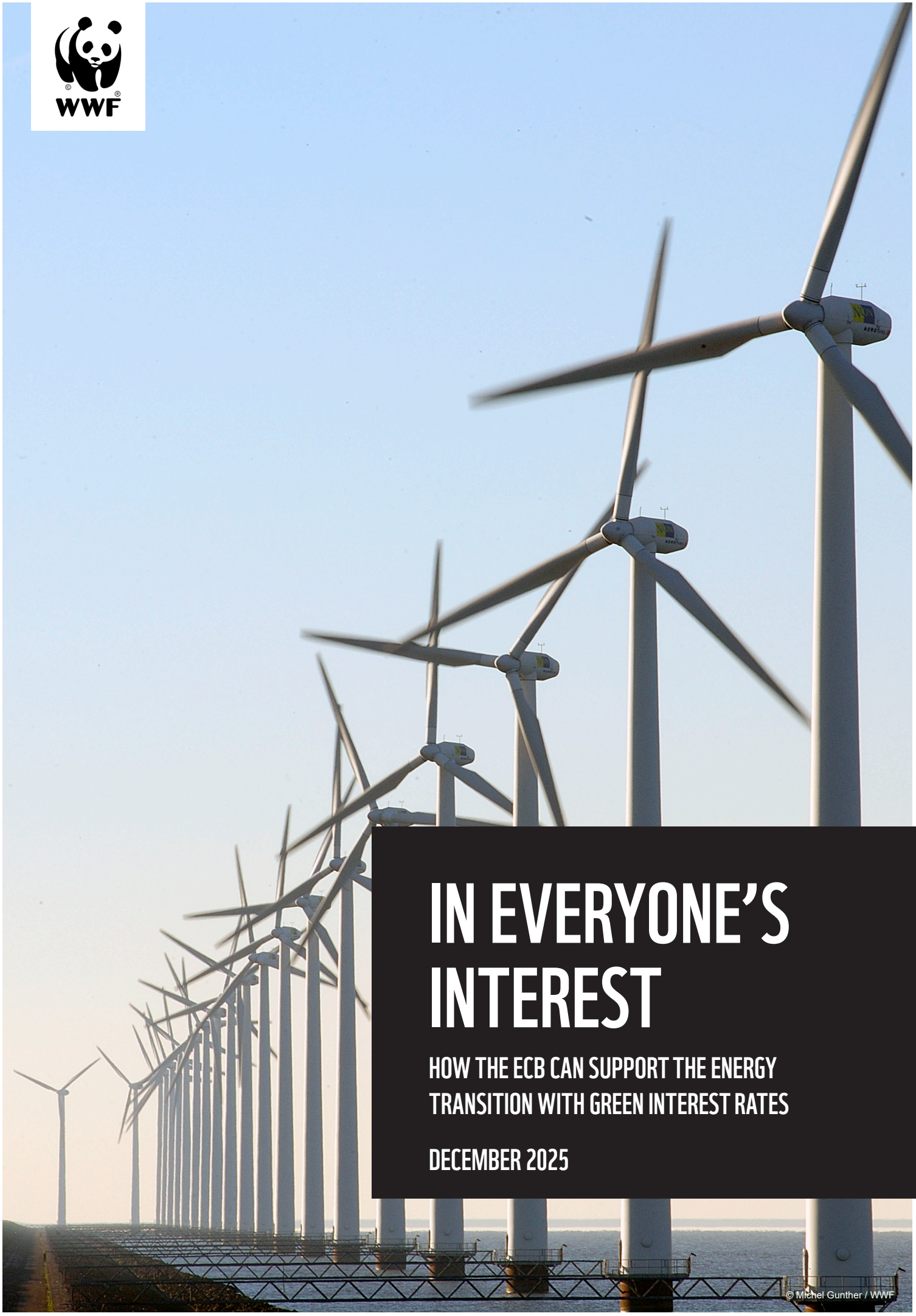

IN EVERYONE'S INTEREST

HOW THE ECB CAN SUPPORT THE ENERGY TRANSITION WITH GREEN INTEREST RATES

DECEMBER 2025

Written by Stanislas Jourdan as commissioned by the WWF European Policy Office.

WWF is an independent conservation organisation, with over 38 million followers and a global network active through local leadership in over 100 countries. Our mission is to stop the degradation of the planet's natural environment and to build a future in which people live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

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Special thanks
The author would like to thank all those who provided valuable inputs and/or reviewed this report, notably:

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Dominyka Nachajute, Sustainable Finance Policy Officer (WWF European Policy Office)

Maud Abdelli, Global Sustainable Finance Lead (WWF Greening Financial Regulation Initiative)

Jochen Krimphoff, Global Lead Data, Tools and Methodologies (WWF Greening Financial Regulation Initiative)

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In everyone's interest: How the ECB can support the energy transition with green interest rates

Abstract

This study investigates the feasibility, design, and macroeconomic implications of introducing a green interest rate into the European Central Bank's (ECB) monetary policy framework. Building on recent advancements in green finance taxonomy and regulatory disclosure, the report argues that preferential interest rates for loans financing taxonomy-aligned green investments would be legally and operationally viable in the ECB's forthcoming operational framework, subject to adequate safeguards and policy calibration. Using bank-level data from 47 EU banks, the study estimates that at least €10 billion in eligible green lending could be supported each year. The analysis demonstrates that targeted support for investments in energy efficiency, renewables, energy grid, and sustainable transport can reduce Europe's vulnerability to energy price shocks, with potential disinflationary effects in the medium term.

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Foreword

Climate change is increasingly disrupting our economies. Extreme weather costs have at least doubled over the past decade and will continue to escalate: the ecological transition needed to contain them has fallen dangerously behind schedule. This directly affects central banks. Climate costs threaten both price stability and financial stability—the twin pillars of their mandate. So does dependence on fossil fuel energy, as the 2021-2023 inflation surge illustrates.

Central banks, including the European Central Bank (ECB), have repeatedly highlighted that an orderly transition to a low-carbon economy represents the most effective pathway to maintaining price and financial stability over the long term. They therefore have a direct stake in seeing this transition materialise – not as a matter of environmental advocacy but as a prerequisite for fulfilling their core mandates. Supporting the transition, when possible, becomes a step towards preserving the stability they are charged with protecting.

Central banks have instruments to support the transition more actively within their existing monetary policy operations frameworks. In this report, Stanislas Jourdan highlights one of them: refinancing operations at lower interest rates for bank loans financing transition investments and proposes a concrete implementation policy to the ECB.

This proposition builds on a policy instrument well-established in central banking practice: targeted refinancing operations (TROs). Through TROs, central banks provide liquidity to banks at favourable conditions to fund their lending to specific segments of the economy. Central banks have a long tradition of using such tools and, since the 2007-2008 financial crisis, have increasingly deployed them to stimulate bank lending to strategic economic sectors and pursue long-term objectives. For example, the Bank of Japan and the Bank Negara Malaysia use TROs to support environmental and transition objectives. The ECB is well-positioned to follow this approach: in June 2014, it introduced Targeted Longer-Term Refinancing Operations (TLTROs), making targeted operations an integral part of its toolkit.

Jourdan's green refinancing operations are a concrete, calibrated option for the ECB. His scheme is based on the euro area's existing regulatory frameworks and disclosure requirements, making it directly operationally implementable in the ECB's monetary policy framework. His estimations suggest that at least €10 billion in lending could immediately qualify for preferential rates, supporting targeted investments in energy efficiency, renewable energy, grid infrastructure, and sustainable transport.

Implementing TROs in the spirit of Jourdan's proposition would represent a significant contribution by the ECB to strengthening the ongoing energy transition in Europe. Such operations would align squarely with the ECB's primary mandate of price stability by helping reduce the euro area's exposure to fossil fuel price shocks – a major source of inflation. They would support the general economic policies of the

European Union, a secondary mandate that the ECB has the duty, not the option, to pursue. Finally, they would contribute to mitigating long-term climate-related risks to financial stability, an area where the ECB has an important contributory role.

-Pierre Monnin
Senior Fellow at the Council on Economic Policies and a Visiting Professor in Practice at the Grantham Research Institute on Climate Change and the Environment in the London School of Economics and Political Science.

Executive Summary

- Unconventional monetary policies, such as the ECB's TLTRO have successfully supported real-economy lending during crises. The ECB signalled it will introduce new structural refinancing operations in the coming months, while taking into account its secondary objectives such as the green transition. In this context, **this report explores how the ECB could use the EU Taxonomy framework to design green structural refinancing operations**.
- A green refinancing operation scheme would provide banks with lower interest rates for loans financing investments in **renewable energy, energy efficiency, grid infrastructure, and sustainable transport**. This would help reduce Europe's dependency on fossil fuel imports, stabilise energy prices, and mitigate fossil fuel price shocks – directly supporting the ECB's price stability mandate while advancing the EU's climate goals.
- Analysis of 47 EU banks' ESG disclosures allows us to estimate that around **€10 billion in annual lending could have qualified for such ECB green refinancing operations in 2024**. Applying greenwashing safeguards – such as excluding lending to firms not aligned with Paris Aligned Benchmarks criteria – would reduce eligible lending to approximately €3 billion.
- Challenges remain in verifying compliance with Do No Significant Harm (DNSH) criteria – particularly for retail loans – and in closing data gaps arising from incomplete disclosures, especially among SMEs and entities reporting on a voluntary basis. For example, Taxonomy-aligned renovation loans for households represent only 0.15% of the €82 billion stock of Taxonomy-eligible loans, highlighting the difficulty in properly capturing actual green investments.
- The European Commission is currently reviewing the Taxonomy DNSH criteria for more usability: WWF insists that it should not come at the expense of their climate ambition. The Commission should also expand eligibility to include voluntary reporting entities under the VSME framework. If done meaningfully, such reforms could maximise the feasibility and impact of future ECB green refinancing operations, and help unlock the full potential of eligible lending, which currently remains disproportionately small.

- Despite these current challenges, establishing green refinancing operations in the short term poses minimal risk to the ECB's monetary policy stance, as the volume of green liquidity injected would remain small relative to the ECB's ongoing liquidity provisions. Depending on the growth pace of green lending in the future, the ECB could fine-tune the calibration of the programme.

Introduction

The transition to a climate-neutral economy is one of the European Union's most urgent and strategic challenges. Achieving the EU's climate targets – such as the 55% emissions reduction by 2030 and net-zero by 2050 – requires an unprecedented scale of investment, particularly in sectors like renewable energy, energy efficiency, and grid infrastructure. Estimates suggest an annual investment gap of over €300 billion in sustainable infrastructure, a significant portion of which must be financed through private capital intermediated by banks.

Despite the recent political momentum and investors' interest in sustainable finance, banks face significant barriers in scaling up green lending. Many green investments – particularly in renewable energy and building renovation – are capital-intensive, long-term, and often subject to regulatory or technological uncertainty. These characteristics do not fit well with traditional banking models that favour short-term, collateralised, and low-risk lending. Moreover, banks with legacy exposures to high-carbon sectors may face internal conflicts of interest, making them reluctant to finance competing clean technologies (Degryse, Roukny and Tielens, 2022). Even when green projects are bankable, limited standardisation, high transaction costs, and incomplete project-level data amplify perceived risks, creating additional hurdles. These market failures are explored further in Box C, but their implications are clear: without targeted incentives or public coordination, the banking sector alone is unlikely to mobilise the capital needed for the transition at the required speed and scale.

This challenge is especially acute in the EU, where capital markets are less developed than in the US. In the Euro area, banks provide roughly over 70% of corporate financing, compared to just 20% from capital markets. While ongoing efforts aimed at scaling up the EU's capital markets could facilitate the financing of the green transition in the long run, these reforms will require time to take place. In the short run, intervention to stimulate green credit flows remains justifiable, if not critically needed.

Since 2021, the ECB has taken incremental steps – from recognising climate risks in its strategy review to tilting its corporate bond purchases toward greener issuers and, most recently, proposing to adjust collateral requirements based on climate criteria (see Table 1 for a timeline of the most significant steps taken by the ECB). Furthermore, the ECB is set to introduce a new operational framework in the coming year, featuring "structural refinancing operations", designed to align with secondary objectives such as climate change-related considerations (ECB, 2024).

In this context, this paper explores the case for green refinancing operations – a targeted tool that would offer lower interest rates on bank loans financing Taxonomy-aligned green investments. We argue that such a mechanism is not only legally and operationally feasible but also economically justified in the context of energy price volatility and supply-side inflation pressures. In a volatile and uncertain environment – marked by trade tensions, wars, and extreme weather events – there is a growing risk that the current monetary policy framework will prove ill-equipped to address these shocks, leading to a structural misalignment with the EU's climate ambitions. By directly incentivising lending to sectors that improve Europe's energy resilience, green refinancing operations can contribute to medium-term price stability, thereby reconciling the ECB's primary mandate with the EU's climate goals.

The key contribution of this paper is to evaluate the feasibility, design, and macroeconomic implications of green refinancing operations focused on energy and transport-related investments. The proposal builds on two critical developments. First, the regulatory and data environment has matured considerably: since 2024, EU banks are subject to mandatory Taxonomy-aligned disclosures, enabling the ECB to credibly assess green lending flows. We offer an empirical estimation of eligible lending volumes based on newly available bank-level data and assess how such a tool could be integrated into the ECB's forthcoming operational framework without undermining its restrictive policy stance.

The paper is structured as follows. Section 1 reviews the evolution of ECB monetary tools and the emergence of policy discussion on the viability of green refinancing operations. Section 2 discusses how green refinancing operations may fit within the ECB's legal mandate. Section 3 presents and discusses design options and provides an empirical assessment of the potential scale and distribution of eligible green lending. Section 4 outlines the enabling conditions needed to operationalise Taxonomy-based green refinancing operations, including data and disclosure reforms. Section 5 concludes with concrete policy recommendations for integrating green refinancing lines into the ECB's toolkit.

Table 1: Timeline of ECB actions on climate and biodiversity

Date	Milestone
November 2018	ECB **joins the Network for Greening the Financial System (NGFS)**.
November 2020	ECB publishes its **final guide on climate-related and environmental risks for banks**, setting supervisory expectations for risk management and disclosure.
July 2021	ECB announces its **climate change action plan**, detailing measures for integrating climate change into its monetary policy framework.
September 2021	ECB publishes results of its **first economy-wide climate stress test**, assessing climate risks on companies and banks over a 30-year horizon.
July 2022	ECB publishes **aggregate results of its 2022 climate risk stress test**, revealing deficiencies in banks' climate risk frameworks.
October 2022	ECB starts the **Corporate Sector Purchase Programme (CSPP) tilting**, aligning corporate bond purchases with greener issuers.

November 2022	ECB sets **deadlines for banks to align with climate and environmental risk expectations by the end of 2024**, with binding requirements imposed on over 30 banks.
January 2024	ECB releases its **Climate and Nature Plan 2024-2025**, outlining actions for integrating climate and biodiversity into its policies.
March 2024	ECB announces **changes to its operational framework** to better incorporate secondary objectives, including climate and biodiversity considerations.
March 2024	ECB conducts a **climate data collection exercise** as part of the Fit-for-55 climate risk scenario analysis.
June 2025	ECB releases its **monetary policy strategy statement for 2025**, adding "nature degradation" as a new factor to account for, in addition to climate.
July 2025	ECB announces plans to **adapt its collateral framework to address climate-related transition risks**.

Section 1: Policy background

This section examines the policy developments and debates surrounding green refinancing operations. By reviewing the historical context, institutional positions, and practical challenges, we aim to clarify the constraints and opportunities for the ECB in implementing this innovative tool.

1.1 Recent evolution in ECB refinancing operations

In the aftermath of the great financial crisis of 2008-2009, the European sovereign debt crisis, and the Covid-19 pandemic, central banks globally adopted increasingly innovative monetary policies in order to respond to financial instability risks and the low-inflation environment.

