HEINRICH BÖLL STIFTUNG
ECOLOGY

Unlocking the ECB's green potential

A framework for integrating green structural refinancing operations

E-PAPER

Author: Jordi Schröder Bosch
Published by the Heinrich-Böll-Stiftung European Union | Global Dialogue
May 2026

positivemoney

The author

Jordi Schröder Bosch worked at Positive Money Europe from March 2022 to August 2025 as a Research and Policy Intern and then as Researcher. Jordi holds a BSc in Economics from the Autonomous University of Barcelona and a MA in International Economics from the Berlin School of Economics and Law and the Université Sorbonne Paris-Nord. Jordi's research interests are international economics, monetary policy and international finance. He's currently pursuing a PhD at the Freie Universität Berlin.

Contents

Executive summary

In 2024, the European Central Bank (ECB) revised its monetary policy operational framework. Under the new framework, a share of the funding that the ECB supplies to banks will be provided through structural monetary policy operations. Importantly, the ECB has committed to design these operations in a way that supports the transition to a green economy.

This development offers a key opportunity for the introduction of a green structural long-term refinancing operations programme. Properly designed, this programme would reduce financing costs for green investments, which in turn would contribute to closing the existing green investment gap to meet the 2030 emission reduction targets and diminishing the euro area's fossil fuel dependence.

While this is a positive development, in this report, we show that, under the ECB's revised operational framework, these structural operations will be introduced late – not earlier than 2028 – and at a modest scale, reaching only around €200 billion by 2029. Their timing and volume are highly constrained by certain features of the ECB's proposed operational framework, which aims to keep the ECB's balance sheet as lean as possible and provide most liquidity through conventional short-term refinancing instruments.

In this report, we propose an alternative operational framework in which structural operations play a much more central role in liquidity provision and the ECB targets a larger balance sheet than what is envisaged in its proposed framework. This would allow for a timelier and larger-scale implementation of structural operations, and, consequently, of a green structural long-term refinancing operations programme.

Finally, the report proposes three different design options for a green structural long-term refinancing operations programme:

1. **Performance-based programme:** Funding volumes and preferential rates are contingent on banks' taxonomy-aligned lending. Banks performing over a pre-defined ambitious benchmark would receive a bonus rate. This programme would incentivise banks to set ambitious taxonomy-aligned lending targets.

2. **Transition plan-based programme:** Eligibility is tied to the credibility and benchmarks of banks' transition plans under the Capital Requirements Directive (CRD). This incentivises banks to adopt ambitious transition plans and implement them effectively.

3. **Collateral-based programme:** Access to refinancing is conditional on posting green collateral, such as bonds issued under the EU Green Bond Standard. This would incentivise the issuance of assets that fund green activities.

The Omnibus legislative package, as agreed at the EU level, will reduce corporate sustainability reporting obligations. This will limit the availability of future taxonomy-aligned data, weakening the information infrastructure needed for the implementation of a green structural refinancing operations programme. While a performance-based programme would be preferable, we offer a broader menu of options from which the ECB could choose, and even sequence among them, depending on their assessed feasibility.

Although the changes in EU sustainability legislation complicate the implementation of such a programme, it remains both possible and necessary for the ECB to follow through on its compromise and seize this opportunity.

Abbreviations

APP	Asset purchase programme
CCGT	Combined-cycle gas turbines
CRD	Capital Requirements Directive
CSDDD	Corporate Sustainability Due Diligence Directive
CSRD	Corporate Sustainability Reporting Directive
DF	Deposit facility
EBA	European Banking Authority
ECB	European Central Bank
EONIA	Euro overnight index average
ESG	environmental, social and governance
€STR	Euro short-term rate
EU-GBS	EU Green Bond Standard
GAR	Green Asset Ratio
GFC	Global financial crisis
GHG	Greenhouse gas
HQLA	High-Quality Liquid Assets
ICMA	International Capital Market Association
IEA	International Energy Agency
IMF	International Monetary Fund
LCOE	Levelised cost of electricity
LTRO	Longer-term refinancing operation
MLF	Marginal lending facility
MRO	Main refinancing operation
NFRD	Non-Financial Reporting Directive
PEPP	Pandemic emergency purchase programme
SME	Small and medium-sized enterprise
SMP	Securities market programme
TPI	Transmission Protection Instrument
TLTRO	Targeted longer-term refinancing operation

1. Introduction

The European Central Bank (ECB) revised its operational framework in 2024, deciding that it should help support the transition to a green economy.[1] This represents a significant step that would further embed climate-related considerations within the day-to-day operationalisation of monetary policy in the euro area.[2]

Specifically, the ECB stated that it would design the so-called *structural monetary policy operations*, which are long-term liquidity-providing instruments, in a way that supports the transition to a green economy. While the ECB has thus far not provided clarity on the design of these structural operations,[3] this creates a window of opportunity to introduce green structural long-term refinancing operations – a green monetary policy instrument that ECB President Christine Lagarde has advocated for in the past[4] – into the ECB's policy toolbox.

Green monetary policy advocates have consistently called for the implementation of this instrument,[5] arguing that it would reduce fossil fuel dependence, strengthen price stability and energy security, and lower financing costs for green investments, which would enhance their competitiveness.

In this study, we show that under the revised operational framework, green monetary policy structural operations will have only a modest policy space, meaning that the volumes of funding provided through this programme will not be enough to make a significant difference, and that they won't be implemented in the near future. This limits the impact that these instruments can have in achieving their stated goal of supporting the transition to a green economy and, in turn, their contribution to the ECB's primary mandate of price stability, which is undermined by the euro area's fossil fuel dependence.

We therefore propose an alternative design of the operational framework in which green structural monetary policy operations provide larger amounts of funding and can be implemented at an earlier stage. This would further enhance the positive impact of the ECB's decision to green its operational framework.

1 ECB (2024): Changes to the operational framework for implementing monetary policy.

2 This follows previous steps to green the ECB's monetary policy, beginning with the 2022 climate action plan. A major milestone was the recent announcement that the ECB will integrate climate-related risks in its collateral framework. See: ECB (2022): ECB takes further steps to incorporate climate change into its monetary policy operations; ECB (2025): ECB to adapt collateral framework to address climate-related transition risks, 2025.

3 Also referred to as green targeted lending, green targeted longer-term refinancing operations (gTLTROs) or green dual rates.

4 Positive Money EU (2022): Christine Lagarde re-affirms willingness to consider lower rates for climate investments.

5 van't Klooster & Tilburg (2020): Targeting a sustainable recovery with green TLTROs; Batsaikhan & Jourdan (2021): Money looking for a home; Jourdan et al. (2024): A green interest rate for the eurozone; Schröder Bosch (2023): A roadmap towards greening the European Central Bank.

Finally, several design options for green structural refinancing operations are outlined, considering the limitations introduced by the Omnibus legislation package, which, as agreed at the EU level, will reduce the data infrastructure on which green monetary policy instruments rely and thus complicate their implementation.

The ECB's revision of the operational framework is a work in progress, and most of the planned changes will take time to materialise as the balance sheet continues to wind down. The main parameters of the ECB's proposal will therefore be reviewed by the Governing Council. The aim of this report is to outline how certain key parameters could be adjusted to maximise the impact of the revised operational framework in supporting the transition to a green economy. Furthermore, as the ECB has not yet provided clarity on the design of the green structural monetary policy operations, the report proposes possible designs for these instruments to maximise their impact in incentivising green investment in the euro area.

The structure of this brief is as follows: Section 2 outlines the relevance of a green structural refinancing operation programme for closing the green investment gap and reducing fossil fuel dependence; Section 3 traces the evolution of the ECB's operational framework, and also outlines the 2024 revision and its implications; Section 4 assesses the role and timing of structural monetary policy operations; Section 5 presents an alternative operational framework that expands policy space for structural monetary policy operations; and finally, Section 6 proposes different design options for a green structural refinancing programme.

2. The importance of a green structural refinancing operation

A green structural long-term refinancing operation is a monetary policy instrument through which the ECB lends to banks, against eligible collateral, at an advantageous rate and with long maturities. This instrument resembles the ECB's past targeted longer-term refinancing operations (TLTROs) programmes, which provided advantageous funding to banks contingent on their lending to non-financial corporations and households. The key difference is that, in this case, preferential funding would be contingent on banks lending to green activities (see Section 6 for an in-depth exploration of possible designs).

