do the right thing, all our problems would go away. If only they would stop lending to this and lend to that instead, problem solved. That's never going to happen. [...] Banks just can't take credit risk that is not justifiable. And they can't reduce returns in a way that upsets shareholders. So if you are a bank that is wasting money on things that aren't generating returns, your shareholders are not going to be very supportive very long. [...] And that's been one of the reasons why we've kind of lost time in terms of this overall effort to create a more sustainable economy, because people think the private sector is going to magically solve it. And it's not. It's never going to happen. And so we need to move beyond that (interview 80).

In this same connection, an interviewee from a German bank criticized the presumption that banks should loan money at cheap rates to governments or to green projects:

For public players, I have to be honest, we're getting a bit desperate because local authorities, in particular, expect free loans, and we'll never give them. [...] I believe that the state could make the distinction between what the state finances and what we should finance a little clearer (interview 31).

Our classification brings this problem to the forefront. ***Green firms and projects that are not yet bankable*** require a form of financial policy that lowers their risks to make them bankable and allow them to access private funding. This is the main focus of current policy discussions. A different set of issues is concerned when it comes to ***bankable high-GHG-emitting firms and projects***. For such activities, financial policy intervention should aim at diminishing the risk-return profile to make them unattractive for financial investors. ***Green activities that are never bankable***, on the other hand, have no chance of being financed by the private sector and should therefore receive necessary funding from the state. In the following three sections, specific policies are discussed to address each of these categories in turn.

5 Not yet bankable green activities and how to increase their bankability

This section deals with green firms and projects that are not yet bankable. Although for various reasons such ventures do not yet have a risk-return profile profitable enough to attract investor financing, many do have high potential, and could very well be made bankable through the creation and implementation of targeted policy intervention. Green hydrogen, for example, could play an important role in the future as a medium for long-term energy storage and a means to decarbonize industry, but it is not yet bankable. Green steel, i.e. steel produced using green hydrogen, is another product that could become bankable in the future. Until this happens, however, investments in areas such as these are very risky, and their expected returns are uncertain. Policy instruments are therefore needed to make such projects investable. In general, instruments of this nature should increase the bankability of green projects by either reducing the risk or increasing the expected return.

Not every approach to increase bankability is possible, effective, or desirable

Alongside policies based on disclosure, standardization, and taxonomy, another approach that has been used to close the green financing gap focuses on policies to increase the bankability of green projects. For the most part, this approach involves so-called de-risking strategies that we argue do not suffice to meet climate goals. Not only do they fail to consider never-bankable green activities and the phasing out of sources with high GHG emissions; they also often prove to be ineffective for increasing the bankability of green activities. What is more, they can entail undesirable consequences. Empirical evidence and case studies show that many policy interventions to increase the bankability of green activities have so far failed to deliver sufficient funds. Some have even increased financial vulnerability while exerting a negative impact on people and the environment (Claar 2020; Elsner et al. 2021; Gabor/ Sylla 2023; Haag 2023; Gabor 2021; 2023; Dafermos et al. 2021; Cooiman 2023).

In an effort to address these policy shortcomings, we have identified a number of considerations that we recommend be taken into account in the formulation of more effective and just policy instruments to increase bankability:

1. Overall, policy must lead to an increase in investment in productive green activities, not merely an increase in green financial assets (Fichtner et al. 2025).
2. If relying on capital from private investors is more expensive than direct public (fiscal) investment and public provision, policies to increase the bankability of green investments for private capital should not be pursued.
3. Empirical evidence shows that policy interventions are generally not effective if they are only about 'carrots' (guaranteeing profits for investors). Hence, policy interventions should also entail 'sticks' (regulating or penalizing investors when they do not fulfil agreements) (Kedward/ Gabor/ Ryan-Collins 2022; Gabor 2023, Gabor/ Braun 2025; Kedward/ Gabor/ Ryan-Collins 2024).
4. If government policy allows the financial sector to increase its returns through public guarantees, risk taking, and financial incentives, part of the profits should be returned to the government to continue

expanding successful programmes (Mazzucato 2014; Christophers 2024).
5. Policy interventions aimed at advancing green objectives should also consider their effects on equality and wellbeing.
6. Policy interventions to increase bankability should be deployed to mobilize private capital to *achieve public goals* such as decarbonization (Schindler/ Alami/ Jepson 2023).

5.1 Differentiated interest rates for green loans: green Targeted Longer-Term Refinancing Operations (TLTROs)

As discussed in section 4, one important reason for the lack of funding for green activities is their high risk. Because banks consider such activities risky, they are either unwilling to finance them or demand interest rates that are too high. In their analysis of the Survey on the Access to Finance of Enterprises (SAFE), Nerlich et al. (2025) found that more than half the firms that partook in the survey identified too high interest rates and financing costs as an important obstacle to accessing finance for green investments. Our research confirms this finding (interviews 26, 31, 46, 47). Renewable energy projects, especially wind power, are vulnerable to higher interest rates because developers need to borrow large amounts of capital to cover upfront investments (IEF 2024; Aguila/ Wullweber 2024). Given that the interest rate charged by banks on loans is partly determined by the interest rate at which they borrow funds, one possible way of tackling this issue would entail lowering the borrowing rate so that banks, in turn, could offer lower rates to their green customers. In this connection, a much-debated proposal to incentivize the financing of environmentally sustainable projects through a special liquidity facility merits a closer look, beginning with some background information.

In 2014, the ECB created a facility to provide collateralized targeted longer-term refinancing operations (TLTROs), offering banks access to cheap[7] long-term (three years) funding, if they lent money to certain targeted sectors. The idea behind the policy was to incentivize bank lending to firms and households. The ECB renewed the policy in 2016 (TLTRO II) and 2019 (TLTRO III). The facility was widely used during the COVID-19 pandemic.

Proposals have been made for the ECB to launch a new TLTRO to provide cheaper lending to banks conditioned on their green lending volume, to incentivize the banks to offer more green loans (van 't Klooster/ van Tilburg 2020). French President Macron has also called for the implementation of dual interest rates, in particular to finance renewable energy (Costa 2023). In response to calls for policies to promote environmentally sustainable projects, the ECB has been considering greening its targeted longer-term refinancing operations facility (TLTROs) (Elderson 2023; Schnabel 2023).

Under current conditions, however, concerns exist about the efficacy of such a program, the reason being that European banks still have excess liquidity after the many years during which the ECB provided banks with an abundance of funds through asset purchasing programmes (so-called quantitative easing). Accordingly, banks have only a limited need for external funding. When they do seek funds, they do so mostly via the repurchase agreements (repo) market and not via the ECB because the repo market continues to be cheaper for most categories of collateral (Schnabel 2024; Wullweber 2024). At least for the present, this suggests that in order for

[7] Rates for targeted longer term financing operations can be as much as 50 basis points (0,5%) below the average on the deposit facility, which during the pandemic was as low as minus one percent.

green TLTROs to be an effective policy tool, their rates should be significantly lower than current market rates to entice banks to tap the facility as a source of liquidity (interviews 26, 31, 46, 47; see also Jourdan et al. 2025). Based on our analysis, we recommend that the ECB take steps to identify and introduce the appropriate interest rate differential, assess the empirical effects thereof, and, based on its findings, adjust the policy accordingly.

Policy recommendation:
The ECB should establish a green facility for targeted longer-term refinancing operations (TLTROs) with an interest rate significantly lower than the key interest rate as well as guidelines and procedures to examine the effects of this policy.

5.2 Financial guarantees for green firms and projects

Bankability can be impaired even for green firms or projects with good profitability potential if banks consider them too risky. One effective way for the government to increase bankability in such cases would be to lower their risks by issuing guarantees for loans. As one interviewee explained:

And then, if there are certain policy actions taken that may lead to green projects being less risky, we don't need to change the regulation for banks to incentivize banks to provide more lending to them because they take credit decisions based on the analysis of risk. So if, for example, the easiest measure is to give states guarantees to green projects, this has an immediate bearing on the decisions of the banks, because in that case the risk that they are facing is very, very low. So they are more willing to provide lending to that. Also, capital requirements for projects that have a state guarantee are super low, if not zero (interviews 87/88).

Guarantees are instruments that transfer different risks (such as political, credit, currency, or interest rate risks) in financial assets (loans, equity, and other types) from the asset holder to a third party, typically in exchange for a fee (González Esquinca et al 2025; Sial/ Chandrasekhar 2024). In guarantees that transfer the credit (default) risk of a loan, for example, one party (the guarantor) becomes responsible for the amount owed if another party (the borrower) fails to meet payments. This makes the provision of loans more attractive for lenders, as it relieves them of risks assumed by the guarantor. In this way, guarantees can transform borrowers with a high-risk rating into bankable counterparts.

Considering that public guarantees oblige the guarantor (such as a government or public development bank) to pay only in the event of default, they are seen as a comparatively cheap form of intervention. Such guarantees potentially allow large amounts of money to be leveraged through contingent liabilities with no immediate budgetary impact. They can take various forms depending on whether they are legal contracts or market-based instruments. Moreover, they can be partial or full as well as funded or non-funded (depending on whether or not liquid funds are kept available to cover the guarantee), and they can fulfil different objectives (Sial/ Chandrasekhar 2024).

Despite the distinct advantages that guarantees offer, they are still not deployed on a scale large enough to effectively drive the green transition. Besides the fact that the amounts mobilized remain inadequate, there are too few providers and only a limited number of climate-targeted instruments (González Esquinca et al. 2025). One example of a climate-targeted approach is the EUR five billion counter-guarantee scheme that the European Investment Bank (EIB) offers under the Wind Power Package recently launched by the European Commission (EIB 2023). Commercial banks generally guarantee

Box 2. Different types of activities based on their bankability and GHG emissions

There are many forms of government contracts that are activated to mitigate demand risks when a certain event takes place (for instance, if a price drops below a certain agreed-upon level). Due to the volatility of energy prices, many renewable energy projects are not bankable (Christophers 2024). They can become bankable, however, if they manage to reduce price volatility. One possible way to achieve this is through a contract with the government (feed-in-tariff agreement, or contract for difference)[8]. Other options include bilateral power purchase agreements with companies or governments for long term energy supply at a fixed price, or financial instruments (futures, swaps) to hedge exposure to price shifts. As a New York based asset manager told us: 'Once you have a PPA [Power Purchase Agreement], it basically becomes a fixed income investment, right? [...] People will just shove the money there, a certain amount, because [even though] the returns are not as high, they are desirable and fixed' (interview 75).

The German Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz) is an example of a feed-in tariff scheme that has successfully accelerated the expansion of wind and solar power to such an extent that in many parts of the world both technologies are now more cost efficient than fossil-fuel-based electricity generation. However, in order to maintain the effectiveness of such price guarantees, periodic modifications are required. Government guarantees could potentially be extended to include other crucial decarbonization sectors such as heating (to incentivize the building and expansion of climate-neutral district heating networks, for example). The European Union provides guarantees under several different programmes. For partner countries outside Europe, the European Commission and the EIB offer these instruments through various facilities such as the European Fund for Sustainable Development Plus (Prontera/ Quitzow 2024; Sial/ Chandrasekhar 2024). Within Europe, the European Commission and the EIB have been mobilizing guarantees through a number of programmes since 1993 (Mertens/ Thiemann 2018; Mertens/Thiemann 2019). A recent example is the InvestEU programme. Moreover, Member States also provide guarantees through a variety of schemes and their national development banks (Buchetti et al. 2025). Germany, for instance, issues guarantees via the German Credit Institute for Reconstruction (KfW). During the COVID pandemic, guarantees were among the various forms of support offered by the German Economic Stabilisation Fund (WSF). By helping to secure loans and mitigate risk, these credit guarantee schemes and facilities can play a key role in making it easier for both public institutions and private firms to finance the building and expansion of carbon-neutral infrastructures.

advance payments that wind energy developers make to their suppliers when ordering new equipment. Due to the fast-growing demand for new wind turbines, many commercial banks have reached their prudential limits for the guarantees they can offer. EIB counter-guarantees ensure that the risk for commercial banks lies with a third party instead of with the wind turbine manufacturer. This allows the

[8]'Feed-in tariffs' are electricity prices that are guaranteed for 10-20 years and paid to renewable energy producers for each unit of energy supplied to the electricity grid. 'Contract for difference' is a subsidy model in which both positive and negative deviations from a fixed reference price are paid out to the contractual partner. This means that a minimum compensation is guaranteed, but revenues are capped.

commercial banks to provide the required increased guarantee volume. The counter-guarantees do not provide direct financial support to the wind industry, and the risk for the EIB is very limited. Claims for payment under such guarantees are, in fact, very rare. An International Chamber of Commerce study for 2016-2020 found that during the reporting period, only 0.2% of the total guarantees issued were actually called in (ICC/GCD 2022).

Empirical research confirms that intelligently designed guarantees can improve the risk-return profiles for green projects while keeping risks low for the state. Based on an extensive survey, Nerlich et al. (2025) demonstrate that fiscal support measures such as tax credit and guarantees improve chances of loan approval, while lowering financing costs for green firms. Their findings show a substantial increase in loan approvals for the period 2022-2023, but decreasing figures as fiscal support measures were wound down. A similar tendency is reflected in data for green investments from the SAFE survey that found the proportion of firms planning to use loans in combination with fiscal support (36%) to be higher than that for firms using loans without fiscal support (26%). The difference is even larger for small and medium-sized enterprises (SMEs), which are the chief target of many fiscal support measures. Large firms, by contrast, use a high proportion of retained earnings (49%) to fund green investments. For investments in general, these results are lower, a fact which suggests that green investments are more sensitive to instruments of public support such as financial guarantees than non-green investments. In this connection it is indeed the case that in addition to high interest rates, insufficient public support is frequently cited in business surveys as one of the largest obstacles to accessing finance for green investments.

