

Review

Integrating Sustainability into Monetary Policy to Address Climate Change—A Critical Literature Review

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Abstract

Climate change is one of the major global challenges of modern times. It also poses a significant threat to price stability—the major objective of modern central banks. It creates the risk of stagflation, as it can lead to price increases (due to the increased frequency of extreme weather events, which will impact food production) and simultaneously weaken economic activity (due to lower productivity resulting from temperature changes). Climate change and political pressure have sparked a lively scientific debate on whether and how central banks should adapt their monetary policy frameworks to support efforts to stop climate change. Although the literature analyzes actions undertaken by monetary authorities in the areas of sustainable finance and climate risk analysis, this research still needs to be developed and disseminated. Therefore, the main aim of this article is to theoretically analyze the integration of climate issues with the monetary policy of modern central banks. This article provides a theoretical and integrative analysis of the role of modern central banks in addressing climate change, with a particular focus on implications for monetary policy. The study is based on a structured critical literature review and desk research, employing a transparent, multi-stage selection and analysis process, based on the PRISMA approach. The article contributes to the existing literature by offering a systematic synthesis of the main approaches to integrating climate-related considerations into central banking. The analysis organizes the literature into distinct analytical strands, including institutional and coordination-based initiatives, theoretical justifications for central bank involvement, debates on mandates and independence and the development of green monetary policy instruments. The findings suggest that the integration of climate considerations into monetary policy is feasible primarily within a risk-based and prudential framework, while more interventionist approaches may generate tensions with the primary objective of price stability. At the same time, the literature reveals persistent trade-offs between market neutrality and active policy intervention, as well as between institutional constraints and policy effectiveness. The study highlights that climate-related measures are often implemented through macroprudential, supervisory and financial stability functions, which complement rather than substitute monetary policy in the strictest sense. The article contributes to a more coherent understanding of the evolving role of central banks in the context of climate change by synthesizing a fragmented body of research and identifying key conceptual tensions that remain unresolved.



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1. Introduction

Climate change is one of the most significant threats to life on Earth. The effects of climate change are currently being felt in the form of weather anomalies, the increasing severity and frequency of natural disasters (including floods, droughts, wildfires and hurricanes), which generate direct property losses and disruptions in supply chains, translating into production and price volatility in the economy. The scientific consensus regarding the anthropogenic causes of climate change is increasingly accepted. It indicates that more than 99% of the global warming observed since the mid-20th century is due to human activity (particularly in the areas of energy, transport, industry, agriculture and deforestation) [1]. The Intergovernmental Panel on Climate Change (IPCC) also indicated in the 1990s that emissions from human activities significantly increase atmospheric greenhouse gas concentrations. In turn, in 2023, the IPCC, updating its position, emphasized that global warming was undoubtedly caused by human activity, primarily due to greenhouse gas emissions [2].

The growing public awareness of the devastating impact of humans on the natural environment and climate change has led to an increased interest in the urgent need to implement real actions to achieve the Sustainable Development Goals (SDGs). Financing sustainable development activities, including combating climate change, has also become one of the goals of the 2015 Paris Agreement, in which the signatories committed to allocating 100 bln USD annually for this purpose starting in 2020, with an increase in this amount by 2025 [3]. During the 2024 United Nations Climate Change Conference (COP29) in Baku in 2024, the parties to the Paris Agreement adopted a New Collective Quantitative Goal (NCQG) for climate finance, which amounts to at least 300 bln USD annually from 2025 until 2035 [4]. However, the transformation towards low-emission economies requires, in addition to public expenditure, significant private investments, especially in the energy, transport and industry sectors, which changes the credit risk profile of financial institutions. Thus, banks have become an important link in financing the energy transformation and achieving climate neutrality.

However, the consequences of climate change-related risks materializing extend to the whole financial system. They can lead to financial market instability, asset price volatility and threats to financial stability. Therefore, integrating sustainable development and climate aspects is becoming a concern not only for environmental decision-makers but for all macroeconomic policymakers, including monetary authorities. In recent years, central banks have been increasingly involved in mitigating the effects of climate change. A turning point that initiated the intensification of these actions was the speech by Mark Carney, former Governor of the Bank of England in 2015, in which he highlighted the so-called “tragedy of the horizon”. This meant that the lack of appropriate actions to proactively and forcefully address the risks resulting from climate change would result in irreversible environmental impacts and significant consequences for the functioning of financial systems. He called for urgent and decisive initiatives that have to be undertaken by central banks, their deep understanding of this problem, and closer cooperation with other financial safety net institutions [5].

Central banks, as institutions responsible for conducting monetary policy and achieving adopted targets, have a range of instruments that can support the transformation of economies towards zero emissions. First, through credit policy and open market operations, they can influence the cost of financing sustainable investments. Second, by utilizing macroprudential policy tools, they can mitigate systemic risks related to exposure to climate-sensitive assets. Third, through disclosures on climate risk exposure and their communication policy, they can create market expectations and support the allocation of capital towards sustainable investments.

The main aim of the article is to theoretically analyze the integration of climate issues with the monetary policy of modern central banks. Therefore, the study employs a structured critical literature review and desk research, based on a transparent multi-stage selection and analysis process (PRISMA approach). There is a knowledge gap in the existing literature on how to integrate sustainability into modern monetary policy to address climate change. This article aims to fill this gap by identifying and synthesizing the main theoretical approaches, policy instruments and institutional arrangements proposed in the recent literature for integrating climate issues into monetary policy frameworks. The contribution of the article is twofold. First, it systematizes and organizes the theoretical approaches presented in the literature regarding the role of central banks in counteracting climate change, with particular emphasis on monetary policy and its interaction with macroprudential and supervisory functions, identifying the main strands of the scientific debate—from the concept of “market neutrality” to the postulates of an active “green supporting factor”. This allows for the creation of a coherent analytical framework for further research on the greening of monetary policy. Second, the article formulates recommendations regarding the scope and conditions of central banks’ involvement in achieving climate goals, indicating the limits to which the integration of environmental (primarily climate) issues remains consistent with the price stability and financial stability mandates.

This study adopts a broad perspective on the role of central banks in addressing climate-related risks, while maintaining an explicit analytical distinction between monetary policy in the strict sense and related policy domains, such as macroprudential regulation, financial supervision and financial stability. Importantly, the inclusion of evidence from these adjacent domains is intentional and methodologically justified. Climate-related risks typically materialize and are first addressed within prudential, supervisory and financial stability frameworks rather than through conventional monetary policy instruments. Therefore, incorporating these domains is necessary to capture the full institutional context in which monetary policy operates. At the same time, all references to these adjacent areas are used to inform the analysis of monetary policy implications, rather than to redefine the scope of monetary policy itself.

To achieve the main objective, the following research questions were formulated:

1. How can climate change be integrated into the modern monetary policy framework while maintaining central banks’ primary price stability mandate?
2. What are the main strands of the existing literature on integrating climate change into monetary policy?

A growing body of literature has analyzed the relation between climate change and central banking, including several review- and survey-type contributions. These studies typically focus on specific dimensions of the problem, such as climate-related financial risks, the role of central banks in supporting the low-carbon transition, or the institutional constraints associated with expanding monetary policy mandates. Although they provide valuable insights, the literature often remains fragmented, with limited integration across different analytical perspectives. In particular, the existing literature tends to emphasize either a risk-based approach, focusing on the implications of climate change for financial stability, or a more policy-oriented perspective, advocating the use of monetary instruments to support the green transition. At the same time, another strand of the literature highlights the legal and institutional limits of central bank action, raising concerns about mandate overreach and central bank independence. However, relatively few studies explicitly analyze the interactions and tensions between these perspectives within a unified framework.

Against this background, the article fills this gap by offering a comprehensive and integrative synthesis of the literature and the ongoing debate on climate-related central

banking. Unlike existing studies that focus on selected aspects of the debate, this paper aims to:

- (a) systematically organize the literature into distinct analytical strands,
- (b) examine the interdependencies and trade-offs between them, and
- (c) develop an original conceptual framework that captures different approaches to integrating climate considerations into monetary policy.

As a result, the study contributes to a more coherent understanding of the evolving role of central banks in the context of climate change and provides a structured basis for future research. Based on the presented premises, the following research hypothesis was formulated:

RH. *Integrating climate criteria into monetary policy does not threaten central banks' current mandates related to price stability and financial stability.*

Due to the qualitative nature of the study, the hypothesis is not verified in a formal empirical sense but is assessed through a structured analysis of the existing literature.