A green structural refinancing operations programme could help fulfil two important functions. First, it could help close the green investment gap in the euro area. Second, it could reduce fossil fuel dependence in the euro area, and, therefore, contribute to greater price stability.

According to the European Commission, green investments in the EU averaged €764 billion between 2011 and 2020.[6] Reaching 2030 targets requires an additional €477 billion of green investments, amounting to 3.2% of 2023 GDP, meaning that €1.2 trillion needs to

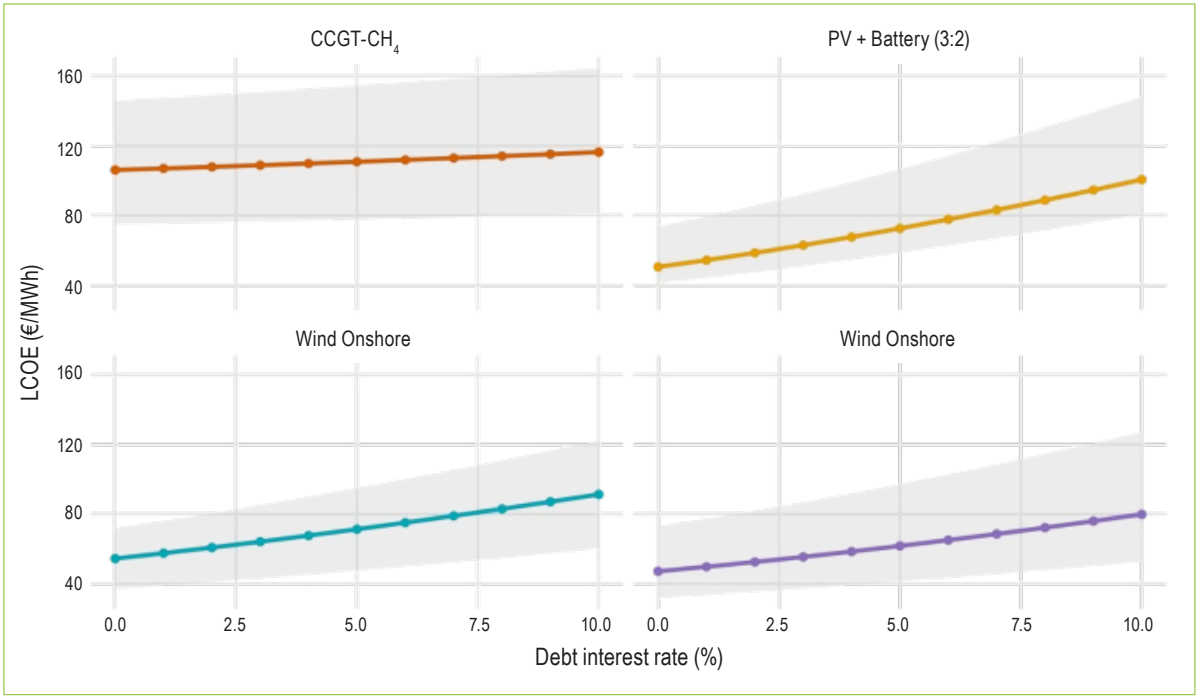
6 European Commission (2023): Investments needs assessment and funding availabilities to strengthen EU's Net-Zero technology manufacturing capacity; ECB (2025): Green investment needs in the EU and their funding.

be invested each year until 2030.[7] According to a European Investment Bank survey, the availability of finance is the main barrier to investment for cleantech firms, with 30% of cleantech firms reporting it as a major obstacle, more than twice the share observed among the broader group of firms.[8]

Green technologies are generally more capital intensive, meaning that financial conditions play a key role in the costs of the goods they produce.[9] As shown in Figure 1,[10] the levelised cost of electricity (LCOE) from renewable energy sources is more sensitive to interest rates than that of gas generators.

Furthermore, as fast-growing industries, they rely more on external finance to sustain such growth. Therefore, a green structural refinancing programme could provide key support in improving financial conditions for cleantech firms and reaching the green investment target.

Figure 1: Impact of interest rates on the LCOE across generation technologies



Source: Fraunhofer. Own elaboration.

This has important implications for price stability. First, by reducing the capital costs of green investments, it would improve their affordability. Figure 1 shows that lower interest

7 ECB (2025): Green investment needs in the EU and their funding.

8 European Patent Office & European Investment Bank (2024): Financing and commercialisation of cleantech innovation.

9 Bianchi et al. (2023): Impact of rising interest rates on sustainable projects; IEA (2023): Will solar PV and wind costs finally begin to fall again in 2023 and 2024?; Schmidt et al. (2019): Adverse effects of rising interest rates on sustainable energy transitions; IRENA (2023): The cost of financing for renewable power; IRENA (2025): Renewable power generation costs in 2024.

10 The data for Figure 1 is sourced from Kost (2024): Levelized Cost of Electricity- Renewable Energy Technologies, Fraunhofer.

rates lead to a reduction in the price of renewable energy, while combined-cycle gas turbines (CCGT) and other fossil energy technologies are less sensitive to changes in interest rates.

Second, by incentivising green investment, this programme would reduce the euro area's fossil fuel dependence. The 2022 energy crisis showed that this dependence poses great risks to price stability, as energy price shocks spread through the economy and lead to broad-based inflation. As shown in multiple studies, the rise in gas and oil prices was the main contributor to the inflation experienced during 2022.[11] This limited the ECB's ability to fulfil its price stability mandate, with inflation rising to a 10.6% peak, well above the ECB's 2% target.

During that same period, past renewable energy investments played an important role in dampening price increase in electricity markets.[12] For example, the International Energy Agency (IEA) estimated that newly installed solar and wind capacity produced €100 billion in savings for European consumers between 2021 and 2023 thanks to their impact on wholesale electricity prices, which would have been 8% higher in the absence of these additions.[13]

Importantly, a study by International Monetary Fund (IMF) economists found that, during the last inflation shock, central banks that tightened forcefully did not achieve better inflation outcomes than those that did not.[14] This casts doubt on the effectiveness of conventional monetary policy in maintaining price stability when facing supply-side disruptions. Therefore, a green structural refinancing programme can be an important first step in endowing the ECB with a broader policy toolkit to ensure price stability in an environment where supply disruptions play an increasingly important role.[15]

11 Álvarez & Kroen (2025): The Energy Origins of the Global Inflation Surge; Arce et al. (2024): What caused the euro area post-pandemic inflation?; Feveile Adolfsen et al. (2024): Gas price shocks and euro area inflation.

12 Quintana (2024): The impact of renewable energies on wholesale electricity prices; Cevik & Ninomiya (2022): Chasing the Sun and Catching the Wind: Energy Transition and Electricity Prices in Europe.

13 IEA (2023): How much money are European consumers saving thanks to renewables?

14 Imam & Poghosyan (2025): Navigating the 2022 inflation surge.

15 van't Klooster (2025): Overcoming myopia in the ECB's 2025 monetary policy strategy review; HBS report; Schröder (2023). A roadmap towards greening the European Central Bank.

3. The evolution of the ECB's operational framework

This section examines the role of the ECB's operational framework and the changes it has undergone. This will provide the context to discuss the recent ECB revision and discuss possible alternatives, which will be addressed in the following sections.

The monetary policy operational framework encompasses the instruments, procedures and intermediary targets through which a central bank sets its monetary policy stance.[16] More specifically, the ECB's operational framework defines how its policy rates are set and liquidity is provided to banks in order to steer the operational target, which is the overnight unsecured interest rate in money markets. Since 2019, the operational target has been the euro short-term rate (€STR), replacing the euro overnight index average (EONIA). By steering this target, the ECB influences broader financial conditions, setting its monetary policy stance.