In an examination of the effects that loan guarantee programmes had on green lending in Europe in response to the COVID-19 crisis, Buchetti et al. (2025) show that unlike in earlier guarantee schemes, programmes adopted during the post-pandemic recovery period provided coverage of up to the total value of the loans. Their study further found that guarantees were not restricted to SMEs or selected sectors. In addition, monitoring requirements were low because the guarantees were designed to privilege quick implementation over rigorous due diligence. The findings demonstrate that public guaranteed lending leads to an increase in loans with a more pronounced effect on green firms. Indeed, the authors estimate that public guaranteed lending led to a 19% growth on average in loans to firms in green industries. According to their analysis, not only are banks more likely to use such programmes to start new relationships with green clients; they also generally charge lower interest rates for publicly guaranteed loans. The study concludes that banks assign a lower probability of default to publicly guaranteed loans especially for green firms because such guarantees allow them to shift risks to the public sector, which, in turn, significantly reduces their monitoring burden.

Researchers have also found, however, that the use of guarantees faces several challenges. Some of the main drawbacks include the lack of technical expertise to prepare bankable green projects, limited information, high costs and fees, insufficient partial coverage or short durations, and burdensome application and reporting requirements (Buchetti et al., 2025; González Esquinca et al 2025). To make guarantees more attractive to lenders, González Esquinca et al. (2025) recommend simplifying application and reporting requirements, establishing or expanding technical assistance facilities to support actors in developing bankable projects, reducing costs and fees, expanding guarantee timelines, and fostering collaboration among stakeholders.

As with other derisking instruments, guarantees can be a way to support private profits without leading to better environmental and social outcomes (Cooiman 2023; Prontera/ Quitzow 2024; Sial/ Chandrasekhar 2024). Thus, the design of public guarantees should

contemplate the criteria discussed earlier in this section. Three factors are germane to the present policy recommendation. First, guarantees should only be provided to green firms that are not yet bankable and projects with the goal of making them bankable. They should not be given to firms and projects that would have been funded anyway. Second, because some of these firms and projects are considered high risk, guarantee schemes should be designed to provide coverage aligned with the value and timeline of the guaranteed loans (up to the full amount and for the whole period). Care should be taken, however to ensure that guarantee schemes do not take unnecessary risks that might potentially jeopardize the public balance sheet. Such programmes should rather seek to incentivize lenders to absorb as much risk as possible or to charge higher fees to reflect the greater risk exposure on the public balance sheet. Third, guarantee schemes should not be used merely to secure private profits. Proceeds derived from green lending should be distributed between the lenders and the guarantee scheme. Guarantee schemes should ensure that proceeds from fees charged to the banks are allocated to expand the scheme or build a fund to finance never-bankable green activities.

Policy recommendation:
The European Commission, the European Investment Bank, and national development banks should develop or expand credit guarantee schemes specifically targeted at not yet bankable green firms and projects.

5.3 Fostering the EIB's green risk-taking capacity

Due to the high risks that they face, green firms and projects are considered non-bankable by commercial banks and other private actors despite the potential they have to become profitable. Public banks that either have a higher risk tolerance or accept a lower level of profitability are particularly well positioned to extend loans to green activities. Several interviewees identified public banks as institutions that are essential for financing projects that are not yet considered bankable (interviews 31, 42).

There are 115 public banks and other public financial institutions in the EU that hold a combined total of EUR 11.2 trillion in assets. This figure amounts to around 70% of the EU's GDP (Vanaerschot 2024). Public banks are owned by the government or a public entity, and operate under a public mandate, which in many cases includes sustainability objectives. As such, they are uniquely positioned to provide long-term loans with favourable interest rates and take up higher risk investments such as sustainable energy projects (IEA 2024). Research indicates, however, that these banks continue to be more risk averse than necessary, which means that a large potential exists to further advance not yet bankable activities. Despite being a non-profit organization, the EIB, for example, makes profits of around EUR 2.5 billion per year (Demertzis/ Pinkus/ Ruer 2024).

One reason why increasing green risk taking is unattractive for public banks, including the EIB, seems to be their interest in maintaining their AAA ratings (Mertens/ Thiemann 2023). However, given that the rating agency Fitch suggests that the EIB could lend an additional volume of USD 89.7 billion (i.e. an additional 16.8%) before ratings would be affected, this does not seem to be the main problem (Fitch Ratings 2024).

Besides taking credit rating constraints into account, multilateral development banks (MDBs) such as the EIB must also consider the limitations of their capital adequacy frameworks, i.e. their capital-to-risk ratio. In preparation for the 2021 G20 Summit, an expert panel conducted an independent review of MDB capital adequacy frameworks. The panel called for reforms in defining MDB risk tolerance and greater recognition of callable capital to 'maximise the MDBs' financing capacity' (Independent Expert Panel convened by the G20 2022: 6). The fact that the report has been brought

up several times at G20 meetings and was also referred to in official documents issued by the German government (e.g. Bundesregierung 2024) signals that a reform process is already underway. This process must continue to be pursued as a priority.

One limitation that needs to be reformed in this connection is the maximum gearing ratio, which is a metric used to refer to how much the EIB can lend in relation to its own resources (subscribed capital, accumulated reserves and retained profits). In October 2024, the European Parliament approved a proposal from the EIB board to amend the bank's statutes so as to allow an increase of the maximum gearing ratio from 250% to 290% (European Parliament 2024). The new gearing ratio is expected to take effect in 2025 (Scope Ratings GmbH 2024b). This is an important first step. However, to effectively encourage green investments, the ratio must be considerably higher. A promising step in this direction was made by the president of the EIB, Nadia Calviño, with her proposal that the maximum gearing ratio be removed entirely (Sorgi 2024).

To effectively raise funding for not yet bankable green activities, the new financial capacity should be accompanied by a programmatic shift towards the conscious accommodation of more financial risk. The EIB claims to have increased its risk-taking via a new segment of loans in 'special activities'. However, the aforementioned profits, as well as the ratio of non-performing loans, which lie at a very low level of between 0.04% (2018-2020) and 0.02% (2021-2023), point to a continued preference for very safe assets (Demertzis/ Pinkus/ Ruer 2024). It is therefore evident that while the EIB is in a financially robust position to cope with the volatility of riskier projects, it continues to favour financial stability over increased efforts to support climate stability.

The foregoing analysis highlights a key difficulty in scaling up the EIB's risk tolerance: By changing the capital adequacy requirements and providing guarantees through instruments such as the InvestEU programme, a facility designed to provide long-term funding to boost sustainable investment (European Commission 2024b), the European Commission can effectively influence the EIB's risk-taking *capacity*. The difficult task in this connection involves finding ways to increase its *willingness* to take risks. A necessary, albeit probably not sufficient, condition toward this end would be to generate political pressure and revise the EIB's management policies. An alternative strategy could involve requiring the EIB to allocate a portion of its profits toward establishing a fund dedicated to financing high-risk or even never-bankable green sectors and activities (see section 7). This would effectively institutionalize a more ambitious approach to risk-taking in support of the green transition.

Policy recommendation:

1. *European Investment Bank (EIB) shareholders should call upon their representatives on the EIB Board of Governors and Board of Directors to encourage an increase in the EIB's risk tolerance for financing green activities, example given by integrating an increased green discount in their creditworthiness analysis.*
2. *EU legislators should further relax the EIB's maximum gearing ratio for green lending.*

Box 3. Increasing the role of savings banks in the green transition

Savings banks are uniquely positioned to support the green transition due to their public welfare mandate, strong ties to the local economy, market leadership in lending to small and medium-sized enterprises, and favourable refinancing conditions (Klüh 2021, Bevilacqua 2022; Flögel et al. 2024; Senn/ Mittler/ Schick 2023). Unlike private banks, savings banks are not required to maximize profits, enabling them, in principle, to lend to activities that advance sustainability in the long term. A potential for financing green activities lies in the proximity and flexibility advantage of savings banks: Due to their close ties to regional businesses and deep understanding of local conditions, Germany's regional savings banks (*Sparkassen)* are well-positioned to understand the entire value chain of regional companies so as to directly observe the impact of their activities on local stakeholders and effectively use their knowledge on climate relevant (soft) information (Flögel et al. 2024; Breuer/ Grabau 2024). Their integration in a network of finance institutions and affiliated associations gives them access to data, expertise, and tools to facilitate climate impact assessments. Savings banks can accordingly provide financing solutions that are tailored to meet both the needs of local companies and regulatory sustainability goals (Flögel et al. 2024).

5.4 ECB purchase of EIB bonds

As our research shows, private financial actors have repeatedly called for more public intervention to support private investments that would increase their bankability, or to directly finance those activities that are not yet bankable (interviews 21, 26, 37, 42). One particularly ambitious approach involves the coordination of fiscal, monetary, and credit policy. For most of the post-World War II period from 1945 into the 1970s, the coordination between different economic policy instruments and actors such as public development banks, treasuries, and central banks was considered a legitimate approach to achieving industrial policy objectives (Ryan-Collins/ Kedward/ Chenet 2023; Bateman/ van't Klooster 2024; Lupi, 2025). However, since the 1980s, the coordination has gradually been replaced by a regime in which central banks are strongly independent, their primary mandate being to preserve price stability through interest rate management. We argue that the debate on economic policy coordination should be given greater attention in the framework of the climate crisis.

To start with, we propose that cooperation be intensified between the ECB and the EIB, which could play a central role in fostering EU climate goals (Mertens/ Thiemann 2023). As part of its public sector asset programme, the ECB has already purchased a number of debt securities issued by the EIB (Mertens/ Thiemann 2024). In 2009, the EIB became an eligible counterparty in the Eurosystem's monetary policy operations through the Banque Centrale du Luxembourg 'under the same conditions as any other counterparty' (ECB 2009). As the EIB itself stresses: '[T]he EIB's access to the Eurosystem's refinancing facility provides additional protection in circumstances of extreme liquidity stress' (EIB 2022: 8).

As envisaged by Mertens and Thiemann (2024), the ECB could commit in advance to purchasing a specified amount of green bonds issued by the EIB. ECB support for the EIB can take a variety of different forms: It can be permanent (for example through perpetuities) or reimbursable, and it can be provided at different interest rates (in the extreme case, in the form of perpetual bonds at a zero interest rate). Findings from our research (Aguila/ Wullweber 2024; Aguila/ Wullweber 2025; Wullweber 2024) suggest the need for a much more active role on the part of the ECB. Based on our analysis, we propose that the EIB issue

a specified amount of green bonds at zero or very low interest rates that the ECB commits to purchase as a last resort buyer. The EIB would then use the proceeds to finance projects in targeted sectors that are not yet bankable but expect to generate profits in the medium or long term. If these expectations do not materialize and the loans are not paid in full, the EIB could repay the bonds with the support of other sources, a carbon wealth tax for example (see section 7.3), or by cross-financing within the EIB, considering the profits it generates with other investments (which have amounted to an average of EUR 2.4 billion annually over the last 10 years).

Central bank support for the financing of not yet bankable activities might draw criticism due to concerns about the potential inflationary impact of such measures. However, it is important to note in this connection that inflationary pressures are generated by the climate crisis itself in the form of phenomena referred to as 'climateflation' and 'fossilflation' (Schnabel 2022). Climateflation arises from natural disasters and their disruptive effects on economic activities and prices, while fossilflation, which played a significant role in the most recent inflation surge, refers to the rising cost of oil and gas. Our research shows that a monetary policy approach that addresses the climate and environmental crisis could also be more anti-inflationary than the conventional approach. It would therefore also be fully consistent with the ECB's primary mandate to maintain price stability (Aguila/ Wullweber 2024; 2025).

Such an approach would establish the EIB in a central leadership role supported by a refinancing framework defined by the ECB for green investments and specific targets set by the European Commission. The main advantage of such a policy solution would be that it would allow the EIB to increase its financing of green investments at particularly attractive rates, while having a more systematic approach to financing green investments. To this end, a coordinated effort between public development banks and monetary policies could finance a well-defined set of sectors identified by the European Commission as strategic for decarbonization but not yet bankable.

***Policy recommendation**:*
The European Central Bank (ECB) should purchase European Investment Bank (EIB) bonds to facilitate the financing of not yet bankable activities.

5.5 Financial regulation: Imposition of a minimum quantitative quota for green loans

Our research shows that banks fail to lend sufficient funds for green activities because such activities are considered not bankable (interviews 26, 31, 37, 39, 45, 47, 49, 69, 70, 72, 73, 75, 80). The policy proposals discussed in the preceding sections are aimed at increasing the bankability of green projects or increasing green lending by the EIB. However, these approaches might not suffice to significantly and positively change their bankability. Moreover, financial derisking interventions to date have not directly altered the risk-return characteristics of non-financial corporations. Therefore, unless banks simultaneously lower the expected returns on green investments or apply a green discount in their creditworthiness analysis, they will not increase green lending even if new policies are introduced. We therefore argue in favour of a more direct approach that would require banks to comply with a minimum quota of green lending.

By pursuing such a policy, financial regulators could ensure that irrespective of risk-return considerations, at least a certain percentage of bank lending portfolios would be devoted to taxonomy-compliant firms or projects. Banks would then be forced to more actively seek out green activities to which they can lend. In order to avoid losing money, they would likely endeavour to find firms and projects that are only marginally more risky or less profitable

than those established by their desired risk-return profiles. In this way, the policy could conceivably encourage banks to issue loans to firms and projects that end up repaying the loans even though they were not considered bankable and would not have received funding in the absence of a quota. In other words, the policy would increase financing for not yet bankable green activities. Even under a quota system it is unlikely that before exhausting all other alternatives, banks would increase lending to green activities that are considered never-bankable because such activities preclude the possibility of loan repayment.