This study goes beyond a descriptive synthesis of the literature by proposing a conceptual framework that captures the structural tensions shaping the evolving role of central banks in the context of climate change. Unlike existing review studies, the paper develops an integrative analytical perspective that explains how competing paradigms—market neutrality versus active intervention, price stability versus sustainability objectives and institutional independence versus policy effectiveness—interact and co-evolve. In this way, the article contributes to theory-building in the field of sustainable monetary policy, offering a dynamic interpretation of central bank behavior under conditions of increasing environmental and regulatory pressure.

The article is structured as follows. The next section presents the methodology of the conducted research. Section 3 constitutes the main part of the paper due to its theoretical nature, and it presents the results of in-depth, critical literature studies focused on identifying the main strands of the literature on integrating climate change into monetary policy. Particular attention was paid to institutional initiatives undertaken by central banks aimed at curbing climate change, the main arguments for their involvement in sustainable development activities, their role in addressing climate issues, and the evolution of monetary policy instruments towards their greening. The critical literature review is supplemented with the case study analysis to illustrate the practical actions undertaken by central banks, analyzed and presented in international research and publications. The chapter concludes with a broad section summarizing the conducted research. It also offers conclusions, limitations and raises the remaining issues to be addressed by future studies.

2. Methodology

This study employs a structured critical literature review methodology combined with desk research to ensure analytical rigour and minimize selection bias. Given the interdisciplinary nature of the topic, including monetary economics, climate finance, central banking and monetary policy, the literature review follows a PRISMA-informed approach (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), adapted to the needs of a qualitative, conceptual analysis.

The choice of sources reflects a deliberate methodological strategy. Scientific databases such as Web of Science and Scopus were used to ensure the inclusion of high-quality, peer-reviewed literature and citation reliability. Google Scholar was additionally used to capture grey literature, working papers and recently published research that may not yet be indexed in traditional databases. This is particularly important in a rapidly evolving field, such as climate-related central banking. Institutional sources (e.g., central banks, IMF, BIS, NGFS)

were included due to their direct relevance to policy practice and their role in shaping the academic debate. Although such sources may reflect normative perspectives, their inclusion is necessary to capture the practical dimension of monetary policy implementation.

The search process was based on combinations of the following keywords: “climate change and monetary policy”, “green central banking”, “climate-related financial risks”, “sustainable monetary policy instruments”, “central bank mandate” and “climate-friendly central bank”. The selection of keywords was based on the following three criteria: (1) conceptual relevance to the intersection of climate change and monetary policy, (2) representation of the main strands of the literature (risk-based, institutional and instrument-based approaches), and (3) frequency of use in highly cited academic and policy publications. The keyword set was iteratively refined during preliminary searches to balance specificity and breadth. For example, broader terms such as “climate change and monetary policy” ensured comprehensive coverage, while more specific phrases, such as “green central banking” or “sustainable monetary policy instruments,” allowed the identification of specialized contributions.

To further increase transparency, approximate search results for individual keyword combinations were as follows:

- “climate change and monetary policy”—approx. 120 records
- “green central banking”—approx. 65 records
- “climate-related financial risks”—approx. 80 records
- “sustainable monetary policy instruments”—approx. 40 records
- “central bank mandate and climate”—approx. 50 records

These results partially overlapped, which justifies the need for a structured multi-stage reduction process.

The research focused mainly on publications from the last 10 years, i.e., 2015–2026, reflecting the rapid development of this field following the Paris Agreement, while also incorporating earlier seminal contributions where relevant.

The selection of sources followed a multi-stage screening process consistent with the logic of the PRISMA framework:

1. Identification: An initial pool of publications was identified through database searches and manual screening of references in key articles.
2. Screening: Duplicates were removed, and titles and abstracts were reviewed to exclude clearly irrelevant studies.
3. Eligibility Assessment: Full texts were assessed based on the following criteria:
 - Direct relevance to the intersection of climate change and monetary policy;
 - Academic quality (peer-reviewed articles or high-quality institutional reports);
 - Contribution to theoretical, empirical, or policy debates.
4. Inclusion: Final sources were selected to ensure coverage of diverse perspectives, including both supportive and critical views on the role of central banks in addressing climate change.

To enhance transparency and reproducibility, the literature selection process is summarized quantitatively. The initial database search yielded a total of 312 records. After removing duplicates (74), 238 records remained for title and abstract screening. At this stage, 162 studies were excluded due to a lack of relevance to the research scope. The full-text eligibility assessment was conducted on 76 articles, of which 38 were excluded based on the predefined criteria (e.g., insufficient relevance to monetary policy, purely technical climate studies, or lack of academic rigor). Ultimately, 38 sources were included in the final analysis. In addition, the sources originated from multiple categories, including peer-reviewed journal articles (approximately 60%), institutional reports (approximately

30%), and working papers or policy documents (approximately 10%). This distribution ensured both academic rigor and policy relevance.

Figure 1 presents the PRISMA flow diagram illustrating the selection process at each stage.

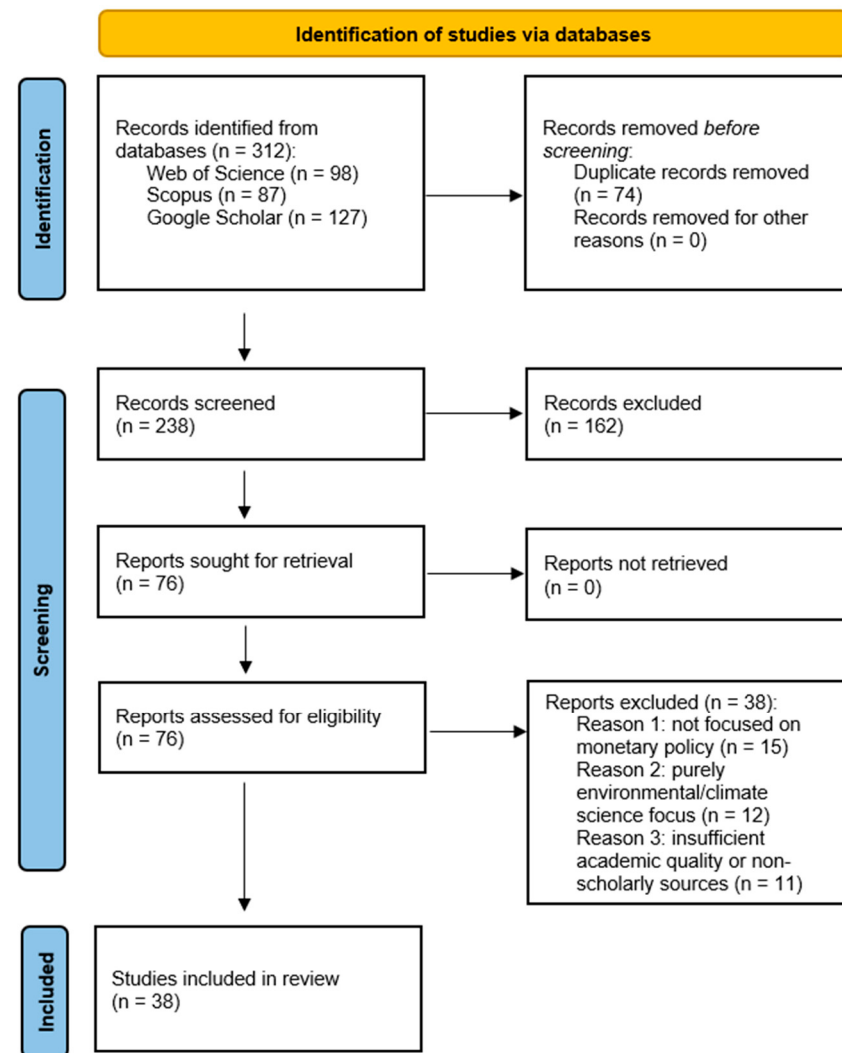


Figure 1. Identification of studies via databases. Source: own work.

To reduce the risk of selection bias, the review incorporates:

- Multiple databases and source types;
- A broad set of keywords capturing different strands of the debate;
- Inclusion of both mainstream and critical perspectives.