In the European context, the European Central Bank has deployed two unprecedented instruments to inject liquidity into the economy. The most notable was the quantitative easing programme, under which the Eurosystem purchased corporate and sovereign bonds on financial markets, culminating with €4 trillion of assets being purchased by the Eurosystem in 2021. Meanwhile, the ECB has also been deploying more discrete but equally powerful instruments in the form of repayable loans to commercial banks at very attractive conditions – the Targeted Longer-Term Refinancing Operations (TLTROs). Both instruments were aimed at helping lower interest rates to stimulate the economy.

Among their key functions, central banks provide liquidity to commercial banks and set policy rates, which together influence the interest rates banks charge to businesses and households. By lowering rates, central banks encourage borrowing for investments and consumption, stimulating economic activity. Conversely, raising rates cools down demand and curbs inflation.

The ECB's response to the Eurozone's financial and economic crises marked a turning point in its use of unconventional monetary tools. Beginning in 2011, the ECB introduced Long-Term Refinancing Operations (LTROs) to inject liquidity into the banking system, offering loans to banks over 3 years (instead of 3 months). The

innovation deepened in 2014 with the launch of Targeted Longer-Term Refinancing Operations (TLTROs), which tied borrowing conditions to banks' real-economy lending performance.

The design of TLTROs evolved considerably over time, with increasingly generous conditions for banks to use the funding to extend more lending to the economy (see Table 2 for a summary of the evolving conditions of TLTROs). Under TLTRO-I, banks that did not increase their net lending enough compared to their benchmark were forced to repay the TLTRO loans.

Under TLTRO-II, which was introduced in 2016, the incentive was changed so that the applicable interest rate would become lower when banks managed to increase their net lending (defined as the outstanding volume of credit to non-financial corporations and households except for mortgages) by 2.5% compared to their benchmark. This particular feature became described as a "dual rate" policy (Lonergan and Greene, 2020; Barbiero *et al.*, 2022).

TLTRO-III went one step further, setting the interest rate even below the ECB's deposit facility rate (if banks achieved certain lending performance), meaning that, in practice, banks were effectively paid to borrow from the ECB. Unsurprisingly, this led to a surge in borrowing, with outstanding TLTRO amounts reaching a peak of €2.2 trillion in 2021.

There is strong empirical evidence that the dual rate setting successfully steered the banking sector to increase lending to the economy (Da Silva *et al.*, 2021). In a speech, ECB board member Isabel Schnabel clearly indicated that TLTROs were probably more effective in stimulating bank lending than quantitative easing, while also representing a more easily reversible policy tool (Schnabel, 2024).

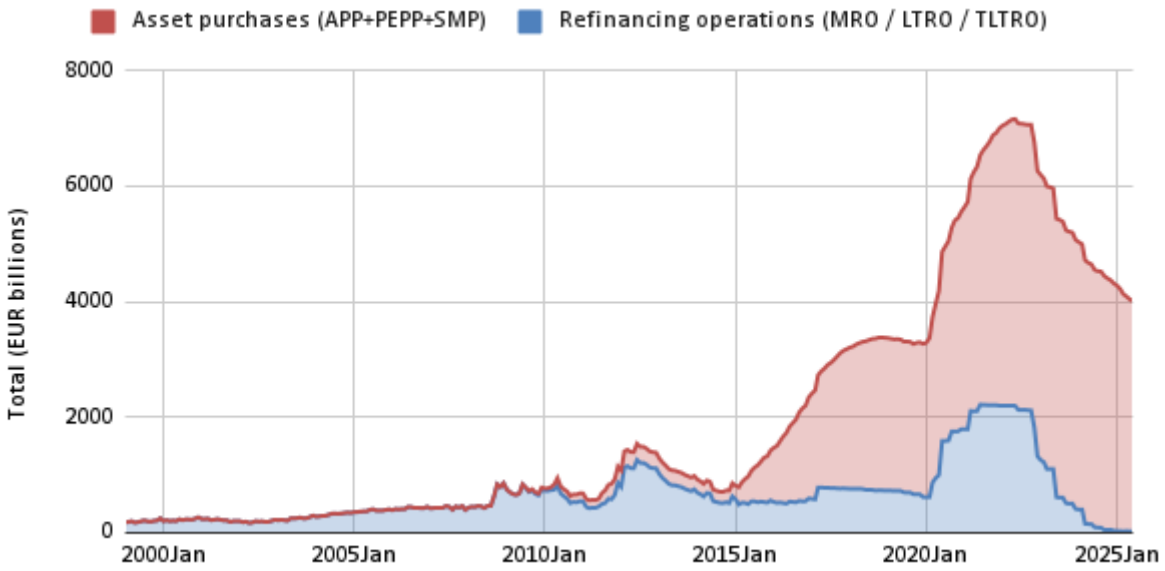
Overall, the TLTROs have been recognised as very innovative and efficient monetary policy instruments. The climate and nature crisis constitutes a systemic threat of comparable magnitude to past financial and economic shocks, with physical and transition risks already driving hundreds of billions in economic losses across the EU and threatening financial stability. This warrants the use of unconventional monetary tools, including targeted refinancing operations, to support the transition.

Table 2: Evolution in the design of the ECB's targeted long-term refinancing operations

Date	Key event	Main policy parameters
June 2014	Introduction of TLTRO-I	• Each participating bank was granted an initial borrowing allowance of up to 7% of its outstanding loans to the private sector (excluding mortgages) as of April 2014. Interest rate fixed at +10bps above the interest rate of the Main Refinancing Operations (MRO). • Banks failing to increase net lending by April 2016 are required to fully repay their TLTRO borrowing. • Maturity set for 4 years, until September 2018.

March 2016	Launch of TLTRO-II	• Borrowing allowance of up to 30% of eligible loans as of 31 January 2016. • Lending performance threshold set at +2.5% • Preferential interest rate for banks exceeding the lending benchmark: as low as the deposit facility rate (DFR) at the time of allotment (-0.4% as of June 2016). • Banks failing to reach the benchmark are charged the MRO interest rate (0% as of June 2016) • Four operations with a four-year maturity were conducted from June 2016 to March 2017 at a quarterly frequency.
March 2019	Introduction of TLTRO-III	• Borrowing allowance increased to 30% of the stock of eligible loans as of February 2019, with a cap of 10% per operation. • Lending performance threshold remains at +2.5% • Preferential interest rate for banks exceeding lending benchmarks: 10bps above the average deposit facility rate (-0.4% as of Sept 2019). • Banks failing to reach their benchmarks were charged +10bps above the average MRO rate. • Operations ran from September 2019 to March 2021. Maturity was initially set at 2 years.
Sept 2019	Further easing of conditions under TLTRO-III	• Applicable interest rates are further reduced by 10bps (regardless of whether they reach their benchmarks or not). • Maturity extended from 2 to 3 years.
March-April 2020	Adjustments to TLTRO III in response to the COVID-19 pandemic crisis	• Borrowing allowance increased to 50%. • Lending performance threshold lowered to 0%. • Preferential interest rate for banks exceeding lending performance threshold lowered to -50bps below the DFR (-1% as of April 2020). • Banks failing to reach their benchmarks were charged -50bps below the MRO (-0.5% as of April 2020). • Lending assessment period brought forward to March 2020 to support early funding. Lending thresholds were adjusted to support banks during the pandemic.
Oct 2022	Recalibration of TLTRO III following interest rate hike	• Increase of the interest rate applicable to all operations from November 2022. • Additional early repayment date.
June 2022-Dec 2024	Significant repayments by banks begin. By Dec 2024, all TLTRO operations had been repaid.	

Chart 1: *Volume of ECB market operations 1999-2025*



Source: *ECB data warehouse*

1.2 Emergence of green refinancing operations proposals

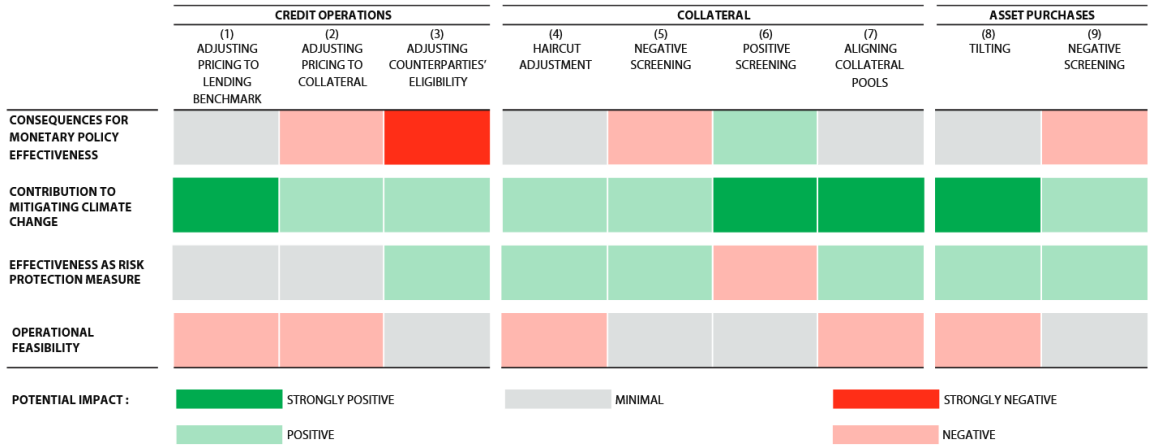
In 2019, Christine Lagarde took the helm of the ECB presidency with high ambitions to consider whether and how the European Central Bank could consider climate change in its monetary and supervisory activities. From January 2020 to July 2021, the Eurosystem carried out a strategy review, for the first time since 2003, and a whole workstream was dedicated to climate change.

In this context, Sustainable Finance Lab and Positive Money Europe were the first to publish a report suggesting that the ECB should adopt green-targeted refinancing operations where the "green interest rate" payable by banks would be set at a lower level than the standard ECB key interest rate (Van't Klooster and Van Tilburg, 2020)[1]. Meanwhile, Hubert Kempf had also imagined the implementation of a "climate spread" on the interest rate applicable to the ECB's refinancing operations (Kempf, 2020). This interest rate differentiation would be based on a climate scoring of commercial banks, serving as either an incentive or a penalty for less environmentally friendly banks. Boser and Colesanti-Senni (2021) also demonstrate that differentiated interest rates in central bank refinancing operations, based on the climate risk exposure of banks' asset portfolios, can correct market failures and align financial flows with climate objectives.

The Network for Greening the Financial System identified green credit operations with adjusted pricing based on lending benchmark by central banks as one of "strongly positive" measures central banks could take to mitigate climate change (NGFS, 2021).

[1] These proposals were inspired by Eric Lonergan, who prescribed the ECB to adopt a "dual interest rates" regime as early as 2019.

Figure 1: *NGFS identified green refinancing operations as one of the potentially most impactful measures central banks could take.*



Source: *NGFS (2021)*

Despite the interest from ECB President Christine Lagarde[2], the ECB's Governing Council did not include the proposal in the final conclusions of its strategy review. A paper co-written by a wide range of Eurosystem staff concluded that "in light of the need to overcome a number of hurdles, it seems premature to concretely envisage targeted green operations at the current juncture" (Drudi *et al.*, 2021). Instead, the action plan focused on more risk-based measures, notably the green tilting of the corporate QE portfolio (ECB, 2021), and the inclusion of climate criteria in the ECB's collateral framework, a measure that will eventually be implemented in 2026 (ECB, 2025a).

Shortly after the conclusion of the ECB's strategy review, inflation started to rise in the Eurozone, especially following the war in Ukraine. Severe tensions in energy prices led to a high level of inflation, culminating at an annual rate of 10.6% in October 2022. In response, the ECB undertook the most aggressive rate-hiking cycles in its history, raising interest rates from -0.5% to 4% in 14 months. At the same time, the last TLTRO operations were carried out in June 2021, and the loans were fully repaid in December 2024.

During this period, many experts, commentators, and civil society organisations nonetheless persisted in advocating for green refinancing operations (Krebel and Van Lerven, 2022; Lonergan *et al.*, 2022; Mugglin, 2022; Schreiber, 2022; WWF, 2022; Monnet and Van't Klooster, 2023; NVDE, 2023; E3G, ShareAction, and WWF, 2024; Grandjean *et al.*, 2024; Sandbu, 2024). In June 2022, a dozen experts, including several chief economists of European banks, co-signed a letter to the ECB, in which they argued that the "ECB could introduce a green discount interest rate on future

[2] Asked by Member of European Parliament Bas Eickhout during a parliament hearing held on 28 September 2020 at the ECON Committee, Lagarde responded "you are asking me whether we would be prepared to consider this proposal as part of our strategy review, and the answer is yes."

refinancing operations, but this time designed to incentivise banks to increase their lending towards (…) clean energy production and energy efficiency renovations" (Lonergan *et al.*, 2022).

Monnet and Van't Klooster also argued that "History reminds us that central banks have not hesitated to give priority to certain loans when they felt that it was absolutely necessary for the economy." (Monnet and Van't Klooster, 2023). To echo this debate, the French President Emmanuel Macron also gave a speech at the COP28 in Dubai, where he stated that "in the next few years, there should be some sort of interest rate for green and an interest rate for brown." (Macron, 2023).

According to WWF's SUSREG tracker – an interactive assessment tool that monitors how central banks and financial regulators adopt climate, environmental, and social measures in their operations – five central banks globally currently implement preferential green refinancing schemes. Central banks in China and Japan have pioneered forms of green targeted refinancing schemes. The People's Bank of China (PBoC) launched the Carbon Emission Reduction Facility (CERF) in 2021, providing low-cost funding to financial institutions for loans supporting clean energy, energy conservation, environmental protection, and carbon reduction technologies. As of the end of 2023, CERF has facilitated over RMB 541 billion (USD 76 billion) in green lending, contributing to more than 150 million tons of emission reductions and aligning with China's ambitious climate goals (Rizkiah and Abdelli, 2024). In Japan, the Bank of Japan introduced the Climate Response Financing Operations, offering long-term, low-interest loans to financial institutions for green loans, bonds, and transition finance. This scheme, which runs until 2031, requires counterparties to disclose climate-related efforts and results, ensuring transparency and accountability. As of July 2025, the BoJ was lending 17 trillion yen (€100 billion) to banks under this scheme (Bank of Japan, 2025).

Meanwhile, in Malaysia, the Central Bank's Low Carbon Transition Facility (LCTF) and High Tech & Green (HTG) Facility have approved over RM 1.2 billion (USD ~250 million) for more than 550 SMEs to support their low-carbon shift (Rizkiah and Abdelli, 2024). In Bangladesh, Bangladesh Bank's green refinance schemes (offered at up to 5 % interest) and its Green Transformation Fund aim to catalyse private investment into clean energy and energy efficiency projects (Bangladesh Bank, 2023, cited in WWF, 2024). And in Hungary, the central bank (MNB) announced in 2021 the introduction of green refinancing programmes – including support for green mortgage bonds and preferential loans for energy-efficient homes – to make green housing finance more accessible (Magyar Nemzeti Bank, 2021).

However, ECB board member Isabel Schnabel pointed out in January 2023 that green lending facilities "could be an instrument worth considering in the future when policy needs to become expansionary again […] But they are not an option for the immediate future, given the current need for a restrictive monetary policy". In other words, the ECB would be unwilling to provide additional liquidity in the banking sector through

TLTROs at a time when its monetary stance is precisely aimed at withdrawing liquidity from the banking sector.

1.3 Towards green structural refinancing operations

In March 2024, the ECB finally opened a new window of opportunity to consider once again the possibility of introducing green refinancing operations in the coming years, when announcing the preliminary contours of its future new operational framework. This announcement was meant to provide forward guidance on how the ECB's policy will operate once excess liquidity in the banking system declines as quantitative tightening unfolds[3]. Experts expect that this will be the case by mid-2027 (Gotti and Papadia, 2024). Under the new framework, the ECB will effectively run a hybrid regime where funding of banks will rely on both the interbank lending market and "structural refinancing operations" by the ECB.

