

GREEN MONETARY POLICY: CAN CENTRAL BANKS BALANCE CLIMATE RISKS AND PRICE STABILITY?

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Abstract

The intersection of climate change and monetary policy has become a central theme in contemporary economic debates. As climate-related risks intensify, central banks face increasing pressure to integrate environmental sustainability into their policy frameworks. This article explores the concept of *green monetary policy* and examines whether central banks can effectively balance climate risk mitigation with their traditional mandate of price stability. Drawing on global experiences from the European Central Bank (ECB), the Bank of England, and emerging market economies, the study analyzes policy tools such as green quantitative easing, climate-related collateral frameworks, and sustainable finance incentives. The article further evaluates the potential trade-offs between inflation control, financial stability, and long-term environmental objectives. Ultimately, it argues that while central banks play an important supporting role, climate mitigation should not compromise their primary mandate. Instead, a coordinated approach involving fiscal policy, financial regulation, and international cooperation is essential to ensure that green monetary policy enhances resilience without undermining credibility.

Keywords : Green monetary policy; central banks; climate risks; sustainable finance; price stability; environmental sustainability; monetary instruments; inflation; financial stability.

JEL Classification : E52; E58; Q54; Q56.

1. Introduction

Climate change is no longer a purely environmental or sectoral problem: it has become a systemic risk for economies and financial systems worldwide. The IPCC's Sixth Assessment and Synthesis Reports highlight that climate impacts and higher frequency of extreme events affect growth prospects, productivity, and the distribution of economic activity — generating both *physical risks* (damage from weather extremes and gradual climate shifts) and *transition risks* (asset revaluations, stranded assets, and sectoral disruption as economies decarbonize). These pathways can amplify macroeconomic volatility and feed directly into inflation, unemployment and financial stability channels.

International policy and financial bodies now treat climate as a macro-financial concern. The Network for Greening the Financial System (NGFS), an international consortium of central banks and supervisors, issues scenarios and guidance to help authorities quantify long-term economic effects and plan stress tests that translate climate scenarios into macro-financial outcomes. NGFS scenario updates (including its 2024 scenarios) explicitly show how different policy paths produce materially different GDP, inflation and asset-price outcomes across regions.

Historically, the core missions of most central banks have been narrowly defined around *price stability* (controlling inflation) and, where mandated, *financial stability* (ensuring a resilient banking/financial system). These mandates justify tools such as interest-rate setting, open market operations, lender-of-last-resort facilities, and prudential regulation implemented by monetary and supervisory authorities. Central banks have also emphasized operational

neutrality: their interventions should not substitute for fiscal policy or industrial policy decisions taken by democratically accountable governments.

Nevertheless, the channels through which climate risks propagate (credit losses, higher insurance costs, supply-chain shocks, sectoral price shifts) create direct links to central banks' mandates. If unaddressed, persistent climate shocks can impair banks' capital buffers, raise credit spreads, and complicate the trade-off between stabilizing inflation and supporting growth — all classical central bank concerns. This is why many central banks justify at least a supportive role in measuring and mitigating climate-related financial risks.

A lively debate has emerged among academics, policymakers and civil society over whether central banks should move beyond risk-management and actively *promote* the low-carbon transition (for example via green asset purchases, climate-weighted collateral frameworks or preferential funding for green lending). Proponents argue that central banks must act to prevent systemic instability and to correct market failures that impede timely decarbonization. Foundational academic work (e.g., Campiglio et al., 2018) and influential speeches and policy notes—most famously by former Bank of England Governor Mark Carney—have broadened public expectations that monetary authorities will confront climate risk.

On the operational side, several concrete measures have been piloted or announced: the Bank of England ran the Climate Biennial Exploratory Scenario (CBES) to estimate exposures of major banks and insurers under alternative transition/physical risk paths; the ECB incorporated climate considerations in its 2021 strategy review and has moved to climate-adjust its operations and collateral rules; and the NGFS has produced disclosure and scenario tools to help central banks and supervisors mainstream climate risk assessment. These real-world initiatives show an active, albeit cautious, shift in central bank practice toward incorporating climate into supervision and — in some cases — monetary operations.