However, it should be emphasized that, as with any qualitative literature review, a degree of subjectivity in interpretation and selection cannot be entirely eliminated. The PRISMA-informed structure improves transparency but does not fully replicate a strictly systematic review due to the conceptual and interpretative nature of the study. Therefore, the approach is adapted to a qualitative and interpretative research design, prioritizing conceptual integration over exhaustive coverage. Nevertheless, the inclusion of explicit selection stages and quantitative reporting improves methodological transparency.

The PRISMA framework was used not only as a reporting tool but also as a structured analytical procedure. It allowed:

- The systematic identification and reduction in sources;

- The assessment of their relevance and quality;
- The thematic coding and content analysis of selected studies;
- The synthesis of findings into coherent analytical strands.

The selected literature was analyzed using a qualitative, interpretative approach aimed at identifying dominant themes, theoretical positions and policy implications. This process led to the identification of four main strands in the literature, which form the basis for the analytical framework developed in this study.

The critical literature review is complemented by desk research, incorporating policy documents, reports and empirical evidence on central bank practices. This allows the study to connect theoretical insights with real-world institutional developments and supports the illustrative evidence presented in Section 4.

3. Literature Review

To ensure conceptual clarity, it is necessary to distinguish between monetary policy and other central bank functions. For the purpose of the conducted analysis, it should be mentioned that monetary policy is understood in a narrow sense as the set of central bank actions aimed at influencing price stability through instruments, such as interest rates, open market operations and balance sheet policy. In contrast, macroprudential policy, financial supervision, and financial stability functions refer to regulatory and oversight activities designed to ensure the resilience of the financial system. Although these domains are institutionally interconnected, they involve distinct objectives, instruments and transmission mechanisms.

Although this section includes evidence from macroprudential policy, supervision and financial stability, these references serve an auxiliary role. They are used to illustrate transmission channels, institutional constraints and implementation mechanisms that shape monetary policy responses to climate change. This approach ensures analytical completeness while preserving the conceptual distinction between monetary policy and related domains.

The existing literature on climate change and monetary policy can be categorized into four main analytical strands (Figure 2). However, these strands should not be interpreted as merely descriptive groupings. Rather, they reflect competing and sometimes conflicting theoretical logics that shape the evolving role of central banks. Their relative importance is conditioned by institutional frameworks, regulatory pressures and macroeconomic environments, which together determine the scope and direction of monetary policy adaptation to climate-related challenges.

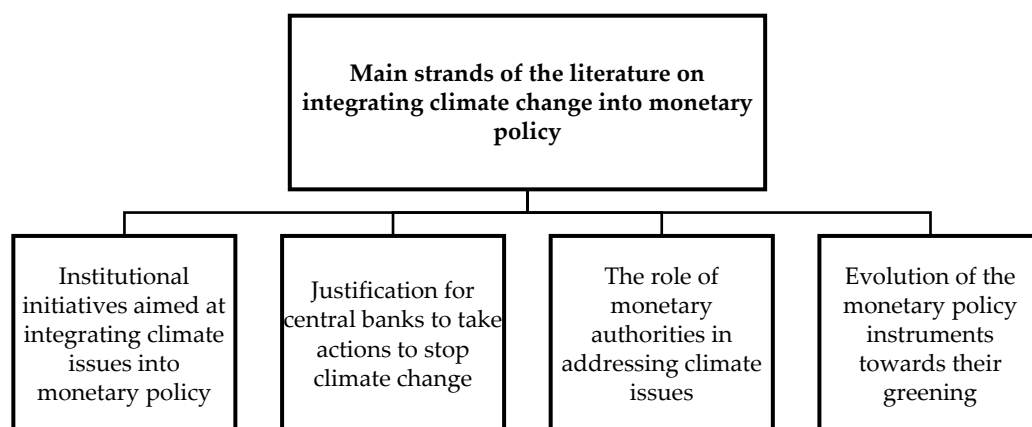


Figure 2. Main strands of the literature on integrating climate change into monetary policy. Source: own work.

Although the existing literature provides an increasing number of studies on integrating climate change into monetary policy, they are far from theoretically coherent. Rather than forming a unified framework, they reflect competing paradigms regarding the role of central banks, the nature of monetary policy and the appropriate balance between price stability, financial stability, and broader societal objectives. Therefore, instead of treating the identified strands as complementary, this section critically evaluates their underlying assumptions, internal inconsistencies and tensions between them.

The first strand refers to the institutional initiatives undertaken by central banks, supervision authorities, and other international institutions or associations to integrate climate issues into monetary policy. When analyzing institutional actions undertaken by central banks in this regard, it is important to consider the broader institutional context, including international initiatives that foster harmonization of approaches and coordination of central bank activities at the global level. The first step in this direction was the establishment of a special task force at the Financial Stability Board, aimed at developing consistent principles for disclosing climate-related financial information for the financial reporting of companies and financial institutions (Task Force on Climate-Related Financial Disclosures, TCFD) [6].

Then, in late 2017, a group of central banks and financial regulators around the world established the Network for Greening the Financial System (NGFS), which aims to support environmental and climate risk management in the financial sector, share best practices, conduct analytical work, and mobilize finance for actions that support the transition to a sustainable economy. The network focuses on integrating climate-related issues into monetary policy frameworks and financial supervision activities, environmental management within these institutions, developing climate scenarios, and raising awareness of the importance of these activities. The growing number of thematic areas, as well as members of this network, demonstrates the increasing commitment of central banks to these ideas. Initially, the Network comprised only eight central banks and supervision authorities, including: Banco de México, Bank of England, Banque de France and Autorité de Contrôle Prudentiel et de Résolution, De Nederlandsche Bank, Deutsche Bundesbank, Finansinspektionen (Sweden), the Monetary Authority of Singapore and the People's Bank of China. By early 2026, it had grown to 149 institutions from 92 countries and 24 observers [7]. In January 2025, the US Federal Reserve System decided to withdraw from the NGFS, arguing that the activities undertaken by the Network exceeded the central bank's mandate, which was deemed inconsistent with its obligations. The FED is so far the only central bank to have withdrawn from the NGFS. In particular, their activities are related to:

- Incorporating issues related to stopping climate change into the monetary policy framework;
- Integrating sustainable and responsible investment practices in managing their own portfolios;
- Assessing climate risk in microprudential supervision.

According to the NGFS, monetary authorities should first map the transmission channels of physical and transitional risks to the financial system and define risk indicators for their monitoring (Figure 3). The Network also advises monetary authorities to conduct quantitative risk analysis and use it in macroeconomic forecasting, preparing possible future risk scenarios. Second, it encourages them to integrate sustainability into their own portfolio management. In this way, central banks should set an example for other entities in the financial system and help them understand long-term risks and opportunities. The third recommendation addresses the need to fill the gaps resulting from the lack of data. Data shortages and inconsistencies constitute a major obstacle to properly assessing climate-related risks. This also applies to the insufficient data currently available and the lack of

expert knowledge to assess them. In the fourth recommendation, the NGFS emphasizes the importance of raising awareness among central banks, building intellectual capacity, and sharing knowledge. This also addresses the need for knowledge sharing among institutions and the inclusion of academic entities in their activities. In additional recommendations (5 and 6), the NGFS emphasizes the importance of improving and standardizing climate risk disclosures and taxonomy. Although these are issues beyond the competencies of central banks, they can also support the earlier general recommendations.