As depending on political events and other circumstances the risk-return profiles of green firms are subject to volatility, this policy could reduce uncertainty for both financial and non-financial actors by demonstrating progress towards the green transition through a concrete political decision. Central banks such as the Bangladesh Bank or the Reserve Bank of India are already using minimum quotas for green sectors or renewable energy (Dikau/ Ryan-Collins 2017; Campiglio et al. 2018). The minimum quota should be aligned with the EU's decarbonization goals and should increase progressively over time. Moreover, the quota should be adapted to local conditions and differentiate between different financial institutions.

Under the current framework, the ECB has no legitimate power to pursue green credit guidance policies. As environmental and climate factors affect price stability, financial stability, and the achievement of the economic objectives of the EU, there are good reasons to argue that within the leeway of its primary and secondary mandates, the ECB could legitimately intervene with green monetary and financial policies (Dikau/ Volz 2021). Indeed, we are already witnessing an increase in calls to reform monetary policy and organizational structures following the experience of several European central banks in the post-war period and the practice of many central banks in developing countries today (Aguila/ Wullweber 2024; Barmes/ Livingstone 2021; Bezemer et al. 2018; Campiglio 2016; Chenet/ Ryan-Collins/ van Lerven 2019; van't Klooster/ Monnet 2023; Monnet 2024; van't Klooster 2024). For instance, the Peoples' Bank of China (PBC) pursued a "window guidance" policy until 2019 and later introduced formal guidelines to encourage financial institutions to invest in green activities and divest from high-GHG-emitting ones (Dikau/ Volz 2023).

Policy recommendation:
European policymakers should create a regulatory framework that would allow financial regulators to impose a progressively increasing minimum green lending quota that would ensure bank funding for EU taxonomy-aligned sectors and projects.

6 Phasing out the financing of high-GHG-emitting activities

The challenge of phasing out bankable high-GHG-emitting economic activities is historically unprecedented in comparison to previous efforts of winding down certain industries: 'Different from past episodes of industrial restructuring revolving around the managed decline of sunset industries, accelerating climate change requires reallocation away from economic activities where the metaphorical sun is still shining' (Ergen/ Schmitz 2023: 1).

We understand high-GHG-emitting activities as those conducted by firms and projects that are inconsistent with a 2050 net zero GHG emissions target and above the threshold defined by widely used climate and transition policy scenarios. Such activities include those in the fossil fuel and the transition sectors, the latter with the potential according to best scientific evidence of transforming to net-zero emissions. Examples of transition sectors include energy, automotive, aviation, construction, steel, shipping, and mining (WEF 2023).

Studies show that taken together, the fossil fuel and transition sectors are responsible for around 70% of EU CO_2 emissions (PACTA 2025) and that Eurozone banks remain heavily invested in these sectors (ECB 2024a). Our research demonstrates that the key reason for this is the bankability of these activities that inhibits a shift of financial flows away from such activities by market forces alone (see section 4 on the problem of bankability). To remedy this situation, strong regulation is needed. As one interviewee stated:

So again, the problem with the oil business - and that's why I think we have to always go into how the business actually works – [is that] you need this constant channel of money for the exploration. You need the constant money for the expansions, for the permits. And you need to keep constantly planning ahead. So that's why if you cut the finances and you're restricted, you end up kind of killing the business (interview 75).

While direct bank financing of high-GHG-emitting firms and investments has slowly begun to decline in the EU (RAN et al. 2024; Rickman et al. 2024), the trend is increasing abroad (Cojoianu et al. 2021; Reghezza et al. 2022). Moreover, as our research shows, investments of this nature continue to be made off bank balance sheets through non-bank financial institutions (NBFIs), or the so-called shadow banking sector (Wullweber 2020; Schairer et al. 2025), which more than tripled in size from 2004 to the end of 2023. During the same time frame, the NBFI share of total financial assets increased from 37% to 49.1%, and by now is almost equal to that of the regulated banking system (Wullweber 2021; FSB 2024).

There is growing evidence that the shift towards sustainable finance has coincided with a rise in what we term 'shadow carbon financing' (Schairer et al. 2025). While banks increasingly resort to securitization of high-GHG-emitting loans to manage climate-related risks and decarbonize their loan portfolios (Cusano et al. 2024; Müller/ Nguyen/ Nguyen 2024), fossil fuel firms are accessing alternative sources of funding. They have been using instruments such as corporate bonds, private equity funds, private credit as well as complex structured financing in which oil reserves are posted as collateral. They frequently also engage in opaque cross-border funding arrangements that obfuscate the GHG emissions of the activities being financed (Schultz/ Mager 2024).

In light of these developments, we argue that an important precondition for creating effective policies and regulations that curb both shadow carbon financing and the concomitant migration of climate-related risks into the shadow banking system will be to ***bring NBFIs under the same regulatory purview as the banking system***, following the principle 'same activity, same risk, same regulation' (Mack 2024). This would also serve the aim of decreasing the shadow banking sector's role in financing high emission activities within the EU and at the same time help to impede global access to credit for high-GHG-emitting activities.

Beyond traditional banks: Shadow carbon financing channels

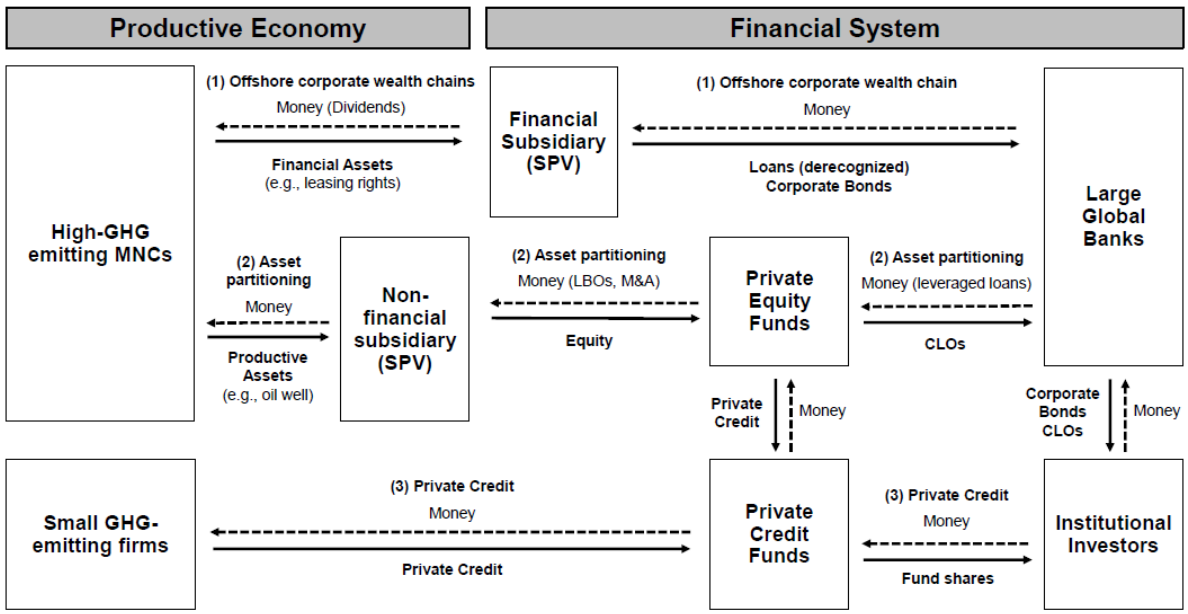
Figure 4, developed on the basis of our research, shows several shadow carbon financing channels that allow fossil fuel firms to circumvent the regular banking system (Schairer et al. 2025). From left to right, the routes mapped out in this figure delineate how high-GHG-emitting firms in the productive economy can receive financing from various NBFIs via the shadow banking system.

First, large multinational corporations (MNCs) can conceal high-GHG-emitting financing flows via offshore corporate wealth chains, as depicted under (1) in the figure. This method involves a complex network of subsidiaries stretching across multiple jurisdictions. Instead of selling a special purpose vehicle (SPV), as indicated under (2), MNCs may also endow it with a financial asset (for instance, by leasing the rights to the mother company's oil pipeline business). This allows access to funding from NBFIs – oftentimes via large global banks acting as underwriters – through corporate bonds or loans whose financed emissions have been derecognized by removing them from financial statements. As a rule, rather than being earmarked as 'fossil fuel financing', such funding is classified under more generic tags such as 'general corporate purposes', thus often securing more favourable financing conditions (RAN et al. 2024). In this way, fossil fuel MNCs may circumvent both investors' and banks' internal exclusion policies as well as regulatory disclosure requirements for ESG risks (Schultz/ Mager 2024).

Second, MNCs can lower their GHG emissions and simultaneously source funds for their operations via asset partitioning, as illustrated in Figure 4 under (2). This involves separating their most carbon-intensive assets (e.g. oil wells) from their mother company and then selling them to other firms or investors such as private equity funds (Armour/ Enriques/ Wetzer 2022; Interviews 70, 81). Private equity funds typically refinance such acquisitions and leveraged buyouts with leveraged loans issued by banks that refinance such loans by issuing 'collateralized loan obligations' (CLOs) that are then sold to institutional investors (Sissoko 2023). However, in recent years private credit funds have also been increasingly financing the private equity industry with funds provided by institutional investors, their asset managers, and other NBFIs (interview 84). This means that pension savings of ordinary citizens can easily end up financing high-GHG-emitting firms via the shadow banking system.

Third, smaller oil firms that do not command such a vast network of subsidiaries and typically depend more on debt financing for their operations (Hanieh 2024) are increasingly relying on alternative funding via private credit. This method is outlined in Figure 4 under (3). During the decade leading up to 2023, total global private credit quadrupled to over USD 2 trillion (IMF 2024). Private credit is lightly regulated and thus largely invisible to most market participants and regulators. It may be granted by private credit funds that issue private loans directly to energy firms (Park 2023) or to private equity funds that they own (interview 84). From 2021-2023 alone, the volume of private loans granted to the oil and gas industry already increased from just USD 450 million to at least USD 9 billion (White 2024).

Figure 4. Shadow carbon financing channels facilitating alternative funding



Legend: SPV = Special Purpose Vehicle; LBOs = Leveraged Buyouts; M&A = Mergers & Acquisitions; CLO = Collateralized Loan Obligations;

Source: Authors' own illustration based on Schairer et al. (2025)

Policy recommendations for bankable high-GHG-emitting activities:

In the following section, we recommend that policymakers follow a three-pronged approach comprising financial regulation and policy measures that combine immediacy and effectiveness to accelerate progress toward the phase out of bankable high-GHG-emitting activities:

1. ***Transparency requirements** for the shadow banking sector*
2. ***Prudential policies** in micro- and macro-prudential financial regulation to price in climate-related risks (including physical, transition, and litigation risks) throughout the banking system and shadow banking system*
3. ***Exclusionary policies** that impose an outright ban on certain high-emission assets from central bank collateral frameworks and securitization*

6.1 Tackling international capital mobility: Enhancing transparency of multi-entity and cross-border shadow carbon financing structures

In recent years, the EU has introduced sustainable financial regulations with the aim of shifting financial flows towards more sustainable productive investments (see section 3). The rationale behind these regulations is to enhance the transparency of 'green' or 'sustainable' financial products and thereby enable informed and deliberate sustainable investment decisions by financial investors (Ahlström/ Monciardini 2022). However, there is a crucial but often overlooked weakness in the EU's regulatory approach. It can be easily circumvented simply by rerouting capital flows to high-GHG-emitting activities through high-secrecy or offshore jurisdictions that require little or no disclosure from registered entities and their accounts. This lack of transparency due to international capital mobility undermines the

EU's regulatory approach and renders it ineffective. The fact remains, however, that international capital mobility is an inherent feature of global financial markets, which also channel funds into high-GHG-emitting activities. As one interviewee explained:

[The] key point is that it is not a flaw. It's a feature of finance to create subsidiary layer vehicles. They do it for sensible debt structuring reasons. In terms of accountability, they do it for tax avoidance reasons (interview 82).

This problem is also illustrated in Figure 4. High-GHG-emitting financing is often not reported as such when channelled through multiple layers of entities in financing structures of this nature, a phenomenon referred to as 'emissions laundering' (Vacarro 2024). The same applies to the phenomenon called 'green laundering', which, however, lays more emphasis on the fact that financial flows are typically channelled through secrecy havens, or so-called offshore jurisdictions, in order to avoid reporting and disclosure (Schultz/ Mager 2024). Between 2016 and 2022, for instance, only three percent of fossil fuel bank financing was in the form of project finance, while 41% was made up of corporate loans, and 56% was provided through the investment arms of banks, i.e. through the underwriting of corporate bonds or equity issues, for which reason the funds do not appear on the balance sheets of the banks themselves (RAN et al. 2024). As pointed out above, because financing through corporate loans is normally not labelled 'fossil fuel financing', and instead is classified under a more generic category such as 'general corporate purposes', banks cannot be sure of the purposes for which clients intend to use proceeds from their loans (Schultz/ Mager 2024). However, academic literature on the existence of internal capital markets suggests that MNCs may very well cross multiple jurisdictions and entities around the world to fund their activities through and between different SPVs and subsidiaries (Casey 2014). As a result, it is often difficult even for banks themselves to identify the exact volume of emissions they have financed (interview 80). This applies in particular to investment banks, which are regarded as NBFIs, since they do not accept deposits and are strongly involved in financing the carbon economy (interviews 31, 39, 75, 80, 82; RAN et al. 2024).