Political and legal pushback highlights the debate's intensity. Some policymakers warn that active “green” policies risk stretching central banks' mandates and undermining independence, while others argue legal frameworks already permit climate-sensitive prudential and operational choices. Recent developments show the debate is dynamic: the U.S. Federal Reserve previously joined NGFS and cooperated on climate research but, amid political changes, has also been reported to scale back participation in some global climate efforts — underscoring that geopolitical and domestic politics shape the extent to which central banks can act.

Against this background, this article asks a focused question:

Can central banks effectively balance the mitigation of climate-related macro-financial risks with their core mandate of price stability?

To answer this, the paper pursues three objectives:

1. Map the channels by which climate risks translate into macroeconomic and financial outcomes that matter for monetary policy (inflation, growth, risk premia).
2. Assess policy instruments available to central banks (climate-aware asset purchases, collateral haircuts, macroprudential calibrations, disclosure and stress testing) and evaluate empirical evidence from major central banks' experiments (BoE, ECB, selected emerging-market central banks).
3. Analyze trade-offs and institutional constraints, including legal mandates, independence concerns, measurement/ data gaps, and coordination with fiscal policy. The goal is to identify practicable policy designs and governance arrangements that allow central banks to manage climate risk without compromising price-stability credibility.

By combining evidence from international reports, central-bank exercises, and the academic literature, the article aims to provide actionable recommendations for central banks and policymakers seeking an integrated macro-financial response to climate change.

2. Theoretical Foundations of Green Monetary Policy

2.1 Definition and Scope

“Green monetary policy” broadly refers to the integration of climate change considerations into the objectives, tools, and operational frameworks of central banks. Unlike fiscal or industrial policy, which can directly target emissions through taxation, subsidies, or regulation, green monetary policy is primarily concerned with *managing the macro-financial implications of climate risks* while remaining consistent with central banks’ core mandates.

The scope of green monetary policy ranges from relatively narrow adjustments—such as incorporating climate-related risks into collateral frameworks, portfolio allocations, and financial supervision—to more expansive measures, including “green” quantitative easing (QE), preferential lending facilities, or differentiated reserve requirements that favor low-carbon activities (Campiglio et al., 2018). The Network for Greening the Financial System (NGFS) frames this as a “risk-based approach” (ensuring climate risks are accounted for in monetary and prudential frameworks) versus a “promotional approach” (using monetary policy to actively support the green transition).

2.2 Channels through which Climate Risks Affect Monetary Policy

Climate risks enter central banking through two main channels: physical risks and transition risks.

- **Physical risks** arise from acute events (floods, storms, droughts) and chronic changes (sea-level rise, temperature shifts) that directly damage capital stock, disrupt supply chains, and affect productivity. The ECB has shown that climate-related disasters can raise volatility in food and energy prices, complicating inflation-targeting frameworks (ECB, 2021).
- **Transition risks** stem from policy, technological, and market shifts in the move toward a low-carbon economy. Stranded assets in fossil-fuel sectors, sudden shifts in carbon prices, or rapid technological breakthroughs can reprice financial assets, increase default probabilities, and create systemic shocks in financial markets. NGFS climate scenarios highlight that delayed climate policies (“disorderly transition”) tend to create sharper economic contractions and price volatility compared to orderly early-action pathways.
- **Liability and reputational risks** also matter: litigation against carbon-intensive firms or financial institutions that mismanage climate risk can propagate through the banking sector and affect monetary policy transmission.

In practice, these risks affect the **transmission channels** of monetary policy. For example, climate-related supply shocks can weaken the effectiveness of interest rate adjustments, while banking-sector stress from stranded assets can impair credit channels (Schnabel, 2021).

2.3 Relationship between Financial Stability, Inflation, and Climate Shocks

The interaction between financial stability and price stability is central to understanding why climate change belongs within central bank mandates.