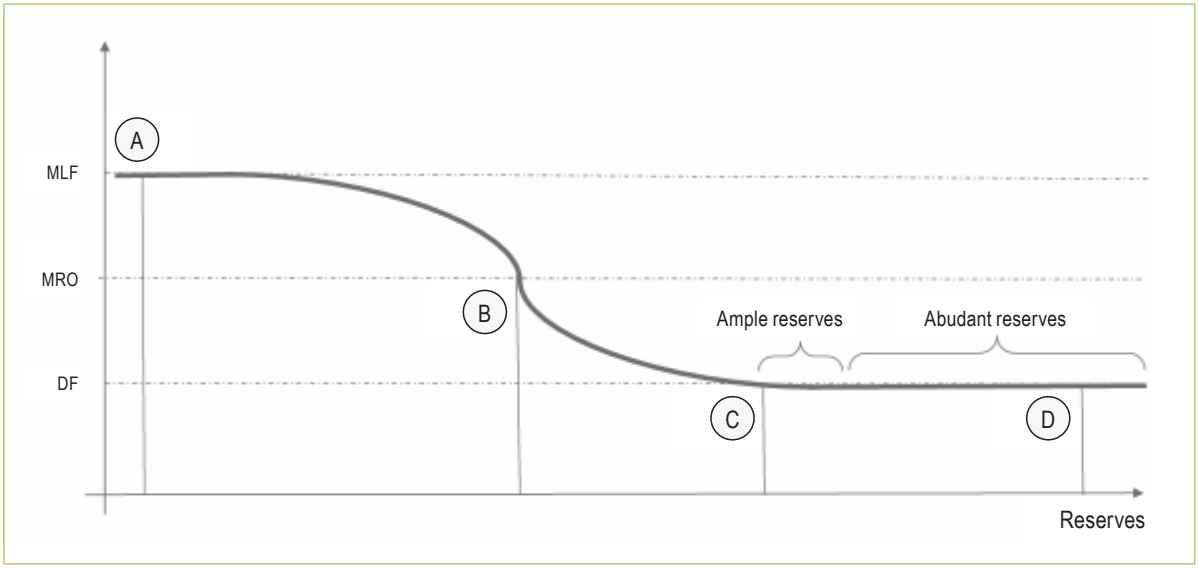
The ECB steers the operational target by setting the interest rate paid on bank' deposits at the ECB, known as reserves, and the interest rate at which it lends reserves to banks, as well as by managing the quantity of reserves in the system. The ECB creates these reserves by lending to banks through short-term or long-term refinancing operations, as well as through asset purchases. The ECB's policy rates establish the bounds within which banks are willing to lend and borrow reserves in the money market. Furthermore, the quantity of reserves that banks hold shapes the supply and demand conditions in that market.

The ECB's three policy rates are: the deposit facility (DF) rate, which is the rate at which banks' deposits are remunerated; the main refinancing operations (MRO) rate, which is the rate at which banks borrow on a weekly basis against eligible collateral; and the marginal lending facility (MLF) rate, which applies to overnight borrowing. Together, these three policy rates form a 'corridor', with the DF rate setting the floor, the MLF rate the ceiling and the MRO standing at the middle (Figure 2). The position of the operational framework within the corridor depends on the quantity of reserves that banks hold.

In its early years, the ECB's operational framework operated as a symmetric corridor with scarce reserves.[17] In that system, the ECB had to supply the exact quantity of reserves so that the operational target was set at the midpoint of the corridor, matching the MRO rate. If the banking system lacked reserves relative to its daily needs, banks in deficit would have been unable to meet all their reserve needs by borrowing from banks in a surplus and would need to obtain those from the MLF, pushing the operational target to the ceiling of the corridor (point A in Figure 2). Conversely, if banks had a surplus of reserves relative to their daily needs, the opposite would happen, pushing the operational target to the floor of the corridor (point C in Figure 2).

16 Coeuré (2016): The European Central Bank's operational framework in post-crisis times.
17 Bindseil (2014): Monetary policy operations and the financial system.

Figure 2: ECB key policy rates and the position of the operational target



Source: Own elaboration.

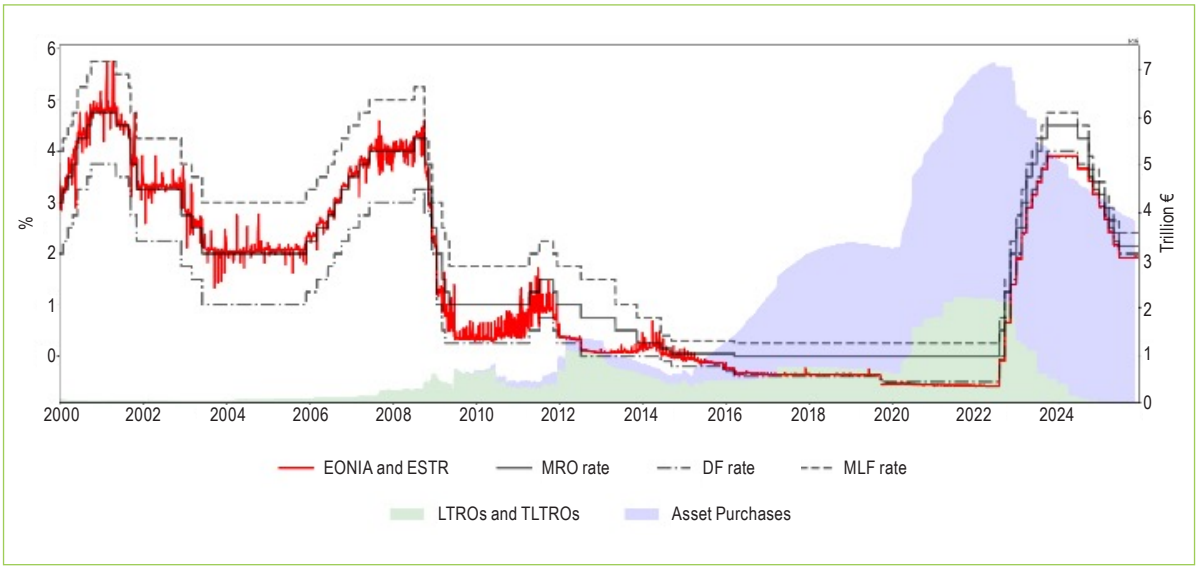
During the period of the 'corridor system', the ECB mainly relied on the MRO and 3-month longer-term refinancing operations (LTROs) to provide liquidity to banks. At the same time, banks did not hold more reserves than those needed to fulfil minimum reserve requirements.[18] As can be observed in Figure 3, the system broadly functioned as intended until the global financial crisis (GFC), with the operational target staying at the middle of the corridor. However, the operational target also displayed some volatility.

The operational framework evolved as different economic shocks hit the euro area, which required the ECB to adjust the size and composition of its balance sheet.[19] Starting in 2008, during the GFC, the ECB's balance sheet expanded for financial stability reasons, as the ECB stepped in to provide liquidity through 6-month and 1-year LTROs in response to the collapse of interbank market liquidity.[20]

It later underwent further significant expansions in subsequent episodes. It introduced the securities market programme (SMP) during the Eurozone crisis, followed by targeted TLTROs in 2014 and the asset purchase programme (APP) in 2015 as the effective lower bound was reached. Most recently, it introduced the pandemic emergency purchase programme (PEPP) in response to the Covid-19 crisis. All these interventions are reflected in the expansion of the green and blue shaded areas in Figure 3. These measures increased the quantity of reserves that banks held, pushing the operational target to the floor of the corridor, at the DF rate (Figure 3). As a result, the operational framework transitioned to a floor system with abundant reserves (point C in Figure 2).

18 Schnabel (2025): Towards a new Eurosystem balance sheet.
19 Ibid
20 Coeuré (2012): The importance of money markets.

Figure 3: ECB's key policy rates and operational target (2000–2025)



Source: ECB Euro short-term rate (EST) and Internal Liquidity Management (ILM) datasets. Own elaboration.