Because money is fungible, any set of policies or regulations targeting the phasing-out of high-GHG-emitting activities via the financial system (both the regulated system and the shadow banking system) therefore faces the risk of evasion through international capital mobility. The financial system is embedded within opaque and complex legal financing and ownership structures. Multiple layers of financial subsidiaries such as SPVs that transfer finances to each other via their balance sheets, may do so as an emissions laundering tactic to conceal underlying GHG emissions associated with assets (Vacarro 2024). It is also frequently the case that such SPVs are legally registered in multiple jurisdictions, typically in offshore financial centres (Garcia-Bernardo et al. 2017). These secrecy jurisdictions, which demand little or no disclosure from registered financial subsidiaries, facilitate 'greenlaundering', the obfuscation of financing to high-GHG-emitting activities by both banks and NBFIs (Schultz/ Mager 2024).

A potential solution to emissions laundering would be what Vacarro and Barmes (2021) have termed a genuine 'look-through' approach: Just as in the implementation of anti-money laundering regulations, when banks conduct 'know your client' (KYC) procedures during client identification processes, regulators should also introduce 'know your CO_2' ($KYCO_2$) requirements to ensure that banks and NBFIs accurately verify their clients' greenhouse gas emissions. In fact, the European Banking Authority's (EBA, 2022) 'Implementing Technical Standards' (ITS) that complement Article 449a of the Capital Requirements Regulation (CRR) do include mandatory Scope 3 reporting for banks. However, this only pertains to emissions financed by banks, not by NBFIs,

because it does not comprise 'facilitated emissions', that is, emissions caused by banks underwriting activities such as stocks and corporate bonds. Furthermore, a study by the ECB revealed that banks do not systematically report emissions financed by their clients. For instance, in 2023, the ECB found that most banks' Scope 3 disclosures were not adequate, with only 16% providing complete, specific and substantiated information (ECB 2023). Hence, rendering Scope 3 emissions reporting mandatory for both banks and NBFIs should be of high priority to policymakers. In particular, an inclusion of 'facilitated' emissions in addition to 'financed' emissions would be necessary to avoid creative circumvention of reporting standards.

This could prove particularly effective as a way to discourage the financing of high-GHG-emitting activities via both leveraged loans granted by banks as well as fund shares of institutional investors and asset managers invested in hedge funds, private equity funds, and private credit funds. In the words of one interviewee:

I don't know exactly where the [financed emissions] data would exist because regulatory authorities are not mandating it. But it would be [...] unreasonable to expect any other behaviour than [emissions laundering], unless regulators are saying we are watching you all the way (interview 82).

A necessary starting point for curbing green-laundering would be to enforce rigorous country-by-country reporting for large banks and NBFIs with cross-border-operations (Schultz/Mager 2024). Policymakers could anchor disclosure requirements within the framework of mandatory Scope 3 emissions reporting for financial institutions – which were exempted from the EU Corporate Sustainability Due Diligence Directive in the most recent amendments that were accepted before the rules came into force. Enhanced data availability and transparency of cross-border high-GHG-emitting financing flows would also make it possible for the European Securities and Markets Authority (ESMA) to become the central supervisor for large cross-border NBFIs. This single authority supervision should also be enshrined in the EU's Financial Conglomerates Directive, with an amendment that explicitly specifies that the rule applies not only to the insurance sector, as is currently the case, but also to asset managers, hedge funds, private equity funds, and private credit funds as part of a financial conglomerate (Mack 2024).

Policy recommendation:
EU policymakers should introduce a genuine 'look-through' approach for high-GHG-emitting financing structures based on the principle of 'know your CO_2' ($KYCO_2$) as well as a rigorous country-by-country reporting requirement for Scope 3 emissions generated by banks and non-bank financial institutions (NBFIs).

6.2 Prudential policies

6.2.1 Raising capital requirements in microprudential banking regulation

The microprudential banking regulatory framework is based on three pillars: Pillar 1 sets minimum capital requirements by applying risk weights that determine how much money a bank can lend against its existing stock of capital. Pillar 2 adds additional capital requirements related to the bank's specific risks. Pillar 3 requires banks to report on the respective risk categories to enhance market decisions (risk disclosures). Raising capital requirements for a defined activity – for financing firms with high GHG emissions, example given – decreases the bankability of this activity in relation to others, by making it more expensive to finance it. As a result, firms that engage in this activity will face higher costs of capital and may be disincentivized to run this kind of business. While such a price-based measure makes certain lending more costly, it does not stipulate which sectors or assets banks should divest from or in which they should remain invested.

According to an ECB (2024a) evaluation, large Eurozone banks remain invested in the fossil fuel sector even though studies show that financing this sector would have to be phased out immediately to reach the Paris Agreement goals (IEA 2021). In addition, banks also heavily finance transition sectors, most of which are currently misaligned with established net-zero pathways. The key entry point for financial supervisors to address this challenge is currently the supervisory review process under Pillar 2 of the prudential framework. As one interviewee explained:

[If] as a bank, your business model is financing polluting counterparties [...] which kind of business model [will be] [...] left? How do you make your money? So [in microprudential supervision] it's not just a matter of the risks, but it's a matter of preserving the ability of the bank to be profitable in the future market (interview 85).

We argue that although the current flexible approach in Pillar 2 may have been a reasonable first response to the regulatory dynamism in EU sustainable finance and the new challenge of financing a green transition, it is insufficient for at least two reasons. First, the lack of specific climate-related risk definitions in Pillar 1 goes against the usual order to first set risk definitions and minimum requirements in Pillar 1, and then to establish the additional capital requirements in Pillar 2, and the risk disclosures in Pillar 3. Second, the lack of climate-related risk definitions and requirements in Pillar 1 also limits the abilities of financial supervisors to increase risks weights for high-GHG-emitting activities under Pillar 2. This relates to the fact that while supervisors can now require banks to measure their exposures to certain sectors, including those with high GHG emissions (interviews 83, 85), they have little power to change the risk-return profiles in markets. A soft-handed regulatory approach, in which financial supervisors rely largely on credit risk assessments of the private financial sector, also serves to reinforce banks' expectations of low credit risks for high GHG- emitting assets. In other words, the high bankability of high-GHG-emitting activities and the current regulatory paradigm contribute to a self-referential system that keeps the financial system locked into financing a carbon-dependent economy. Revising Pillar 1, which would create a uniform treatment of dedicated asset classes for all banks, can thus be viewed as the next logical step to increase the credibility of the EU prudential framework and its climate commitments.

Increasing Pillar 1 minimum capital requirements for the financing of high-GHG-emitting activities was already discussed prior to the recent update of the EU banking framework (Matikainen 2017; Schoenmaker/ Boot 2018; Thomä/ Gibhardt 2019). Finance Watch (2020), for example, recommended that loans granted for new fossil fuel activities be backed by 100% capital. Compared to the regulatory minimum ratio of 8% capital to total lending, this would have the effect of strongly discouraging banks from channelling finances into this sector. Dafermos and Nikolaidi (2021) argue that increasing the minimum capital requirements for high-GHG-emitting assets would effectively decrease profit rates and increase default rates, producing the desired effect of reducing their bankability. They also point out that it would dampen economic growth, an effect that they suggest could be counteracted by green fiscal policies. To date, however, the EU banking framework lacks specific climate-related risk definitions and dedicated minimum capital requirements under Pillar 1.

Due to an incomplete integration of climate-related risks into current microprudential banking regulations and the danger that insufficient integration will contribute to a carbon lock-in of the economy, we suggest increasing capital requirements for financing high-GHG-emitting activities. This would empower the supervisory authorities to provide recommendations on the calibration of risk weights and, if necessary, to provide regular updates to ensure financing in line with the EU's path to net zero.

Policy recommendation:
EU policymakers should increase capital requirements for high-GHG-emitting activities in Pillar 1 of the EU prudential framework, based on sector-specific calibrations and in line with the EU's climate targets.

6.2.2 Introducing a climate-related maximum exposure limit and systemic risk buffers in macroprudential banking regulation

The macroprudential framework addresses the interconnected nature of the financial system with the aim of safeguarding financial stability by preventing the growth of systemic risks. It requires banks to set aside additional capital (capital buffers), amongst other things, on top of the microprudential provisions, and thereby affects bankability by increasing the risk of a defined asset or counterparty and reducing respective expected returns. Systemic risks have a cross-sectional dimension in affecting all agents in the economy, including the way the productive economy affects the financial economy and vice versa, and a time dimension that refers to the build-up of irreversible financial risks over the financial cycle (Hiebert/ Monnin 2023; Thiemann 2024). Capital buffers can limit the risk-taking of private financial actors by lowering exposures to other financial and non-financial actors and can thereby decrease the build-up of financial crises. They can also increase the resources that banks have at their disposal to be prepared for unexpected events, financial or non-financial, that could affect the stability of the financial system. The economic and financial effects of macroprudential instruments depend on complex interactions between different agents in the economy. While potentially impinging on short-term economic growth, macroprudential measures can contribute towards more sustainable growth pathways through softening boom and bust cycles (e.g Tarne et al 2022 for the real estate sector).

By now, major international institutions such as the Financial Stability Board, the Basel Committee on Banking Supervision and the International Monetary Fund, as well as EU macroprudential supervisors, the ECB, and the European Systemic Risk Board, have acknowledged that climate-related and environmental risks have a systemic risk dimension that creates a case for a macroprudential policy response (Monnin 2021; Hiebert/ Monnin 2023). However, the EU has not yet introduced any concrete macroprudential policy tools that go beyond stress testing (Finance Watch, 2021, 2023; Hiebert/ Monnin 2023). One of our interviewees from an EU supervisory authority accordingly problematized the 'somewhat artificial separation between the microprudential arm and the macroprudential arm', which in the case of climate concerns has come to privilege a microprudential approach (interview 86). The director of a leading sustainable finance think tank similarly regretted that the 'whole discussion about how macroprudential policy should take climate into account [...] has been sort of halted' (interview 22).

The macroprudential instruments most discussed in connection with climate-related risks are 'maximum exposure limits' (also called concentration limits) and 'systemic risk buffers', both of which address the cross-sectional dimension of risks (Miller/ Dikau 2022; Hiebert/ Monnin 2023; Ikeda/ Monnin 2024). Maximum exposure limits build on the insight that 'transition and physical risks are concentrated in some financial exposures' and 'arise from a few counterparties' (Hiebert/ Monnin 2023: 10). This also holds true for the transition sectors with high GHG emissions (Miller/ Dikau 2022), and accordingly calls for an instrument to target those specific exposures and counterparties. When a bank's lending

level exceeds a defined threshold[9], the supervisor can demand additional capital and/or request the bank to divest from these sectors (Hiebert/ Monnin 2023; Miller/ Dikau 2022). Climate-related systemic risk buffers are additional capital requirements that in turn could account for long-term, non-cyclical risks that are characteristic for environmental degradation and climate change and that especially accrue to real assets. They could address a situation where the real economy transitions too slowly and/or where the financial sector remains invested in high-GHG-emitting activities, which would strongly increase physical risks at the level of the economy (Ikeda/ Monnin 2024).

To confront this issue, we recommend introducing both a 'climate-related maximum exposure limit' and a 'climate-related systemic risk buffer', since each of these instruments is designed to address distinct environmental and climate policy scenarios. The proposed 'maximum exposure limit' would be calibrated through a transition risk analysis and would be based on the expectation that the too slow transition of the real economy is the driving factor behind the increasing risks to financial stability (Miller/ Dikau 2022). However, in the case of waning climate commitments and a carbon lock-in within the financial sector, the systemic risk buffer could be a more suitable instrument, since it would also account for the physical risk dimension. The design of the instrument should be oriented towards tackling the issues of proper risk absorption, effective prevention, individualized treatment as well as recalibration on a regular basis (considering the dynamic nature of the transition) (Ikeda/ Monnin 2024).

Policy recommendations:
Macroprudential regulation and supervision frameworks should be expanded by national and EU policymakers to include

1. *a climate-related maximum exposure limit, and*
2. *a climate-related systemic risk buffer*

6.2.3 Macroprudential transition plans for banks

EU policymakers have introduced transition plans as a novel tool to incentivize productive and financial corporations to integrate a forward-looking element into their respective business strategies and risk analyses. This tool is intended to provide information about how well the current emissions of the productive economy on the one hand, and the financed emissions of the financial sector on the other, are on track with the climate policy targets that ensure a net-zero economy by 2050. Transition plans serve to require financial actors to align their activities, whether through their customer relationships or their engagement as shareholders, with sustainability criteria. While the details of the plans' design will become clearer upon implementation between 2025 and 2027, the current regulation requires banks (and prospectively insurances) to comply with two kinds of transition plans: The first, which is anchored in the Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CSDDD), requires relevant entities to show how their portfolios align with the Paris Agreement. The second, which is anchored in the microprudential Capital Requirements Directive (CRD3), demands proper treatment of climate-related and environmental risks.

At present, the challenge arising from the provisions of these two directives is that the microprudential approach to transition plans tends to override the CSRD/CSDDD requirements by leaving the decision entirely up to the banks as to which sectors they choose to finance (interviews 24, 85, 86, 87, 88). This leads to a situation in which the financial sector continues to invest in sectors that have

[9] Hiebert and Monnin (2023) as well as Miller and Dikau (2022) suggest 25% of banks' eligible capital.

been proven to be incompatible with a net-zero economy, or in sectors that tend to transition too slowly (Miller/ Dikau 2022; Ikeda/ Monnin 2024). Due to the high bankability of these sectors and the current microprudential approach, financial actors still have very little incentive to divest. EU supervisors hence admit that there is currently a disconnect 'between the [micro]prudential concept and the net-zero concept' (interview 85, also 24). According to one official, the microprudential transition plans may have even 'created an unnecessary complication'. In their view, it is the CSRD/CSDDD transition plans with clear environmental targets that are 'what really matters' (interview 86).