- **Inflation dynamics:** Climate shocks frequently create supply-side disturbances that raise relative prices (e.g., energy, food). These pressures can translate into headline inflation, often with high volatility. The ECB (2021) noted that climate shocks could lead to more persistent deviations from target inflation, especially if accompanied by transition frictions.

- Financial stability risks: If banks and insurers are overexposed to carbon-intensive assets or underprepared for physical risks, climate shocks can weaken balance sheets, increase non-performing loans, and propagate systemic instability. The Bank of England's CBES stress test (2022) demonstrated that under a "late action" scenario, UK banks and insurers could face significant credit losses concentrated in carbon-intensive industries.
- Feedback loops: Financial instability can, in turn, impair the transmission of monetary policy, reducing its effectiveness. For example, if climate-induced shocks raise risk premia and shrink lending, traditional monetary easing may fail to stimulate investment in the real economy. Conversely, inflation volatility from climate shocks may pressure central banks to tighten prematurely, worsening financial vulnerabilities.

This creates a trilemma for central banks: stabilizing inflation, maintaining financial stability, and addressing climate risk. Green monetary policy seeks to manage this trilemma by embedding climate considerations into risk assessments and operations without overstretching mandates.

3. Global Experiences in Integrating Climate into Monetary Policy

3.1 European Central Bank (ECB): Climate-Related Asset Purchases and Disclosure Frameworks

The ECB has taken some of the most explicit steps among major central banks to integrate climate concerns into its monetary operations. In its **2021 strategy review**, the ECB acknowledged climate change as a source of macroeconomic and financial risk that can undermine price stability and financial stability. The bank committed to integrating climate considerations into monetary policy operations, financial stability assessments, and statistical databases (ECB, 2021).

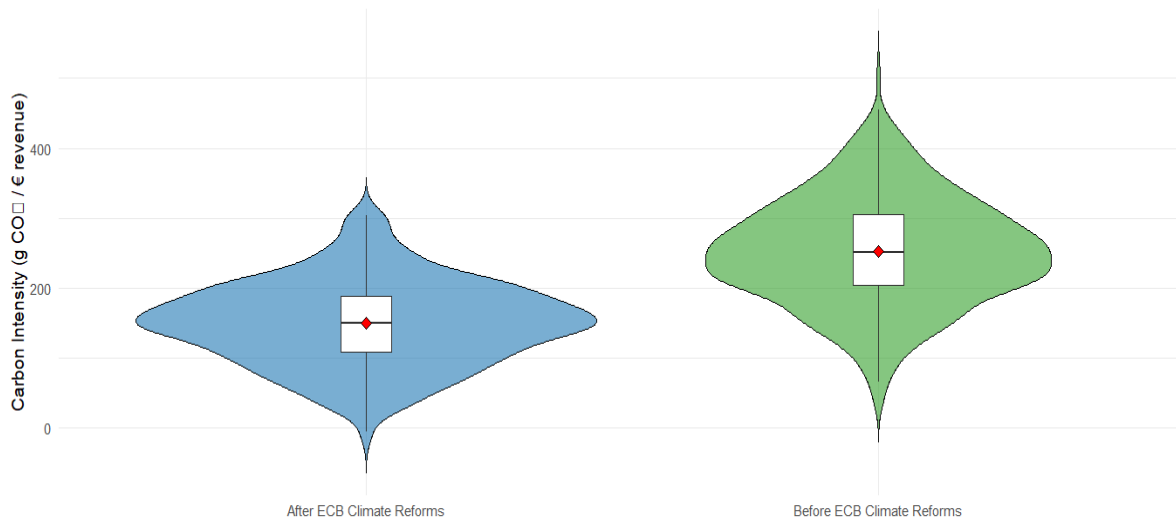
Concrete measures include:

- Climate-adjusted asset purchases: The ECB announced it would gradually tilt corporate bond purchases towards issuers with better climate performance, aligning its portfolio with the Paris Agreement.
- Collateral framework reforms: From 2024 onward, the ECB started incorporating climate risk into collateral valuation and eligibility, applying higher haircuts to assets with greater carbon intensity.
- Disclosure requirements: The ECB mandated that counterparties disclose climate-related information to remain eligible for collateral operations or targeted lending schemes.