Finally, as a response to the 2022 energy crisis, the ECB raised interest rates and started to wind down its balance sheet. This unwinding process is still ongoing, as the ECB, alongside other major central banks, aims to normalise its operational framework. After reaching a peak in 2022, the holdings of monetary policy–related assets have decreased by 45%.[21] This process of normalisation, while involving a reduction in the size of the balance sheet, does not imply going back to the pre-GFC operational framework, as the ECB recognises that central bank reserves play a different role today than they did in the past, given their importance for banks in meeting liquidity regulations, banks' changed liquidity management practices and banks' preference for holding larger precautionary buffers.[22]

4. The 2024 revision of the operational framework

In 2024, the ECB introduced key changes with regard to the provision of liquidity and the setting of the operational target in its operational framework. First, in the revised operational framework, the ECB will primarily meet banks' liquidity needs through MROs and 3-month LTROs. In this system, the quantity of reserves that banks hold will ultimately be determined by banks' own demand. MROs and 3-month LTROs will cover banks' excess reserve demand and a share of banks' structural liquidity needs (see Box 1). With this setting, the ECB aims for its balance sheet to be 'as thin as possible'. This demand-driven system stands in contrast to the supply-driven system of recent years, in which the ECB determined the level of reserves and provided them through long-term monetary policy instruments.

21 Schnabel (2025): Towards a new Eurosystem balance sheet.

22 Borio (2023): Getting up from the floor; Schnabel (2023): Back to normal? Balance sheet size and interest rate control; Schnabel (2025): Towards a new Eurosystem balance sheet.

However, not all liquidity will be supplied through these short-term instruments. The ECB will complement the shorter-term MROs and 3-month LTROs with longer-term structural monetary policy operations, which include longer-term refinancing operations and asset purchases, to cover banks' structural liquidity needs arising from autonomous factors and minimum reserves (see Box 2). Importantly, these structural operations will be designed so as to provide support to the transition to a green economy.

According to the ECB's planned approach, before these operations can be implemented, the size of the balance sheet must decrease further, and the volume of MROs and 3-month LTROs must increase significantly. Structural operations will play a secondary role in the provision of liquidity relative to the role of MROs and 3-month LTROs within the revised framework. Their role will be further discussed in the next section.

Finally, the ECB will steer its monetary policy stance through a 'soft floor' approach, with the DF rate acting as the key policy rate anchoring the operational target. However, the ECB will allow volatility in the operational target, which will fluctuate between the DF rate and the MRO rate. In order to limit this volatility, the spread between the DF rate and the MRO rate has been decreased from 50 to 15 basis points. There is an element of ambiguity within the revised operational framework, given that the DF rate remains the key policy rate while the MRO plays a central role in meeting banks' liquidity needs.

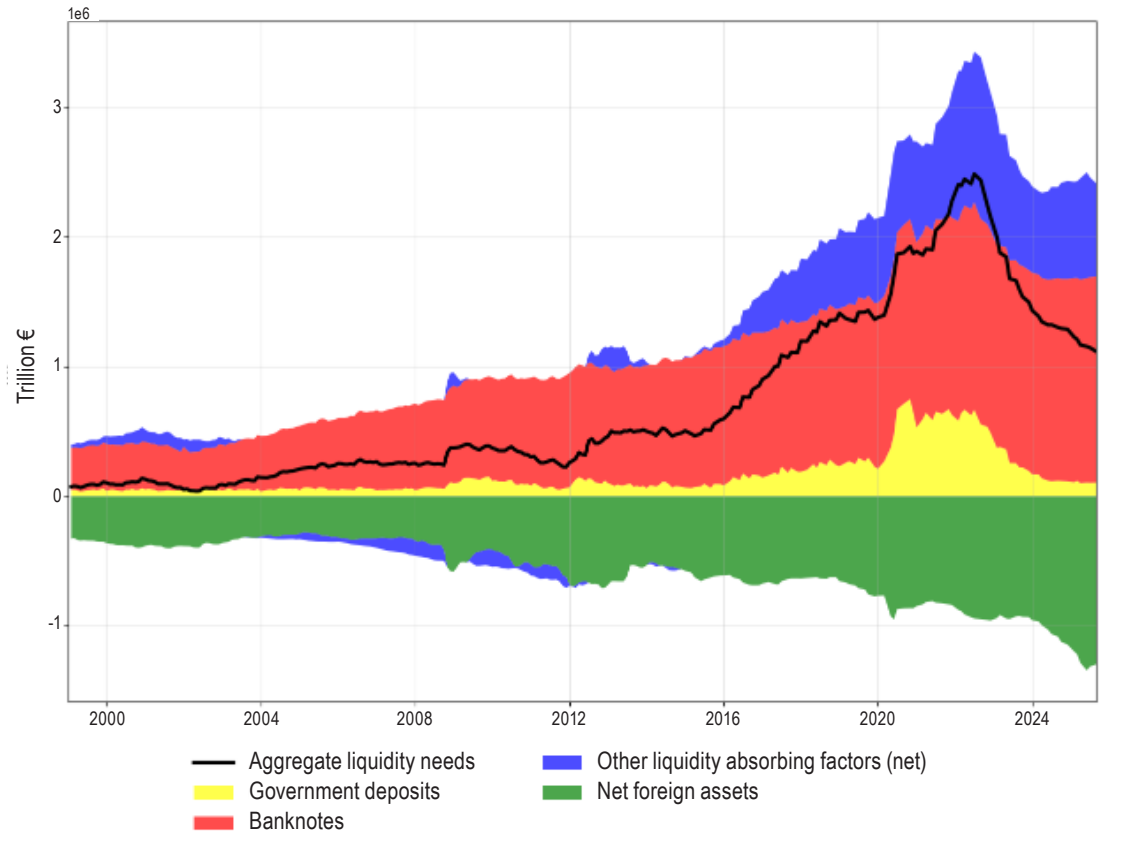
Box 1: The ECB's balance sheet – structural liquidity and excess reserves

The size of the ECB's balance sheet, and that of its monetary policy–related assets, is driven by different factors. First, the volume of liquidity provided through monetary policy–related instruments depends on banks' structural liquidity needs, which are determined by autonomous factors and minimum reserve requirements.

Autonomous factors are items within the central bank's balance sheet that are not related to monetary policy operations but which nonetheless inject or absorb liquidity, meaning they create or withdraw reserves. For instance, when cash withdrawals increase, banks exchange reserves for banknotes to meet this demand, which decreases the quantity of reserves they hold. Conversely, when the ECB purchases foreign exchange assets, this increases reserves held by banks. At the aggregate level, autonomous factors result in a structural deficit, when they absorb more liquidity than they provide, or a surplus, when they provide more reserves than they absorb.

As shown in Figure 3, banks currently have a structural deficit vis-à-vis the ECB, given that liquidity absorbing autonomous factors (displayed as positive values) are larger than liquidity providing ones (displayed as negative values). The role of banknotes is particularly important, as their volume has more than quadrupled since 2000. As a result, the structural liquidity deficit of banks vis-à-vis the ECB tends to rise over time. This deficit needs to be covered by the ECB through monetary policy operations, that is, by providing reserves to banks via refinancing operations or asset purchases.

Figure 4: Autonomous factors and structural liquidity needs

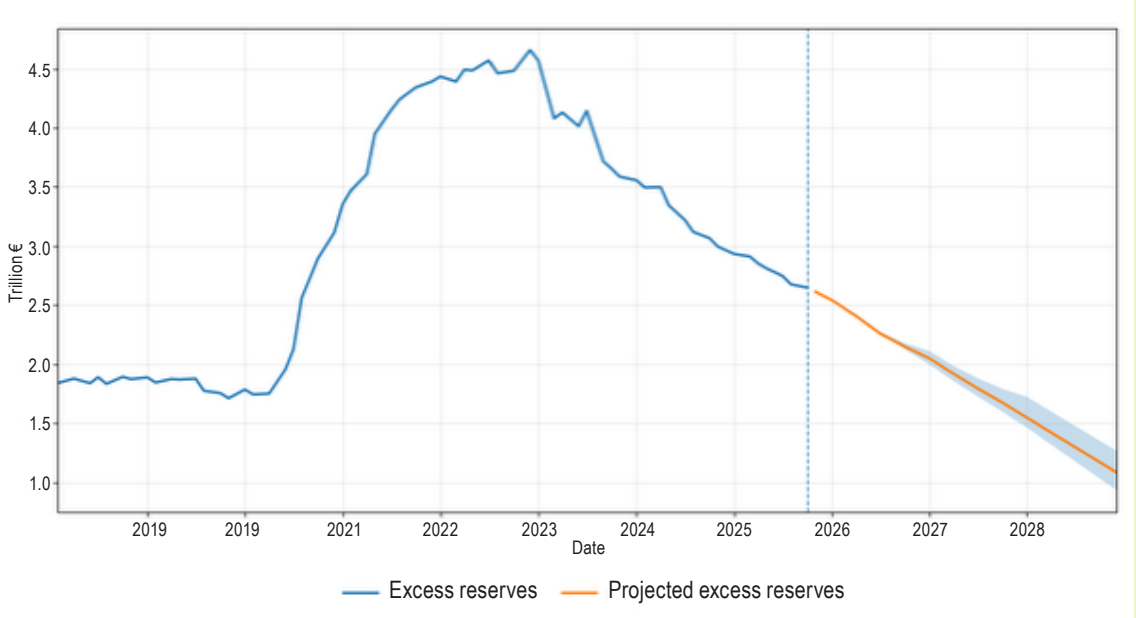


Source: ECB Balance Sheet Items (BSI) and ILM datasets. Own elaboration.