One alternative for addressing the current disconnect between the two legal requirements would be to integrate transition plans into macroprudential regulation and supervision. In a macroprudential context, transition plans would have the effect of allowing supervisors to check the 'information derived from aggregating bottom-up transition plans [...] against a system-level top-down cross-check on modelling the evolving macro financial environment' (Smoleńska / Tamburrini/ Hiebert 2025). In the first place, this would provide a much more granular data basis for assessing systemic risks that may appear minor through a microprudential lens. Supervisors would be able to identify certain 'pressure points' (Smoleńska / Tamburrini/ Hiebert 2025) that might arise, for example, through a high aggregate exposure to high-GHG-emitting sectors. And in the second place, it would help to address the challenge of ensuring that financial actors are not tempted to simply 'greenwash' their balance sheets, example given, by concealing the financing of emissions through the shadow banking sector. Further, it would keep the financial sector from hindering the transition by maintaining favourable financing conditions for high-GHG-emitting activities.

Policy recommendation:
National and EU policymakers should integrate transition plans into their macroprudential regulation and supervision frameworks.

6.2.4 Introducing and/or raising capital requirements for high-GHG-emitting activities in microprudential regulation of non-bank financial institutions (NBFIs)

In accordance with the principle of 'same activity, same risk, same regulation' (Mack 2024), we propose that risk-weights applicable to the banking system, both now and in the future, should also apply to the shadow banking system. On a microprudential basis, this would involve introducing and/or increasing risk-based capital requirements for the financing of high-GHG-emitting activities as a way to reduce their bankability (see section 6.2.1). In order to avoid shadow carbon financing, such climate-risk adapted capital requirements for high-GHG-emitting assets should be extended to (already partly regulated) institutional investors, including pension funds, insurance companies and asset managers along with their subsidiaries such as money market funds (Kedward/ Gabor/ Ryan-Collins 2024). Capital requirements should also apply to hitherto only weakly regulated NBFIs such as private credit funds as well as private equity firms that acquire and thereby finance fossil fuel firms (Armour/ Enriques/ Wetzer 2022; Gözlügöl/ Ringe 2023). As the financial system is constantly evolving, financial regulation must also keep pace to prevent financial instability and future crises (Schairer 2024).

Even more importantly, prudential regulation of NBFIs needs to be extended in general to hedge funds, private equity funds, and private credit funds (see Box 4, AIFMD). As many of these funds acquire a significant share of their capital from institutional investors, they accordingly control the retirement and insurance savings of ordinary citizens (Sgambati 2024; Interviews 68, 70, 75). Micro- and macropruden-

tial supervision in these areas could be conducted by specifically delegated authorities from ESMA, EIOPA, and the European Systemic Risk Board (ESRB). Monitoring should be complemented by monetary policy measures designed by the ECB (see sections 5.1, 5.4 and 6.3.1), which has already built-up institutional capacities to carry out the macroprudential supervision of climate-related systemic risk in the banking system (Hiebert/ Monnin 2023; Miller/ Dikau 2022; Interview 86). This would also be in the interest of the ECB for two reasons. On the one hand, institutional investors now allocate 28-35% of the assets they manage to private markets (Palladino/ Karlewicz 2024), with potential negative impacts on financial stability. On the other hand, distortions within the shadow banking system may impede the transmission mechanism of monetary policy (ECB 2024a). So far, EIOPA has been the only NBFI supervisory institution in the EU to explore issues of risk-weight increases for capital allocations to high-GHG-emitting activities. It recommends amending the Solvency II Directive to include a 17% capital requirement increase for stocks and 40% capital charge for corporate bonds issued by high-GHG-emitting firms (EIOPA 2024).

If climate-risk adapted capital requirements were to be set high enough, they would amount to a price-based punitive leverage-ratio as set out in the above-cited proposal made by Finance Watch (2020) with respect to the risk weights in the EU prudential framework (CRR) that are applicable for banks. This would be especially effective for those NBFIs operating closest to the lending side of capital markets, including private credit, private equity, and hedge funds. These actors typically increase their leverage with the help of banks via leveraged loans, collateralized loan obligations (CLOs) (Sissoko 2023) or repurchase agreements (Sgambati 2019). Such a measure could therefore be effective to curb shadow carbon financing because it would hinder large-scale lending and borrowing between NBFIs, particularly institutional investors such as pension funds or insurance companies (see Figure 4 above), which have been increasing their investments in private equity and credit funds in recent years (Park/ Woodall 2024; Platt/ Gandel 2024).

Policy recommendation:
EU legislators should introduce and/or increase risk-weighted capital requirements for NBFIs' holdings of assets linked to high-GHG-emitting activities.

6.2.5 Introducing a climate-related maximum exposure limit and a systemic risk buffer into macroprudential regulation of pension funds and insurers

From the problems implicit in shadow carbon financing, it is evident that a purely microprudential approach to climate-related risks in the NBFI sector would not suffice to adequately assess, monitor, and mitigate such risks.

A macroprudential perspective, on the other hand, would focus on aggregate exposures as opposed to individual exposures. Such a perspective is essential for a genuine 'system-wide approach' (ESRB 2024) to assess the overall accumulation of climate-related risk and the sum of financed emissions across the entire shadow banking system. However, it would be ineffective to simply transfer the current macroprudential framework, which is specifically designed for the banking system, to the shadow banking system. The current regulatory framework for NBFIs, which is fragmented and lacks coordination, did not emerge to reduce the build-up of climate-related systemic risk, nor to curb the continued financing of high-GHG-emitting activities (Bolton et al. 2020). Present NBFI regulations relating to sustainability issues – directives such as e.g. the EU's Sustainable Finance Disclosure Regulation (SFDR) and Green Bond Standard – tend to focus rather on ensuring investor protection and market integrity. Notwithstanding, these and other existing NBFI regulations could provide a starting point for more ambitious prudential regulation of NBFIs (see Box 4 below). One sub-group of already comparatively well-regulated NBFIs comprises insurers

and pension funds regulated under the Solvency II Directive and supervised by the European Insurers and Occupational Pensions Authority (EIOPA). Since this group of institutional investors is based largely in Europe with most of its liabilities also being owed to European clients, we argue that macroprudential regulation of climate-related risks for NBFIs could start here.

The two most important macroprudential policy measures for banks discussed in section 6.2.2 are climate-related maximum exposure limits and systemic risk buffers (Miller/ Dikau 2022; Hiebert/ Monnin 2023; Ikeda/ Monnin 2024). We argue that these instruments should also be applied to portfolio holdings of high-GHG-emitting assets based on system-wide climate stress tests for insurers and pension funds. Such stress tests could be conducted by the ESRB and should focus on potential vulnerability of portfolios in situations of diminishing market liquidity and loss of value for high-GHG-emitting assets, in particular through second- and third-round effects of risk contagion that include margin calls and fire sales (Mack 2024). Depending on the outcome of these stress tests, EIOPA could impose additional capital requirements on insurers and pension funds in the form of climate-related systemic risk buffers to limit overall leverage of the shadow banking sector in connection with high-GHG-emitting assets.

Insurers and pension funds must invest insurance premium payments and pension savings in assets to maintain future solvency when liabilities become due – so-called 'solvency capital'. To ensure that insurers have enough capital to absorb unexpected losses over a 12-month period with a confidence level of 99.5%, the Solvency II directive stipulates that at least 50% of the total solvency capital requirement must be covered by 'Tier 1', that is, high-quality liquid assets such as retained earnings and reserves or ordinary share capital. However, the rest of 'Tier 2' and 'Tier 3' assets may also consist of lower quality assets such as corporate bonds and equity (EIOPA 2025).

To incorporate climate-related risks into the regulatory framework, EIOPA could, on the one hand, increase the ratio of Tier 1 solvency capital requirements for underwritings in high-GHG-emitting sectors. On the other hand, regulators could also disqualify assets related to those sectors (e.g., corporate bonds) from being considered Tier 1 capital for both insurers and pension funds[10]. Should these modifications to Solvency II and pension fund capital requirements prove to be ineffective as a price-based instrument to disincentivize investment in assets with high GHG emissions, regulators could resort to mandating divestment from assets with high GHG emissions. In contrast to regulations in the traditional banking sector, EIOPA's maximum exposure limits should focus on exposures to private equity funds and private credit funds, considering that in recent years pension funds in particular have increased their allocations of capital to these actors (Palladino/ Karlewicz 2024). Implementation of these policies would likely require policymakers to grant additional macroprudential power to supervisors such as the ESRB, and especially the ESMA (Lagarde, 2023). Recent calls for the introduction of a 'consolidated supervisory approach for large cross-border asset management groups' by the Austrian, French, Italian, and Spanish national financial market authorities, are an indication of mounting momentum for political change in this direction (AMF 2024). The key challenge to implementing said change lies in the fact that each EU Member State has its own competent authorities responsible for supervising asset managers (and most other NBFIs). In light of this circumstance, one interviewee called for a supranational supervisory institution to ensure such an approach:

[10] In the case of EU pension funds, national policymakers would have to modify existing regulations in order to implement such a climate-related systemic risk buffer.

In other words, what is actually needed is uniform regulation across the various financial market segments. What is actually needed is someone who sits above ESMA, EBA, and EIOPA with expertise [and takes action], which in my opinion can only be the ECB. But there is a tussle between the institutions (interview 9).

Accordingly, we recommend centralizing the macroprudential supervision of climate-related systemic risks emanating from NBFIs within one institution. While some argue that ESMA would be the best-suited institution for the task (ECB 2024a; Interview 86), it would be up to policymakers to decide on the most appropriate option for future supranational supervision of NBFIs. In the interest of expediting meaningful reform, however, supervisory powers similar to those of the ECB for systemically relevant institutions could be delegated to the ESMA as an interim solution to enable effective implementation and oversight of EU-wide measures based on recommendations from the ESRB (Mack 2024).

Policy recommendations:

1. *National policymakers and EIOPA should introduce climate-related systemic risk buffers for pension funds and insurers based on system-wide climate stress tests conducted by the European Systemic Risk Board (ESRB)*
2. *National policymakers and EIOPA should set maximum climate-related exposure limits for pension fund and insurer investments in NBFIs with high-GHG-emitting assets, in particular private equity funds and private credit funds.*
3. *EU policymakers should reform and empower the European Securities and Markets Authority (ESMA) to improve its supervision of high GHG emission financing via NBFIs.*

Box 4. Starting points for including prudential regulation of non-bank financial institutions (NBFIs) within the EU financial regulatory framework

The various micro- and macroprudential tools described in this section could be integrated into corresponding current EU regulatory frameworks for NBFIs. This should include provisions on capital, liquidity, and risk management that enhance entity-level resilience as well as macro-prudential systemic risk buffer and concentration limits as already discussed for the regulated banking system (Demertzis/ Pinkus/ Ruer 2024; EIOPA, 2024; Kedward / Gabor/ Ryan-Collins 2022; Monnin 2021; Hiebert 2022; Hiebert & Monnin 2023; Mack 2024).

Money Market Funds Regulation (MMFR):
For money market funds *(Money Market Funds Regulation 2017/1131/EU)*

Alternative Investment Fund Managers Directive (AIFMD):
For hedge funds, private equity and private credit funds *(Alternative Investment Fund Managers Directive 2011/61/EU)*

Undertakings for collective investment in transferable securities (UCITS):
For asset managers, investment funds and special purpose entities involved in the issuance of asset backed securities (ABS) and collateralized loan obligations (CLO) *(Undertakings for collective investment in transferable securities; Regulation 2024/911/EU)*

Regulation on the prudential requirements of investment firms (IFR/IFD):
For asset managers, hedge funds, private equity and private credit funds (*Regulation on the prudential requirements of investment firms 2019/2033/EU)*

Solvency II Directive:
(Re)insurance companies, pension funds *(Directive 2009/138/EC on the taking-up and pursuit of the business of Insurance and Reinsurance)*

Financial Conglomerates Directive (FiCoD):
For financial conglomerates, in particular (re)insurance companies *(Directive 2002/87/EC of the European Parliament and of the Council of 16 December 2002 on the supplementary supervision of credit institutions, insurance undertakings and investment firms in a financial conglomerate)*

6.3 Exclusionary policies

6.3.1 Excluding high-GHG-emitting assets from ECB collateral frameworks

Another possibility to decrease the bankability of high-GHG-emitting activities would be for central banks to amend their collateral framework for secured lending (Schoenmaker 2021; Aguila/ Wullweber 2024). Commercial banks are currently able to borrow money from the collateral framework defines the type and minimum quality of assets the central bank accepts as collateral in its credit operations with banks. Pursuant to the ECB's collateral framework, the ECB determines:

- what kind of securities are eligible for borrowing (*eligibility*),
- how much money a borrower can get against the value of its collateral assets –

since the central bank typically applies a discount over the value of the collateral to hedge against risk (‘*haircut’*),
- what interest rate is charged, and
- at what liquidity risk counterparties can borrow, i.e. how shifts in market prices of collateral assets affect the credit agreement between the borrower and the central bank (*valuation type and margin call requirements*).

The decision to include or exclude a certain type of asset from the collateral framework can have a strong impact on the liquidity of and the demand for an asset (e.g. a corporate bond). Therefore, this policy would directly affect the bankability of investments (Wullweber 2024).

