The Central Bank
of the Republic of Uzbekistan

Prospects for the implementation of green monetary policy

Monetary Policy Department
S.Inogamov, Sh.Shodieva

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Abstract

This article delves into the theory of green monetary policy, which establishes a framework for central bank policies aimed at contributing to the fight against climate change. Within this framework, central banks employ various tools, categorized into two groups: green lending measures and green macroprudential policies. Among these, green lending measures signify the central bank's proactive engagement in addressing climate change, while macroprudential policy represents a more passive approach.

As no economic policy is flawless, green instruments exhibit both advantages and disadvantages that warrant thorough analysis. For instance, conflicts of interest may arise when applying these instruments, potentially diverging from the central bank's primary objectives. Additionally, challenges in implementation can complicate matters. These issues are further exacerbated by the central bank's active stance in combating climate change. Consequently, fostering collaboration between monetary and fiscal bodies becomes essential. Drawing from international experience, green policy should prioritize fiscal measures as the primary driver, with monetary policy playing a complementary role.

Furthermore, the article delves into the topic of green finance in Uzbekistan and provides insights into the role played by the Central Bank of the Republic of Uzbekistan in the country's transition toward a green economy.

Keywords: *climate change, green monetary policy, low carbon economy, the Central Bank of Uzbekistan*

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ACRONYMS

UNO	-	United Nations Organization
ECB	-	European Central Bank
FRS	-	Federal Reserve System
RBI	-	Reserve Bank of India
CCPI	-	Climate Change Performance Index
HQLA	-	High Quality Liquidity Asset
NDC	-	Nationally Determined Contribution
NGFS	-	Network of Central Banks and Supervisors for Greening the Financial System
UNFCCC	-	United Nations Framework Convention on Climate Change

INTRODUCTION

Climate change, also known as global warming, refers to the gradual increase in the Earth's average temperature and the resulting degradation of environmental conditions essential for human life. This phenomenon results from the accumulation of greenhouse gases[1] in the atmosphere. In recent years, the pace of climate change has accelerated, posing direct and indirect threats to the global economy. Addressing this urgent challenge necessitates the widespread implementation of climate change mitigation measures. Consequently, international cooperation plays a pivotal role in solving this global crisis.

According to the International Monetary Fund's 2022 stress test, failure to implement coordinated economic policies could lead to a staggering 1.8 trillion US dollars reduction in global GDP due to climate change impacts.[2]

Countries worldwide face a critical choice regarding climate change. The first path involves inadequate action in the near term, which would expose society to inevitable catastrophic consequences. The second path entails proactive efforts to combat climate change, ensuring sustainable economic growth and long-term development. Both options come with economic costs, but early action significantly reduces the financial and environmental consequences of climate change.

The international community has made significant efforts to combat climate change. The 2015 Paris Agreement established global targets for climate action, with countries aiming to limit the increase in temperature to 1.5°C.

An important step toward achieving these goals was the establishment of the Network for Greening the Financial System (NGFS), which brings together central banks and supervisors. Beyond the financial sector, various measures are being implemented to promote sustainability across other economic sectors. For instance, The Global Alliance for Buildings and Construction focuses on reducing carbon emissions in the construction industry. The International Renewable Energy Agency supports countries in their transition to renewable energy sources. These examples represent just a fraction of the many organizations working at international, national, and regional levels to facilitate the transition to a green economy.

While climate change continues to pose a significant challenge, practical solutions are available. Fiscal policies, technological advancements, and coordinated efforts all play critical roles in addressing this issue. Additionally, the financial system serves as a crucial component, with green monetary policy acting as a complementary tool within this context.

[1] Greenhouse gases are gases that retain heat in the atmosphere. The more of these gases there are, the more the Earth warms up, similar to a greenhouse. Common greenhouse gases include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Remarkably, over 80 percent of all greenhouse gases consist of carbon dioxide.

[2] Mora, C. T., Mora, M. C. E. T., Wu, M. Y., & Zheng, T. (2022). Stress Testing the Global Economy to Climate Change-Related Shocks in Large and Interconnected Economies (No. 2022-2189). International Monetary Fund.