Structural liquidity needs are not the only component determining the volume of monetary policy operations. Monetary policy operations that create more liquidity than that needed to cover structural liquidity needs result in excess reserves. At the peak of the balance sheet expansion during Covid-19, these amounted to more than €4.5 trillion (Figure 5). Excess reserves have been decreasing since 2023 and will continue decreasing in the near future, as the legacy portfolio of past asset purchase programmes reaches maturity (Figure 5).

The future size of excess reserves is uncertain, as it will depend on banks' demand for reserves, linked to regulatory liquidity requirements and precautionary motives. An ECB scenario analysis indicates that demand for excess reserves could range from €600 billion to €2.2 trillion, underscoring the current uncertainty surrounding banks' future demand. As current developments in the US illustrate, banks' demand for reserves today might be substantially higher than in the pre-GFC period.

Figure 5: Excess reserves – historical and forecasted



Source: ECB BSI and Survey of Monetary Analysts (SMA) datasets. Own elaboration.

In the past, the high level of excess reserves was driven by ECB balance sheet expansions that were introduced in response to different economic shocks. Under the revised operational framework, the level of excess reserves will be driven – in the absence of economic shocks that require balance sheet expansion – by banks' demand for them. The future banks' demand for reserves will reflect their liquidity management practices, their precautionary motives to hold reserves and the extent to which they choose to meet liquidity regulations through reserve holdings instead of other High-Quality Liquidity Assets (HQLA). 4.1.

5. The role of structural operations

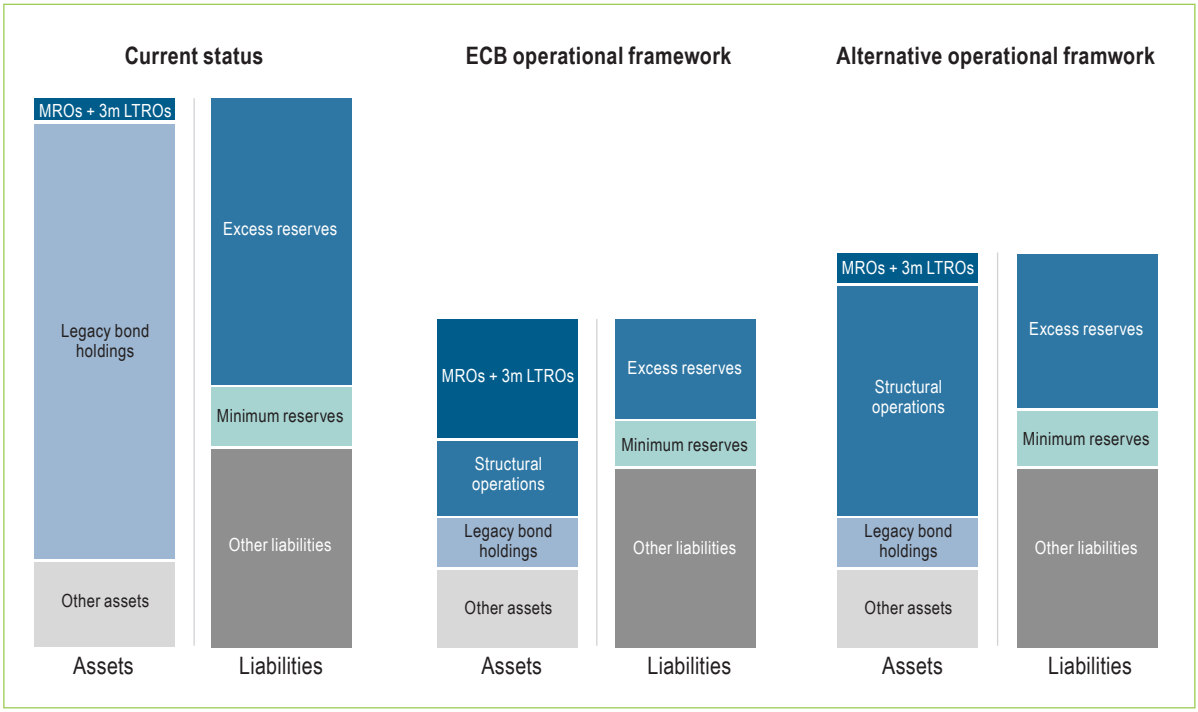
This section outlines the role that structural monetary policy operations are expected to play in the ECB's revised operational framework and provides a provisional estimate of their funding volumes and implementation timeline. We show that, under the ECB's proposed framework, they are expected to play a marginal role.

Within the revised operational framework, structural operations will cover the biggest share of the banking system's structural liquidity needs (Box 2). Structural refinancing operations will consist of both longer-term refinancing operations and asset purchases.

Figure 6 illustrates a stylised representation of the ECB's balance sheet. On the left-hand side, we observe the current situation, where the legacy portfolio of securities acquired through past asset purchase programmes is still high. The middle panel represents a stylised

representation of the ECB's balance sheet under the revised operational framework, once most of the legacy portfolio has reached maturity. In this framework, banks' excess reserve demand and a small portion of structural liquidity needs are covered by MROs and 3-month LTROs, while structural operations cover the remaining share of structural liquidity needs. The right panel depicts the alternative framework, which will be discussed in the following section.

Figure 6: Stylised ECB balance sheet representation



Source: Own elaboration.

As for the sequencing between structural refinancing operations and a structural portfolio of securities, the ECB plans to implement the former first, once the balance sheet starts growing durably again. This will happen once a sufficient portion of the legacy portfolio of securities has reached maturity. Therefore, the volume of future structural operations, as well as their date of implementation, will depend on the growth of autonomous factors, the decrease of the legacy portfolio of securities and banks' demand for excess reserves.