Climate-related risks are not taken into account in current collateral frameworks, and their scores ignore the effects that climate-related shocks can have on the price and liquidity of assets used as collateral (Gabor et al. 2019; Dafermos et al. 2021; Kedward/ Gabor/ Ryan-Collins 2024; Interview 75). This constitutes a built-in bias against green assets while mobilizing credit in the direction of high-GHG-emitting activities, as became apparent during the ECB’s Pandemic Emergency Purchase Programme (PEPP) in response to the COVID-19 pandemic economic fallout (Cojoianu et al. 2020). The effects are illustrated, for example, in a study which found that 59% of corporate bonds accepted as collateral by the ECB are issued by high-GHG-emitting companies, while the gross added value of emission intensive sectors only amounts to 29% (Dafermos et al. 2021).

In 2021, the ECB developed plans to limit the share of assets from high-GHG-emitting entities that could be used as collateral, while only accepting collateral and purchasing assets from companies that comply with the CSRD (Kedward/ Gabor/ Ryan-Collins 2024). In July 2024, however, the ECB decided not to move forward with the adoption of climate change collateral pool concentration limits, arguing that the technical preconditions had not been met (ECB 2024b).
One solution for central banks to reduce carbon bias in their operations would be for them to adapt their collateral frameworks. This could be accomplished by adopting either a direct negative screening approach that would exclude assets that fail to meet ESG criteria (on a one-by-one basis), or a tilting approach that uses haircuts, interest rates, and margin requirements in a way that would prevent high-GHG-emitting from being privileged over other assets and securities (Oustry et al. 2020; Dafermos et al. 2021; Kedward/ Gabor/ Ryan-Collins 2024). Schoemaker (2021: 591) contends that ‘a medium tilting approach could reduce carbon emissions in the central bank’s corporate and bank bond portfolio by 55%, offsetting the current carbon bias’.

The advantage in creating greener collateral frameworks is that they would be binding not only on traditional banks, but also on shadow banks (NBFIs), which fund a large part of their operations with repos. Repos, in turn, require safe collateral for lending activities, in other words, primarily the type of collateral that is accepted by central banks. This is because many commercial clearing houses (so-called ‘market-makers’) pay close attention to the central bank collateral frameworks, which in effect gives central banks indirect control over liquidity creation in the shadow banking sector (Gabor/ Ban 2016; Wullweber 2024). For instance, haircut levels for high-GHG-emitting corporate bonds, asset backed securities (ABS), and CLOs, if set high enough (e.g. at 50% of the bonds’ value), would constitute a punitive leverage ratio for NBFIs that finance their lending activities as market-makers through instruments such as hedge funds. An even more drastic haircut of 100% for high-GHG-emitting securities would effectively amount to an exclusionary policy for such assets. In either case, private market-makers would avoid building up a portfolio of that nature because it would not allow them to use repos as a source of leverage.

Accordingly, we recommend that central banks amend their collateral requirements (eligibility, haircuts, interest rates, valuation, and margin requirements) so that, as a first step, they are tilted against very high-GHG-emitting securities such as fossil fuel corporate bonds, but also against other securities such as ABS or CLOs that may be connected with the financing of high-GHG-emitting activities. They should subsequently tighten their requirements incrementally so as to eventually achieve an outright ban on such collateral assets.

One first step in this direction would be for the ECB to apply mark-to-market valuation and tight margin call policies for high-GHG-emitting collateral while relying on long-term annualized valuation policies and very loose margin calls for green assets. In terms of legislation, a promising starting point would be for the EU to adopt the Financial Stability Board's minimum haircut framework for transactions to finance securities (FSB 2020). This could be augmented by a provision that would stipulate higher haircuts for high-GHG-emitting securities. Measures of this nature would not only curb leveraged lending based on such securities but would also protect the recipients of collateral in repo transactions by reducing climate-related risks in their portfolios.

Policy recommendation:
The ECB should introduce a 'tilting' approach in its collateral framework based on the exclusion of assets issued by fossil fuel companies and other high-GHG-emitting firms. It should then incrementally tighten its collateral requirements to eventually achieve an outright ban on those assets in its collateral framework.

6.3.2 Excluding high-GHG-emitting assets from securitization

Traditional securitization (also known as 'true sale' securitization) is the process by which a bank converts illiquid loans into tradable ABS or CLOs and then sells such securities or obligations to investors. In an alternative type of securitization (known as 'synthetic' or 'on-balance sheet' securitization), a bank can retain the loans on its balance sheet but transfer the attached credit risk to an investor in exchange for the interest accrued on the loans.
As regulatory and reputational pressures on commercial banks in the EU have been mounting, banks have begun to lower their loan portfolio exposure to high-GHG-emitting sectors (Reghezza et al. 2022; Rickman et al. 2024). Securitization has come to be increasingly used as a tool to 'derecognize' loans issued to high-GHG-emitting activities by removing them from a bank's balance sheet and selling them off to investors (see Cusano et al. 2024 for ABS; Müller/ Nguyen/ Nguyen 2024 for CLOs). As one interviewee put it:

Securitization and those sort of synthetic ways of just getting rid of the stuff if it was ever to hit. That's what's familiar. That's what's in the muscle memory. So again, it's unsurprising that that's coming back (interview 82).

This increasing attention to the role of securitization in financing the green transition has triggered debate in the EU on the potential, challenges, limits, and perils of both 'green securitization' and 'carbon securitization' (Cerami/ Fanizza 2023; Gabor 2019; Petit/ Schlosser 2020). One policy to counter carbon securitization strategies employed by banks would be to impose an outright ban on the securitization of high-GHG-emitting loans. Such an approach would increase pressure on banks not to simply employ risk management techniques to clean up their balance sheets for regulators, but rather to engage with clients to decarbonize their businesses.

Policy recommendation:
EU policymakers should exclude loans and other assets from high-GHG-emitting firms and projects from securitization under supervision of the European Securities and Markets Authority (ESMA).

7 Funding never-bankable green activities

The preceding sections provide policy recommendations for financing not yet bankable activities and for phasing out bankable high-GHG-emitting activities. There is, however, a large and important area of sustainable activities that need to be financed but will probably never be bankable. This was frequently pointed out in our interviews. Especially bankers, but also professionals from other financial institutions, described the experience of being asked to finance activities they held to be not financeable due to bankability concerns. According to one interviewee: 'Local authorities, in particular, expect free loans, and we'll never give them' (interview 31). The financing of sustainable initiatives is rather viewed as a public responsibility (interviews 26, 27, 31, 80). As one German banker remarked: 'There are certain things we simply won't do' (interview 26, translated). Or, as a major French asset manager put it: 'When projects are not bankable, we need the public sector' (interview 27).

There are various reasons for this. Some sustainable projects (e.g. climate adaptation measures such as building higher dams) fail to generate private profits but are desirable from an environmental and social welfare point of view. Never-bankable activities can be found in various categories of green investments. In a recent study, EIT Urban Mobility, an initiative of the European Institute of Technology and Innovation (EIT), found that meeting the EU Green Deal objectives for the transport sector by 2030 and 2050 will require an amount of up to EUR 1.5 trillion in resources to enable the sustainable development of urban mobility in European cities (EIT Urban Mobility 2024). Heilmann, Steitz and Schuster-Johnson (2025) estimate that the figure of EUR 62 billion will be needed to develop Germany's train infrastructure alone, and that an additional amount of EUR 38 billion will be required to strengthen Í£local public transport by 2030. While some of this funding can potentially be raised through ticket fares and other sources of revenue, it has been proven that public subsidies are required to make public transport more accessible and climate resilient (Delgado Jalón/ Sanchez de la Lara/ Gelashvili 2019; Liu et al. 2023, Follmer et al. 2023). Public funding can also serve to counterbalance the persisting subsidization of private fossil-fuelled transportation (IMF 2023).

Various projects in the electricity sector, including the upgrading of grid infrastructure, may also fall into the category of never-bankable activities. The EU Commission's Action Plan for Grids estimates that it will take investments of between EUR 375 and EUR 425 billion to upgrade and connect grid infrastructure across Europe. Refinancing such investments solely or mainly through consumer tariffs — a precondition for making them bankable — is difficult and can also have severe social repercussions (European Commission 2024a).

For activities geared to fostering climate change adaptation, bankability is even harder to achieve. In the past, 92% of global climate adaptation flows came from public budgets (Climate Policy Initiative 2024: 4). In the realm of environmental and biodiversity protection, there is no profit potential in activities such as wetland restoration, river renaturation, or

ocean clean up. This creates a huge investment gap[11]. The Forest Declaration Assessment has found that current global climate finance for forests, an annual amount of USD 2.3 billion, is less than one percent of what is necessary to reach the goals set for 2030 (Forest Declaration Partners 2022). Another group of never-bankable activities comprises those designed to pay for already existing climate-induced loss and damage, a trend that will continue to escalate and create an ever more dire need for financing. The European Environment Agency has estimated that between 2021 and 2023 in the EU alone, the economic losses caused by climate-related extreme weather events amounted to more than EUR 162 billion (EEA 2024). In the future this figure will grow increasingly higher.

Enabling a flexible response to the need for climate and sustainability financing will require a substantial upscaling of the capacity to provide sufficient financing to never-bankable sustainable activities. A recent ECB study calculated that from 2026 until 2030, the annual green public funding gap in the EU will amount to a figure of between EUR 46 and EUR 52 billion (Nerlich et al. 2025). This is a very conservative estimate, however, considering that the figure is a lower bound estimate and that it is based on the assumption that only 17% of the total green funding gap should be covered by public funds.

Other estimates suggest that the public share of the total gap should amount to between 20% and 25% (Darvas/ Wolff 2021), or even up to 50% (Baccianti 2022). Heilmann, Steitz and Schuster-Johnson (2025) suggest that by 2030, depending on the price of carbon, the public funding gap to meet the 2030 targets for Germany alone will amount to a figure of between EUR 111 and EUR 207 billion. As a senior employee working for a US bank *remarked:*

Don't let my colleagues [...] hear that I said we need more state intervention. We do need more state intervention. [...]. [In this country, there] is going to be this state-owned bank, a state-owned energy company. And there's also a wealth fund. And these are the things that can actually make a difference. And this is what we need to have, because allowing the private sector – in the absence of any incentives to sort it out between them because they want to do the right thing – it's just never going to happen (interview 80).

In the following, we present two policy recommendations that, in combination, can enable and further advance public financing capacity for necessary but never-bankable green activities. As this report focuses on financial and monetary policy, the topic of taxation – a crucial and potential stream of revenue – is discussed only briefly below (see Box 7).

7.1 Proposal for a European Climate Fund

During the COVID crisis, the European Union established the Recovery and Resilience Facility (RRF). This temporary instrument, which came into effect in February 2021, serves as the centrepiece of the NextGenerationEU, the EU's plan to recover from the crisis. The RRF is authorized to issue bonds for EUR 723,8 billion that are jointly guaranteed by all Member States and distributes the proceeds in the form of grants (EUR 338 billion) or loans (EUR 385.8 billion) to the Member States to finance investments in the productive economy (European Commission, 2020). The RRF already requires that the investment plans submitted by

[11] This is not to deny current attempts to commodify and profit from nature: A multiplicity of financial instruments has emerged in recent decades following the aim to financialize and speculate over nature and climate based "assets" and "services" (Bracking 2019). However, increasing attempts to price natural "assets" and ecosystem "services" and to create markets for such assets and services are based on controversial assumptions such as the fungibility and substitutability of different elements of the environment. They also have a poor track record in terms of conservation and restoration effectiveness and give rise to social justice concerns (Buller 2022).

Member States allocate 37% of the funds to green investments. This temporary facility will expire in 2026, and, as pointed out by the ECB, the disappearance of the RRF 'may trigger a sizeable shortfall' in public funding sources for green investments (Nerlich et al. 2025). Thus, we propose leveraging the momentum generated by the establishment of the RRF to launch a European Climate Fund (ECF).

Several proposals have already been made to create an EU supranational fund dedicated to green investments (Abraham/ O'Connell/ Oleaga 2023; Bakker/ Beetsma/ Buti 2024; Garicano 2022; Darvas/ Wolff 2021; Darvas 2022a; Monasterolo et al., 2024). Considering that the climate crisis entails systemic risks, and that the EU has set ambitious climate goals to be achieved by 2030 and 2050, we believe that a well-calibrated supranational climate fund could be a relevant instrument to finance never-bankable green activities.

First, regarding the size of the ECF, there are various estimates of how much would be needed. Abraham, O'Connell and Oleaga (2023) propose a Climate and Energy Security Fund capable of providing EUR 500 billion by 2030. Bakker, Beetsma and Buti (2024), in turn, suggest a fund similar in size to the RRF, i.e. around EUR 750 billion by 2030, but they argue that it should also include the financing necessary for the digital transition. Based on the figures discussed at the beginning of section 7, an ECF would need to be at least large enough to cover the green public funding gap of approximately EUR 200 billion identified by Nerlich et al. (2025) from 2027 to 2030. However, as already argued, this figure is very conservative. While estimates vary, the existence of a significant public funding gap is evident. This highlights the need to mobilize public resources for the green transition in a coordinated way, particularly for activities that are never-bankable. Consequently, and considering evolving needs, it would be advisable to make the fund flexible enough so that it can be increased later on according to need.

Second, the proceeds of the European Climate Fund bonds should be dedicated to financing only a well-defined set of never-bankable green activities. Strict accountability and supervision rules should ensure that they are used exclusively to finance the agreed activities. As with the Recovery and Resilience Facility, the proceeds collected at European level would be distributed to Member States in shares of loans and grants, and the precise distribution of these would be determined in a political process. Member States in cooperation with the European Commission should define ex ante a set of criteria to identify the never-bankable activities. The governance designed for the RRF could simply be replicated for the EU Climate Fund, but it seems appropriate to envisage an involvement of the Directorate General for Climate Action (DG CLIMA) in the definition of the never-bankable activities to be funded by the ECF.