I. GREEN POLICY MAKING

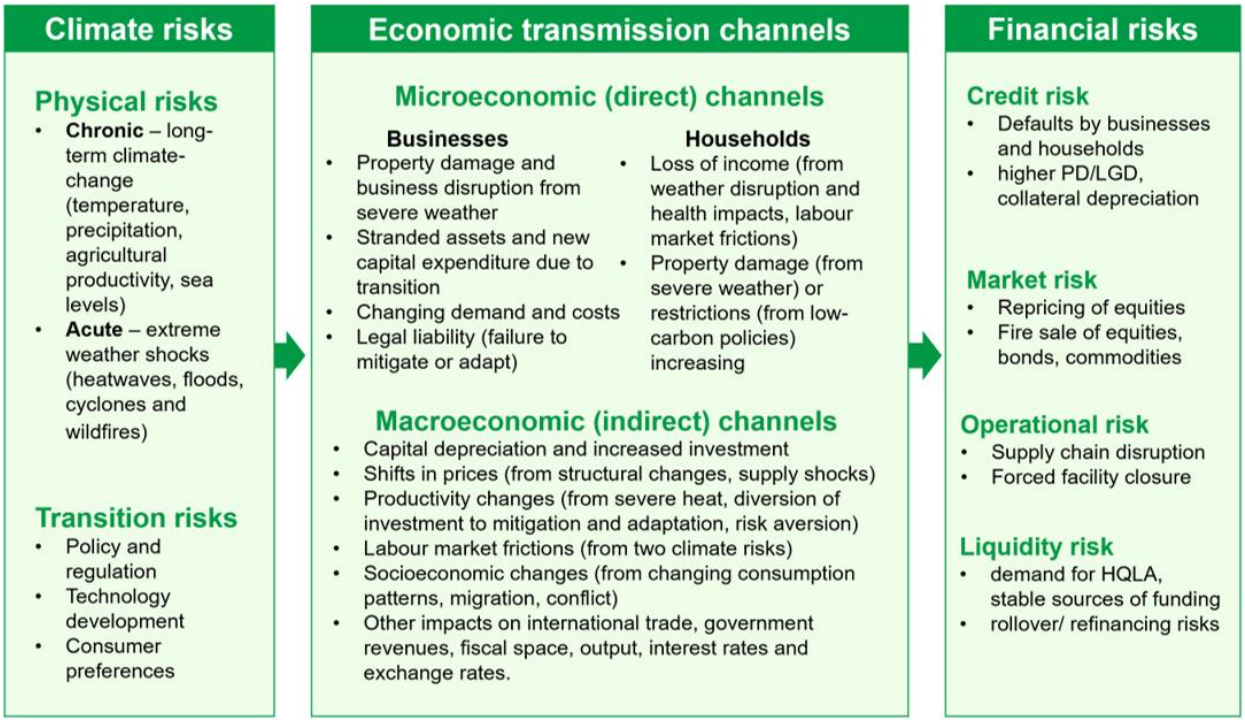
1.1. Climate change risks

Risks from climate change can be categorized into two main types: physical risks and transition risks (Figure 1). When economic decision-making fails to account for climate change, serious risks emerge. These risks fall under the category of *physical risks*. Specifically, extreme weather events such as floods, droughts, wildfires, and hurricanes, along with long-term climate changes like rising sea levels and alterations in precipitation patterns, can significantly disrupt supply chains. The repercussions extend to both the economic and social spheres. Developing countries face heightened vulnerability to material risks associated with climate change. This vulnerability can be attributed to their greater reliance on agriculture and less robust infrastructure compared to developed nations.

However, when a country transitions from a high-carbon to a low-carbon economy to combat climate change, it faces *transition risks* stemming from abrupt changes in economic functioning. These risks are associated with policy changes, technological advancements, and changing consumer preferences that aim to reduce greenhouse gas emissions. These risks can affect supply chains by altering the demand for certain products or services, potentially leading to disruptions in production or distribution.