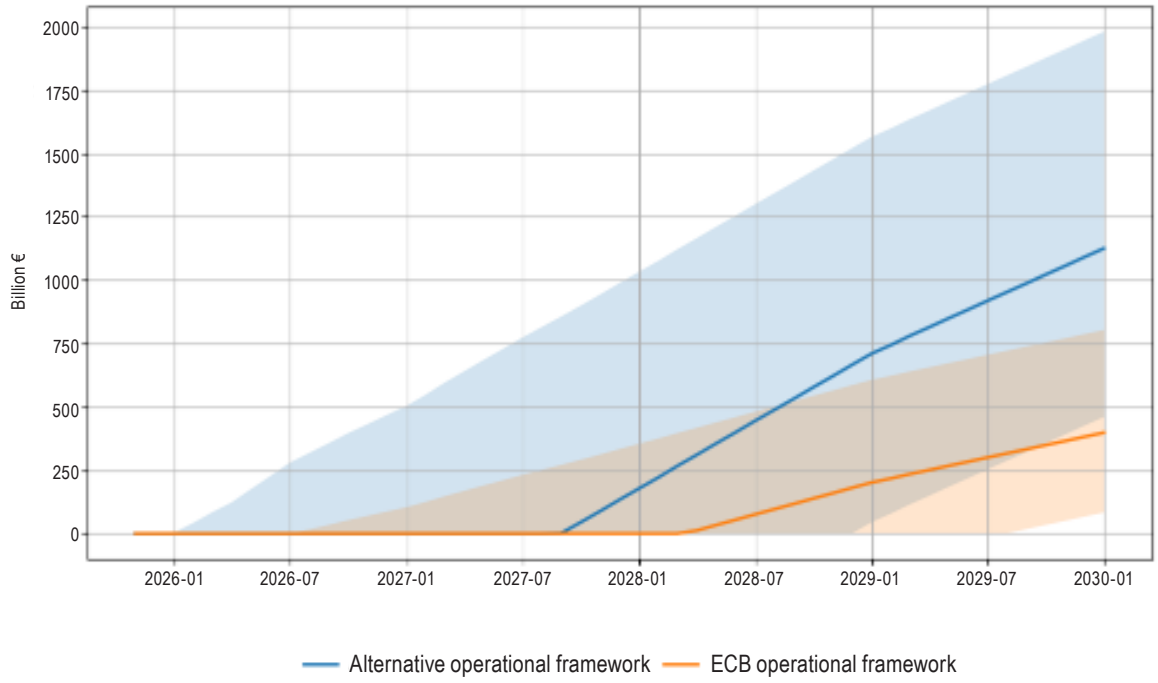
The orange line in Figure 7 maps the future size of structural operations under the ECB's revised operational framework. To derive this estimate, we incorporate: (i) projections for the future size of legacy portfolios (APP and PEPP) from the ECB's Survey of Monetary Analysts;[23] (ii) autonomous factor projections from Gotti and Papadia (2025); and (iii) an assumed level of banks' demand for future excess reserves based on the €1.3 trillion estimated by Brandao-Marques and Ratnovski (2024) and Gotti and Papadia (2025).[24] The shaded area reflects the range between minimum and maximum values for banks' demand

23 ECB (2025): The ECB Survey of Monetary Analysts.

24 Brandao-Marques & Ratnovski (2024): The ECB's Future Monetary Policy Operational Framework: Corridor or Floor?; Gotti & Papadia (2024): The European Central Bank's operational framework and what is missing.

for excess reserves (€600 billion to €2.2 trillion) in the ECB's scenario analysis.[25] The blue line, which maps the size and implementation date under an alternative operational framework, will be discussed in the next sections.[26]

Figure 7: Projected volumes of structural operations under the ECB's current and alternative operational frameworks



Source: Own elaboration based on simulations using data from the ECB's SMA and ILM datasets, Gotti & Papadia (2025), and Brandao-Marques & Ratnovski (2024).

Figure 7 shows that, under these assumptions, structural refinancing operations would not be implemented until 2028. By 2029, their volume would reach around €200 billion. There-fore, under the revised operational framework, there are two downsides in terms of the role of structural operations as an instrument to support the transition to a green economy. First, implementation would arrive late and at modest volumes.

Second, these projections only apply under current conditions. If, in the coming years, the ECB were to increase the size of its balance sheet as a response to economic shocks, the implementation of structural operations would be postponed even further. For example, if the ECB were to purchase government bonds under the Transmission Protection Instrument

25 Schnabel (2025): Towards a new Eurosystem balance sheet.

26 Figure 7 omits two important factors. First, Eurosystem national central banks are currently increasing the amount of reserves held by banks by purchasing financial assets within their non-monetary portfolios (see Schnabel (2025): Towards a new Eurosystem balance sheet). If accounted for, this would shift the lines in Figure 6 slightly to the right. Second, the future introduction of the digital euro would constitute a liquidity absorbing autonomous factor, increasing the structural liquidity deficit of banks vis-à-vis the ECB, pushing both lines to the right. The magnitude of this effect would depend on household take-up. See Bindseil (2020): Tiered CBDC and the financial system.

(TPI) to address fragmentation risks,[27] this would increase the quantity of excess reserves that banks hold and further delay the introduction of structural operations. For these reasons, in the next section we present an alternative operational framework that would be more impactful in supporting the green transition.

6. An alternative operational framework proposal

The main change under this alternative framework relates to the provision of liquidity. A significantly higher portion of liquidity needs, both in terms of structural liquidity needs and demand for excess reserves, would be met through structural operations, as can be seen in the right panel in Figure 6. In contrast to the ECB's proposed framework in which banks' demand determines the volume of excess reserves, this system would be a supply-driven one, with the ECB setting the desired level of excess reserves. It would do so under a regime of ample reserves, similar to that of the Federal Reserve, ensuring that the operational target stays at the floor of the corridor (Point C in Figure 2), with minimal volatility.[28]

This would not imply a size of the balance sheet comparable to the post-GFC period. Instead, the level of excess reserves would be set slightly above estimates of banks' demand for reserves. In this system, MROs and 3-month LTROs play a secondary role in terms of the volume of liquidity provision. However, they provide flexibility to the system, helping manage short-term fluctuations in banks' liquidity needs. As a result, there is no ambiguity between the role of the MRO rate and the DF rate, as the operational target is anchored at the DF rate.

Given that structural monetary policy operations play a more central role in this framework, they would be introduced earlier and at a larger scale. Returning to Figure 7, the blue line shows that under the alternative operational framework, structural monetary policy operations would be introduced earlier, beginning in 2027, and at larger volumes. By 2029, their size would reach €800 billion, compared with €200 billion under the ECB's proposed framework. This scenario assumes that the ECB targets €1.6 trillion excess reserves as the level of future ample reserves, slightly above the €1.3 trillion estimated under the current framework. Such a target would ensure that the operational framework remains at the floor of the corridor while requiring only a moderate increase in the size of the balance sheet relative to the ECB's current proposed framework. The proportionally larger size of structural operations within the alternative framework stems from their central role in providing liquidity, rather than from a larger balance sheet.

It must be noted that, given that the alternative framework does not prioritise the role of MROs and 3-month LTROs, or the pursuit of a lean balance sheet, the implementation date could even be brought forward, reducing the pace of balance sheet reduction. This would

27 ECB (2022): The Transmission Protection Instrument.

28 For a more in-depth discussion of this alternative operational framework, see Batsaikhan et al. (2024): A future-fit operational framework for the European Central Bank.

allow the ECB to gain institutional experience in how to best implement these programmes at an earlier stage. Table 1 summarises the key features of each operational framework.

Table 1: Main features of the ECB operational framework and the alternative operational framework

Characteristics	ECB operational framework	Alternative operational framework
Liquidity provision instruments	Conventional short-term refinancing operations (MROs and 3-month LTROs) are the main liquidity providing instruments. Structural operations play a secondary role.	Structural operations play a central role in liquidity provision. Conventional short-term refinancing operations play a secondary role, helping manage short-term fluctuations in banks' demand for reserves.
Determination of volume of reserves	The size of the balance sheet is demand-driven, according to banks' demand for reserves.	The size of the balance sheet is supply-driven, determined by the ECB.
Operational target position	Soft floor: the operational target can (and will be allowed to) deviate from the DF rate.	Floor system: the operational target stays at the DF rate.
Balance sheet size	Lean	Ample

7. Designing a green structural long-term refinancing operations programme

Having assessed how an alternative operational framework design leads to higher volumes of finance provided through structural operations, this section presents three different designs for a green structural refinancing operations programme. These designs could be implemented under either the ECB's proposed framework or the alternative framework, with the latter allowing for larger funding volumes and earlier implementation.

Such a programme should follow several design principles. First and foremost, it must provide targeted support that directly contributes to the transition to a green economy. Therefore, eligibility for the programme must be conditional on banks fulfilling practices that contribute to financing activities that are aligned with that objective. In order to have a positive impact, the programme must provide advantageous lending to banks that fulfil the eligibility criteria. On top of this, the programme should ideally introduce further incentives to banks that meet certain ambitious improvement targets.

Below, we discuss three different possible designs: a *performance-based*, a *transition plan-based* and a *collateral-based* programme. In a performance-based programme, participation is conditional on meeting certain performance metrics. In a transition plan-based programme, participation is conditional on banks having a credible transition plan that fulfils certain benchmarks. Finally, in a collateral-based programme, participation is conditional on the collateral that banks post.