Third, the EU RRF has a redistributive effect among Member States, privileging the distribution of grants to countries with more fragile or heavily impacted economies. In addition, countries jointly guarantee the repayment of EU debt, implying an implicit redistribution that leads to lower interest rates in the market for more than half of the Member States[12].The EU Climate Fund would be especially beneficial for Member States that face higher borrowing costs relative to the EU, enabling them to access more affordable financing for green investments. To increase spending on essential but never-bankable green activities, the Climate Fund should be complemented by a fiscal 'Green Golden Rule' designed to incentivize

[12] While more than half of the Member States enjoy lower interest rates compared with bonds issued at the national level, other countries (including Germany) borrow at lower cost if they issue bonds at the national level.

Box 5. Global dimension

The consequences of the ecological crisis are global, but the means to finance a green transition are not evenly distributed internationally (Aguila/ Haufe/ Wullweber 2024). In particular, the countries of the Global South, which are severely affected by extreme weather events such as hurricanes, floods, droughts, and other ecological disasters, lack the financial resources necessary to mitigate and adapt to the climate crisis, and to address loss and damage. While financial contributions by countries of the Global North to those of the Global South are justified based on considerations of international justice alone, the case can also be made that failing to provide such resources would also have negative consequences in the Global North. This further legitimizes the call for greater commitment on the part of wealthier countries to contribute to financing the transition on a global level. Another important problem faced by countries of the Global South is that they require foreign currency to be able to import the goods and services that they do not (yet) produce domestically but need in order to finance the green transition. Many countries and firms from the Global South face exorbitant interest rates or are excluded altogether from international markets because they are considered non-bankable by global financial investors (Alami/ Guermond 2023). In order to address this problem, we propose the establishment of a new green Bretton Woods system (Aguila/ Haufe/ Wullweber 2024).

Besides this, however, Global South countries also require resources to compensate for loss and damage resulting from ecological breakdown. This issue was at the forefront of discussions during the most recent Conference of the Parties (COP29 in Baku, Azerbaijan, November 2024). Proposals made in this context have focused on climate reparations and the increase of contributions to an international Loss and Damage Fund. Further proposals have been made to address the high indebtedness of Global South countries by granting debt forgiveness to lower the financial burden and free resources for the green transition (Bolton et al. 2022, Hurley et al. 2024).

similar to or lower than those charged by the EU (see Section 7.2 below).

Fourth, the accounting treatment of the RRF implies that grants are not counted in national deficit and debt indicators, while loans are included (Eurostat, 2021). It is advisable that an EU Climate Fund should be subject to the same accounting treatment, meaning that any component of grants to finance never-bankable activities would not be counted under the budgetary rules.

Finally, several options exist to repay the bonds issued by the EU Climate Fund. As with the RRF, a component of these bonds could be repaid by the European Union through the while another component could be repaid directly by the Member States.

The current mix of instruments to repay bonds could be enriched by forms of taxation such as a carbon wealth tax that would guarantee a green transition accompanied by wealth redistribution (Bastos Neves/ Semmler 2024; see Box 7 on taxation).Moreover, taxation could be complemented by using a portion of the profits from the EIB (see section 5.3.2) and support from the ECB to mobilize the resources needed to repay the bonds.

Policy recommendation:
EU legislators should establish an EU Climate Fund for never-bankable activities. The fund

should have a volume of at least EUR 200 billion by 2030, with the flexibility to allow for increases according to financing needs.

7.2 Financing green investments under and beyond existing fiscal Rules: Opportunities and the role of a 'Green Golden Rule'

A constantly recurring theme throughout our research was the need for more public support toward never-bankable green activities (e.g. Interviews 26, 27, 31, 80). To address this issue requires turning our attention to factors that currently limit the fiscal capacity to provide this support: fiscal rules, both at the national and the European level.

As demonstrated above, the costs of climate damage that are already high today will continue to rise in the future. Taking on debt now to mitigate climate damage is the rational approach to prevent future costs of damage and recovery. We argue that it is therefore justifiable to expand sovereign debt (or use taxation) to finance public investment in sustainable initiatives that private investors are not willing to finance. Such investments naturally involve expenses, but ultimately the amount would only come to a fraction of what it would cost in the alternative scenario of non-investment in preemptive measures such as flood protection, reforestation projects, or urban greening.

Research highlights the significant year-to-year rise in the cost of inaction as expenses associated with climate adaptation increase with

Box 6. The German debt brake

Embedded in Articles 109 and 115 of the Basic Law, Germany's constitution, the debt brake was enacted in 2009, and has been operational since 2016. This fiscal rule limits structural government deficits to 0.35% of GDP at the national level (Golka/ Murau/ Thie 2023). According to the German Council of Economic Experts, the strict constraints of the rule pose massive challenges to the financing of large-scale public investments in climate mitigation and adaptation as well as to the provision of necessary relieve for loss and damage (Sachverständigenrat 2024). The latest legislative amendments to the debt brake, passed by the German Parliament in March 2025, allow more deficit spending in security-relevant policy fields. While this is a welcome step, severe restrictions still persist on environmental and climate-related spending.

Despite these restrictions, certain financing mechanisms remain permissible within the debt brake framework. For instance, financial transactions are allowed, provided they do not alter the net financial wealth of the state. Such transactions can be made as equity contributions, particularly when they are expected to generate long-term returns. They can also be made as loans, even interest-free loans, to spread costs over the lifespan of the investment or to finance growth-inducing activities. Additionally, the debt brake includes a conjunctural component that permits more fiscal flexibility when the economy operates below its potential, in which case counter-cyclical spending is possible (Schuster et al. 2024). This means that even within the debt brake framework, leeway would exist to finance long term investments in infrastructure adaptation related to climate change and climate mitigation measures. However, the debt brake does render such investments unnecessarily complicated and limited (Schuster et al. 2024; Golka/ Murau/ Thie 2024). To facilitate the process, Germany's debt brake legislation would need to be further reformed, at a minimum to align regulations with the flexibility permitted under the Maastricht framework, including the adoption of a 'Green Golden Rule' to exempt climate and environment-related spending.

every fractional degree of global warming (Iizumi et al. 2020, Doll et al. 2014). What is more, emissions are cumulative. That means that every year we invest less than necessary 'increases the subsequent investment requirement, not only by dint of the absolute shortfall but also because of the delay that it represents' (Christophers 2024: xvii).

Consequently, from a public finance perspective, measures to mitigate and adapt to climate change must be regarded as urgent, ultimately cost-saving, and indispensable investment priorities. They face significant legal barriers, however. At the European level, fiscal constraints are imposed by the Maastricht Criteria (convergence), where the rules on public finances limit annual national budget deficits to three percent of GDP and total public debt to 60% of GDP. These rules are further reinforced by national policies, with Germany's debt brake, the so-called *Schuldenbremse*, serving as an extreme example.

Already now, the EU fiscal rules allow productive investment in line with the growth strategy of the EU (Schuster et al. 2024). Furthermore, several instruments not factored into Maastricht debt could be helpful to a certain extent in expanding green public spending especially in public infrastructure. These include equity instruments, for example (Bundesbank 2018). Furthermore, as mentioned above, the RRF does allow some spending that does not count as Maastricht debt. Nerlich et al. (2024) describe a considerable backlog in the absorption of funds of the RRF, which suggests the existence of unexploited fiscal flexibility.

In addition, while several countries exceed Maastricht criteria (Council of the EU 2025), there are also many whose debt-to-GDP ratio has remained well below the required 60% mark, including, among others, Denmark, Poland, Estonia, Luxemburg, the Netherlands, and Sweden (Eurostat 2024). This also points to the existence of flexibility to finance sustainable investments with public funds.

This notwithstanding, in view of the urgency of financing needs, we recommend facilitating additional funds at the level of the Member States by relaxing the EU Maastricht criteria that exclude green spending. One promising proposal is the so-called 'Green Golden Rule', which would exclude expenditures on climate-related and green investments from the fiscal deficit and debt calculations under both national and EU-level frameworks. Removing green investments from fiscal constraints in this way would create the fiscal space needed to meet climate objectives without violating constitutional or EU treaty obligations (Darvas 2022b; Darvas/ Wolff 2021).

The potential benefits of a Green Golden Rule are substantial. First, it would align fiscal policy with the long-term imperatives of climate stabilization, counteracting the tendency of pursuing short-term public consolidation at the expense of long-term climate mitigation activities. These are often the first to be cut, as they do not produce immediate social or economic outcomes (Darvas 2022b). Second, by enabling Member States to prioritize climate action, a Green Golden Rule would incentivize climate stabilization and adaptation across the EU and not just on a state level. The Green Golden Rule would be particularly powerful for financially robust countries that can borrow at low interest rates. To encourage EU Member States that borrow at higher interest rates to invest in never-bankable but essential green activities, such a provision should be complemented by an EU Climate Fund (see section 7.2). Since the relaxation of the Maastricht criteria for specific types of spending is already being discussed (Foy/ Tamma 2025), it is now crucial to implement a reform that would align European fiscal budgets with long-term climate goals.

Policy recommendations:

1. *National governments should use existing financial and fiscal flexibility to finance necessary long-term climate- and environment-related investments and pay for loss and damage.*

2. *EU legislators should initiate the establishment at the European level of a Green Golden Rule that excludes climate-related and environmental investment from fiscal indicators and constraints.*

Box 7. Taxation – A Carbon Wealth Tax

Several studies have shown that the environmental and climate crisis exacerbates existing socio-economic inequalities (IPCC 2022; Islam/ Winkel 2017). At the same time, wealthier individuals and countries consume more resources and produce higher greenhouse gas emissions than their poorer counterparts, and thereby contribute significantly to environmental degradation and climate change (Islam 2015). Moreover, financial constraints limit the ability of low-income populations and countries to adopt sustainable technologies and practices, and consequently reinforce dependence on environmentally harmful activities. The clear link between inequality and the climate crisis calls for taxation measures that not only finance green initiatives but also address existing socio-economic disparities. Against this background, an appropriate response would be to complement the existing carbon pricing mechanisms with a Carbon Wealth Tax (CWT) on carbon capital. Bastos Neves and Semmler (2024) propose that such a tax should be imposed on carbon capital returns, and that the proceeds should be used to subsidize green capital. The advantage of a CWT is that it would directly target polluting assets instead of emissions or consumption. A CWT could generate revenues to finance additional green investments and also alter portfolio allocation choices in favour of green capital, fostering disinvestment in carbon capital.

Egli, Grubb and Stünzi (2024) suggest a tax on profits as an instrument to tackle the recent surge in profits of oil and gas companies. Their findings demonstrate that the energy crisis in 2022 resulted in 'superprofits' for the oil and gas industry (i.e. profits exceeding the projections made at the start of the year) that totalled approximately half a trillion US dollars, an amount of USD 490 billion above the USD 753 billion projected by said companies. In other words, the profits generated on oil and gas in 2022 alone are nearly equal to the total international climate finance flows allocated to developing countries for the entire period from 2020 to 2024. While over USD 200 billion in superprofits (42% of the total) are related to companies directly controlled by governments, the remaining 58% accrue to privately controlled companies (Egli/ Grubb/ Stünzi 2024). Given the high profits of oil and gas companies, and the relationship between socio-economic inequalities and the environmental and climate crisis, a tax on windfall carbon profits can be an appropriate fiscal instrument to promote a just green transition. In addition, in the context of rising interest rates, several countries have considered and partly implemented taxes on banks' superprofits (Maneely/ Ratnovski 2024).

The recent emergence of several further innovative taxation and levy proposals has intensified the debate on taxation. One such proposal has been made by the Global Solidarity Levies Task Force (2024). Based on the findings from their research, the group recommends the use of targeted levies on aviation tickets weighted according to the luxury/economy ticket typology, and on maritime shipping. In addition, citing a study by Zucman (2024), the Brazilian G20 Presidency recently proposed the introduction of a minimum two percent tax on the wealth of the world's billionaires that could generate annual revenues ranging from USD 200 to USD 250 billion. While discussions in this area primarily focus on general fiscal policies, the idea of allocating the proceeds from such taxes to support green investments (and particularly never-bankable projects) is a potential avenue for future policy development.

8 Implications and conclusion

This report presents the findings and recommendations that were derived from the research project Climate change and global finance at the crossroads: Policy challenges, politico-economic dynamics, and sustainable transformation. The project was motivated by the aim of understanding the reasons why the level of financing available for green projects relative to estimates (the green financing gap) still remains relatively low, and why significant funds still flow into sectors with high GHG emissions.

Based on 88 interviews with financial practitioners, public officials, and civil society organizations in the field of sustainable finance, together with an analysis of more than 330 relevant documents, we have developed four key messages.

Key message 1: The main barrier to the financing of the necessary activities for the sustainable transition is their lack of bankability.

Many green firms and projects are not considered bankable, that is, they do not meet the risk-return profiles desired by financial investors. To shed light on this situation and its challenges, we elaborated a classification of activities based on two criteria: on the one hand, whether the activities concerned are green or high-GHG-emitting, and on the other, whether they are bankable, not yet bankable, or never-bankable. The taxonomy yields six distinct types of activities: green bankable, green not yet bankable, green never-bankable, high-GHG-emitting bankable, high-GHG-emitting not yet bankable, and high-GHG-emitting never-bankable.