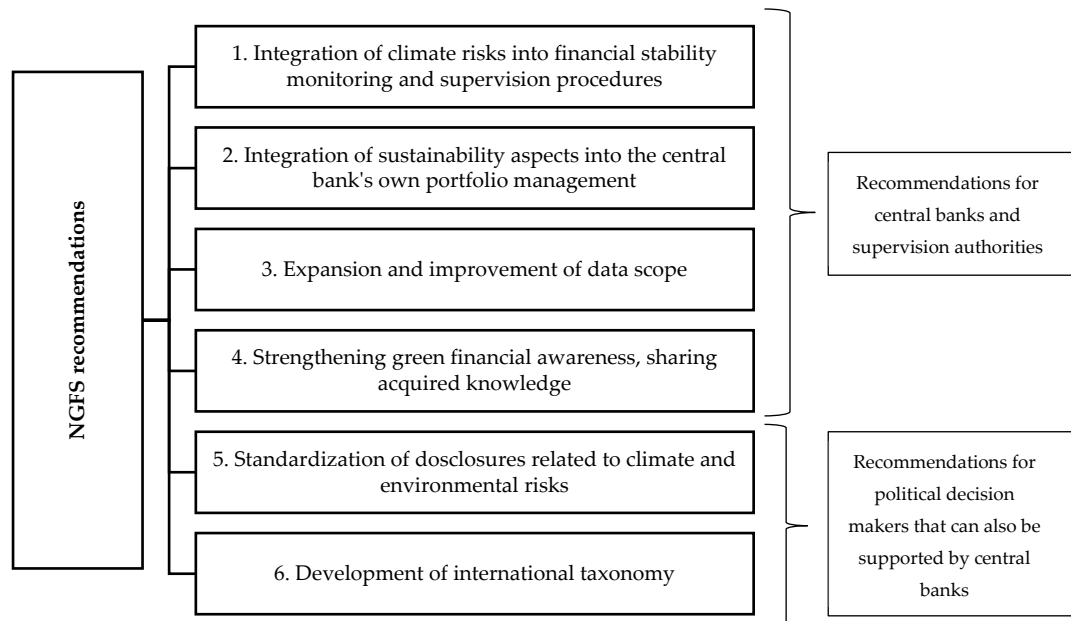


Figure 3. NGFS recommendations for central banks, supervision authorities and political decision-makers. Source: own work based on [8].

It should be emphasized that the literature tends to present these initiatives as neutral and purely technical. However, this assumption requires critical scrutiny. Institutions such as the NGFS can also be interpreted as forms of soft governance, through which central banks expand their influence over climate-related policies without explicit democratic mandates.

In addition, these approaches are based on the implicit assumption that climate-related risks can be adequately measured and incorporated into existing macroeconomic and financial models. Given the significant uncertainty, non-linearity and long-term horizon of climate change, this assumption remains highly contested. As a result, increasing reliance on climate scenarios and disclosure frameworks can create an illusion of control rather than significantly improving risk management.

Finally, the emphasis on international harmonization obscures important differences in national mandates and institutional settings, which limits the practical applicability of these recommendations.

The second strand of the literature includes considerations on the justification for central banks to engage in activities aimed at stopping climate change [9]. Although the literature provides multiple arguments for central bank involvement in climate change, these arguments are based on different theoretical frameworks that assign varying importance to price stability and financial stability. In mainstream approaches, climate change is treated primarily as a source of exogenous shocks affecting inflation dynamics, which implies a largely reactive role for central banks. In contrast, more heterodox contributions emphasize the need for an active role of central banks in steering credit and supporting structural transformation towards a low-carbon economy. This divergence reflects a deeper

theoretical tension about whether central banks should remain neutral stabilizers or become active agents of economic transformation.

Aguila and Wullweber [10] point out that central banks concentrate on climate change for two reasons. First, due to its potential consequences for the value of money and the price level. Therefore, it poses a threat to price stability, the primary objective of most modern central banks worldwide. Second, climate change generates a number of risks to the financial system that are difficult to identify, measure and manage. This is particularly dangerous from the perspective of maintaining financial stability, an overriding objective imposed on central banks after the global financial crisis [11].

In this context, Schnabel [12] identifies three different but interrelated types of shock resulting from climate change that can affect price levels. These are:

1. Climateflation, which refers to price increases resulting from climate-related shocks. Significant temperature fluctuations caused by climate change, including extreme weather events or major natural disasters (hurricanes, droughts, floods), have a significant impact on price levels, thus fuelling inflation [13–17].
2. Fossilflation, which is related to inflation driven by rising fossil fuel prices. It refers to a situation in which the economy's dependence on coal, oil, and gas leads to rising energy prices and production costs, which in turn causes inflation. This situation was particularly observed in the context of the energy crisis following the outbreak of the war in Ukraine, which caused an increase in energy prices due to the heavy dependence of European countries on Russia.
3. Greenflation, which refers to the potential inflationary effect that arises as production processes are adapted to reduce carbon footprints and transition towards a low-carbon economy. As economic entities transition to low-carbon technologies in their production processes, demand for metals and minerals, whose supply remains stable in the medium term, increases. In turn, the increase in demand creates an upward pressure on prices. Fiscal policy instruments aimed at reducing emissions, such as carbon taxes or emissions trading systems, can also lead to greenflation by increasing the costs of carbon-related activities. Therefore, banks' commitment to sustainable monetary policy is, in a sense, an indirect commitment to maintaining price stability.

Importantly, the literature rarely addresses the potential contradictions between these inflationary channels. Although climate change is presented as a source of inflationary pressure, policies aimed at mitigating it—particularly the transition to a low-carbon economy—may themselves generate inflation (so-called greenflation).

This creates a fundamental policy trade-off: central banks may face a situation in which supporting climate objectives conflicts with their short-term price stability mandate. The assumption of full compatibility between these objectives therefore appears overly optimistic.

The International Monetary Fund also notes that there is a strong justification for incorporating climate issues into monetary policy. It argues that climate change can generate various types of risk and influence central banks' monetary policy and the goals they achieve through various channels (Figure 4). It emphasizes that these risks primarily generate physical and transition risks. Physical risks materialize in the event of negative environmental events through physical impacts on the environment, infrastructure, property, and human resources. While transition risks are associated with the effects of the transformation towards a climate-neutral economy. These risks relate to changing regulations regarding the implementation of climate policies, technological progress as well as changes in consumer demand and their preferences for goods and services [18].

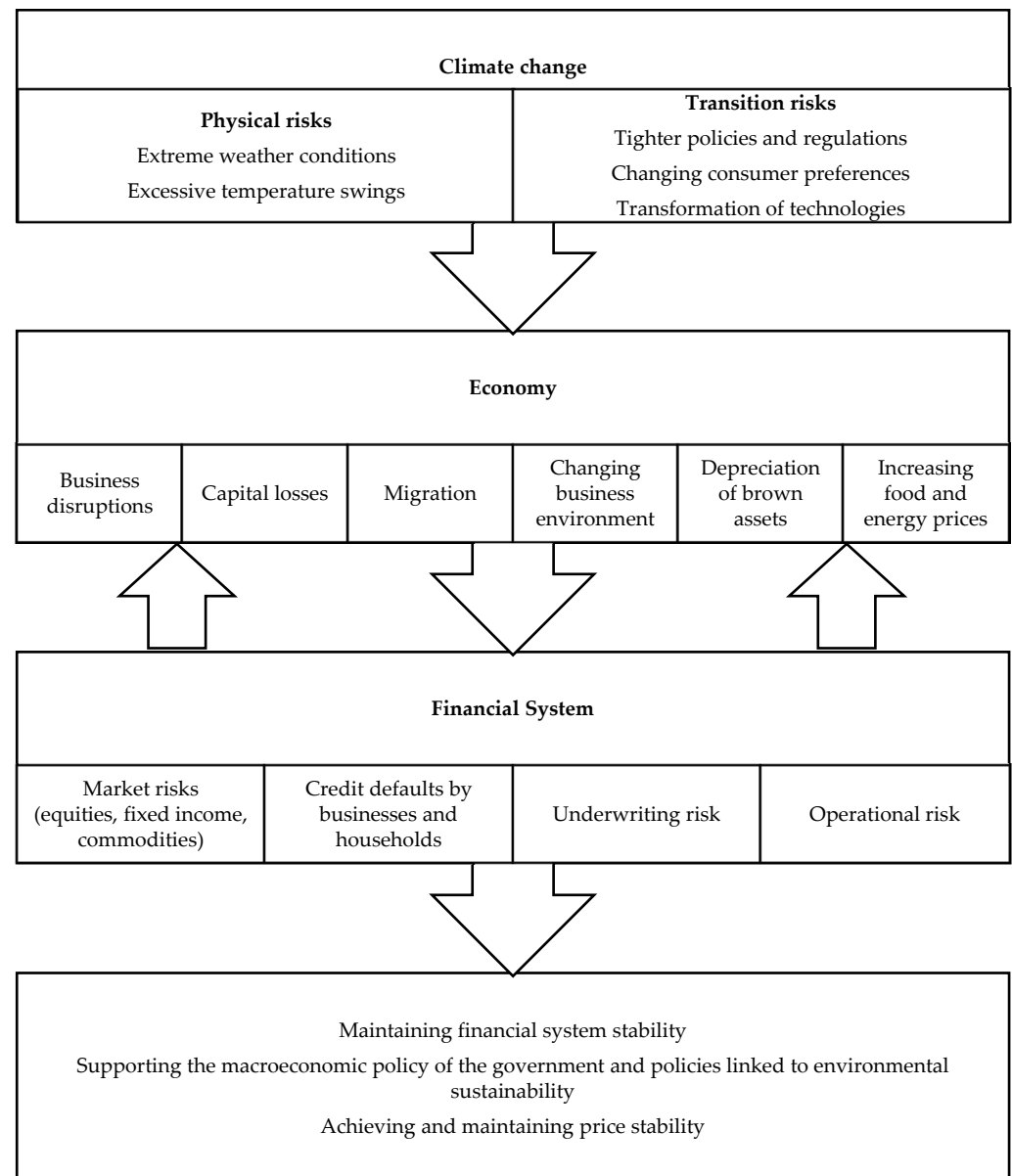


Figure 4. Impact of climate change on monetary policy and central banks' objectives. Source: own work.