Importantly, in this context, the ECB said it "will aim to incorporate climate change-related considerations into the structural monetary policy operations" (ECB, 2024). ECB Board member Frank Elderson further underlined this commitment by stating, in October 2024, that "if there is a monetary policy need to reconsider targeted longer-term refinancing operations (TLTROs) for banks in the future, there are compelling reasons to seriously consider greening these TLTROs." (Elderson, 2024).

However, a number of hurdles still must be overcome for the ECB to introduce meaningful green refinancing operations.

The first and ECB's most cited obstacle has been the lack of reliable data. As the Eurosystem staff explained back in 2021, "While in principle the definition of green lending could rely on the Commission's EU Taxonomy Regulation, the taxonomy is not sufficiently prescriptive at present and banks do not collect the necessary information systematically" (Drudi *et al.*, 2021). Failing a robust data framework and verification systems, the ECB foresaw a risk that it would not be possible to ensure "that the fungible funds provided by banks are correctly and effectively used by individual borrowers to finance green projects"(Drudi *et al.*, 2021). In other words, the ECB was careful to avoid establishing an instrument which could lead to greenwashing.

Indeed, while the EU Taxonomy regulation (EU) 2020/852 entered into force in July 2021, the three separate delegated acts defining the disclosure requirements for banks and technical screening criteria were only adopted in December 2021 and June 2022, respectively, and in November 2023 for the delegated act on biodiversity and ecosystems protection. It was arguably complicated for the ECB to start designing a green refinancing operations programme without knowing exactly how the Taxonomy

[3] The ECB's balance sheet expanded significantly during the asset purchase programs that were deployed from 2012 until 2022, leading to a surplus of liquidity in the banking system. As of 2022, the ECB stopped rolling over these portfolio, meaning that the process is now reverting: as governments and corporates repay the assets held by the Eurosystem, the Eurosystem's balance sheet reduces in the size. The reduction in excess liquidity could lead to higher volatility in short-term interest rates, particularly if banks struggle to meet their liquidity needs when accessing the interbank lending market. The ECB's new operational framework is meant to prevent such disruptions by pre-committing to deliver new central bank liquidity provisions.

framework would work in practice. However, important progress has been made since. In 2024, the Taxonomy disclosure requirements for banks became fully effective. In this context, the Dutch think tank Sustainable Finance Lab published in October 2024 a paper providing the possible design of such green refinancing operations (Jourdan *et al.*, 2024). The authors also provide an exclusive analysis of how the EU Taxonomy could facilitate the operationalisation of a green refinancing operations policy and provide preliminary estimates of the volumes of green lending which could be identified among the biggest banks in the Eurozone.[4]

It is worth noting that the Commission's 2025 first 'Simplification Omnibus' package could significantly undermine the usability of the Taxonomy framework for green refinancing operations. The proposals under negotiation include sharply narrowing the Corporate Sustainability Reporting Directive's (CSRD) scope, delaying reporting waves, and trimming Taxonomy datapoints via amendments to the Article 8 Taxonomy delegated acts. For banks, whose Green Asset Ratio (GAR)/Taxonomy alignment relies on counterparties' disclosures, this would mean fewer reporting borrowers, less granular activity data, and weaker comparability, diluting the power of Taxonomy alignment-based incentives such as green refinancing operations.

Furthermore, the paper also discusses the technical features of green refinancing operations, in particular as to how the green interest rate could be calculated and how policy parameters could be calibrated to ensure the programme would not interfere with the ECB's primary task of containing inflation. The remainder of this paper will update and augment this analysis.

Section 2: Justifying green interest rates under the ECB's mandate

As the previous section has made clear, any refinancing operation with a green differentiated interest rate feature must square with the several policy constraints of the ECB's policy framework, which are embedded in its legal mandate. According to Article 127 of the TFEU, the ECB's primary mandate is to maintain price stability, which the ECB has defined as reaching an inflation target of 2%. In addition, the EU Treaty adds that "without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union." A provision often described as the ECB's "secondary mandate" or "secondary objectives" (see Box A).

In this section, we will demonstrate that green refinancing operations geared at accelerating the energy transition away from imported fossil fuels can fall squarely within the ECB's remit. First, we will demonstrate that in the absence of green refinancing operations, the ECB will be faced with an important trade-off and misalignment of the ECB's monetary policy framework with the EU's climate policies. Furthermore, we will show that not only would green refinancing operations not give

[4] The author of this WWF-EPO report was also the lead author of the Sustainable Finance Lab paper.

"prejudice" to the ECB's mandate, but they would likely contribute substantially to price stability in Europe.

However, we will recognise that the governance and independence framework of the ECB complicates the decision-making process for such instruments, as several of their implementation design features could be perceived as fringing with political decision-making. These complications can, however, be overcome thanks to the ECB's secondary objectives, which legally oblige the ECB to support the EU's economic policies. With institutional dialogue and clarifications in the interpretation of the ECB's secondary objectives, it would thus be possible to give democratic legitimacy for the ECB to introduce green refinancing operations.

Box A: the ECB's evolving interpretation of its secondary objectives

The European Central Bank does not have a fully-fledged dual mandate like the US Federal Reserve. However, the EU Treaties do equip the ECB with a broader mandate than solely maintaining price stability. As is widely known, Art. 127 TFEU stipulates:

"Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union."

Article 3 of the Treaty on the European Union, in turn, covers a wide range of laudable objectives and principles, such as the promotion of peace and stability in Europe and beyond, freedom, security and justice, "well-balanced economic growth", sustainable development and environmental protection, combating social exclusion and discrimination, promoting social cohesion and children's rights, furthering scientific and technological progress, and ensuring the respect of cultural diversity. As is readily apparent, these objectives are highly diverse and relatively unspecific. For this reason, the secondary objective of the ECB is the subject of a longstanding dispute over its interpretation.

For the earliest part of its existence, the ECB has been pushing back on the various demands emerging from civil society and social partners to take a more flexible approach to its monetary policy by taking into account its secondary mandate. Led by Otmar Issing, the ECB adopted a minimalistic view of its secondary objectives, where, in effect, simply pursuing price stability was already the best contribution the ECB could make to the economic policies in the EU (ECB, 2002).

Arguably, it has been difficult for the ECB to act upon the secondary objectives despite their legally binding nature. As Van't Klooster and De Boer aptly note, "the ECB faces an all but impossible task: it has to act on its secondary mandate, while lacking the legal and democratic authority to make the contested choices that doing this requires" (Van't Klooster and De Boer, 2021). As stated by a former member of the ECB's governing Council, Athanasios Orphanides, "the responsibility to contribute to the achievement of all the noble objectives listed in Article 3 of the Treaty (…) adds considerable complexity to the task of evaluating ECB policy. (…) Without additional guidance on how to compare the relative merit of these contributions, the basis of an evaluation may not be well defined." (Lengwiler and Orphanides, 2020).

This state of affairs has led a number of experts and commentators to suggest that more coordination between the ECB and the EU's political institutions would be needed in order to clarify or prioritise the remit of the ECB's secondary objectives (Lengwiler and Orphanides, 2020; Berès, 2021; Claeys *et al.*, 2021; Prieg *et al.*, 2025).

However, in recent years, the ECB has taken a more pragmatic view of its secondary mandate. The ECB's decisions to integrate climate factors in its monetary policy framework were explicitly justified by the ECB's secondary objectives, which were unprecedented.

In a remarkable paper by senior ECB staff members of the ECB's Directorate General Legal Services, the authors lay down a more modern and pragmatic interpretation of the ECB's secondary objectives, while also pointing out its clear limitations (Ioannidis, Hlásková and Zilioli, 2021). According to the authors, at a minimum, the secondary objectives mandates that "the ECB should at a minimum check that its monetary policy does not undermine general economic policies that promote the achievement of the objectives of the Union". Moreover, the authors argue that "if the ECB has a choice between policy options that contribute equally to the maintenance of price stability, but one of these provides more effective support for the general economic policies in the Union, it must prefer the latter, assuming all other relevant factors are equal".

However, the authors also point out that strict reading of the Treaty imply clear limitations on the scope of the secondary mandate. In particular, the ECB can only support policies "that have been already shaped and defined by the competent institutions" – and not abstract objectives underlying these policies. Furthermore, the secondary objectives do not confer to the ECB new competences to create policy in areas of relevance of the secondary objectives. Relatedly, this also implies that it is difficult for the ECB to support policies that are too abstract or broadly defined, given that doing so would immediately require the ECB to make policy judgements.

Ultimately, the authors argue that "any clear prioritisation given by the institutions mentioned above to certain policies and objectives should guide the ECB's priorities" while also considering other criteria such as "the proximity of the policy to the primary objective and the ECB's main field of expertise."

Since 2023, as part of its accountability power, the European Parliament has repeatedly asked the ECB to clarify how "it has interpreted and acted upon its secondary objectives", however, the ECB has not yet provided a substantial response[5].

2.1 Green dilemma for monetary policy

As already alluded to in section 1, an important argument for green refinancing operations starts from the recognition of the growing risk of misalignment between monetary policy and the EU's climate objectives, together with the inadequacy of conventional central banking frameworks in addressing supply-side economic shocks. We will now develop on these challenges.

Supply-side shocks and the limits of conventional policy

The last inflationary episode of 2021-2023 has highlighted the limitations of the current monetary policy framework in addressing supply-side sources of inflation, and the negative side effects of this for the green transition. By raising interest rates from 0 to 4% the ECB has effectively dampened aggregate demand in the economy, notably by suppressing demand for mortgage loans. However, as widely recognised in the literature (Adolfsen *et al.*, 2024; Bernanke and Blanchard, 2024; Casoli, Manera and Valenti, 2024) as well as by the ECB in its most recent strategy review (Nickel, Kilponen and Moral-Benito, 2025), the primary cause of inflation, which affected the European economy in 2021-2023, was not so much related to excessive demand, but rather to a supply-side inflationary pressure linked to the war in Ukraine, the sabotage of the Nordstream pipeline, and the subsequent record-high increase in gas and energy prices. Many economists have described this phenomenon as "fossilflation" (Schnabel, 2022).

As is widely recognised, monetary policy works best to address excessive demand shocks but is ill-equipped to combat negative supply shocks. As a matter of fact, multiple studies have evidenced the tangible contribution of fiscal policy (as opposed to monetary policy) in reducing inflation (Dao *et al.*, 2023; Rabensteiner *et al.*, 2025). This creates a paradox where, although central banks have a clear mandate to fight inflation, the general public tends to hold elected governments accountable for the management of inflation (van der Cruijsen, de Haan and van Rooij, 2024).

The green trade-off: Short-term price stability vs. long-term resilience

In the words of Swedish governor Erik Thedéen: "*In general, it is more difficult to manage supply-related shocks than demand shocks. When inflation and production move in the same direction, the central bank does not have to make a trade-off between stabilising inflation and production. But in cases of supply shock, a trade-off*

[5] See the Parliament's resolutions 2023/2064(INI) and 2024/2054(INI). The ECB argues that "such reporting continues to be integrated across chapters" of its annual report. However, the words "secondary objectives" appear only twice in the 200-page-long report.

must be made between stabilising inflation and production." The presence of policy trade-offs is not a new problem in central banking. It is indeed well understood that raising interest rates tends to lead to an increase in unemployment, a relationship often described as the Philippe's curve. Given their mandate, ECB policy-makers may tolerate higher unemployment during disinflation episodes – since they are not directly held politically accountable for labour market outcomes.

The green transition creates one additional trade-off. By raising interest rates, the central bank is immediately raising the cost of capital across the board, in particular for investments in the green transition, which are inherently more capital-intensive (Schmidt *et al.*, 2019; Fornaro, Guerrieri and Reichlin, 2024; Martin *et al.*, 2024). This problem was evidenced in a study by Serebriakova, Polzin and Sanders (2025), which analyses empirically the effect of the ECB's interest rate policy on the installations and cost of electricity of 6 energy technologies across Europe during the period 2013-2022. They find that rate hikes of 0.25% correspond to a decrease by 8% in newly installed capacity for offshore wind, and a reduction of 26.5% for solar PVs. Furthermore, increased capital cost for renewable projects also translates into a higher levelised cost of electricity (LCOE) (Monnin, 2015).

As Fornaro, Guerrieri and Reichlin (2024) have argued, this raises an acute "green dilemma" for the central bank. If the ECB decided not to raise rates, it would most probably run the risk of letting inflation become unanchored, which could severely damage the credibility of the central bank in its determination to maintain price stability. By contrast, by raising interest rates in the short term, the central bank may act in favour of short-term price stability, however, it risks sacrificing longer-term price stability, as a delayed transition perpetuates the EU economy's exposure to climateflation and fossilflation risks. Hence, the green trade-off has more profound consequences than the traditional trade-offs vis à vis unemployment and growth, insofar this ultimately represents a trade-off between short-term and medium to longer-term price stability. In other words, it is a trade-off against the central bank's mandate itself.

As pointed out by Barmes *et al.* (2024), *"The welfare costs of sustained and aggressive tightening in response to persistent climate-related inflationary pressures, however, could be significant. Contracting monetary policy under these circumstances risks amplifying the negative impacts of supply shocks on economic output, financial stability, fiscal space, income inequality and progress towards a green transition, undermining the conditions needed for long-term price stability. Excessive tightening could also have lasting adverse effects on investment, reducing productive capacity and exacerbating trade-offs between medium- and long-term price stability."*

The need for coordinated policy responses

Going forward, the possibility that the EU's economy will continue to face repeated geopolitical, energy-related or climate-related shocks in the coming years raises

concerning prospects for the suitability of the ECB's monetary policy framework. In this context, it would be politically risky for the central bank to ignore such a trade-off.

Facing these challenges, a converging body of literature concludes that a new approach for combating supply-side inflation shock would be needed in the future. For example, Van 'T Klooster and Weber (2024) advance the notion of an "inflation governance gap", and suggest that "the EU needs to develop a new toolbox for sector-specific policies that ensure adequate supply, avoid shocks, and mitigate their impact" (Van 'T Klooster and Weber, 2024). Meanwhile, Barmes et al (2024) recommend that central banks should adopt an "adaptive inflation targeting regime", allowing central banks greater "patience and discretion" to "look through" these shocks before tightening, explicitly tolerating higher inflation bands during prolonged supply-side stress, allowing inflation to drift moderately above the usual 2%, and by extending the definition of the "medium term" horizon, to allow more time for evaluating trade-offs and allow temporary overshoots to fade (as also proposed by Reichlin and Zettelmeyer, 2024).

While these proposals have their own merits, they require broader changes in the ECB's governance framework and mandate. By contrast, this report argues that upgrading the policy toolkit of the central bank, by introducing green differentiated interest rates in refinancing operations, could be a more pragmatic approach.

Essentially, we want to flesh out the conclusions of Fornaro, Guerrieri and Reichlin (2024) when they say that "one way or another, a strong coordination between monetary, fiscal and energy policies is going to be crucial to maintain inflation under control (…) In particular, fiscal and credit policies that subsidise green investments may be key to reconcile low inflation, high economic activity, and an effective green transition."

In essence, the type of green refinancing operation we flesh out in this report is purposefully designed to mitigate the trade-off by enabling the ECB to continue to steer monetary policy while avoiding undermining the smooth financing of the decarbonisation of the energy sector despite business cycles.

2.2 Green interest rate as a disinflationary instrument

As elucidated above, the case for a green interest rate is essentially to pre-emptively reduce future inflationary factors such as the economy's reliance on fossil-fuel-based energies. This policy is therefore contributing directly to the ECB's primary objective of price stability.

Of course, this approach is based on the premise that a faster transition away from fossil-based energy production and consumption will be conducive to greater price stability. The former ECB board member Fabio Panetta has once described this possibility as a "divine coincidence between price stability and decarbonisation" (Panetta, 2022), and was also acknowledged by the ECB President in a letter to MEP Jonas Fernandez, in which Christine Lagarde writes *that "While entailing high fixed costs in the short term, the marginal costs of renewable energy production tend to be lower than those of other fossil-based energy sources. Therefore, renewable energy*

could put downward pressure on overall energy prices in the medium term. Moreover, expanding renewable energy production would gradually increase the European economy's resilience to fossil fuel price spikes and supply disruptions." (Lagarde, 2025).