While a performance-based programme would be the preferred option, it might be more operationally difficult to implement, especially given the reduced reporting scope of the EU sustainability framework (see Box 2). Therefore, we outline alternative options should the ECB consider a performance-based programme infeasible in the short term.

Box 2: The impact of the Omnibus package on green monetary policy

In February 2025, the EU Commission launched the Omnibus package, aimed at amending key sustainability legislation, including the Corporate Sustainability Reporting Directive (CSRD), the Corporate Sustainability Due Diligence Directive (CSDDD) and the EU Taxonomy Regulation. Following its agreement at the EU level, the Omnibus package reduces both the scope and the reporting requirements of the CSRD, the CSDDD and the EU Taxonomy, as well as postponing their implementation for firms not yet required to report.

Companies subject to the Non-Financial Reporting Directive (NFRD) have been required to disclose their taxonomy alignment. Under the agreed Omnibus package, some of these companies will no longer be required to do so, according to the ECB. [29]

Banks depend on non-financial corporations' disclosures to assess their own taxonomy alignment. In turn, to implement a green structural refinancing programme, the ECB would rely on bank disclosures to assess their eligibility for the programme. By substantially reducing the number of companies required to report their taxonomy alignment, the Omnibus package constrains the data infrastructure on which such a programme would rely.[30]

As the ECB warned in its opinion on the Omnibus package, restricting data collection 'is relevant to the design of these monetary policy measures, as it can provide information on greenhouse gas (GHG) emissions, transition plans and decarbonisation targets, green investment, and the use of green financing instruments at the firm level'.[31] Therefore, the Omnibus package jeopardises the capacity of the ECB to implement green monetary policy and to assess climate-related financial risks.

29 ECB (2025): Opinion of the European Central Bank on the proposals for amendments to corporate sustainability reporting and due diligence requirements.

30 Rasche et al. (2025): Scenarios for CSRD scope amendments.

31 ECB (2025): Opinion of the European Central Bank on the proposals for amendments to corporate sustainability reporting and due diligence requirements.

7.1. A performance-based green structural refinancing programme

The EU Taxonomy, adopted in 2021, is a classification system that defines activities that are aligned with the EU climate and environmental goals.[32] As such, within a performance-based programme, the ECB can rely on the EU Taxonomy as a benchmark instead of having to develop its own definition of green activities.

Under Article 8 of the EU Taxonomy Regulation, banks must disclose the taxonomy alignment of their asset exposures. While the taxonomy alignment of loans to households, such as mortgages or auto loans, is relatively easier to get,[33] banks depend on non-financial corporations' disclosures to assess their corporate exposures. Companies under the scope of the NFRD began reporting the taxonomy alignment of their activities in January 2022, allowing banks to start assessing their own taxonomy alignment.

Banks' taxonomy alignment disclosures would be the backbone of a performance-based programme. Each year, banks would disclose the volume of taxonomy-aligned lending they originated during the previous reference period. This would determine the amount of funding that banks can receive from the programme. This process would be reiterated each year, with taxonomy-aligned lending from the previous reference year determining the programme's refinancing volumes in the current period. Importantly, given that banks' taxonomy alignment data is not being currently audited, the ECB would need to set up an external audit process by third parties to verify banks' disclosures and penalise banks if there are inconsistencies in the reported data.[34]

In this programme, banks would receive a preferential green interest rate on the refinancing they obtain. This rate would be set below the MRO rate, implying a negative spread. Optionally, on top of this green interest rate, banks would get a 'bonus' green interest rate – an even wider spread – if they achieve certain performance metrics.

One proposal for setting this performance metric is the improvement in banks' Green Asset Ratio (GAR)[35] – which is the proportion of banks' green assets as a proportion of total covered assets. However, the GAR is highly dependent on banks' lending practices, given that certain assets counted in the denominator are not counted within the numerator, such as lending to small and medium-sized enterprises (SMEs).[36]

Therefore, a more straightforward benchmark for determining whether banks qualify for the bonus green interest rate would be the percentage increase in taxonomy-aligned lending achieved during the previous reference period. That is, banks that in the previous reference

32 European Commission (2025): EU taxonomy for sustainable activities.

33 The same does not apply to renovation loans. For further discussion of the challenges involved in assessing whether a renovation loan is taxonomy aligned, see Jourdan (2025): How the ECB can support the transition with green interest rates.

34 For a more in-detail exposition, see Jourdan et al. (2024): A green interest rate for the Eurozone.

35 Jourdan et al. (2024): A green interest rate for the Eurozone.

36 de Barros Fritz (2024): Why EU banks' Green Asset Ratios may mislead on green alignment; Frykström (2025): The green asset ratio — a metric to measure banks contribution to a green transition.

period increased their taxonomy-aligned lending over a pre-defined target would benefit from a bonus interest rate. Such benchmark performance indicators should be set at a high enough target to incentivise an ambitious increase in banks' green lending.

An important issue is whether all the taxonomy-aligned lending by banks should be eligible for refinancing, or whether a more granular approach should be adopted. Currently, most of banks' taxonomy-aligned lending consists of mortgages, which mostly finance the acquisition of already existing energy-efficient housing.[37] Such financing does not directly lead to reductions in carbon emissions, and, therefore, it is unclear whether it should be eligible within the programme. One proposed approach is to restrict eligibility to lending that directly leads to a reduction in fossil fuel dependence. On the upside, more granularity allows more precise targeting to key sectors. On the downside, greater granularity would reduce the funding volumes provided through the programme and requires the ECB to choose which activities qualify for the programme. The latter, in the absence of a well-defined rationale, could raise legitimacy concerns.

Another feature to consider is the maturity of the funding that the ECB provides within the programme. Longer maturities are more desirable given that they would ensure that the programme better matches the maturity profile of green investments, which typically require stable funding over longer horizons.[38] Furthermore, longer maturities would ensure that the programme provides enough liquidity for banks to meet their liquidity needs, given that funding volumes would accumulate each year over the maturity period, matching the increasing liquidity needs of banks (Figure 7).

A final consideration is the borrowing allowance that the ECB would apply, that is, the percentage of funding that banks would get with respect to their taxonomy-aligned lending. A one-to-one borrowing allowance would increase the liquidity provided through the programme and make it more attractive for banks. However, both the borrowing allowance and the maturity profile could be calibrated to match the amount of liquidity that the ECB wants to supply.

The Omnibus package adds a layer of difficulty in implementing such a programme, as it severely reduces the data availability on which the programme relies (Box 2). To prevent the programme from only benefiting larger corporations that would still be required to disclose their taxonomy alignment, the ECB should put in place an external auditing process for smaller companies that voluntarily disclose their taxonomy alignment.

Another option would be for the ECB to establish its own data disclosure system in which lending to specific sectors that can be linked taxonomy-aligned activities would be deemed eligible under the programme. However, this would impose a significantly greater operational burden on the ECB.

37 Jourdan et al. (2024): A green interest rate for the Eurozone; Jourdan (2025): How the ECB can support the transition with green interest rates.

38 Lane (2023): Central bank liquidity: a macroeconomic perspective.

7.2. A transition plan-based programme

Another design option is to link the design of green structural refinancing operations to banks' transition plans.[39] From 2026 onwards, banks will prepare transition plans under the Capital Requirements Directive (CRD), under the guidelines of the European Banking Authority (EBA) and be supervised by the ECB and national competent authorities.[40] In their CRD transition plans, banks must assess the impact of environmental, social and governance (ESG) risks within short-, medium- and long-term horizons, and develop concrete plans to address these risks.[41]

Programme eligibility would depend on banks having a credible transition plan and meeting specific benchmarks based on several backward- and forward-looking indicators disclosed within the plan. Particularly relevant indicators include: (i) the amount and share of exposures to counterparties operating in sectors that highly contribute to climate change; (ii) the portfolio alignment showing the extent to which exposures are projected to follow a pathway consistent with reaching net-zero GHG emissions by 2050; and (iii) financed GHG emissions and their evolution over time.

Importantly, the programme should ensure that banks follow through on the projections set out in their transition plans, creating an incentive that is missing today.[42] Banks that fall short in terms of their projected portfolio alignment or financed GHG emissions trajectories should face penalties. Conversely, banks that meet or exceed their projections should benefit from a bonus green interest rate.