Figure 01 : Shifting the Carbon Intensity Profile of ECB Asset Purchases: A Violin Density Illustration of Climate-Adjusted Operations

ECB Climate-Related Asset Purchases & Collateral Reforms

Illustrative distribution of portfolio carbon intensity
Before vs. After climate integration (2021–2024)



Source: ECB (2021, 2022); Schnabel (2021). Simulated illustrative data.

The (fig01) illustrates the transformation in the distribution of corporate bond carbon intensity within the European Central Bank's (ECB) monetary policy operations before and after the implementation of climate-related reforms. In the pre-reform period, the distribution is wider and centered on higher carbon intensity values, reflecting the ECB's earlier commitment to market neutrality in asset purchases. The post-reform distribution, by contrast, shows a clear downward shift in mean carbon intensity and a narrower spread, indicating the effect of climate-adjusted portfolio tilting, collateral framework reforms, and disclosure requirements. This simulated illustration supports the ECB's stated objective of integrating climate risk considerations into monetary policy to both reduce financial vulnerability and incentivize greener corporate practices (ECB, 2021; Schnabel, 2021). It highlights how even incremental adjustments in asset eligibility and valuation frameworks can alter the composition of central bank portfolios in ways that align monetary operations more closely with the objectives of the Paris Agreement. However, it also underscores the trade-off: while the reforms reduce exposure to carbon-intensive issuers, they potentially raise questions about the ECB's neutrality and the balance between climate risk mitigation and its primary mandate of price stability.

These innovations are intended not only to reduce financial risk exposure but also to incentivize market participants to improve their climate performance. ECB Executive Board members such as Isabel Schnabel have argued that "market neutrality" is no longer viable when climate change distorts risk profiles (Schnabel, 2021).

3.2 Bank of England (BoE): Stress-Testing Climate Risks in the Financial System

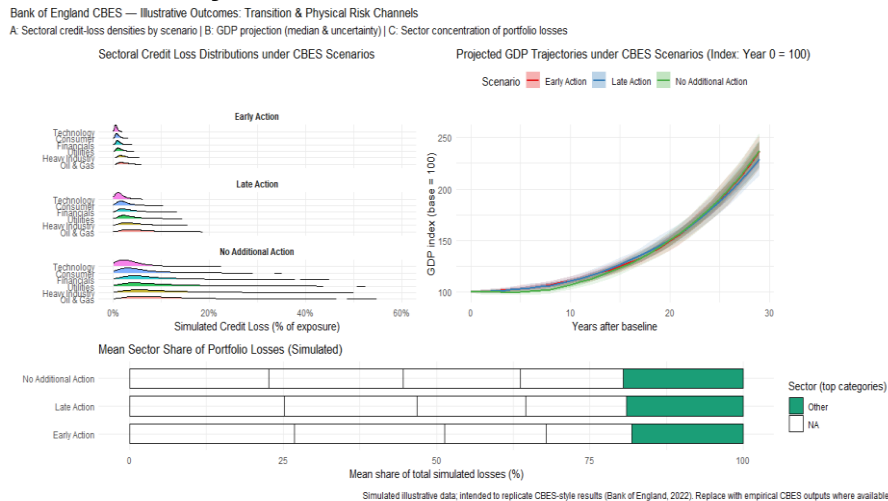
The Bank of England has been a pioneer in climate-related financial stress testing. Under Governor Mark Carney, the BoE emphasized climate change as a systemic risk and helped launch the NGFS in 2017. Its most significant initiative was the 2021–2022 Climate Biennial Exploratory Scenario (CBES), which tested how banks and insurers would respond to three climate policy pathways: *early action*, *late action*, and *no additional action*.