As discussed in Box B, there are multiple evidence-based studies confirming that increasing the share of renewables in the EU's energy mix will positively contribute to lowering energy prices, and thus ultimately lead to relatively lower inflation.

One valid concern nonetheless remains that while having disinflationary effects on the longer run, the green refinancing operations would trigger "greenflation", that is short-term inflationary pressures generated by a push of green investments, due to, for instance, bottlenecks and shortages in critical materials needed for building renewable energy equipment. However, this issue largely boils down to figuring out the right calibration for the green refinancing operations. For example, it would be possible to cap the borrowing allowances in order to reduce the volume of liquidity provided to banks. It thus becomes critical to analyse the various segments of the green investment needs and their effects on inflation, in order to fine-tune the green refinancing operations programme so that it works to support disinflationary pressures and does not interfere with the main (restrictive) policy stance.

While we develop further on these considerations in section 3, it is important to make an additional observation: nowadays, the ECB operates with a package of policy instruments. Thus, in the hypothetical case[6] where green refinancing operations would generate an unanticipated, disproportionate, and unwarranted accommodative effect in the transmission of monetary policy, leading to higher inflation, it would always be possible to calibrate other policy instruments in order to maintain the overall monetary policy stance. As was recognised by the National Bank of Belgium's governor, Pierre Wunsch, the central bank can always raise its main policy rate in order to compensate for the lower green interest rate (Wunsch, 2024). In this scenario, the ECB could simultaneously have lower-interest-rate green refinancing operations while effectively delivering an overall tightening policy stance.

Box B: How renewable energy can help fight fossilflation

The inflationary episode of 2021–2023, triggered largely by fossil fuel price volatility, underscored the vulnerability of energy-dependent economies to external shocks. Several studies have identified fossil energy – particularly natural gas – as key transmission channels for inflationary pressures in Europe and beyond.

[6] A study by Le, Uddin and Lucey (2024) suggests that a green dual rate framework would not exacerbate inflation.

For instance, (Adolfsen *et al.*, 2024) document that gas price shocks were a major driver of euro area inflation during this period, accounting for up to 40% of headline inflation increases. Similarly, (Alessandri and Gazzani, 2023) find that natural gas shocks have significantly stronger and more persistent effects on macroeconomic indicators than oil price shocks. Complementing these findings, (Blondeel et al., 2025) show that fossil fuel dependency has been inflationary in Belgium, with global fossil price shocks driving short-term price pressures. Marangoz (2025) further adds that the geopolitical volatility surrounding fossil fuel supply has been inflationary, which further strengthens the macroeconomic case for accelerating the clean energy transition.

Amid this context, renewable energy has proven to be a buffer against fossilflation. According to the International Energy Agency, the rapid deployment of solar PV and wind capacity between 2021 and 2023 played a critical role in reducing wholesale electricity prices, which would otherwise have been 3% higher in 2021, 8% higher in 2022, and 15% higher in 2023 (IEA, 2023). In Spain, Quintana (2024) finds that a 26% increase in the share of electricity generated from renewables since 2019 led to a 40% drop in wholesale electricity prices. If Spain continues to meet its national energy objectives, wholesale energy prices could fall by an additional 50% by 2030.

The deflationary effect of renewables was visible even before the recent energy crisis. In a study covering European economies over the past two decades, IMF researchers found that increased renewable energy penetration of 1 percentage point was associated with lower wholesale electricity prices by about 0.6% on average. The implications are very significant: the authors point out that if the share of renewables in electricity production in Europe had been 30% instead of an average of 14% during the period 2014–2021, wholesale electricity prices would have been lower by 8.8% – and by almost 20% if the share of renewables had been 50% (Cevik and Ninomiya, 2023).

However, the impact of renewables on inflation is not uniform across countries or over time. Research by Millischer et al. (2024) covering 75 countries over 50 years finds no systemic correlation between renewable energy deployment and reduced inflation, except in a subset of European countries where renewables make up over 85% of the electricity generation mix. This threshold effect, which is also confirmed by Cevik and Ninomiya (2023) is closely tied to the marginal price-setting mechanism used in electricity markets – particularly in Europe – where the price is set by the most expensive generator needed to meet demand, often gas-fired plants. As the authors bluntly put, “as long as the marginal producer is a gas-fired power plant, it does not matter whether 5% or 75% of electricity production comes from renewables, power prices and gas prices move in sync.”

Ultimately, the key to breaking the link between fossil fuels and inflation lies in reaching a structural tipping point where renewable energy generation, storage, and grid integration are sufficient to displace gas entirely during peak demand periods. In this context, Krahé and Heilmann (2023) argue that energy transition policies are not only crucial for climate goals, but also for shielding economies from fossil-driven inflation shocks. As Chafwehé, Colciago and Priftis (2024) also emphasise, doing so would not only create greater resilience to future energy crises, but also enhance productivity.

2.3 Shifting from reactive to proactive green monetary policy

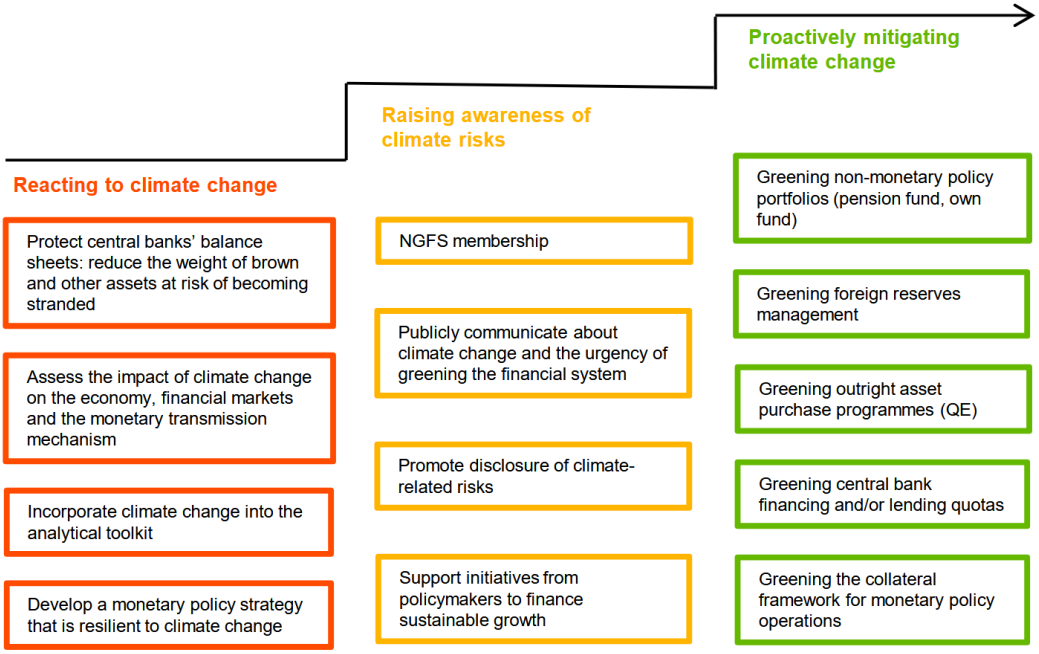
As was already covered in section 1, since its strategy review of 2020-21, the ECB has made important progress in understanding the impact and implications of climate change in its mandate. But if the case for green refinancing operations is so clear-cut, why has the ECB not yet embraced it?

Aguila and Wullweber (2024) identify three main narratives which the ECB has mobilised to justify the relevance of climate change to its actions so far. The first narrative relates to climate-change related risks: dominant until 2021, this narrative frames climate change as a threat to financial stability, legitimising supervisory measures on climate-related and environmental risks. A second narrative revolves around the green financing gap and the ECB's role as catalysing private investment by advocating for market integration (e.g., capital markets union), without direct intervention. A third narrative directly links the impact of climate change with the ECB's primary mandate of price stability. If such a link becomes empirically grounded, it would, in theory, justify stronger interventions or adjustments from monetary policy.

Paradoxically, while Aguila and Wullweber (2024) find that the third narrative gained prominence between 2018-2022 in ECB board members' speeches, no measures have been taken by the ECB so far on this basis.

In the same vein, ECB researchers (Boneva, Ferrucci, and Francesco Paolo Mongelli, 2021), make a distinction between reactive, awareness-raising, and proactive types of green central banking measures (see Figure 2), and conclude that reactive measures are easier to justify than proactive measures.

Figure 2: *Possible central bank actions to respond to climate change*



Source: *ECB*

As the authors recognise, green refinancing operations clearly fall in the "proactive" category, given that they aim at directly stimulating lending in certain sectors of the economy, without primarily taking into account a financial risk dimension.

Thus, the paradox can be explained by the fact that while price stability justifications are theoretically closer to the ECB's primary mandate, the instruments required to operationalise such justifications are more likely to require departing from some of the core tenets of the ECB's conventional approaches to monetary policy implementation.

For example, the ECB tended to follow a "market neutral" approach as it generally assumes that the banking system is a competitive market which allocates resources optimally, although the ECB ultimately recognised the contradiction between market neutrality and the EU's climate policy (Schnabel, 2021; Papoutsi, Piazzesi and Schneider, 2022).

Differentiated interest rates would fundamentally require from ECB policy-makers the acceptance of taking an intentional role in steering capital allocation by the banking sector. In that sense, it would certainly be categorised as a "proactive" measure, given that it aims at directly stimulating lending in certain sectors of the economy, without taking primarily into account a financial risk dimension.

As Boneva and al. write, "A widespread concern [towards proactive approaches] is that if central banks engage with climate change, other objectives deemed worthy of social consideration may be added, without a clear endpoint in sight, to an ever-expanding remit of central bank responsibilities." In other words, proactive green monetary policy measures are therefore less consensual for central bankers to consider, as they entail

more sensitive decisions, which may sometimes be perceived as overlapping with the realm of political decision-making, which unelected technocratic central bankers should avoid interfering with.

Thus, the core question which we need to address is whether the central bank has the political legitimacy to deploy a kind of instrument that would intentionally drive the allocation of credit into the economy? This brings us back to the discussion on the ECB's secondary mandate, and whether green refinancing operations geared at the energy transition would sit well with the ECB's duty to "support the general economic policies in the EU" as stipulated under Art 127 TFEU. In the next section, we explore how to overcome this conundrum by clarifying the ECB's secondary objectives.

Box C – Market failures in green finance

A key argument against a differentiated green interest rate is the concern that it would distort capital allocation and interfere with free market dynamics. Accordingly, the ECB should refrain from deviating from the market neutrality approach. However, this presumes that financial markets are currently allocating capital efficiently – a premise increasingly challenged by empirical research and by the ECB itself.

In reality, the financial system exhibits several systemic obstacles to financing the green transition:

- **Risk aversion and short-termism**: Banks and institutional investors tend to favour large-scale, low-risk, short-term investments. This biases them against many clean energy and efficiency projects, which are capital-intensive, long-term, and sometimes involve emerging technologies or new business models (Polzin, 2017, p. 201; Wullweber *et al.*, 2025).
- **Legacy exposure and conflicts of interest**: Banks with substantial existing portfolios in fossil fuel or legacy infrastructure face disincentives to fund clean technologies that could erode the value of their incumbent assets (Degryse, Roukny and Tielens, 2022).
- **Profitability gaps**: Despite rapid cost declines, renewable technologies often yield lower and more volatile returns than fossil fuel investments. As Brett Christophers (2024) argues, the core challenge is not price competitiveness but insufficient profitability in the eyes of private investors.
- **Incomplete pricing of externalities**: While carbon pricing is theoretically a key solution, it alone may not be sufficient. High capital costs can neutralise the effects of carbon pricing, and studies show that combining carbon pricing with low interest rates yields more effective outcomes (Hirth and Steckel, 2016).

The ECB has acknowledged that in the presence of market failures, strict adherence to market neutrality may entrench inefficiencies. As ECB board member Isabel Schnabel stated, "market neutrality may reinforce pre-existing inefficiencies that give rise to a suboptimal allocation of resources." (Schnabel, 2021). This insight has already justified the ECB's departure from market neutrality in its corporate bond purchase programme, where it briefly applied a "tilt" toward greener assets. The ECB has repeatedly said ever since that it can "justifiably depart from market neutrality in order to achieve its objectives and comply with Treaty principles." (ECB, 2025b)

In this context, targeted interventions to lower the cost of capital for green investments – such as through a dedicated green refinancing line – are not distortions, but corrections. By addressing these market failures, central banks can improve capital allocation, reduce macroeconomic exposure to fossil price shocks, and support long-term price stability.

Furthermore, insofar as the transmission mechanism of green refinancing tools relies entirely on private banks' responsiveness to their customers' demand, these instruments would also be aligned with the principle of an open market economy, as specified in the ECB's mandate (Art 127 TFEU). Rather than replacing the market, green refinancing operations would help internalise the externalities that markets currently ignore.

2.4 Leveraging on the ECB's secondary objectives

This section argues that the legal foundation for a green refinancing operations programme can be reinforced by the ECB's secondary mandate as outlined in Article 127(1) of the Treaty on the Functioning of the European Union (TFEU). This mandate obliges the ECB to support the general economic policies of the Union – so long as doing so does not conflict with the primary objective of price stability. As explained in Box A, the ECB's doctrine on its secondary objectives has evolved in recent years, with the ECB's official position being that, when faced with two policy options, it should choose the one that is most in compliance with its secondary objectives. This legal interpretation has been underpinned by a paper written by ECB staff (Ioannidis, Hlásková and Zilioli, 2021) and published on the occasion of the ECB's strategy review of 2021. What is unique in this paper is that the ECB authors articulate how the secondary objectives can be prioritised by the ECB (See Box A).

On these grounds, there is a clear indication that EU policies are already prioritising the greening of the energy sector. Indeed, in pursuit of strategic autonomy, the EU's political leadership has pledged to curtail reliance on fossil fuel imports and accelerate the deployment of domestic clean energy capacity – setting ambitious targets to reshape Europe's energy infrastructure and sovereignty. For instance, the EU's revised Renewable Energy Directive (RED) adopted in 2022 aims to reach 42.5% of renewable

energy production in the EU by 2030. Meanwhile, the Energy Performance of Buildings Directive (EPBD) also set a binding target to increase the average energy performance of the national residential building stock by 16% by 2030. Moreover, the RepowerEU strategy supplemented the EU Green Deal by reinforcing the EU's ambition to decrease its dependence on Russian gas.

More recently, the Council of the EU's annual report on the economic policy of the euro area reiterates that the EU should "*Develop and implement a comprehensive Union-wide strategy to complement and bring together national strategies for effective electrification and the green transition, including through a sharp increase in the production and use of renewable energy and further cuts in the use of imported fossil fuels. In particular, sufficient, cost-effective and efficient grid interconnections, especially cross-border interconnections, are crucial for connecting producers and consumers across wide geographic areas.*" (Council of the EU, 2025). This constitutes a well-defined and politically endorsed policy field in which the ECB has clear expertise and tools to contribute.

Secondly, and as was already argued, interest rate policy by central banks has a very direct impact on the financing conditions of renewable energy investment projects, and the ECB is already operating refinancing operations and intends to continue doing so in the context of its forthcoming new operational framework. Given this, one can reasonably argue that a green interest rate would fall within the field of competence of the ECB, to the extent that central bank policies already have a very direct and material impact on the financing conditions of green projects.

In short, introducing green refinancing operations would not represent a politicisation of monetary policy but rather a coherent and legally grounded interpretation of the ECB's mandate. On the contrary, inaction could expose the ECB to criticism for failing to align its instruments with the EU's democratically agreed climate goals – especially if conventional monetary tightening undermines green investment again. As such, well-calibrated green refinancing operations would not only comply with the ECB's primary and secondary mandates but also help avoid future policy conflicts.