Then, physical and transition risks impact various areas of the economy, causing, among others, disruptions to business activity, capital losses, migration problems, a changing business environment, depreciation of brown assets and rising food and energy prices. These macroeconomic effects may, in turn, negatively affect the financial system, generating market risk, underwriting risk, and operational risk, as well as increasing the likelihood of corporate and household insolvency. However, it should be noted that the risks generated in the financial system can also impact the real economy, causing a feedback loop. All these negative factors may hinder the achievement of the main objectives of monetary authorities, including maintaining financial system stability, supporting the implementation of the macroeconomic policy, particularly those aspects that focus on sustainable development, and ultimately destabilizing price levels. Therefore, climate change, through various channels and mechanisms, may hinder the achievement of the main objectives of central bank monetary policy [18].

In the current literature, there is also a consensus that states that the impact of climate change on monetary policy is not only significant but will increase dynamically, which

further justifies the involvement of central banks in this field [19–25]. This impact is analyzed from two perspectives: long-term and short-term. In the long term, Boneva et al. [26] and representatives of the Bank of England [27] agree that recurring and frequent natural disasters will lead to slower potential growth, lower global economic growth and reduced demand due to higher precautionary savings. These consequences will, in turn, cause a lower long-term natural real interest rate. On the other hand, they point out that the implementation of transition policies to protect the climate, assuming an increase in investment and innovation, will—in contrast—exert upward pressure on natural real interest rates. The impacts that will ultimately be greater will depend on the path that climate policy will take worldwide. In turn, in the short term, Batten et al. [19] emphasize that both physical and transition risks can affect the level of inflation in both directions, depending on whether supply or demand side influences will be dominant.

Furthermore, the literature presents conflicting conclusions regarding the long-term macroeconomic effects of climate change. Some studies point to a decline in the natural rate of interest due to lower growth, while others emphasize upward pressure resulting from increased green investment. These contradictions are not merely empirical uncertainties but reflect different underlying macroeconomic models and assumptions. As a result, the justification for central bank involvement is based on theoretically contested foundations rather than on a unified analytical framework.

Chen et al. [28], analyzing the relations between monetary and climate policy, provided information to central banks considering their commitment to climate change. They developed the extended E-DSGE model (Environmental Dynamic Stochastic General Equilibrium Model), which demonstrated that the process of formulating the monetary policy assumptions should take into account current climate policy, as it influences price levels and inflation. They also noted that the reaction coefficients used in the traditional monetary policy rule should be adjusted for climate policy objectives, allowing for optimal policy mixes.

Kurowski [29] in turn verified the involvement of central banks by analyzing the frequency with which monetary authorities refer to climate issues in their inflation reports. He used a text mining approach and analyzed 459 inflation reports from 10 central banks in post-communist countries published between 2013 and 2023. He found that climate issues constitute only a small part of inflation reports. However, a positive conclusion of the research was that the frequency of references to climate issues increased, particularly after 2022.

Simandan et al. [30] analyzed communication, announcements and narratives of the European Central Bank and the Bank of England in which they explained and justified planned and implemented sustainable development initiatives. They stated that the communication policy of the analyzed monetary authorities became an important foundation and justification for changes in their monetary policy, while simultaneously increasing the effectiveness of newly undertaken actions. They also demonstrated that green central banking gained new momentum in the wake of the COVID-19 pandemic.

The third strand of the international literature concentrates on the role of monetary authorities in addressing climate issues. Particular attention is paid to how central banks can integrate climate considerations into their core functions and mandates. Volz [31] indicated that climate-related risks (both physical and transition risks) pose potential threats to financial system stability. At the same time, incorporating climate concerns into monetary policy is justified only when these risks could threaten financial stability. However, he warned that formally expanding the mandate of central banks to include climate goals carries risks. It can undermine accountability, reduce transparency and limit the independence of central banks. He emphasizes that while monetary policy authorities

possess technical tools to address climate-related risks, such as the climate stress test and adjustments to capital requirements, these measures should remain their instruments of risk management rather than instruments of direct climate policy. Any climate-related responsibilities should result from a formal statutory change, and central banks should not independently determine sustainability priorities, as these remain the responsibility of governments.

This debate reflects a broader tension between legalist and functionalist interpretations of central bank mandates. The legalist perspective emphasizes strict adherence to formally defined objectives, while the functionalist view allows for a more flexible interpretation, especially when climate risks threaten financial stability. Although the literature presents both perspectives, it does not resolve the contradiction between them. In practice, many central banks appear to engage in a *de facto* expansion of their mandates, raising concerns about accountability and institutional legitimacy.

Dikau and Volz [32] also highlighted that a significant part of central banks in the world (24% of 135 analyzed monetary authorities) engage in climate-related actions even without explicit mandates. These actions often occur through participation in networks, such as the previously mentioned NGFS or by incorporating climate risks into macroprudential supervision. Nevertheless, the authors argued that proactive climate protection measures should be legally mandated to ensure accountability and transparency. In turn, D’Orazio and Popoyan [33] showed that central banks in G20 countries generally integrate climate considerations through their financial stability mandates, while maintaining traditional price stability objectives. They suggested that effective integration of sustainability into monetary policy requires a coordinated approach, combining both monetary and macroprudential instruments, to avoid overextension of central bank responsibilities. This framework allows central banks to support the transition to a low-carbon economy while remaining within their institutional mandate. Moreover, increased involvement in climate-related policies introduces a trade-off between policy effectiveness and central bank independence. While a broader role may enhance the ability to address systemic risks, it also exposes central banks to political pressures and distributional conflicts. Therefore, the integration of climate considerations cannot be treated as purely technical but involves inherently political choices. It is also emphasized that although central banks are not responsible for climate policy in the legislative sense, their actions can indirectly contribute to the implementation of Sustainable Development Goals by supporting financial stability and reducing economic risks resulting from climate change.

The fourth important research strand in the literature on integrating sustainability into monetary policy explores the evolution of modern monetary policy instruments towards their greening, including climate change mitigation. This strand is often presented in a normative manner, emphasizing the potential benefits of greening monetary policy instruments. However, the existing literature provides limited critical assessment of their effectiveness, risks, and consistency with traditional monetary policy principles.

Campiglio [34] argues for the need to combine monetary policy instruments with financing of a low-carbon economy. He emphasizes a significant role of transformation in credit allocation and asset purchase programmes to support financing a low-carbon transition and mitigate risks from climate change. Shapoval [35] proposed a framework for integrating monetary policy with the concept of sustainable development. She also suggested that central banks could implement two types of sustainable monetary policy instruments:

- “light green”—such as adjusting asset purchases or regulating liquidity to promote environmentally friendly assets, within the current institutional structure;

- “bright green”—which includes more transformational changes, including direct financing of ecological transition projects, which may require significant institutional adjustments.

Nocoñ [36], analyzing the transformation of modern monetary policy instruments in the context of sustainable development, identified new green monetary policy tools resulting from the incorporation of emission reduction targets into traditional instruments. She demonstrated that greening instruments is a process in which previously well-known and used monetary policy instruments are directed toward achieving Sustainable Development Goals and climate policy. On this basis, she distinguished: green interest rate policy, green lending policy, green targeted longer-term refinancing operations (GTLTRO), green collateral framework, green quantitative easing (GQE), green forward guidance as well as green financial regulations.