Key findings included:

- Transition risks could generate large credit losses in carbon-intensive sectors (e.g., oil, gas, and heavy industry).

- Physical risks under a “no additional action” scenario could cause persistent GDP contractions and portfolio losses.
- Systemic exposures were manageable but highly concentrated, underscoring the need for diversification and risk management (Bank of England, 2022).

Figure 02 : Bank of England’s CBES Scenarios: Sectoral Loss Distributions, Macroeconomic Trajectories, and Portfolio Concentration of Climate Risks



The above multi-panel visualization (fog02) illustrates the complex channels through which climate risks materialize in the financial system, as explored in the Bank of England’s 2021–2022 Climate Biennial Exploratory Scenario (CBES). Panel A shows that sectoral credit losses are unevenly distributed across scenarios, with oil and gas and heavy industry consistently facing the most severe losses, especially under the “No Additional Action” pathway. This underscores the concentrated nature of transition risk in carbon-intensive industries, reflecting the vulnerability of their balance sheets to both policy shifts and investor repricing. Panel B traces GDP trajectories, where early action results in a modest short-term adjustment followed by stabilization, while delayed or absent action leads to persistent declines in output and heightened uncertainty. These findings reinforce the macroeconomic costs of inaction and the systemic importance of timely climate policy. Finally, Panel C highlights portfolio loss concentration, where a small number of sectors account for the bulk of simulated exposures, demonstrating how financial stability risks can cluster in specific asset classes and challenge diversification strategies. Collectively, the plots affirm the BoE’s central conclusion that climate risks are financial risks: they are material, quantifiable, and relevant for prudential supervision. However, they also show that risks remain manageable if addressed through coordinated policy action, timely disclosure, and stronger risk management frameworks (Bank of England, 2022).

The BoE’s approach emphasizes that climate risks are financial risks, requiring supervisory integration rather than only environmental policy. It has also encouraged insurers and banks to align disclosures with the Task Force on Climate-related Financial Disclosures (TCFD) framework.

3.3 Federal Reserve: A Cautious Approach

The U.S. Federal Reserve has been slower and more cautious in integrating climate into its monetary framework, reflecting both its narrower statutory mandate and the polarized political environment. While Fed officials acknowledge that climate change has implications for financial stability, the central bank emphasizes its role is limited to risk management, not active climate policy (Federal Reserve Board, 2022).

Steps taken include:

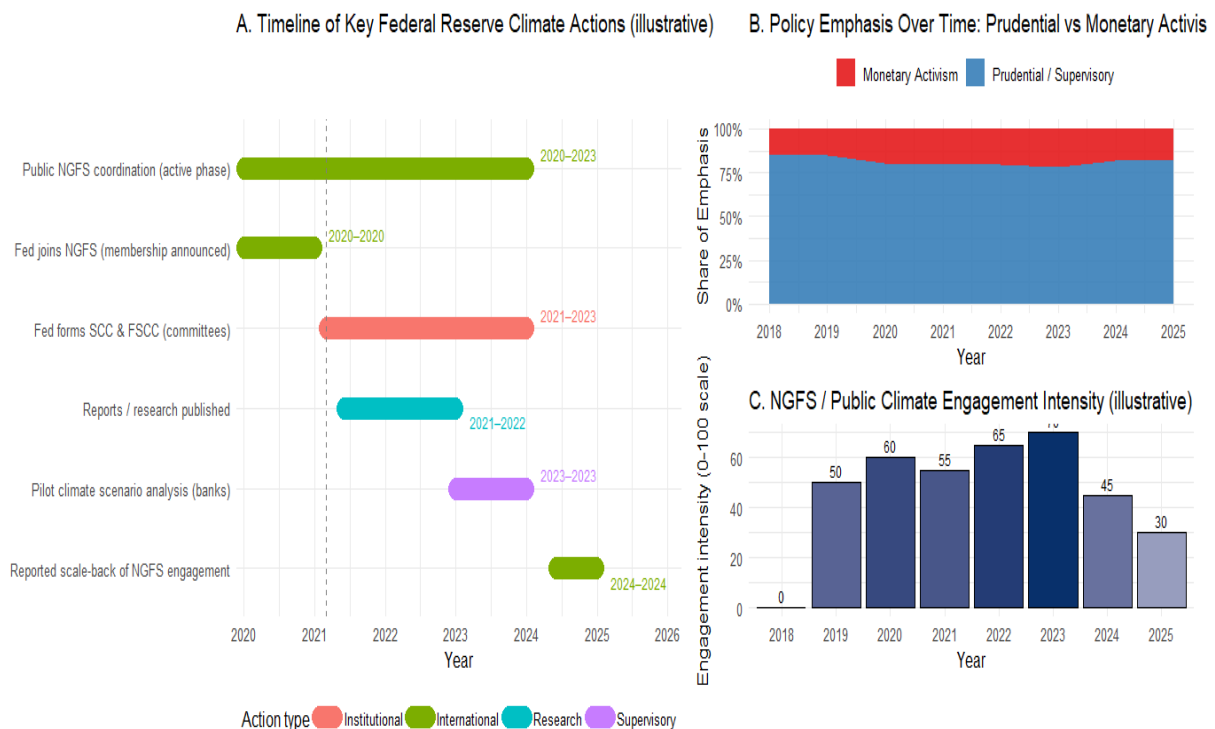
- Establishing two climate committees in 2021: the Supervision Climate Committee (SCC) and the Financial Stability Climate Committee (FSCC).
- Joining the NGFS in 2020, though reports in 2024 suggested some scaling back of active participation due to political pressures.
- Initiating pilot climate scenario analysis with major banks in 2023, designed to explore potential credit risks from climate shocks rather than prescribe capital requirements.

The following visualization (fig03) captures the Federal Reserve's gradual and cautious integration of climate considerations into its supervisory framework. Panel A outlines the institutional milestones, including the creation of the Supervision Climate Committee (SCC) and Financial Stability Climate Committee (FSCC) in 2021, the Fed's membership in the NGFS in 2020, and the pilot climate scenario analysis launched in 2023. Compared with the European Central Bank or the Bank of England, these measures remain primarily exploratory, reflecting the Fed's narrow statutory mandate and the polarized U.S. political environment (Federal Reserve Board, 2022). Panel B highlights the persistence of a prudential orientation, with supervisory and risk-management functions dominating over monetary activism throughout the period 2018–2025. Although pilot stress testing and NGFS membership briefly raised the salience of climate within Fed policy debates, this emphasis remained marginal relative to financial risk oversight. Panel C further illustrates the institution's shifting global engagement: after an initial surge in participation following NGFS membership, reports of reduced involvement in 2024 point to the political constraints shaping U.S. central banking. Taken together, the figure demonstrates that while the Fed acknowledges climate change as a financial risk, it remains cautious and defensive in its approach, prioritizing legal mandates of price stability and employment over proactive climate policy.

Figure 03 :Federal Reserve's Cautious Climate Strategy: Timeline, Policy Emphasis, and Engagement Intensity

Federal Reserve: A Cautious Approach to Climate — Illustrative Visualization

Timeline of actions (A), relative emphasis (prudential vs activism) (B), and NGFS engagement intensity (C).



Overall, the Fed positions climate primarily as a *prudential and supervisory issue* rather than a monetary policy driver, reinforcing its legal focus on maximum employment and price stability.

3.4 Emerging Markets: People's Bank of China and Brazil

Emerging market central banks have often been more experimental, driven by both vulnerability to climate impacts and opportunities in green finance.