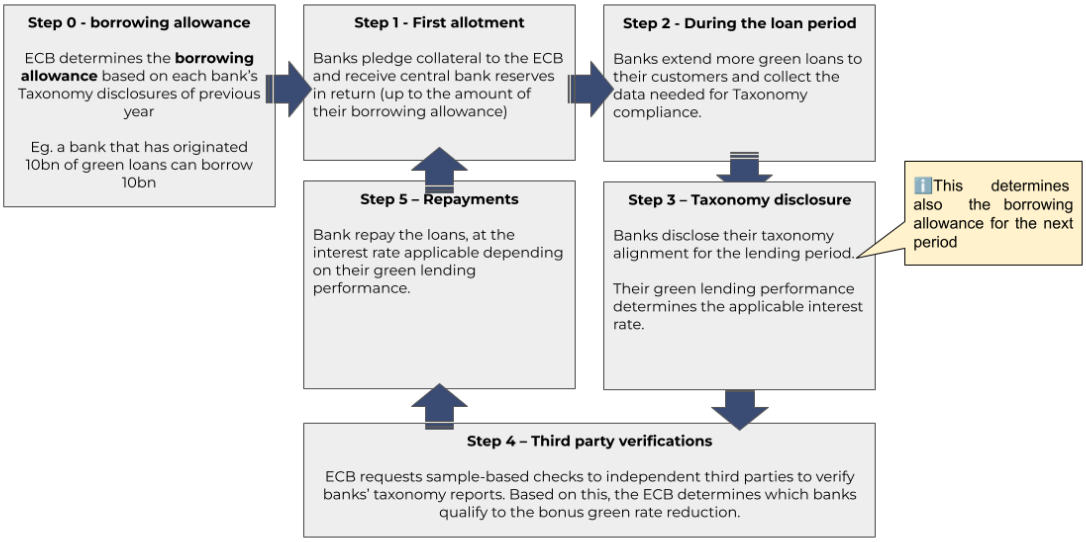
Section 3: Designing green refinancing operations

The case for integrating climate considerations into the ECB's monetary policy framework is increasingly compelling, but its practical feasibility depends on robust operational design. This section moves from theory to practice, outlining how green refinancing operations – a targeted tool to incentivise bank lending for Taxonomy-aligned investments – could be structured within the ECB's existing and future operational frameworks. We begin by defining the key terminology and mechanics of such operations, including eligibility criteria, collateral rules, and performance incentives. Using empirical data from Taxonomy disclosure reports of 47 EU banks, we assess the potential scale of eligible green lending and discuss the institutional and data-related challenges that must be addressed to make this tool effective.

3.1 Design parameters: How would green refinancing operations work?

In a report by Sustainable Finance Lab (Jourdan *et al.*, 2024), the authors formulated for the first time a practical approach to designing a green refinancing operations programme and discussed a range of policy variations for the calibration of the instrument. At the generic level, green refinancing operations would work along the following process (see Figure 3):

Figure 3: The proposed process for implementing green refinancing operations



Building upon this basic framework, this report refines the design in three critical ways. First, we narrow the scope of eligible activities to focus exclusively on sectors most directly linked to the energy transition and price stability (e.g., renewables, energy efficiency, grid infrastructure), excluding activities like real estate acquisition that offer limited climate benefits. Second, we introduce exclusions for "dirty" assets – loans to companies misaligned with Paris-Aligned Benchmark exclusion criteria – deducting these from banks' borrowing allowances to prevent greenwashing and ensure alignment with the ECB's secondary mandate. Third, we explore additional variations of the performance targets.

Scope of eligible taxonomy activities and borrowing allowances

A key question is whether the scope of green refinancing operations should include the whole range of Taxonomy activities, or whether the ECB should opt for a more narrow and calibrated approach, by selecting specific Taxonomy activities that are more prone to contributing to the ECB's price stability mandate.

As extensively discussed in section 2, the underlying assumption of this report is that green refinancing operations should be geared towards specific market segments, which would be more conducive to supporting the EU's energy transition and thus could be more closely contributing to the ECB's primary mandate of price stability.

For the purpose of this analysis, we want to evaluate the feasibility and impact of green refinancing operations focused on the following Taxonomy activities: energy efficiency, renewable energy generation, storage, grid infrastructure investments, as well as the electrification of the automotive industry and other related investments in sustainable transport. The full list of Taxonomy activities we have selected is available in Annexe 2.

The selection of eligible activities directly determines the borrowing allowance for each bank. Under the proposed mechanism, a bank's borrowing allowance is calculated based on the volume of new loans originated in the previous year that align with the selected Taxonomy activities. For example, if a bank extends €5 billion in new loans for renewable energy projects and €3 billion for energy-efficient building renovations, its total borrowing allowance would be €8 billion. Conversely, loans for activities excluded from the scope would not count toward the borrowing allowance, even if they meet broader Taxonomy criteria.

An important decision we make is to exclude retail mortgages from the scope of eligible green lending. The reason is that most "green mortgages" merely finance the purchase of a house with a preexisting highly energy-efficient performance level, thus, they do not meaningfully contribute to reducing energy consumption or carbon emission in practice. Moreover, making green mortgages eligible for a lower green interest rate would reward households who can afford to purchase already highly energy-performant homes, and not households renovating dwellings with low energy performance labels. Given the considerable volume of green mortgages in banks' balance sheets, this would also risk making such green liquidity operations bigger than they need to be and thus distorting the ECB's monetary policy strategy.

This targeted approach ensures that the program's liquidity incentives are focused on high-impact sectors that advance the energy transition while avoiding distortions in less relevant markets.

Collateral requirement

Collateral requirements are a critical component of any green refinancing operation. Collateral rules determine which assets banks can pledge to access central bank liquidity, thereby influencing the volume of borrowing a bank can request from the ECB.

Importantly, the ECB has announced plans to integrate a climate factor into its collateral framework, with adjustments to haircuts and risk assessments for corporate bonds and other marketable assets (ECB, 2025a). While this measure is set to take effect in mid-2026, it will initially apply only to corporate bonds, which represent a small fraction (around 2%) of the collateral currently pledged by banks. This climate risk adjustment should be extended to all ECB refinancing instruments, including green refinancing operations.

While it would be conceptually desirable to go one step further by requiring banks to supply green collateral to access green liquidity, such an approach risks complicating

operational feasibility and diminishing the effectiveness of monetary policy transmission across the euro area, for three key reasons:

1. **Discrimination of retail assets:** Under the ECB's latest rules, retail assets – including loans to private individuals and pools of credit claims backed by real estate (e.g., mortgages) – are no longer eligible as collateral under the new Eurosystem Collateral Management System (ECMS). These assets were temporarily accepted under the COVID-19-specific Additional Credit Claims (ACC) framework but are now being phased out to reduce complexity and heterogeneity in the collateral pool. Moreover, credit claims towards private households (such as renovation loans, EVs auto loans) are more likely to bear higher credit risks, which would risk being penalised through haircuts under the Eurosystem's collateral quality steps framework.

2. **Operational Burdens and Costs**: Conducting credit risk assessments for a multitude of small retail assets would impose significant operational burdens and transaction costs on both banks and central banks. National Central Banks (NCBs) have unequal capacities to manage such processes, potentially leading to inefficiencies or disparities in access to liquidity.

3. **Principle of Broad Collateral Eligibility**: Historically, the Eurosystem has prioritised broad collateral eligibility frameworks to ensure all banks – regardless of their business models or balance sheet compositions – can easily access ECB liquidity facilities (Bindseil, 2016). Strict green collateral requirements could undermine this principle, as the availability of green collateral (especially in the short term) may be too limited to support widespread participation in green refinancing operations.

Overall, a strict green collateral rule risks generating collateral scarcity, operational inefficiencies, and market fragmentation. For these reasons, we conclude that at the current juncture, the current ECB's standard collateral policy (with the inclusion of the forthcoming climate factor) would be suitable for green refinancing operations. In practice, this means banks may pledge standard collateral (e.g., sovereign bonds, high-quality corporate/SME loans) to access green liquidity, but the quantity of liquidity supplied by the ECB remains tied to the volume of green loans previously issued by the bank (as outlined earlier).

Determination of the green interest rate

Following Jourdan et al (2024), we suggest that the interest rate applicable to the loans under the green refinancing operations scheme would be subject to two mechanisms. First, a green interest rate reduction would be applicable to the entire loan. Second, an additional "bonus interest rate" would apply in case the bank reaches a certain green performance target. As an illustration, they propose that banks would be required to increase their Green Asset Ratio by at least 2 percentage points every year in order to qualify for the green bonus rate, however, more specific targets could be envisaged. In addition to these two mechanisms, we will evaluate the impact of the introduction of a

"greenwashing prevention rule", whereby lending towards dirty businesses would be deducted from banks' borrowing allowances.

The combination of these two mechanisms in the specification of the green interest rate helps avoid two pitfalls. The first one would be that the sole application of a "bonus interest rate" approach (as was the case under the TLTRO III) would risk reducing the participation of banks. The reason is that banks which evaluate that the targets are not attainable for them would be discouraged from participating in the green refinancing operations programme in the first place. Moreover, banks would be incentivised not to pass through the lower interest rate to their customers until they are confident enough that they will qualify for the interest rate reduction. And as a result, the effect of the policy would be less pervasive across the European economy and would benefit the bank's customers less. To mitigate this issue, all banks should be eligible for the green interest rate on the basis of their full borrowing allowance. The second pitfall, however, is that in the absence of a performance-based incentive (such as the green bonus interest rate), banks would not be incentivised to develop strategies to increase their green lending performance to a significant scale. As a result, the effect of a green interest rate would constitute an undeserved windfall profit for banks. Thus, the combination of the basic green interest rate and the bonus interest rate optimises the cost and rewards, by ensuring broad participation from banks, but also effectively stimulating banks in deploying more efforts to increase green lending in the economy.

Maturity

The maturity of green refinancing operations is a critical policy parameter. We propose a 4-year maturity, consistent with the ECB's past TLTRO practice, and making the funding eligible for inclusion in banks' Net Stable Funding Ratio (NSFR). This duration is sufficiently long to incentivise green lending while preserving the ECB's ability to adapt to evolving economic conditions.

To maintain the programme's effectiveness and manageability, the green interest rate should be recalculated annually based on banks' green lending performance, ensuring that only those institutions demonstrating sustained commitment to green finance benefit from the most favourable terms over the four-year period. The scope of eligible lending should be subject to periodic review, both to align with updates to the EU Taxonomy and to prevent the programme from expanding beyond the Eurosystem's liquidity requirements. In this way, should the volume of eligible lending risk exceed the ECB's intended liquidity provision, the ECB could adjust eligibility criteria to contain the quantity of future allotments. Straightforward guidance on these parameters should enable banks to plan ahead and avoid unexpected disruptions to their liquidity management.

Operationally, annual allotments – aligned with banks' Taxonomy reporting schedules – would streamline and reduce administrative burdens for both banks and Eurosystem central banks compared to the quarterly schedule of previous TLTROs, while maintaining rigorous oversight.

Finally, the ECB should commit to maintaining the programme at least until 2030 (in line with the EU's climate goals) but retain the flexibility to recalibrate or phase it out earlier if macroeconomic conditions or policy priorities shift.

Exclusion of dirty lending

Furthermore, we consider the possibility of introducing greenwashing safeguards to avoid the risk that banks benefit from the green interest rates while continuing to finance corporations that are directly working against the EU's climate ambitions. In the absence of a "brown taxonomy", we use the EU Regulation 2020/1818 on Paris-Aligned Benchmark (PAB). This regulation establishes stringent criteria for financial products aligned with the 1.5°C goal of the Paris Agreement. Under Article 12 of this regulation, the following exclusion criteria shall be applied:

- Companies involved in the business of controversial weapons or tobacco
- Companies violating global standards such as the United Nations Global Compact (UNGC) Principles
- Companies deriving more than a set percentage of their revenues from coal, oil, gas, or electricity generation activities
- Companies that do not meet the criteria for environmentally sustainable economic activities as defined in the EU Taxonomy regulation (Article 9).

Conveniently, the Pillar 3 disclosure framework requires banks to disclose the share of assets that are excluded from Paris-aligned benchmarks. We can thus exploit these data points in order to simulate the effect of a subtraction of the volume of loans towards companies excluded from PABs from the borrowing allowance. As we will see in the next section, the amount of lending towards companies excluded from PABs is significant and exceeds by far the amount of green lending.

While the lack of data in itself is certainly not the main issue anymore, banks and other stakeholders have pointed out various difficulties with the use of the EU Taxonomy, indicating potential reliability issues. It is likely that not all banks are uniformly applying the EU Taxonomy criteria (in particular, DNSH), resulting in possible discrepancies between banks. These issues are being widely discussed in the context of the Omnibus proposal and the review of the EU Taxonomy. The European Commission intends to complete the review of the Taxonomy's screening criteria by Q2 2026.

To deal with any remaining difficulties and risk of mis-reporting or greenwashing, the ECB could put in place an ad-hoc verification system, for example, by requiring ex-post verifications by third parties (e.g. audit companies) as was the case for the TLTRO-III programme. Third parties could be tasked to review the underlying portfolios of green loans, which banks claimed to have originated, and in case of significant errors, the green interest rate applicable via the green refinancing operations shall be adjusted. The detection of systematic fraud (including several years after the completion of the loans) should lead to dissuasive penalty payments, analogously to the current supervisory practices.

Lending performance targets

The effectiveness of green refinancing operations hinges on well-designed lending performance targets, which determine whether banks qualify for the 'bonus green interest rate'.

Jourdan et al (2024) suggest that such a performance target could be based on the growth of a bank's Green Asset Ratio (GAR). For instance, banks would be required to demonstrate a measurable year-on-year increase in their GAR by two percentage points. While this approach is suitable for broadly defined green refinancing operations, a more tailored strategy is needed for sector-specific interventions, such as those targeting energy-intensive sectors.[7]

Conceptually, lending performance targets could be based on two main factors:

- **Investment needs:** These can be derived from quantitative goals set in EU legislation for each selected sector (e.g., energy infrastructure, building renovations, and vehicle electrification). In addition, the targets should reflect the share of these investment gaps that banks are expected to fill through lending.
- **Market share:** Targets should account for each bank's approximated market share in the selected sectors, either at the country level (e.g., for mortgages and auto loans) or at the EU level (e.g., for large-scale energy infrastructure projects). This ensures that targets are proportional to a bank's size and market penetration.

For example, in the case of building renovations, the EU Directive on the energy performance of buildings (EPBD) requires member states to design national building renovation plans (NBRP) to reduce the average primary energy use of residential stock by 16% by 2030 (vs. 2020 levels)[8]. In addition, the EU regulated Energy Performance Certificates (EPCs) do provide estimates of the primary energy demand of the building, and banks are already collecting these EPCs as part of their customer engagement processes. On this basis, it would theoretically be feasible to track annually how much primary energy consumption has been reduced by the bank's lending[9].

Similar approaches could be developed for the automotive sector and energy generation (based on the goals set out in the Renewable Energy Directive).

In the absence of politically defined sectoral targets as outlined above, a simpler and more pragmatic option would be to take a **"best-in-class" approach**, whereby bonus interest rates are awarded based on the relative performance of banks. For example,

[7] To illustrate why the GAR cannot be a useful KPI in this context it is important to note that mortgages represent nearly 85% of all the taxonomy-aligned assets. In this context, the level of GAR is overly-determined by the ability of banks to collect well-rated EPCs on their real estate portfolios (such data collection effort in itself relies hugely on the existence or not of national public databases), and not by the overall green performance of the banks.
[8] The European Commission also provides voluntary NBRP templates with specific annual fundings targets, including with a breakdown of financing sources including mortgages and unsecured renovation loans.
[9] Such targets could be integrated into the voluntary mortgage "portfolio framework" which the European Commission aims to establish by 2026.

the top 20% of participating banks – ranked by the volume of eligible green lending originated relative to their total GAR denominator – could qualify for the maximum interest rate discount. A **tiered reward structure** could be introduced, where the top 20% performing banks would get a stronger reduction in their bonus interest rates, the banks in the next 20% bracket receiving a smaller rate reduction, and so on. This design would reward ambition while preserving flexibility and competitiveness across the banking system.