As for the volumes provided, setting them would be less straightforward, since they would not be directly linked to a specific volume of lending, as is the case in performance-based programmes. The ECB could allocate a fixed amount to each bank, calibrated to the overall liquidity it intends to supply. In addition, individual banks' volumes could depend on the quality of the disclosures and fulfilment of certain benchmarks within their transition plans, with better performers receiving access to larger refinancing volumes, and worse performers receiving no refinancing.

The main disadvantage of a transition plan-based approach is the ambiguity in its implementation, given the wide range of indicators included in these plans. It would also require a thorough supervisory process. On the positive side, such a design would encourage banks to develop high-quality and ambitious transition plans and follow through on their commitments.[43]

39 Colesanti-Senni et al. (2023): The CO_2 content of the TLTRO III scheme and its greening.

40 CSRD transition plans would have been another natural candidate. In CSRD plans, banks disclose and adopt strategies to align their business models with the Paris Agreement climate goals. However, the European Parliament's current position on the Omnibus proposal is to eliminate CSRD transition plans. In addition, by weakening corporate reporting standards more broadly, the Omnibus proposal could undermine the quality of banks' own CSRD transition plans.

41 EBA (2025): The EBA publishes its final guidelines on the management of ESG risks.

42 Vandeloise (2025): Principles to identify and manage deviations from Paris-aligned pathways.

43 Etienne & Schreiber (2025): Bank transition plans. A roadmap to nowhere.

In a collateral-based programme, eligibility depends on the collateral that banks post to get refinancing. The most important design principle in a collateral-based programme is that the financial assets eligible within the programme provide financing for the green transition. The clearest candidate are green bonds issued within the EU Green Bond Standard (EU-GBS). These are bonds for which at least 85% of proceeds are used to finance taxonomy-aligned activities.[44] Furthermore, non-marketable credit claims, which are bank loans that are not traded on financial markets, that are taxonomy aligned should also be eligible. While current issuance volumes are modest,[45] a collateral-based programme would incentivise the voluntary disclosure needed to increase the supply of these financial assets.

Given that the main assumption for implementing such a programme is that the volumes of such taxonomy-aligned financial assets will remain low given limited data disclosure, these should be complemented with other financial assets to ensure that the programme provides sufficient liquidity. Green bonds issued within the International Capital Market Association (ICMA) guidelines,[46] for which proceeds must be invested in projects with environmental benefits, could also be eligible to get refinancing under this programme. Importantly, the ECB should require that these are externally audited. However, bonds within the EU-GBS standard and taxonomy-aligned credit claims should get a wider spread than that of ICMA-aligned green bonds, so as to incentivise the former over the latter.

Since the programme aims to incentivise banks' green lending practices, assets should only be eligible if they are originated by the same bank that posts them as collateral. That is, if the bank provides the financing itself, instead of acquiring them in secondary markets. Regarding the granularity of the programme, the same considerations apply as for the performance-based programme. The ECB could narrow the scope of eligible collateral to assets that finance specific economic activities, instead of accepting the entire universe of green assets, facing the same trade-offs mentioned above.

7.3. Embedding the green structural refinancing operation into the broader operational framework

A key question is how such a programme would be embedded within the broader operational framework. Importantly, the ECB would need to ensure that the volumes provided through a green structural refinancing operations programme do not exceed its targeted volumes, irrespective of the operational framework under consideration.

A straightforward way to ensure that the volumes provided do not exceed the target would be to set pre-defined allotment amounts and provide them through competitive auction with variable rates, as the ECB did in the pre-GFC period. However, this approach would undermine the goal of the programme, which is to provide a stable green interest rate contingent on eligibility.

44 European Commission: The European green bond standard.
45 de Barros Fritz (2025): Uptick of EU GBS will be limited and restricted to a few sectors; Schuller (2025): Banks stick to ESG bonds, EU GBS yet to gain traction.
46 ICMA (2025): Green bond principles.

Therefore, alternative ways to calibrate the amount of financing provided by such a programme must be found, so that liquidity can be supplied under a fixed-rate full allotment principle – meaning that banks receive the full amount of liquidity they request at the established rate, provided they fulfil the programme's eligibility conditions.

Each programme design would require a different approach to calibrate the volumes of financing provided, depending on its specific features. For example, as shown in Table 2, the financing volumes in a performance-based programme would be calibrated through borrowing allowances and the degree of granularity applied in defining what sectoral lending is eligible for the programme. In a collateral-based programme, calibration would instead occur by adjusting the universe of eligible green financial assets. In a transition plan-based programme, the volume would be predefined and allocated across banks depending on their performance benchmarks discussed above.

Table 2: Main features of each green structural refinancing operations programme

	Performance-based	Transition plan-based	Collateral-based
Eligibility	Contingent on banks' disclosing taxonomy-aligned lending.	Contingent on credible CRD transition plans and meeting certain benchmarks.	Contingent on banks posting eligible green collateral.
Bonus rate	Contingent on banks exceeding a pre-defined lending benchmark.	Banks outperforming transition plan projections receive a bonus rate.	Differentiated spreads across green collateral.
Allotment and rate modality	Fixed-rate full allotment.	Fixed-rate. Allocation is bank specific, depending on the quality of transition plan and benchmarks.	Fixed-rate full allotment.
Calibration of financing volumes	Borrowing allowances and granularity of eligible activities.	Adjusting the bank-specific envelopes.	Adjusting eligible green assets.

Under the ECB's operational framework, a more restrictive calibration would be required, given that these programmes would provide lower volumes of financing (see Figure 6). Conversely, a green structural refinancing programme could be more easily integrated within the alternative operational framework, given that in that framework structural operations play a more central role in providing liquidity to banks.

Therefore, within the alternative framework, the risk of providing more liquidity than what is targeted greatly decreases. The contrary could rather be the case. For example, if implementing a performance-based programme, it is highly possible that the amount of banks' taxonomy-aligned lending would fall short of the amount to be provided through structural operations. In such a case, the ECB could always complement green structural operations with conventional longer-term refinancing programmes, operating as an auction with fixed volumes and variable interest rates.

8. Policy recommendations

By recognising structural monetary policy operations as an instrument to support the transition to a green economy, the ECB has made a significant step towards adapting its monetary policy to today's environment. However, under the ECB's proposed operational framework, structural operations would be introduced in the medium term and at a modest scale.

Our analysis shows that an alternative operational framework – a supply-driven ample reserves regime – would allow the ECB to deploy a green structural long-term refinancing operations programme earlier and in higher volumes. This would ensure a more impactful contribution to the green transition.

The implementation of the Omnibus package poses a risk to the information infrastructure necessary for the most effective version of such a programme. However, it does not preclude implementation. In this report, we have outlined three possible design options, each with different operational requirements and impact profiles. The ECB should select among them – and, if necessary, sequence them over time – depending on expected effectiveness and feasibility within the evolving legislative context.

Three years after Christine Lagarde first proposed the implementation of a green-targeted lending facility, this goal is closer than ever. Given the urgent need to increase green investments and the central role of fossil fuel dependence in jeopardising price stability, it is imperative that the ECB follows through on its commitment.

Imprint

Published by

Heinrich-Böll-Stiftung European Union | Global Dialogue, Brussels
Rue du Luxembourg 47-51, 1050 Brussels, Belgium

Contact: Anton Möller, Head of Programme – Green Economic and Social Policy in the EU, Heinrich-Boll-Stiftung European Union | Global Dialogue, Brussels
E Anton.Moeller@eu.boell.org

Place of publication: https://eu.boell.org

Release date: May 2026

Proofreading: Chris Meikle

Edition: Joan Lanfranco, Head of Communications and Outreach, Heinrich-Boll-Stiftung European Union | Global Dialogue, Brussels

Layout: Micheline Gutman, Brussels

Cover photo: mzabarovsky | Shutterstock, All rights reserved.

License: Creative Commons (CC BY-NC-SA 4.0),
https://creativecommons.org/licenses/by-nc-sa/4.0/

The opinions expressed in this report are those of the author and do not necessarily reflect the views of the Heinrich-Böll-Stiftung European Union | Global Dialogue.