- **People's Bank of China (PBoC):** China has integrated green finance into monetary operations since 2016. The PBoC developed **green bond standards**, incorporated green bonds into collateral frameworks, and introduced green credit guidelines that encourage commercial banks to increase lending to low-carbon sectors (PBoC, 2016). It also uses window guidance and macroprudential assessments to favor green lending. This proactive approach reflects China's strategy to align financial policy with its "dual carbon" goals (carbon peaking before 2030, neutrality before 2060).
- **Brazil (Banco Central do Brasil):** Brazil faces significant **physical risks** from deforestation, droughts, and biodiversity loss, which have macroeconomic consequences (e.g., food inflation, hydropower reliability). The central bank integrated sustainability criteria into its prudential regulation and stress testing, and in 2021 published its Sustainability Agenda, linking environmental and social risks to financial stability. Brazil's approach emphasizes that climate is not only a transition issue but also an immediate macroeconomic challenge in emerging economies.

These cases illustrate that while advanced economies tend to focus on transition risks through disclosure and stress testing, emerging markets often embed green finance more directly into credit guidance and regulatory incentives.

4. Trade-offs and Challenges

4.1 Risks of mandate overstretch and credibility loss

A central concern is that "green" policies may stretch central bank mandates beyond price and financial stability into fiscal or industrial policy. Such role expansion could undermine central bank credibility, legal legitimacy, and independence. Dikau and Volz (2021) argue that while some central banks have broad statutory flexibility to pursue sustainability objectives, others have narrowly defined mandates that constrain climate-related action. If central banks appear to substitute for fiscal authorities—such as by favoring green sectors in asset purchases—they may face political backlash and reduced trust, weakening their ability to maintain inflation expectations (IMF, 2024).

Real-world tensions illustrate this risk. For example, internal disagreements within the European Central Bank (ECB) Governing Council have surfaced around the reinterpretation of "market neutrality," with critics warning that such shifts could invite litigation or legislative pushback (Schnabel, 2021). Loss of credibility in this domain could spill over into inflation-control capacity, eroding central banks' core mandate.

4.2 Inflation vs. climate objectives: short-term vs. long-term tensions

Climate events and transition policies create **supply- and demand-side shocks** that complicate monetary policy. Acute climate shocks such as droughts and floods typically reduce output and raise relative prices for food and energy, producing stagflationary pressures (Cevik & Jalles, 2023). By contrast, disorderly transitions—for instance, sudden imposition of carbon pricing—can cause credit tightening and asset repricing, depressing demand while raising uncertainty (NGFS, 2024).

This dynamic generates a temporal trade-off. In the short term, responding aggressively to climate-driven inflationary spikes could worsen financial vulnerabilities or slow low-carbon investment. In the long term, however, neglecting climate risks may allow persistent volatility

and mispricing that undermine both growth and stability. The ECB (2021) has emphasized that climate shocks could produce longer-lasting inflation deviations, underscoring the need for a balanced approach.

4.3 Political neutrality vs. climate-activism debates

Central banks traditionally guard their political neutrality to maintain independence. However, climate engagement risks being perceived as “activist.” Supporters argue that climate is a systemic risk and therefore a legitimate concern for monetary and supervisory policy (Schnabel, 2021). Critics counter that skewing asset purchases or collateral eligibility toward low-carbon firms constitutes an industrial policy choice, which should be reserved for elected governments (IMF, 2024).

The Bank of England (2022), for instance, framed its Climate Biennial Exploratory Scenario (CBES) as a *risk management exercise* rather than an activist stance. This framing sought to preserve legitimacy by showing that climate risks are prudential concerns, not policy preferences. Ultimately, central banks can reduce accusations of activism by grounding climate-sensitive interventions in transparent, risk-based criteria and coordinating with fiscal authorities.

4.4 Data and measurement challenges in assessing climate risks

Green monetary policy depends on robust, forward-looking data, yet current disclosure frameworks remain incomplete. Many firms lack consistent reporting on Scope 3 emissions, taxonomies differ across jurisdictions, and long-term asset-level data on physical risks are scarce (NGFS, 2021). These gaps create “model risk” when central banks attempt to incorporate climate factors into collateral frameworks, stress tests, or asset purchases (NGFS, 2024).