Given the current regulatory uncertainty and the underlying complexity, this report does not attempt to prescribe a definitive lending performance target. It is clear, however, that incorporating well-calibrated conditionalities into the green interest rate mechanism will be essential to maximise impact, minimise windfall gains, and align incentives with the EU's transition objectives. As much as possible, these targets should be designed jointly with the EU legislators and not exclusively by the ECB.

3.2 Dataset and methodology

Having established the conceptual and policy framework for green refinancing operations, this section turns to the empirical assessment of their feasibility and implications. The analysis relies on newly and publicly available bank-level data, which now allows for an unprecedented evaluation of Taxonomy-aligned lending in banking books. Below, we outline the dataset and methodology used to estimate the potential scale and distribution of green lending across 47 major Eurozone banks.

Data sources

Our sample includes 47 banks, which cover nearly €23 trillion of assets, or 70% of EU banking assets as of Q2 2024. The sample was built upon the list of systemically significant banks directly supervised by the ECB's single supervisory mechanism (SSM). It excluded non-Euro area banks, which have supervised entities headquartered in the Euro area and whose reporting currencies were not the euro, as well as banks for which pillar 3 reports could not be retrieved. The full list of selected banks and main data points can be found in Annexe 1.

Since 2024, major EU banks have been required to disclose their Taxonomy alignment for environmental objectives 1 and 2 (climate mitigation and adaptation). Banks have to include such reporting at least annually under the EU disclosure delegated act, using the Annexe 6 provided by the European Commission. The biggest banks also have to carry out such reporting under the Pillar 3 reporting requirements framework set out in Article 449a of the Capital Requirement Regulation (CRR). Accordingly, the Pillar 3 reporting templates have been developed by the European Banking Authority (EBA) under the implementing technical standards on prudential disclosures on ESG risks (ITS). Unlike the standard reporting, Pillar 3 disclosures are biannual, and some of the reporting templates differ from the ones provided in Annexe 6 of the Commission's regulation. We chose to use the Pillar 3 reporting exercises for June 2024 as these were readily available at the time of the construction of the dataset (March 2025).

Furthermore, the collection and aggregation of data was made simpler thanks to Table 1 of the ESG Disclosure templates, which requires banks to disclose their exposures towards non-financial corporations as per a shortlist of 14 NACE sectors and subsectors, which "highly contribute to climate change". For each sector: a) a breakdown of the Taxonomy-aligned (CCM) exposure, b) a breakdown of exposures to companies excluded from the Paris-aligned benchmark. Other useful datapoints include the average maturity of the portfolios for each sector.

In addition, we have collected a few selected data points from table 7 of the Pillar 3 templates, in particular, retail mortgages, renovation loans, and car loans ("motor vehicles loans").

Identification methodology

We then analysed the whole set of Taxonomy activities relevant for Climate Mitigation and selected 68 Taxonomy activities that are specifically relevant for energy transition and transport. The full list of selected taxonomy activities is available in Annexe 2.

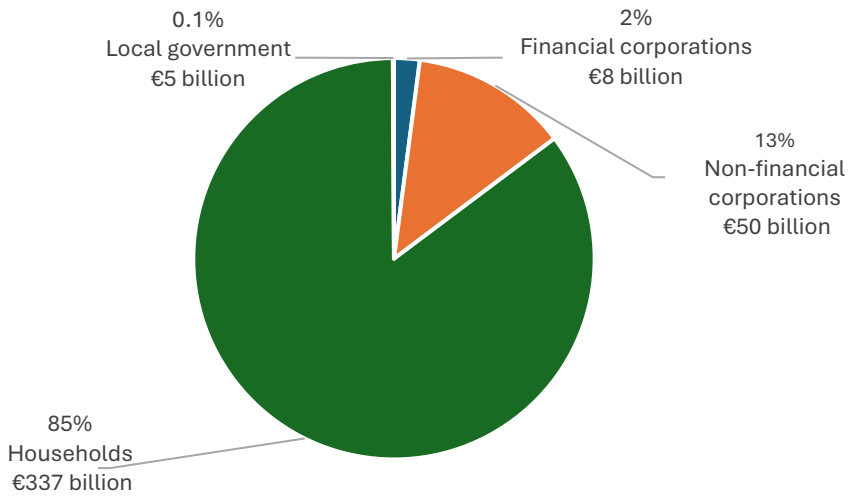
A key limitation of the dataset is that exposures are disclosed per NACE sectors and not per Taxonomy activities. We thus make a reconciliation by identifying the NACE codes that are likely to include the selected Taxonomy activities, on the basis of the correspondence table provided by the European Commission. From there, we were able to identify 14 NACE subsectors from the Pillar 3 table 1.

Another important limitation with our dataset is the inability to exclude fossil fuel gas and nuclear (Taxonomy activities CCM 4.28, CCM 4.29 and CCM 4.30) from the data available for NACE "D35.11 - Production of electricity" in which we find €16.7 billion of Taxonomy-aligned assets. For obvious reasons, inclusion of "sustainable" fossil gas as eligible under the green refinancing operations would be counter-productive, given that one objective of such policy is to reduce the EU's reliance on fossil fuels.

3.3 Results

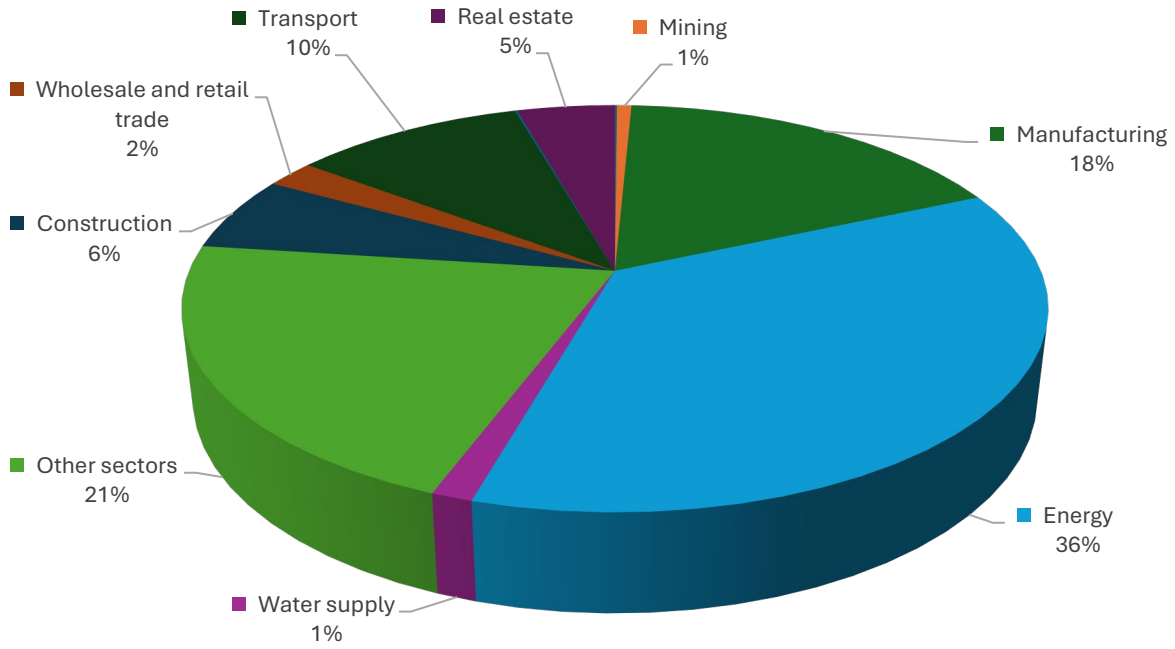
Overall, we find that banks in our sample hold a total of €400.7 billion of Taxonomy-aligned assets, with an average green asset ratio of 2.37%. Households represent an 85% bulk of the stock (€337 billion) – of which 98% are loans collateralised by real estate (i.e. mortgages, which we exclude from the scope), and the remaining include auto loans (€6.7 billion) and renovation loans (€119 million). Loans for other than non-financial corporations represent a relatively small 13% share of these green loans (€50 billion), alongside 2% for loans to financial corporations. Loans to local governments represent a negligible share of 0.1% (€5 billion).

Chart 2: *Taxonomy-aligned assets per counterparty (EUR billion, Q2 2024)*



If we look exclusively at loans towards non-financial corporations, we observe that the energy sector is the biggest sector (36%), alongside manufacturing (18%). Those two sectors alone represent nearly €30 billion.

Chart 3: *Taxonomy-aligned corporate loans per sector in our sample*



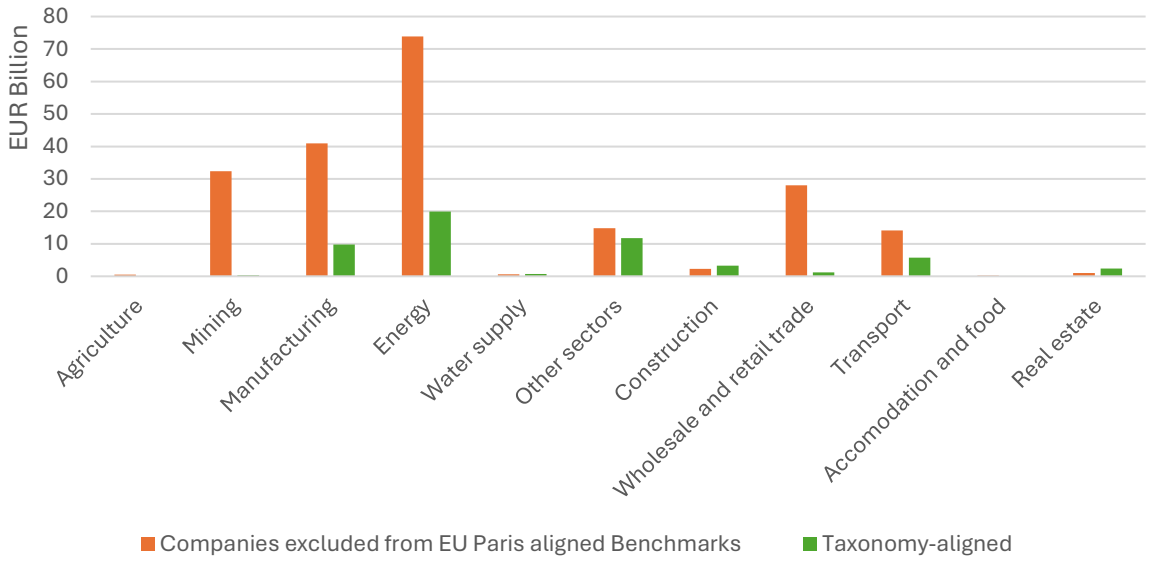
Loans to companies excluded from Paris-Aligned Benchmarks

In comparison, the total volume of loans to corporations that are excluded from Paris-Aligned Benchmarks under EU Regulation 2020/1818 (referred to thereafter as 'dirty loans') is four times bigger than Taxonomy-aligned lending. Banks in our sample held

€205 billion of such 'dirty loans'. Once again, loans in the energy and manufacturing sectors are the most important components.

The disproportionately higher share of dirty lending compared to green lending reinforces the case for introducing further greenwashing safeguards in the design of ECB refinancing operations.

Chart 4: *Corporate loans per sector*



Retail loans (mortgages, renovations, car loans)

As outlined before, households represent more than 85% of the stock of Taxonomy-aligned retail loans, however, 98% (€329 billion) of these are mortgages.

Renovation loans to households represent a very small proportion of banks' Taxonomy-aligned assets: only €119 million, that is, barely 0.15% of the €82 billion stock of renovation loans that are disclosed as Taxonomy-eligible.[10] This is a striking finding, given that the investment gaps for renovating the residential building stock are estimated at 150 billion per year until 2030 (Keliauskaitė *et al.*, 2024).

However, it is possible that this number is artificially lower than the real amount of Taxonomy-aligned lending due to banks' difficulties in assessing the Taxonomy alignment (we return to this issue in the next section).

In terms of loans for electric vehicles, we found a total of €6.7 billion of Taxonomy-aligned retail car loans, within a total of €188 billion of Taxonomy-eligible car loans in banks' disclosures (the alleged total size of the auto car loan market is €300 billion). Our data suggests that at this point only 4,22% of the car loan portfolios of banks are Taxonomy-aligned. One bank (Santander) holds 77% of the total lending for Taxonomy-aligned car loans, while 39 of the 47 banks (83%) have reported zero, which

[10] This indicates that much more renovation loans could potentially be Taxonomy-aligned, but the banks could not attest with enough certainty the compliance with the Taxonomy's criteria for renovation.

suggests potentially large heterogeneity in banks' approaches to assess Taxonomy-alignment.

3.4 Estimating banks' borrowing allowances

We now zoom in on the 14 selected NACE sub-sectors selected in the eligible scope of the ECB's green refinancing operations, in order to estimate the total borrowing allowance, and therefore the maximal size that green refinancing operations could take.

We find €38 billion of Taxonomy-aligned lending in these 14 sectors, which represent 69% of the total of Taxonomy-aligned corporate loans. Once again, we find that the amount of dirty lending in the selected sectors is much larger: €98 billion.

Based on this data, we can attempt to assess the maximal size of borrowing allowance. An important consideration here is that banks' borrowing allowances would be based on the volume of loans that were *originated* during the previous reporting year. However, the Taxonomy disclosure templates require banks to disclose on a stock basis.[11] To overcome this limitation, we can nonetheless make a simplified estimate based on the average maturity of each subset of the bank's portfolio, which is disclosed by banks in the Pillar 3 ESG table 1.[12] For the purposes of this analysis, we will thus take the assumption that the average maturity of each portfolio is a linear representation of the flow of lending of the bank.[13]

Summary of green refinancing eligible lending (EUR million)			
NACE Sector	**Taxonomy-aligned stock**	**Maturity**	**Eligible to green refinancing (annual flow)**
Manufacture of wood and of products of wood and cork	47	4,357	13
Manufacture of other non-metallic mineral products	500	3,617	131
Manufacture of electrical equipment	1399	3,227	565
Manufacture of machinery and equipment	658	3,242	223
Manufacture of motor vehicles, trailers and semi-trailers	2211	2,690	1082
Manufacture of other transport equipment	1304	3,104	528
Production of electricity	16917	7,102	2630
Electric power transmission and distribution	3715	6,847	747
Manufacture of gas; distribution of gaseous fuels	1709	5,695	258

[11] Banks are required to disclosure their "GAR Flow", however this KPI is only disclosed at aggregate level, so it is not possible to directly identify the flow of new green asset for each sector.
[12] The maturity for retail loans is however not included in template 7. We assumed a maturity of 4 years for car loans, and 10 years for renovation loans.
[13] This is, of course, a simplified assumption. In practice, the proportion of Taxonomy-aligned loans is likely to be concentrated among the most recent years, as data are more likely to be available for loans originated after the introduction of the EU Taxonomy regulation. This would imply that our calculations would slightly under-estimate banks' borrowing allowances.

Steam and air conditioning supply	90	5,932	12
Construction of buildings	856	5,632	224
Specialised construction activities	544	4,501	129
Transportation and storage	5715	5,028	1550
Real estate activities	2416	7,042	333
Total corporate loans	**38081**	**4,858**	**8425**
Retail - car loans	6702	4	1675
Retail - renovation loans	119	10	13
Total (corporate+retail)	**44917**	**n/a**	**10114**

We thus find that around €10.1 billion of Taxonomy-aligned lending have presumably been originated during the year before June 2024 and could have been eligible for green refinancing by the ECB in 2024.