However, it should be noted that a key issue concerns the compatibility of these instruments with the principle of market neutrality. Traditional monetary policy aims to avoid influencing credit allocation between sectors, while green instruments explicitly favour environmentally sustainable activities. This raises the question of whether central banks are implicitly involved in industrial policy.

In addition, empirical evidence on the effectiveness of these tools still remains limited, as most studies rely on theoretical models rather than observed results. The literature also largely neglects the political economy dimension, including the role of taxonomies, regulatory capture and the contested definition of “green” assets.

Rosa [37] indicated that monetary authorities increasingly formulate and implement monetary policy instruments that directly support low-emission transitions, despite the fact that due to the relatively short period of their implementation, the effectiveness of such tools has not yet been fully assessed and understood. She demonstrated that, first, central banks that are particularly “sensitive” to climate change (climate responsive) have expanded their mandates and implemented sustainable monetary policy instruments to the greatest extent. Secondly, such instruments are also being implemented by central banks with narrow mandates, even though institutional conditions are inconsistent with the expansion of their responsibilities. She also emphasized that climate-focused instruments can be suspended when the objectives of monetary and environmental policy are not fully aligned.

Finally, Dafermos et al. [38] analyzed the effectiveness of green quantitative easing (GQE). They showed that implementing a green QE programme can reduce financial instability caused by climate change and limit global warming.

The four analytical strands identified in the literature are not mutually exclusive but represent interconnected dimensions of a broader transformation process. Their interaction gives rise to structural tensions that influence central bank decision-making. In particular, the coexistence of market-based and interventionist approaches reflects different assumptions about the role of monetary authorities, while the tension between price stability and sustainability highlights the temporal mismatch between short-term policy mandates and long-term environmental risks. These tensions should be understood as endogenous to the transformation of monetary policy rather than as external constraints.

First, the strand focusing on institutional initiatives (Strand 1) promotes coordination, standardization, and the development of common frameworks for incorporating climate risks into central banking. However, this technocratic vision stands in implicit tension with the concerns raised in Strand 3 regarding mandate overreach and democratic legitimacy. The expansion of central bank activities through international networks and soft-law mechanisms may effectively broaden their influence without corresponding formal changes in their legal mandates, raising questions about accountability and transparency.

Second, the justification for central bank involvement (Strand 2) is often based on the argument that climate change threatens both price stability and financial stability. However, this strand tends to assume that these objectives are aligned, which is not necessarily true. In particular, the inflationary effects associated with the transition to a low-carbon economy (e.g., greenflation) may conflict with short-term price stability objectives. This creates a fundamental trade-off: policies that are intended to mitigate long-term climate risks may simultaneously generate short-term macroeconomic instability.

Third, the strand addressing the role of central banks (Strand 3) emphasizes the importance of maintaining clear institutional boundaries and preserving central bank independence. This perspective is in direct tension with the proposals advanced in Strand 4, which advocate the active use of monetary policy instruments to support the green transition. Green monetary policy instruments, such as green quantitative easing, targeted refinancing operations, or differentiated collateral frameworks, imply a departure from the principle of market neutrality and involve selective allocation of credit across sectors. As a result, central banks may move closer to the domain of industrial policy, which has traditionally been considered outside of their remit.

Fourth, the interaction between these strands highlights a deeper conflict between two competing paradigms of central banking. On the one hand, the traditional paradigm emphasizes neutrality, rule-based policy, and a narrow focus on price stability. On the other hand, the emerging paradigm envisions central banks as active agents in supporting structural transformation and addressing systemic risks, such as climate change. The literature does not resolve this tension, and different contributions implicitly adopt different positions along this spectrum.

In general, these inconsistencies suggest that integrating climate change into monetary policy cannot be understood as a straightforward extension of existing frameworks but rather as structural features of an evolving monetary policy paradigm. It involves fundamental trade-offs between price stability and environmental objectives, between policy effectiveness and institutional independence, and between technocratic governance and democratic legitimacy. Recognizing and explicitly addressing these trade-offs is essential for developing a coherent and credible framework for green central banking.

Therefore, based on the conducted critical literature review and moving beyond a purely classificatory approach, it is possible to formulate a set of theoretically grounded propositions that capture the key drivers and dynamics of sustainability-oriented monetary policy transformation. They are as follows:

P1: The intensity of climate-related regulatory pressure increases the likelihood that central banks deviate from the principle of market neutrality in favor of more interventionist policy approaches.

This proposition is based on the observation that regulatory frameworks, including climate disclosure requirements and prudential regulations, increasingly encourage financial institutions to incorporate sustainability considerations into their operations. As central banks operate within these evolving regulatory environments, maintaining strict market neutrality becomes increasingly difficult, leading to a gradual shift toward targeted interventions, such as green asset purchases or differentiated collateral frameworks.

P2: The greater the exposure of the financial system to climate-related risks, the stronger the integration of sustainability considerations into monetary policy frameworks.

This relationship stems from the growing awareness that climate-related risks, both physical and transition risks, pose systemic threats to financial stability. As these risks become more visible, central banks are more likely to incorporate them into their analytical models, risk assessments and instruments, thereby expanding the traditional scope of monetary policy.

P3: Incorporation of climate-related objectives into monetary policy frameworks generates increasing tensions with the principle of central bank independence, which requires the development of new governance mechanisms.

This proposition reflects the institutional dimension of monetary policy transformation. Expanding central bank mandates to include sustainability objectives may blur the boundaries between monetary and fiscal policy, raising concerns about democratic accountability and political influence. As a result, new governance arrangements and clearer mandates may be required to preserve institutional credibility.

P4: The evolution of monetary policy toward sustainability is a path-dependent process shaped by institutional, regulatory and macroeconomic conditions.

The literature indicates that central banks differ significantly in their approaches to climate-related issues, reflecting variations in legal mandates, economic structures and policy traditions. This suggests that the transition toward sustainability-oriented monetary policy does not follow a uniform trajectory but is instead determined by country-specific and institutional factors.

4. Illustrative Evidence of Central Bank Practices

This section provides illustrative examples of how central banks address climate-related risks in practice. It is not intended as a systematic empirical analysis, but rather as a set of case-based illustrations that complement the theoretical and literature-based findings presented earlier in the paper. Accordingly, the cases should be interpreted as empirically informed examples that are consistent with the proposed analytical framework, rather than as direct empirical tests or validation of it. The primary purpose of this section is to demonstrate how the conceptual tensions identified in the literature, particularly those related to mandates, policy instruments and institutional constraints, manifest in real-world central banking practices.

The "Central Bank and Climate Change Survey" conducted by the Official Monetary and Financial Institutions Forum in 2019 indicated that approximately 70% of 33 analyzed central banks and regulators representing three-quarters of global economic output considered climate change as a serious risk to financial system stability, and 55% had begun monitoring climate-related threats [39]. As of 2026, central banks are not only aware of the nature and significance of their involvement in this process but are also increasing the frequency of real actions related to the transformation of monetary policy aimed at curbing climate change. Table 1 presents selected climate-related actions undertaken by major central banks. It adopts a standardized analytical structure to enhance comparability across cases. Each central bank is evaluated along three consistent dimensions:

- (1) Type of instrument;
- (2) Functional domain (monetary policy vs. macroprudential/supervisory);
- (3) Corresponding analytical strand identified in the literature.

It should be noted that the European Central Bank was the first central bank in the world to include actions to combat climate change in its strategic review. It also outlined how banks should manage climate risk and conduct supervisory stress tests for climate-related risks. As a part of its asset purchase programme, it purchased green bonds while trying to minimize market disruptions. In February 2021, the central banks of the Eurosystem agreed on a common position on sustainable climate-related investments in their portfolios [40].

In turn, the Bank of England became the first central bank in the world to incorporate ESG goals into its legal mandate in 2021. This added a formal objective to support transition to a low-carbon economy, as a part of broader government policy support. Since 2015, it has undertaken a number of actions to incorporate climate considerations into its monetary

policy, becoming a global leader in the integration of ESG risks into central banking and monetary policy. In 2019, the Bank of England published a consultative report urging banking institutions to incorporate climate risks into their risk management systems, integrate them into decision-making and lending policies, and ensure oversight of these issues by bank boards. Together with the Financial Conduct Authority, it also established the Climate Financial Risk Forum (CFRF). CFRF was aimed at supporting the financial sector in managing climate risks by providing guidance and scenarios, later updated in 2025 with more stringent requirements for banks and insurers in managing climate risk. In 2021, the British central bank conducted the first “Climate Biennial Exploratory Scenario” (CBES), a climate stress test among the largest banks and insurance companies. The Bank also began a “green recalibration” of its own asset portfolio by incorporating ESG factors, including climate factors, into its investment policy. Finally, in 2022, it published its own climate report (TCFD-aligned disclosures) and updated its internal monitoring metrics in this area.