For instance, the ECB (2021) noted difficulties in integrating climate considerations into its operations due to inconsistent market data. Similarly, UNEP FI (2024) highlighted that financial institutions often rely on private vendors with divergent methodologies, undermining comparability. Until disclosure standards improve globally, central banks must proceed cautiously, emphasizing pilot programs and gradual integration of climate criteria.

5. Policy Recommendations

5.1 Enhancing central bank mandates without undermining independence

Central banks must integrate climate considerations into their frameworks without eroding independence or credibility. Where statutes permit, mandates can be clarified to include sustainability alongside price and financial stability (Dikau & Volz, 2021). For example, the Bank of England’s remit letter explicitly incorporates support for the government’s net-zero strategy (HM Treasury, 2021). However, excessive expansion of central bank responsibilities risks blurring lines between monetary and fiscal authority (IMF, 2024). A balanced approach involves providing central banks with legal recognition of climate risks while reaffirming their primary mandate of inflation control.

5.2 Improving climate-related risk disclosure

Reliable data remain the cornerstone of effective green monetary policy. To close disclosure gaps, central banks should promote standardized, forward-looking climate risk reporting in coordination with financial regulators (NGFS, 2021). The ECB has already begun requiring enhanced disclosures for counterparties in its collateral framework, setting a precedent for aligning monetary operations with transparency standards (European Central Bank, 2022). Furthermore, integrating frameworks such as the Task Force on Climate-related Financial Disclosures (TCFD) into regulatory requirements can harmonize practices globally (UNEP FI, 2024).

5.3 Developing green financial markets and instruments

Central banks can foster deep and liquid green markets to support monetary transmission and reduce climate risks. Green bonds, sustainability-linked loans, and climate stress-tested collateral instruments can channel capital toward sustainable projects (OECD, 2021). For instance, the People's Bank of China (PBoC) has expanded collateral eligibility to include green bonds, encouraging financial institutions to finance low-carbon projects (Campiglio et al., 2018). By supporting the infrastructure for green asset classes, central banks reduce reliance on carbon-intensive markets while maintaining neutrality through risk-based adjustments.

5.4 Building global resilience through coordination

Climate change is inherently a **global systemic risk**, requiring coordination across jurisdictions. The Network for Greening the Financial System (NGFS) provides a platform for knowledge-sharing and methodological development, but broader integration with fiscal authorities and international organizations remains critical (NGFS, 2024). Joint initiatives—such as harmonized carbon pricing, cross-border disclosure standards, and coordinated financial supervision—can reduce fragmentation and “carbon leakage.” Global forums like the G20 and IMF are well-positioned to ensure that central banks' climate actions are complementary rather than duplicative, reinforcing resilience without undermining monetary stability (Carney, 2021).

6. Conclusion

The analysis shows that while climate change poses systemic risks to inflation, financial stability, and long-term growth, central banks face inherent limitations in addressing them directly. Evidence suggests that central banks can integrate climate risks into their monetary and supervisory frameworks, but these actions should remain supportive rather than substitutive of fiscal and structural policies (IMF, 2024; Schnabel, 2021).

Key findings indicate that central banks play a supportive but constrained role. They can enhance resilience by incorporating climate risks into stress testing, collateral frameworks, and asset purchases (European Central Bank, 2022; Bank of England, 2022). They can also promote green financial markets by recognizing climate-adjusted instruments and encouraging disclosure standards (NGFS, 2021). However, overstretching mandates risks eroding credibility and politicizing monetary institutions (Dikau & Volz, 2021).

Ultimately, balancing climate risks with price stability requires integrated policy approaches. Central banks must remain focused on their primary mandate of price and financial stability while complementing broader national and international climate efforts. Fiscal authorities, financial regulators, and global institutions such as the NGFS, IMF, and G20 are better positioned to drive large-scale climate transitions (Carney, 2021; NGFS, 2024). A collaborative model—where monetary authorities incorporate climate risks prudently, and fiscal actors lead decarbonization—offers the most credible pathway to ensuring that green monetary policy strengthens rather than undermines stability.

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