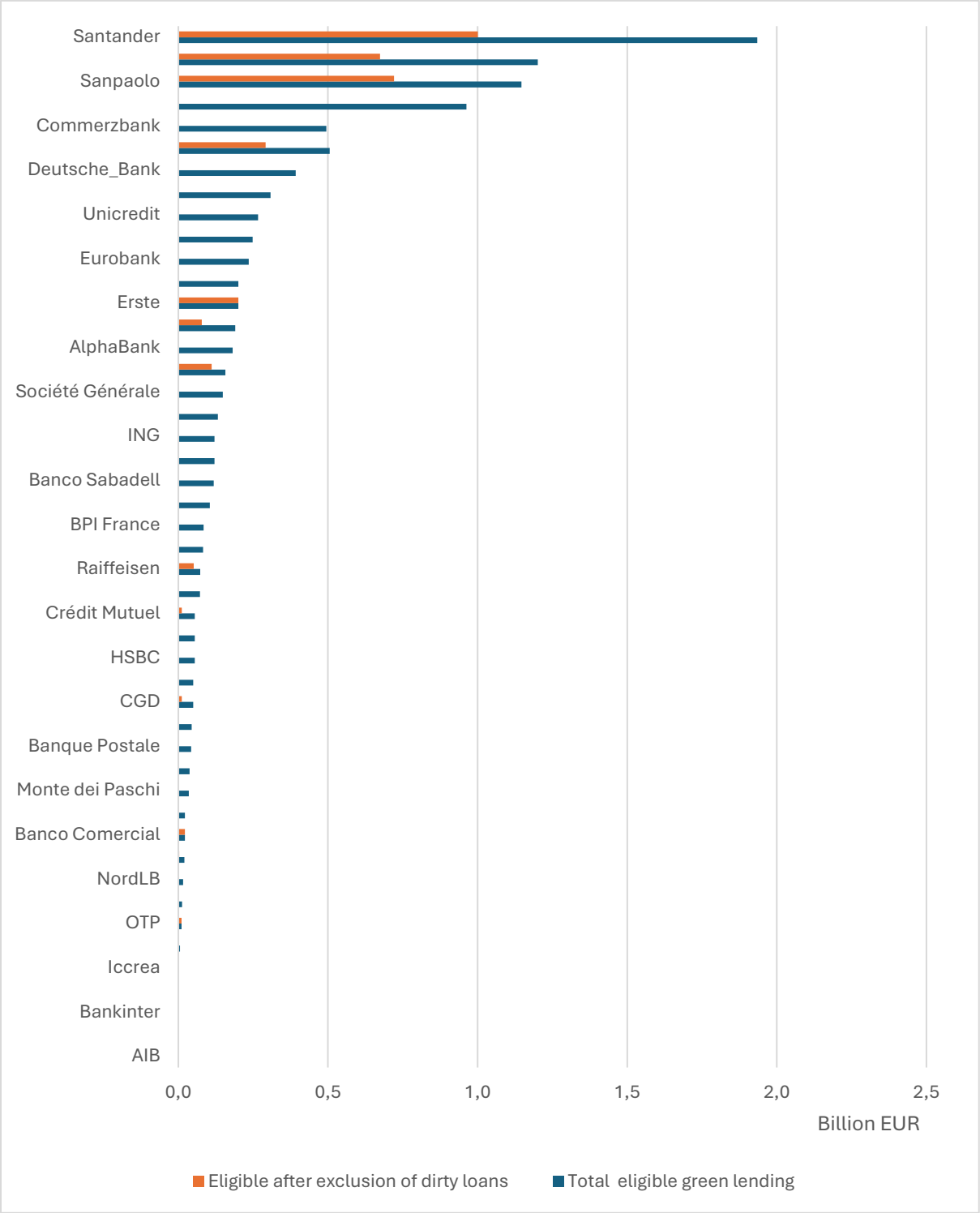
As we will see later, the deduction of 'dirty' corporate loans from banks' borrowing allowance would shrink this amount to around €3 billion.

3.5 Borrowing allowances per bank

We now want to analyse how much each individual bank in our sample could theoretically borrow. We find that, on average, banks would be able to borrow €200 million (the median is 82 million). Only three banks would not have been able to participate due to the absence of Taxonomy alignment in their loan books.

We then apply the greenwashing prevention rule and deduct lending to corporations excluded from Paris-Aligned Benchmarks from the bank's borrowing allowance. The effect of this rule is very drastic: only 13 banks (28% of the sample) would have net positive borrowing allowances, with an average of 273 million per eligible bank. At the aggregate level, this would shrink the total volume of ECB lending to €3 billion instead of €10 billion. Chart 5 below provides detailed figures for each bank in each scenario.

Chart 5: *Borrowing allowance per bank*



3.6 Conclusions

Overall, the volumes of Taxonomy-aligned lending within the sample of banks are disappointingly small. From a stock of €400 billion of Taxonomy-aligned assets, we arrive at €10 billion of annual lending flow, which could be refinanced by the ECB under green refinancing operations.

At the same time, in all likelihood, our result is almost certainly an under-estimation, for various reasons. First, our sample only represents around 70% of EU banking assets. Including all euro area banks would certainly increase the volume of Taxonomy alignment. Second, the subtraction of the €319 billion stock of green mortgages from the eligibility scope of green lending makes a major dent in the total stock of eligible lending. The motivation for this exclusion is to ensure that green refinancing operations benefit actual investments in energy-efficiency renovations and not simply purchased transactions of pre-existing green real estate assets. However, it is likely that doing so might still exclude certain renovation investments where the use of proceeds from the mortgage includes a certain amount for renovation investments. In the next section, we provide recommendations on how to ensure that the flow of renovation investments covered by mortgage instruments becomes eligible for green refinancing operations.

Moreover, when analysing the data, we can also see that certain banks are clearly lagging behind in their disclosure (with very partial or non-existent data in the Taxonomy-related sections). These issues are partly complicated by the regulatory uncertainty around the Taxonomy's criteria. As banks make progress in incorporating the relevant ESG data collection processes, the volumes of Taxonomy-aligned lending will unavoidably continue to grow. Preliminary analysis of the Taxonomy disclosures as of December 2024 shows an increase in the GAR stock from €400 billion to €456 billion. However, the speed of such future growth is nearly impossible to predict, given the added uncertainty created by the European Commission's Omnibus proposals.[14]

In any case, what transpires from our analysis is that Taxonomy-based refinancing operations bear minimal risks to prejudicing the ECB's current monetary policy stance in the short to medium term, given that the amount of green liquidity potentially injected would remain very small. Indeed, for comparison, the ECB currently provides around 25 billion of liquidity to banks through its main refinancing operations (MRO) and long-term refinancing operations (LRO). In this context, it would be virtually possible for the ECB to already implement green refinancing rules within the envelope of the ongoing liquidity provisions by the Eurosystem to the banking system.[15]

Given the disproportionate share of dirty lending compared to green lending, there is a strong case for excluding lending to firms barred under the EU's Paris-Aligned Benchmark regime from banks' borrowing allowances. However, while doing so would provide a strong incentive for banks, it would also reduce the overall size of the green refinancing operations so much that the operational cost for deploying this instrument might overweigh its benefits. For this reason, it might be preferable to introduce greenwashing safeguards at a later stage, when the volume of green lending reaches comparable levels. At this point, the possibility of subtracting "dirty lending" from

[14] The European Commission recently proposed to make Taxonomy disclosures voluntary until 2027, which will most likely reduce data availability in the next 3 years and make it more difficult to produce estimations.
[15] This would however assume a perfect substitution between banks currently receiving MRO and LRO funding and the ones that would request funding under the green refinancing operations scheme, which is likely not the case.

banks' borrowing allowances would be a very effective way of containing the overall quantity of liquidity injected under green refinancing operations within the liquidity needs identified by the Eurosystem for its structural operations.

Section 4: Improving the EU Taxonomy framework to enable green refinancing operations

In this section, we explore how the European Commission and other EU institutions can facilitate the introduction of Taxonomy-based refinancing operations by the ECB.

4.1 Improving disclosures

As our methodological choices have evidenced, identifying the exact amount of new lending in specific segments of the EU transition is not a straightforward task. This is due to several major limitations in the disclosure framework for banks provided for in the Disclosure Delegated Act 2021/2178.

Data point for loan origination

First, even though banks do report the GAR "Flow", this indicator is only required at the aggregate level and not at the sector or asset level. Consequently, it is not possible to derive directly from the disclosure reports the amount of newly originated green loans for each sector or each Taxonomy activity, which would be needed in order to calculate the borrowing allowance of each bank under green refinancing operations. Instead, we had to estimate these annual flows by making simplistic assumptions about the structure of the portfolio, whereby the lending flows are linearly aligned with the average maturity.

Going forward, it would be useful for the disclosure framework to directly require banks to disclose the annual flow of new Taxonomy-aligned lending for each sector or Taxonomy activities. Even if the green refinancing policy was never implemented, we would argue that such data points could be extremely useful for policy-makers in evaluating the contribution of banks in filling in the investment gaps.

Limitations of the NACE classification

Second, corporate lending is reported by sector using NACE codes, not by individual Taxonomy activities, which seriously limits the analysis of the green lending flows, and the assessment of their eligibility to the green refinancing operations.

Taxonomy activities and the NACE classification are two distinct classification systems that are not perfectly interoperable. Even though the Taxonomy classification broadly follows the NACE classification, in practice, reporting entities associated with one NACE code will engage in investments in multiple Taxonomy activities, including some that are not directly related to the primary NACE code of the entity. For example, supermarket companies can typically invest in activities ranging from installation, maintenance and repair of charging stations for electric vehicles (CCM 7.4) to the construction of new buildings (CCM 7.1) or the collection and transport of non-hazardous waste (CCM 5.5). From the perspective of a bank's disclosure, such CAPEX

investments will be classified under “Wholesale and retail trade”, leaving no possibility of disentangling which proportion of the Taxonomy-aligned exposure is linked to either charging stations or the collection of waste.

The EU Taxonomy was developed, among other reasons, precisely to compensate for the shortcomings of the NACE classification in capturing sustainability investment flows. Thus, the representation of this data per Taxonomy activity would give more precise and qualitative information as to which sustainability activities are being financed by banks, while at the same time facilitating the fine-tuned calibration of any kind of financial incentives from monetary, fiscal or prudential policies.

In the context of the Omnibus amendments, the European Commission has already proposed to simplify the EU Taxonomy reporting by including nuclear and fossil gas activities directly in the sectoral reporting template (Annexe VI, table 2) – de facto combining the use of both NACE codes and Taxonomy activities in this template. It would likely be simpler to use only the Taxonomy framework for the entire disclosure template.

4.2 Fixing Technical Screening Criteria

Other issues emerge in the use of the EU Taxonomy by banks to assess whether assets or loans are fully aligned with both the Technical Screening Criteria (TSC) provided for in the EU Taxonomy. To be aligned with the EU Taxonomy, loans must be compliant with both Significant Contribution Criteria (SCC) and Do No Significant Harm (DNSH) criteria.

Complexity and challenges in the use of both types of criteria quickly emerge when attempting to assess them in the context of loan-financing of SMEs or consumers. These have been widely documented in multiple reports from the EU Platform for Sustainable Finance and other research and consulting firms (EU Platform on Sustainable Finance, 2024, 2025).

Banks are often responding to regulatory uncertainty by adopting overly conservative approaches when screening their portfolios, leading to an underestimation of the proportion of Taxonomy-aligned assets (Schütze and Sandbaek, 2025). Based on direct engagement with banks in the course of this project, the low volumes of loans for renovations and car loans aligned with the EU Taxonomy were found to be a direct consequence of these difficulties.

It goes much beyond this report to analyse in detail the challenges experienced for each of the Taxonomy activities that could potentially be covered in green refinancing operations. Moreover, the European Commission has announced that the whole TSC will be carefully reviewed by 2026, with the aim of making these criteria more usable in practice and is currently working on this review. Nonetheless, for illustrative purposes, we produced a case study on renovation loans (see box D).

Box D: Case-study on the usability of the EU Taxonomy for renovation loans

The EU Taxonomy includes "Renovation of existing buildings" as a sustainable activity (CCM 7.2). To comply with the Significant Contribution Criteria, a renovation must comply with one of these criteria:

- Comply with the "major renovation" definition under the EPBD, which leaves a member state the possibility to define it as either a renovation where the total cost of the renovation is higher than 25 % of the value of the building (excluding land value), or where more than 25 % of the surface of the building envelope undergoes renovation.
- The renovation "leads to a reduction of primary energy demand (PED) of at least 30%", certified by an Energy Performance Certificate and excluding PED reduction obtained by renewable energy generation.

In addition, the renovation must comply with around ten DNSH criteria, which range from, among others:

- a maximum flow of water in taps, showers and toilet flushes;
- recycling at least 70% of demolition material must be recycled or reused; other waste materials must be minimised;
- the renovation process must emit less than 0,06 mg of formaldehyde per m3.

In the context of a transaction between a bank and households, the following issues have often been raised:

- Ex-ante compliance is hard to verify: Banks cannot confirm upfront whether a renovation will meet SCC or DNSH requirements. This complicates pricing and pre-approval of green refinancing benefits.
- EPC data is not always available: customers are often reluctant to obtain an updated EPC after the renovation is completed, as this incurs additional cost on the consumer. As a result, it implies additional engagement efforts by the bank to obtain such a document from the customer.
- Some DNSH checks are overly burdensome: Assessing pollution, waste, and water-use criteria requires documentation often unavailable to either banks or homeowners. Banks do have neither the resources nor the expertise to do on-site verifications.
- Incompatibility with specific lending products: Renovation loans disbursed flexibly (e.g., as mortgage supplements) give banks little visibility into the actual works being carried out.

As a result, Taxonomy alignment in this segment is extremely low: our data shows just €119 million in aligned renovation loans out of €82 billion in Taxonomy-eligible exposures across 47 banks.

While the current framework may be suitable in the case of the construction of new buildings, or the renovation of commercial or large public buildings, its usability and verifiability seem disproportionately in the residential housing market. In this context, strict application of the DNSH criteria may lead to the risks of increasing transaction costs for the bank and discouragement for households.

As suggested by the EU platform for Sustainable Finance's report on simplifying the EU Taxonomy (EU Platform on Sustainable Finance, 2025), several targeted measures could be taken in the future to ensure that the DNSH criteria do not disproportionately slow down the use of the EU Taxonomy:

- Decoupling DNSH criteria related to the companies performing the renovation vs. the homeowner. For instance, while SCC criteria shall clearly be established by the provision of an updated EPC by the consumer, DNSH criteria related to waste or pollution could be checked at the company level. Relatedly, one solution would be to relieve banks from the duty to assess DNSH compliance of the companies when the DNSH criteria are already aligned with national or EU regulations, for example, in the context of green certification or labels for the construction/renovation companies. In this case, the provision of the company's certificate to the bank (or via a public register) could be sufficient.
- Establish an EU-level green renovation loan label, possibly with simplified and partial Taxonomy alignment criteria, in line with the EBA's recommendation (EBA, 2023).
- Incorporate data points such as water usage of taps directly into the EPC documentation.
- Introduce explicit waivers on certain DNSH verifications when adequate (for instance, no need to check the water use of taps when the renovation only involves the insulation of the building envelope).
- Explicitly allow banks to use a pre-simulated EPC16 (provided by a certified entity, on the basis of the renovation being planned as documented by the renovation operator) in order to pre-assess the Taxonomy-alignment of the loan. Such a solution would empower banks to provide incentives in the form of lowered interest rates, since they would be assured of the Taxonomy compliance.

These improvements would not only enhance alignment accuracy but also increase the effectiveness of green lending incentives under a potential green refinancing operations scheme.