Table 1. Selected climate-related actions and instruments of central banks. Source: own work.

Central Bank	Climate Actions and Instruments	Type of Instrument	Scope of Integration	Analytical Strand	Degree of Intervention
European Central Bank	• “Climate and Nature Plan” • Green Quantitative Easing • Climate stress tests • Green Collateral Framework—climate disclosure requirements for collateral • Green forward guidance	Asset purchases (green QE), collateral framework, stress tests	Monetary policy Macroprudential policy Financial supervision	Strand 1 Strand 4	Medium-High
Bank of England	• Incorporating climate risk into stress tests • Climate scenario analysis • Disclosure of ESG risks in central bank reports	Stress tests, scenario analysis, disclosures	Financial stability Risk analysis	Strand 1 Strand 3	Medium
Bank of Japan	• Green bonds accepted as collateral in transactions with the central bank • New targeted green lending—supporting green projects in refinancing operations • Green Targeted Longer-Term Refinancing Operations (GTLTROs) • A special green credit line implemented to support the achievement of climate neutrality • Green financial regulation—higher interest rates on required reserves to banks with better results in terms of green financing • Market surveys taking into account climate change • Monitoring the impact of climate change on the financial system	Green lending programmes, collateral policy	Market analysis	Strand 4	High

Table 1. Cont.

Central Bank	Climate Actions and Instruments	Type of Instrument	Scope of Integration	Analytical Strand	Degree of Intervention
People's Bank of China	- Green bonds accepted as collateral in transactions with the central bank - New targeted green lending—supporting green projects in refinancing operations - Green Targeted Longer-Term Refinancing Operations (GTLTROs) - A special green credit line implemented to support the achievement of climate neutrality - Green financial regulation—higher interest rates on required reserves to banks with better results in terms of green financing	Targeted lending, collateral policy, regulation	Monetary policy Macroprudential policy	Strand 4	High
Federal Reserve System	- Inclusion of climate issues in economic analyses - Research on the impact of climate risk on variables relevant from the central bank's perspective	Research, risk analysis	Early phase of integration	Strand 2 Strand 3	Low
Bank of Canada	- Stress tests with elements of environmental risk - Analyses on the impact of climate change on monetary policy	Risk analysis, disclosures	Risk analysis	Strand 1 Strand 2	Low-Medium

Note: The classification is based on the dominant characteristics of each central bank's approach and is intended for analytical comparison rather than exhaustive representation. Source: own work.

The Bank of Japan, despite its narrow mandate, actively integrates climate considerations into its monetary policy. A narrow mandate means that the central bank focuses solely on achieving its primary objective, such as price stability. On the other hand, a broad mandate implies a broader scope of responsibility. In this case, a central bank focuses—in addition to achieving its primary objective—on supporting other goals, such as maximizing employment or supporting economic growth. Together with the People's Bank of China, these are the only central banks in the world that have implemented lending programmes specifically designed to support the achievement of climate neutrality. Furthermore, the Bank of Japan was the first central bank that, even in 2010, implemented an environmental instrument, the Growth-Supporting Funding Facility (GSFF), aimed at countering economic recession and achieving environmental goals. In 2021, this programme was replaced by the creation of the new Climate Response Financing Operations programme [41].

In turn, the Bank of Canada does not formally hold a mandate; however, it recognizes that climate change impacts the economy and the financial system and therefore aligns with its mission of price stability and financial stability. Consequently, it conducts climate risk analysis, with results published in annual reports: "Disclosure of Climate-Related Risks", and incorporates climate risk into its risk management framework, both operationally and financially. Furthermore, it strives to reduce the negative impact of its own activities on the climate by reducing waste and water consumption and managing its carbon footprint. It also actively participates in the NGFS and engages in national initiatives, such as the Sustainable Finance Action Council, supporting the development of green

finance, sustainability taxonomy and consistent climate reporting. Although it has not implemented separate prudential regulations on climate risk, it also prepares to conduct climate stress tests.

The presented central banks' responses to climate change do not mean that they neglect their primary goals or disrupt operational procedures. In contrast, the interaction of new ideas and interests related to climate change with the main objective and formal structures of central banks has created a new model of sustainable monetary policy.

The Federal Reserve System has repeatedly been criticized for its reluctance and relatively slow progress in redirecting monetary policy toward sustainable development. Its representatives, led by the Chair Jerome Powell, have regularly pointed out that the Federal Reserve does not have a mandate to use monetary policy instruments to address climate change. At the same time, they have emphasized that the government should implement actions to build a green economy. Referring to the sustainable monetary policy efforts undertaken by other central banks around the world, including the European Central Bank and the Bank of England, they pointed out that, unlike them, the Federal Reserve does not have a secondary mandate to support the government's macroeconomic policy.

The Fed's current official position is that climate change poses a significant systemic risk threatening the financial stability of the United States. Therefore, the central bank has formulated guidelines on climate risk and aims to integrate climate issues into monetary policy. However, it has not provided specific deadlines for implementing these actions. It also has not addressed climate stress tests or climate scenario analyses, popular among many central banks. The Fed has established a new Supervision Climate Committee and announced a Financial Stability Climate Committee to advise the Board of Governors on how to counteract climate risk. Furthermore, the US central bank has encouraged investments in renewable energy and climate resilience initiatives under the Community Reinvestment Act.

The prudent approach of the Federal Reserve can be interpreted as an example of the conservative risk-based approach. Its reluctance to adopt explicitly green monetary policy instruments reflects strong adherence to a narrow mandate and concerns about institutional independence. At the same time, its gradual incorporation of climate risk analysis indicates a shift toward the prudential integration approach. This illustrates the broader tension identified in the literature between maintaining institutional legitimacy and increasing policy effectiveness in addressing climate-related risks.

In summary, the illustrative evidence suggests that central banks adopt heterogeneous approaches to integrate climate considerations. While monetary authorities, such as the European Central Bank and the Bank of England, are moving toward more market-shaping approaches, others—such as the Federal Reserve System—remain more cautious. This divergence reflects differences in mandates, institutional environments and policy priorities and reinforces the importance of considering both theoretical and institutional constraints when evaluating the role of central banks in addressing climate change. It is important to emphasize that the presented cases do not constitute a representative or systematically selected sample of central banks. Instead, they are purposively chosen to illustrate variation across institutional settings and policy approaches. Therefore, they should be understood as supportive qualitative evidence aligned with the theoretical framework, rather than as a basis for causal inference or generalization. Future research could develop this approach using systematic comparative or quantitative methods.

5. Conclusions and Limitations

Although public entities—essentially governments—possess the broadest range of regulatory, fiscal, and institutional powers to initiate and coordinate transformation pro-

cesses, the banking sector is a crucial mechanism to support transformation towards a more sustainable economic model. Banks, due to their ability to allocate financial resources and create investment structures in the economy, play a key role in redirecting capital flows towards projects that support the Sustainable Development Goals (SDGs). In this context, ensuring a stable and sustainable financial system has also become one of the important areas of interest for central banks.

The conducted critical literature review led to several important conclusions. First, central banks have changed their attitude from a passive approach to actively integrating climate risk into their monetary and macroprudential policies. Second, the integration of sustainability into monetary policy has caused the evolution of monetary policy instruments. They are increasingly using the so-called green (or sustainable) monetary policy tools, which take into account climate policy goals. Third, the international scientific debate not only highlights the need to maintain a balance between traditional central bank mandates and climate-related objectives but also reveals fundamental tensions between competing approaches, particularly between institutional constraints and the growing pressure to actively green monetary policy instruments. Fourth, it should be emphasized that although the frequency with which central banks refer to climate issues in their reports, publications and statements increases, their current engagement is still insufficient to address the challenges of climate change.

The findings of this study should be interpreted in light of the analytical distinction between monetary policy and other central bank functions, such as macroprudential policy and financial supervision. Although the paper focuses on monetary policy, many climate-related measures discussed in the literature are implemented through these adjacent domains, which complement rather than substitute traditional monetary policy instruments.