After comparing the different categories in our classification with the results obtained from our extensive analysis of documents on the current policy and regulatory environment in the EU as well as with the findings from the interviews we conducted, it became clear that current policies based on disclosure, stress testing, green taxonomy, and voluntary approaches, together with derisking interventions, have not succeeded in increasing the volume of green financing. Accordingly, based on our research, we offer recommendations in three areas that we consider to be the most pressing: not yet bankable green activities, high-GHG-emitting bankable, and never-bankable green activities.

Not yet bankable activities are those that are currently not profitable, or only to a marginal degree, while being burdened with significant risks for a variety of reasons. Among other things, these not yet bankable activities rely on new technologies. Moreover, they tend to have long-term investment horizons, more volatile cash flows, and uncertain policy frameworks. Accordingly, we argue that the prevailing EU approach is insufficient to overcome these obstacles and unable to upscale the flows of climate finance to any significant degree. To address this problem, we recommend that the present policy framework be expanded to provide for a more comprehensive approach that includes:

1. *Creation of green targeted longer-term refinancing operations (TLTROs):* The European Central Bank (ECB) should provide green credit facilities with interest rates below the key interest rate.
2. *Expansion of financial guarantees*: The European Commission, the European Investment Bank (EIB) and national development banks should offer targeted guarantees for green investments.
3. *Strengthening the EIB's risk-taking capacity*: EU Member States should allow for higher risk tolerance and credit margins for green projects.
4. *Purchase of EIB green bonds by the ECB*: This would significantly increase the EIB's financial scope to support not yet bankable but necessary green activities.

5. *Setting minimum quotas for green loans:* The EU should create a legal basis for introducing mandatory lending quotas to require financial institutions to allocate a set share of their financing to green initiatives.

Key message 2: High-GHG-emitting activities remain bankable and thus continue to attract financing from banks and NBFIs (shadow banks).

High-GHG-emitting bankable activities are those that need to be phased out but remain highly profitable and low risk, and therefore are still attractive for financial investors. They continue to be financed with significant amounts of money loaned by commercial banks. But there are also high-GHG-emitting investments not financed by banks that are increasingly being funded by non-bank financial institutions (NBFIs), the so-called shadow banking system. This is a phenomenon that we call 'shadow carbon financing'. To downscale the volume of financing available to these sectors, we propose that the following policy measures be adopted and implemented:

1. *Steps should be taken to curb carbon capital mobility*. Analogous to "Know Your Customer" (KYC) policies, relevant regulatory bodies should introduce "Know Your CO_2" principles ($KYCO_2$) and comprehensive emissions reporting requirements (including indirect emissions covered under Scope 3).
2. *Higher capital requirements should be adopted and incorporated* into banking and NBFI regulations to address high-GHG-emitting activities.
3. *Climate-related risk limits and systemic risk buffers* should be introduced and embedded in both micro and macroprudential frameworks.
4. *Mandatory transition plans* should be integrated into macroprudential supervision policy.
5. *Introducing and/or raising capital requirements for high-GHG-emitting activities* in microprudential regulation of non-bank financial institutions (NBFIs).
6. *Introducing a climate-related maximum exposure limit and a systemic risk buffer* into macroprudential regulation of pension funds and insurers.
7. *High-GHG-emitting assets should be deemed unsustainable and excluded from the ECB's collateral framework.*
8. *High-GHG-emitting assets should no longer be eligible for securitization.*

Key message 3: Many activities necessary for the green transition will never be bankable, and therefore will never be attractive for financial investors. As a result, the state must directly provide the necessary financing.

Finally, never-bankable green activities are those that will very likely never generate streams of revenue, or will only do so only to a very limited extent. Consequently, they will fail to attract private financiers. Some of the activities that fall under this category, including environmental conservation and protection projects, are fundamental to the sustainable transition. As the private sector is not willing to finance such activities, the state is required to step in. However, current fiscal rules at the European and Member State levels constrain the capacity of governments to do so. To enable governments to meet the additional financial needs, we propose:

1. *The creation of a European Climate Fund:* With a conservative estimate of at least €200 billion by 2030, EU member states should finance green activities that will never be bankable.
2. *A Green Golden Rule:* harnessing existing flexibility in fiscal rules to pursue green fiscal and industrial policies; introduction of a Green Golden Rule.

Key message 4: As no single policy suffices to address the challenges of sustainable transformation, a combination of monetary, financial, fiscal, and industrial policies is required.

It is important to acknowledge that there are no single solutions or easy answers to solve the problems facing financing the sustainable transformation. None of our recommended policies would suffice on their own to increase necessary green financing or decrease financing for high-GHG-emitting sectors. Our policy recommendations must rather be understood as a combination of different but complementary measures, and therefore as a part of a broader policy mix. Accordingly, a key finding of our report focuses on the limits of finance. Increasing the financing available for green projects and decreasing that for high-GHG-emitting ones is critical to enabling the transition to a net-zero future.

However, there are important limitations to what a financial policy approach can achieve on its own. It is therefore imperative to complement the recommended financial and monetary policies with fiscal and industrial policies specifically designed to help drive the sustainable transformation of the productive economy.

Table 2 on pages 53 and 54 presents an overview of our policy recommendations grouped, on the one hand, according to the competent authorities and decision-makers to whom the recommendations are addressed, and, on the other hand, according to our bankability classification.

Table 2. Summary of policy recommendations according to competent authorities addressed and bankability of activities

Competent Authorities and Decision Makers	Activities		
	Not yet bankable green	***Bankable high-GHG-emitting***	***Never-bankable green***
Monetary and financial authorities			
ECB	Introduction of Green TLTROs (5.1); purchase of EIB green bonds (5.4)	Exclusion of high GHG emitting assets from ECB collateral framework (6.3.1)	
EU financial supervisory authorities (EBA, ESMA, EIOPA, ESRB)		Introduction of a climate-related maximum exposure limit and a systemic risk buffer into macroprudential regulation of pensions funds and insurers (6.2.5); exclusion of dirty assets from securitization (ESMA) (6.3.2)	
Public banks (EIB, KfW)	Provision of financial guarantees for green projects (5.2)		
Fiscal authorities and entities			
Finance Ministries of EU Member States	Provision of financial guarantees for green projects (5.2)	Enhancing transparency of multi-entity and cross-border shadow carbon financing structures (6.1); integration of transition plans into the relevant macroprudential regulation and supervision frameworks (6.2.3)	Harnessing existing flexibility in fiscal rules to pursue green fiscal and industrial policies; introduction of a Green Golden Rule (7.2)
European Climate Fund	Provision of loans for green projects (7.1)		Provision of grants for green projects (7.1)

Table 2. Summary of policy recommendations according to competent authorities addressed and bankability of activities

Competent Authorities and Decision Makers	Activities		
	Not yet bankable green	***Bankable high-GHG-emitting***	***Never-bankable green***
		Legislative bodies	
European Parliament, European Commission and European Council and, where applicable, Member State parliaments	Provision of financial guarantees for green projects (5.2); Use of shareholder role to encourage greater green risk-taking by the EIB (5.3); imposition of minimum quantitative quotas for green loans (5.5)	Raising capital requirements for dirty activities in microprudential banking regulations (6.2.1); introduction and/or raising of capital requirements for dirty activities in microprudential regulation of NBFIs (6.2.4); introduction of a climate-related maximum exposure limit and systemic risk buffers in macroprudential regulation of banks (6.2.2) and pension funds and insurers (6.2.5); integration of transition plans in the relevant macroprudential regulation and supervision frameworks (6.2.3); enhancing transparency of multi-entity and cross-border shadow carbon financing structures (6.1)	Initiation of a Green Golden Rule at the EU level to exempt climate investments from fiscal constraints (7.2)

Legend: ECB = European Central Bank; EBA = European Banking Authority; ESMA = European Securities and Markets Authority; EIOPA = European Insurance and Occupational Pensions Authority; EIB = European Investment Bank; KfW = German Credit Institute for Reconstruction; TLTRO = Targeted Longer-Term Refinancing Operations; NBFI = Non-Bank Financial Institutions, ESRB = European Systemic Risk Board; CRR = Capital Requirements Regulation

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Appendix 1

List of Interviewees

1. Former senior managing director investment banking, Germany (16 November 2022).
2. Member of supervisory board of large bank, Germany (14 December 2022).
3. Policy director of civil society organization, Germany (10 July 2023).
4. Research director financial markets at institute for research, Germany (13 July 2023).
5. Member of supervisory board of small bank, Germany (1 September 2023).
6. Executive director of civil society organization, Netherlands (16 February 2023).
7. Staff member of civil society organization, Germany (6 September 2023).
8. Head of division of central bank, European Union (18 September 2023).
9. Managing director of financial service provider, Germany (18 September 2023).
10. Manager of sustainable investment fund, Germany (20 September 2023).
11. Head of sustainable finance at civil society organization, Germany (4 October 2023).
12. Staff member of European Union, Belgium (11 October 2023).
13. Staff member of civil society organization, Belgium (11 October 2023).
14. Staff member of European Union, Belgium (11 October 2023).
15. Staff member of European Union, Belgium (11 October 2023).
16. Economist at central bank, South America (25 October 2023).
17. Staff member of European Union, Belgium (26 October 2023).
18. Member of private association on reporting standards, Germany (26 October 2023).
19. Staff member of European Union, Belgium (27 October 2023).
20. Head of research at civil society organization, Belgium (27 October 2023).
21. Head of sustainable finance of large bank, Germany (7 November 2023).
22. Director of civil society organization, Netherlands (1 November 2023).
23. Chief economist of reinsurance company, Germany (10 November 2023).
24. Staff member of central bank, European Union (14 November 2023).
25. Staff member of civil society organization, Belgium (17 November 2023).
26. Head of sustainable finance of large bank, Germany (20 November 2023).
27. Head of sustainability of asset manager, France (22 November 2023).
28. Sustainable finance expert at large bank, France (22 November 2023).
29. Sustainable finance and regulation expert at large bank, France (22 November 2023).

30. Head of sustainable finance at civil society organization, Germany (27 November 2023).
31. Head of sustainable finance of large bank, Germany (4 December 2023).
32. Project manager sustainability of large bank, Germany (4 December 2023).
33. Member of supervisory board of asset manager, Germany (4 December 2023).
34. Chief executive officer of financial service provider, Switzerland (11 December 2023).
35. Climate investment analyst at insurance company, Switzerland (12 December 2023).
36. Managing director at asset manager, Germany (13 December 2023).
37. Head of sustainability of small bank, Germany (13 December 2023).
38. Managing director at asset manager, France (19 December 2023).
39. Head of sustainability for markets and securities at large bank, UK (15 January 2024).
40. Sustainability expert at consulting firm, UK (15 January 2024).
41. Head of sustainability risk at large bank, UK (15 January 2024).
42. Head of ESG at reinsurance company, UK (16 January 2024).
43. Chief responsible investment officer at asset manager, UK (16 January 2024).
44. Head of risk monitoring at public asset owner, UK (17 January 2024).
45. Vice president Sustainability at large bank, UK (17 January 2024).
46. Head of sustainability at large bank, UK (17 January 2024).
47. Vice president climate and ESG at large bank, UK (17 January 2024).
48. Senior engagement manager at civil society organization, UK (18 January 2024).
49. Director for green finance at public development bank, UK (18 January 2024).
50. Executive director green finance at research institute, UK (19 January 2024).
51. Staff member of European Union, Belgium (22 January 2024).
52. Managing director responsible investment at public asset owner, NL (22 January 2024).
53. Director sustainable finance at industry association, UK (1 February 2024).
54. Head of sustainability client advisory at asset manager, NL (5 February 2024).
55. Head of sustainability at industry association, Germany (22 February 2024).
56. Head of sustainability at industry association, Germany (22 February 2024).
57. Staff member of European Union, Belgium (22 February 2024).
58. Expert in Sustainable Finance at central bank, European Union (29 February 2024).
59. Director of technical development at not-for-profit organization, UK (6 March 2024).
60. Senior analyst at national regulator, European Union (11 March 2024).

61. Senior Researcher at civil society organization, Germany (28 March 2024).
62. Former regulator, Germany (19 March 2024).
63. Staff Member at civil society organization, Germany (27 March 2024).
64. Expert at public-private partnership, Germany (11 April 2024).
65. Finance expert at civil society organization, Germany (22 April 2024).
66. Senior researcher at civil society organization, France (26 April 2024).
67. Lead ESG fixed income capital markets at bank, US (17 May 2024).
68. Chief ESG officer at public asset owner, US (28 May 2024).
69. Executive director at civil society organization, US (28 May 2024).
70. Former fund manager fixed-income, US (28 May 2024).
71. Managing director at civil society organization, US (29 May 2024).
72. Capital markets analyst at large bank, US (30 May 2024).
73. Capital markets analyst at large bank, US (30 May 2024).
74. Sustainable finance lead at large bank, US (31 May 2024).
75. Sustainable investment strategist at asset manager, US (31 May 2024).
76. Co-founder of civil society organization, US (25 June 2024).
77. Sustainable finance regulator, Belgium (3 April 2024).
78. Campaigner at fossil fuel divestment initiative, Germany (28 August 2024).
79. Head of research at financial service provider, UK (10 September 2024).
80. Head of EMEA Sustainable Finance Debt Capital Markets at large bank, UK (10 September 2024).
81. Renewable energy investment officer at private equity firm, UK (11 September 2024).
82. Executive Director of sustainable finance think tank, UK (18 September 2024).
83. Team Lead at central bank, European Union (1 October 2024).
84. ESG investment officer at private credit firm, UK (7 October 2024).
85. Team Lead at central bank, European Union (15 October 2024).
86. Financial Stability Expert at central bank, European Union (16 October 2024).
87. Head of ESG Risks Unit at EU supervisor, European Union (18 October 2024).
88. Sustainable Finance Policy Expert at EU supervisor, European Union (18 October 2024).