4.3 Voluntary reporting

At the time of writing this report, the European Commission has proposed a number of amendments to the CSRD, which aim at simplifying and reducing the disclosure requirements for companies. As a result of these amendments, the number of companies required to disclose Taxonomy alignment is likely to shrink significantly, which in turn will limit the future growth of Taxonomy-aligned assets in banks' disclosures, and henceforth the potential scope of the green refinancing operations programme.

In compensation for the narrowing of the CSRD scope, the Commission wants to facilitate simplified voluntary reporting for SMEs (VSME). It is particularly important that entities which report voluntarily also be eligible to participate in the green refinancing operations programme. For example, renewable energy projects financed via Special Purpose Vehicles, which are not subject to CSRD, should clearly be able to benefit from green refinancing operations – provided their reported data are subject to credible third-party verification to ensure integrity and prevent misreporting.

To this effect, simplified reporting standards and templates under VSME should be sufficiently detailed, in line with the previous subsections of this chapter.

Section 5: Conclusions and policy recommendations

The climate crisis and the energy transition present profound challenges for macroeconomic stability, requiring central banks to rethink the tools and assumptions that have long guided monetary policy. This report has shown that green refinancing operations for specific Taxonomy-aligned activities represent a timely, feasible, and effective instrument to address these challenges.

Green refinancing operations would offer preferential interest rates to commercial banks for loans financing Taxonomy-aligned investments in renewable energy, grids, storage, buildings' energy efficiency, and the electrification of transport. As demonstrated in Section 2, these investments are not only vital to meeting the EU's climate objectives, but also have a disinflationary potential, reducing Europe's exposure to fossil fuel price volatility and energy-driven supply shocks. In this sense, a green interest rate feature could find coherence with the ECB's increasing attention to climate-related dynamics in its macroeconomic analysis and policy-making, which was reconfirmed during the last ECB strategy review. Crucially, with the ECB's pre-commitment to consider its secondary objectives in the design of future structural refinancing operations, a clear window of opportunity has emerged for designing and piloting a green refinancing operations scheme.

The analysis also shows that significant progress has been made in overcoming past implementation barriers. Many banks are now familiar with the EU Taxonomy disclosures. Our empirical assessment, based on data from 47 major Eurozone banks, suggests that (under conservative assumptions) at least **€10 billion in eligible**

green lending could already be supported under such a program. With further improvements in disclosure and verification, this figure could grow substantially.

At the same time, our analysis also reveals the remaining limitations in the EU Taxonomy framework – both in terms of the Taxonomy criteria and the disclosure requirements. As it stands, the Taxonomy disclosure will become voluntary until 2027, which is a major drawback. At the same time, the creation of green refinancing operations based on the Taxonomy could create powerful incentives for banks and their customers to continue or start using the EU Taxonomy. As a result, this would also mitigate the risk that less data becomes available in the next few years for the purpose of managing climate-related risks at the supervisory and macroprudential level.

In order to facilitate the swift implementation of green refinancing operations, we therefore propose the following policy recommendations:

1. For the European Central Bank (ECB):

- Carefully evaluate the impact of investments in energy-efficiency, renewables, grids, and sustainable transportation on inflation patterns and monetary policy, in particular by incorporating energy transition factors (capacity, cost of capital, investment needs, and take-up) into its medium-term Eurosystem-level scenarios for monetary policy-making.
- **Start designing a green interest rate** component within the forthcoming structural refinancing operations, calibrated to support Taxonomy-aligned energy transition investments.
- **Coordinate with the European Commission** and EBA to ensure that disclosure requirements and monitoring frameworks deliver the granular, verifiable data required to track green lending for the implementation of the green refinancing operations scheme.

2. For the European Commission:

- **Improve further the EU Taxonomy disclosure framework** to ensure banks report new green lending flows at the activity or sector level, complementing the GAR with flow-based indicators essential for tracking green credit origination.
- **Clarify DNSH criteria and improve their usability**, in particular for retail loans where more proportionality and clarity are needed. Make sure these improvements are fully operational as soon as possible.
- **Ensure continued coverage of non-CSRD entities** through voluntary reporting and inclusion of project-level disclosures (e.g. from SPVs), in view of ensuring their eligibility to green refinancing operations.

- **Highlight further the synergies between the energy transition, competitiveness, and price stability in the EU's broad economic policy guidelines**, to reinforce the legitimacy of the ECB's role in supporting the EU's climate and energy objectives while respecting its mandate.

In everyone's interest: How the ECB can support the energy transition with green interest rates

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Annexes

Annexe 1: Summary of bank data

Summary of bank data (selected items, million EUR)							
		Taxonomy disclosures (all sectors)					
Bank name	**Total assets (June 2024)**	**GAR (turnover)**	**Taxonomy-aligned (corporate loans)**	**Taxonomy - aligned (retail car loans)**	**Taxonomy - aligned (retail mortgages)**	**Taxonomy - aligned (retail renovation loans)**	**Excluded from PABs**
ABN AMRO	2 450 513	9,00%	120	0	30 578	0	1 723
AIB	1 822 234	5,86%	0	0	5 514	0	158
AlphaBank	2 101 792	2,45%	1 052	0	0	0	1 879
Banco BPM	1 466 244	2,17%	187	0	2 206	0	1 883
Banco Comercial	1 439 064	3,50%	121	0	1 982	0	0
Banco Sabadell	1 353 415	4,72%	600	0	7 349	0	3 306
Bank of Ireland	981 279	2,84%	0	0	2 648	0	189
Bankinter	822 360	1,82%	0	0	888	0	397
Banque Postale	773 370	5,90%	366	0	8 502	0	409
Barclays	809 542	0,50%	58	0	0	0	341
Bayerische Landesbank	731 778	0,33%	287	0	216	36	17
BBVA	628 760	0,53%	977	0	883	0	13 211
Belfius	563 407	0,17%	1	0	0	0	1 946
BNP	581 121	0,77%	3 119	0	0	0	19 741
BPCE	551 345	4,09%	1 946	0	37 344	0	4
BPER	526 645	1,86%	91	0	1 598	0	481
BPI France	406 452	7,21%	163	0	0	0	5 987
Caixabank	348 336	0,86%	1 804	0	0	0	8 185
CGD	365 148	2,59%	248	1	1 258	17	258
Commerzbank	312 403	2,68%	3 109	0	6 383	0	13 319

Crédit Agricole	328 602	4,20%	5 729	0	52 971	0	7 419
Crédit Mutuel	280 462	4,40%	331	0	26 504	0	650
Deutsche_Bank	258 405	1,20%	842	0	6 545	0	9 049
DZ	248 397	0,27%	509	0	270	1	12 990
Erste	211 047	0,77%	1 095	0	0	0	0
Eurobank	203 084	2,70%	2 493	4	14	0	2 479
HSBC	182 518	0,27%	175	0	0	0	1 368
Iccrea	169 691	1,25%	7	0	1 380	0	626
ING	165 948	6,81%	620	0	53 123	0	21 825
KBC	139 397	0,26%	238	0	1	0	1 530
Landesbank Hessen-Thüringen	150 084	1,52%	864	0	49	0	1 205
LBBW	140 508	0,37%	486	0	17	0	6 876
Monte dei Paschi	138 548	0,65%	104	0	577	0	911
NBG	136 368	1,80%	777	0	17	0	2 459
Nordea	99 720	2,10%	632	0	6 328	0	1 708
NordLB	130 998	0,22%	114	0	0	0	1 232
Nova Ljubljanska banka	115 994	0,99%	17	0	84	0	247
OP	119 697	6,32%	834	0	5 881	0	1 345
OTP	107 614	0,10%	27	11	0	0	0
Piraeus	101 802	2,30%	1 068	0	54	55	0
Rabobank	103 790	4,25%	75	0	21 473	0	8 949
Raiffeisen	83 178	0,46%	266	0	170	0	249
Sanpaolo	90 720	3,28%	3 420	0	12 942	0	7 425
Santander	76 626	2,45%	1 126	6 578	22 953	0	16 518
Société Générale	74 599	1,32%	733	17	8 389	0	15 021
Unicredit	73 684	1,06%	1 251	10	2 551	10	9 852
Volkswagen	26 493	0,13%	0	81	0	0	339
TOTAL	**22 993 182**		**38 081**	**6 702**	**329 642**	**119**	**205 706**

Annexe 2: List of selected Taxonomy activities			
NACE	**Sector**	**Activity number**	**Activity**
C25, C27, C28	Manufacturing	CCM 3.1	Manufacture of renewable energy technologies
C25, C27, C28	Manufacturing	CCM 3.2	Manufacture of equipment for the production and use of hydrogen
C27.2, E38.32	Manufacturing	CCM 3.4	Manufacture of batteries
C16.23, C23.11, C23.20, C23.31, C23.32, C23.43, C25.11, C25.12, C25.21, C25.29, C25.93, C27.31, C27.32, C27.33, C27.40, C27.51, C28.11, C28.12, C28.13, C28.14	Manufacturing	CCM 3.5	Manufacture of energy efficiency equipment for buildings
C22, C25, C26, C27, C28	Manufacturing	CCM 3.6	Manufacture of other low carbon technologies
C23.51	Manufacturing	CCM 3.7	Manufacture of cement
C20.11	Manufacturing	CCM 3.10	Manufacture of hydrogen
C26.51, C27.1, C27.3, C27.9, C33.13, C33.14, C33.2	Manufacturing	CCM 3.20	Manufacture, installation, and servicing of high, medium and low voltage electrical equipment for electrical transmission and distribution that result in or enable a substantial contribution to climate change mitigation
D35.11, F42.22	Energy	CCM 4.1	Electricity generation using solar photovoltaic technology
D35.11, F42.22	Energy	CCM 4.2	Electricity generation using concentrated solar power (CSP) technology
D35.11, F42.22	Energy	CCM 4.3	Electricity generation from wind power
D35.11, F42.22	Energy	CCM 4.4	Electricity generation from ocean energy technologies

D35.11, F42.22	Energy	CCM 4.5	Electricity generation from hydropower
D35.11, F42.22	Energy	CCM 4.6	Electricity generation from geothermal energy
D35.11, F42.22	Energy	CCM 4.7	Electricity generation from renewable non-fossil gaseous and liquid fuels
D35.11	Energy	CCM 4.8	Electricity generation from bioenergy
D35.12, D35.13	Energy	CCM 4.9	Transmission and distribution of electricity
	Energy	CCM 4.10	Storage of electricity
	Energy	CCM 4.11	Storage of thermal energy
	Energy	CCM 4.12	Storage of hydrogen
D35.21	Energy	CCM 4.13	Manufacture of biogas and biofuels for use in transport and of bioliquids
D35.22, F42.21, H49.50	Energy	CCM 4.14	Transmission and distribution networks for renewable and low-carbon gases
D35.30	Energy	CCM 4.15	District heating/cooling distribution
D35.30, F43.22	Energy	CCM 4.16	Installation and operation of electric heat pumps
D35.11, D35.30	Energy	CCM 4.17	Cogeneration of heat/cool and power from solar energy
D35.11, D35.30	Energy	CCM 4.18	Cogeneration of heat/cool and power from geothermal energy
D35.11, D35.30	Energy	CCM 4.19	Cogeneration of heat/cool and power from renewable non-fossil gaseous and liquid fuels
D35.11, D35.30	Energy	CCM 4.20	Cogeneration of heat/cool and power from bioenergy
D35.30	Energy	CCM 4.21	Production of heat/cool from solar thermal heating
D35.30	Energy	CCM 4.22	Production of heat/cool from geothermal energy
D35.30	Energy	CCM 4.23	Production of heat/cool from renewable non-fossil gaseous and liquid fuels
D35.30	Energy	CCM 4.24	Production of heat/cool from bioenergy
D35.30	Energy	CCM 4.25	Production of heat/cool using waste heat
M72, M72.1	Energy	CCM 4.26	Pre-commercial stages of advanced technologies to produce energy from nuclear processes with minimal waste from the fuel cycle

D35.11, F42.22	Energy	CCM 4.27	Construction and safe operation of new nuclear power plants, for the generation of electricity and/or heat, including for hydrogen production, using best-available technologies
D35.11, F42.22	Energy	CCM 4.29	Electricity generation from fossil gaseous fuels
D35.11, D35.30	Energy	CCM 4.30	High-efficiency co-generation of heat/cool and power from fossil gaseous fuels
F41.1, F41.2, F43	Construction and real estate activities	CCM 7.1	Construction of new buildings
F41, F43	Construction and real estate activities	CCM 7.2	Renovation of existing buildings
F42, F43, M71, C16, C17, C22, C23, C25, C27, C28, S95.21, S95.22, C33.12	Construction and real estate activities	CCM 7.3	Installation, maintenance and repair of energy efficiency equipment
F42, F43, M71, C16, C17, C22, C23, C25, C27, C28	Construction and real estate activities	CCM 7.5	Installation, maintenance and repair of instruments and devices for measuring, regulation and controlling energy performance of buildings
F42, F43, M71, C16, C17, C22, C23, C25, C27, C28	Construction and real estate activities	CCM 7.6	Installation, maintenance and repair of renewable energy technologies
L68	Construction and real estate activities	CCM 7.7	Acquisition and ownership of buildings
M71	Professional, scientific and technical activities	CCM 9.3	Professional services related to the energy performance of buildings
C29.1, C30.1, C30.2, C30.9, C33.15, C33.17	Manufacturing	CCM 3.3	Manufacture of low-carbon technologies for transport
C30.2, C27.1, C27.9	Manufacturing	CCM 3.19	Manufacture of rail rolling stock constituents
F42, F43, M71, C16, C17, C22, C23, C25, C27, C28	Construction and real estate activities	CCM 7.4	Installation, maintenance and repair of charging stations for electric vehicles in buildings (and parking spaces attached to buildings)

C22.2, C26.1, C26.2, C28.14, C28.15, C29.2, C29.3, C33.17	Manufacturing	CCM 3.18	Manufacture of automotive and mobility components
H49.10, N77.39	Transport	CCM 6.1	Passenger interurban rail transport
H49.20, N77.39	Transport	CCM 6.2	Freight rail transport
H49.31, H49.3.9, N77.39, N77.11	Transport	CCM 6.3	Urban and suburban transport, road passenger transport
N77.11, N77.21	Transport	CCM 6.4	Operation of personal mobility devices, cycle logistics
H49.32, H49.39, N77.11	Transport	CCM 6.5	Transport by motorbikes, passenger cars and light commercial vehicles
H49.4.1, H53.10, H53.20, N77.12	Transport	CCM 6.6	Freight transport services by road
H50.30	Transport	CCM 6.7	Inland passenger water transport
H50.4	Transport	CCM 6.8	Inland freight water transport
H50.4, H50.30, C33.15	Transport	CCM 6.9	Retrofitting of inland water passenger and freight transport
H50.2, H52.22, N77.34	Transport	CCM 6.10	Sea and coastal freight water transport, vessels for port operations and auxiliary activities
H50.10, N77.21, N77.34	Transport	CCM 6.11	Sea and coastal passenger water transport
H50.10, H50.2, H52.22, C33.15, N77.21	Transport	CCM 6.12	Retrofitting of sea and coastal freight and passenger water transport
F42.11, F42.12, F42.13, F43.21, M71.12, M71.20	Transport	CCM 6.13	Infrastructure for personal mobility, cycle logistics
C25.99, C27.9, C30.20, F42.12, F42.13, M71.12, M71.20, F43.21, H52.21	Transport	CCM 6.14	Infrastructure for rail transport
F42.11, F42.13, M71.12, M71.20	Transport	CCM 6.15	Infrastructure enabling low-carbon road transport and public transport
F42.91, M71.12, M71.20	Transport	CCM 6.16	Infrastructure enabling low-carbon water transport

F41.20, F42.99	Transport	CCM 6.17	Low-carbon airport infrastructure
N77.35	Transport	CCM 6.18	Leasing of aircraft
H51.1, H51.21	Transport	CCM 6.19	Passenger and freight air transport
H52.23, H52.24, H52.29	Transport	CCM 6.20	Air transport ground handling operations

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