With regard to the first formulated research question, it should be noted that the literature indicates that the integration of climate change considerations into modern monetary policy is feasible primarily within a risk-based and prudential framework. This approach involves incorporating climate-related risks into existing policy instruments and analytical tools, such as macroeconomic modelling, collateral frameworks, stress tests, and disclosure practices, without fundamentally altering the primary objective of price stability. However, more interventionist strategies, including the use of explicitly green monetary policy instruments, may generate short-term inflationary pressures and thereby create tensions with the price stability mandate. Consequently, the degree of compatibility between climate objectives and monetary policy depends on both the scope of policy intervention and the interpretation of central bank mandates.

Regarding the second research question, the analysis also identifies four distinct but interrelated strands within the literature: (1) institutional and coordination-based initiatives, (2) theoretical justifications for central bank involvement, (3) debates concerning the appropriate scope of central bank mandates, and (4) the development of green monetary policy instruments. These strands reflect competing paradigms rather than a unified framework, highlighting fundamental tensions between market neutrality and market intervention, as well as between institutional independence and policy effectiveness.

The conducted literature review does not provide unequivocal support for the research hypothesis and is consistent with the answers to the research questions. Although climate considerations can be incorporated into monetary policy within existing frameworks, this is primarily possible under limited, risk-based approaches. More active forms of integration can challenge the price stability objective and increase the risk of mandate overreach. Therefore, the hypothesis holds only conditionally and depends on the specific model of integration adopted by central banks.

Based on the conducted critical literature review, the following conceptual framework can be formulated to integrate climate considerations into monetary policy. It systematizes the main approaches to integrating climate considerations into monetary policy. Rather than treating the identified strands as separate, the framework highlights two key analytical dimensions that structure the debate:

- (a) The scope of central bank mandate (narrow vs. expanded);
- (b) The degree of policy intervention (market-neutral vs. market-shaping).

Based on these dimensions, four stylized approaches can be distinguished:

- (1) Conservative risk-based approach—characterized by a narrow interpretation of the mandate and low intervention. Central banks focus on identifying, monitoring and mitigating climate-related financial risks within existing frameworks, primarily through macroprudential supervision and risk analysis. This approach aligns with the views presented in Strand 3 and emphasizes institutional neutrality and independence.
- (2) Prudential integration approach—combines a relatively narrow mandate with moderate intervention. Climate considerations are incorporated into existing monetary and supervisory tools (e.g., stress testing, collateral frameworks), but without explicitly directing capital allocation. This represents a middle-ground strategy increasingly adopted by major central banks.
- (3) Market-shaping green approach—reflects a broader interpretation of central bank responsibilities and a higher degree of intervention. It includes the use of green monetary policy instruments, such as green quantitative easing or targeted refinancing operations aimed at supporting low-carbon sectors. This approach corresponds to the proposals discussed in Strand 4.
- (4) Transformational approach—characterized by both an expanded mandate and strong intervention. Central banks actively support the financing of the ecological transition, potentially including direct funding of green investments. This approach implies a redefinition of the institutional role of central banks and closer coordination with fiscal authorities.

The framework highlights that the key tension in the literature arises from the trade-off between institutional legitimacy and policy effectiveness. While more interventionist approaches may enhance the ability to address climate change, they also raise concerns regarding mandate overreach, political influence and central bank independence. On the contrary, more conservative approaches preserve institutional credibility but may prove insufficient to address systemic climate risks. At the same time, this typology provides a structured basis for future research, particularly in assessing the effectiveness, feasibility and institutional implications of different models of climate-related monetary policy engagement.

The findings of this study also suggest that the integration of sustainability considerations into monetary policy is not a linear or uniform process but rather a complex and multidimensional transformation shaped by competing theoretical paradigms. The identified analytical strands and their associated tensions indicate that central banks operate within a constrained decision-making environment, where economic, institutional and environmental objectives must be continuously balanced. This perspective contributes to a deeper theoretical understanding of how monetary policy evolves under conditions of systemic transition. Overall, the results demonstrate that the integration of climate considerations into monetary policy is neither uniform nor uncontroversial and that both research questions must be addressed jointly, as the form of integration is closely linked to the underlying theoretical approach adopted in the literature.

This study contributes to the literature by moving beyond a purely descriptive review and offering a structured conceptual framework that explains the evolving role of central banks in addressing climate change. By identifying and theorizing the interactions between competing policy paradigms, the paper provides a foundation for further theoretical and empirical research on sustainable monetary policy. Future studies should focus on empirically testing the proposed propositions and examining how different institutional contexts influence the trajectory of monetary policy adaptation.

However, these considerations are not without limitations but constitute a basis for further in-depth research. First, to strengthen the validity of the above findings and significantly contribute to the development of theory, further literature studies are necessary to identify new initiatives undertaken by central banks to stop climate change, as well as comparative analysis to confirm the dynamics of institutional changes that take place in central banks around the world. The presented results of critical literature review include research and studies conducted and published until early 2026, while this problem is a very trending topic, therefore the analysis should be systematically expanded. It would also be important to examine whether the growing climate crisis and increased data availability will lead to more significant and long-lasting changes in future monetary policy decisions or whether these changes will prove ineffective or institutionally impossible to implement. Furthermore, it would be worthwhile to conduct additional case studies of central banks in other countries and regions of the world (beyond major central banks) to identify the main drivers and barriers, as well as whether these monetary authorities have incorporated climate factors into their monetary policy. Although Table 1 introduces a comparative analytical structure, it remains based on illustrative case selection rather than a systematically constructed dataset, which limits the possibility of drawing generalized empirical conclusions. Potential areas of future research also include examining the mechanisms through which informal data set and ideological changes have created central banks' green policy preferences. A further limitation relates to the analytical scope of the study. Although the paper maintains a conceptual distinction between monetary policy and other central bank functions, the analysis necessarily draws on evidence from macroprudential, supervisory and financial stability domains. This reflects the institutional reality in which climate-related measures are primarily implemented. However, these considerations are not without limitations but constitute a basis for further in-depth research. First, to strengthen the validity of the above findings and significantly contribute to the development of theory, further literature studies are necessary to identify new initiatives undertaken by central banks to stop climate change, as well as comparative analysis to confirm the dynamics of institutional changes that take place in central banks around the world. The presented results of critical literature review include research and studies conducted and published until early 2026, while this problem is a very trending topic, therefore the analysis should be systematically expanded. It would also be important to examine whether the growing climate crisis and increased data availability will lead to more significant and long-lasting changes in future monetary policy decisions or whether these changes will prove ineffective or institutionally impossible to implement. Furthermore, it would be worthwhile to conduct additional case studies of central banks in other countries and regions of the world (beyond major central banks) to identify the main drivers and barriers, as well as whether these monetary authorities have incorporated climate factors into their monetary policy. Although Table 1 introduces a comparative analytical structure, it remains based on illustrative case selection rather than a systematically constructed data set, which limits the possibility of drawing generalized empirical conclusions. Potential areas of future research also include examining the mechanisms through which informal organizations and ideological changes have created central banks' green policy prefer-

ences. Another limitation relates to the analytical scope of the study. Although the paper maintains a conceptual distinction between monetary policy and other central bank functions, the analysis necessarily draws on evidence from macroprudential, supervisory and financial stability domains. This reflects the institutional reality in which climate-related measures are primarily implemented. However, it may also create interpretative ambiguity regarding the boundaries of monetary policy. Future research could address this issue by developing a more explicit empirical frameworks that focus exclusively on monetary policy instruments. An additional limitation relates to the potential bias that arises from the reliance on institutional reports and the published literature. A significant part of the analyzed sources originates from central banks and international organizations, which may reflect normative or policy-oriented perspectives rather than fully independent analytical positions. This may lead to an over-representation of views that implicitly support the integration of climate considerations into central banking, while under-representing critical or dissenting perspectives. Finally, the proposed conceptual framework should be understood as interpretative rather than empirically validated. It is derived from a qualitative synthesis of the literature and reflects the analytical structure of existing debates, adopted by the author. While it provides a coherent lens for understanding the evolution of sustainability-oriented monetary policy, it has not been systematically verified using quantitative or comparative empirical methods. Future research should therefore aim to validate and refine the framework through empirical analysis.

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