This, in turn, can impact the financial system by affecting the profitability and stability of businesses involved in these supply chains, as well as the value of investments tied to these industries. If substantial losses from both physical and transition risks materialize simultaneously, financial instability becomes a real concern.

Figure 1. Relationship between Climate Change and Financial System



Source: *NGFS (2020), Overview of Environmental Risk Analysis by Financial Institutions.*
Note: *HQLA – High Quality Liquidity Asset*

Therefore, climate change should be addressed to eliminate the physical risk, and it should be done by implementing well-thought-out policies to minimize the transition risk.

The transition to a low-carbon economy hinges on a dual strategy: reducing emissions from polluting "brown" sectors such as fossil fuels and promoting growth in "green" sectors like renewables. While this shift toward sustainability is critical, the associated costs pose a significant challenge, particularly for developing countries. To overcome this obstacle, policy support and incentives are essential, making clean energy more accessible and bridging the "green gap". This underscores the urgent need for climate-conscious policymaking across all levels.

Effective policy design for climate change mitigation follows a three-step process.

The first step is to understand the root causes of climate change. Greenhouse gases mainly come from four sources: energy use, agriculture, forestry & land use, industrial processes and waste. Energy consumption accounts for over ¾ of total emissions.[3] And the economic sectors that use a lot of energy are responsible for biggest shares of CO_2 emissions.[4] Therefore, fighting against climate change centers around "cleaning" the energy. Clean energy is the one that comes from renewable sources.[5]

The second step involves measurement, which is crucial in addressing climate change. Globally, the accepted metric for assessing climate impact is atmospheric carbon dioxide emissions intensity. This metric quantifies the amount of carbon dioxide emitted per unit of energy consumed. By tracking emissions intensity, policymakers can evaluate both energy efficiency and pollution levels.

The third step is designing green macroeconomic policies.[6] These policies are fiscal (carbon taxes, green subsidies), monetary (central bank tools favoring sustainable activities), or structural (regulations like energy efficiency standards and cap-and-trade systems) – all aiming to steer the economy towards a greener future.

1.2. Green fiscal policy

Green fiscal policy refers to the strategic use of budget spending and tax policies during the transition to a green economy. In the context of climate, introduction of carbon tax, green subsidies and transfers in the tax part of the fiscal policy; and in the budget part, it is envisaged to direct a certain part of the revenues to climate change mitigation and adaptation.

Carbon Tax stands out as the most effective green fiscal tool for reducing fuel consumption.[7] This tax can be levied on suppliers of various fuels (such as coal, petroleum products, and natural gas). In many countries, it takes the form of an excise tax. Suppliers then pass this tax cost on to the price of the products and services they

[3] *Source https://www.iea.org/data-and-statistics/data-tools/greenhouse-gas-emissions-from-energy-data-explorer*
[4] *Carbon emissions are divided into 3 different sections in the Greenhouse Gas Protocol (the world greenhouse gas accounting standard) to understand where it comes from: scope 1 - direct emission, scope 2 - indirect emissions from purchased energy, scope 3 - other indirect emissions*
[5] *Solar, wind, hydropower, geothermal, biomass, and marine energy (including wave, tidal, and current) are all renewable sources of powering*
[6] *That is, to develop a set of appropriate measures in response to climate change and create their legal basis.*
[7] *Benkhodja, M. T., Ma, X., & Razafindrabe, T. (2023). Green monetary and fiscal policies: The role of consumer preferences. Resource and Energy Economics, 73, 101370.*

offer (such as electricity, gasoline, and heating oil). By doing so, this approach encourages both producers and consumers to shift toward more renewable energy sources.

Green Subsidies are financial incentives provided by governments to promote the use of renewable energy sources and environmentally friendly practices. The primary goal of green subsidies is to enhance the competitiveness of clean energy sources in the electricity market by reducing their costs.

While green subsidies increase the adoption of clean energy sources, they may not necessarily reduce overall fuel usage. In contrast, carbon taxes directly target emissions reduction and are more effective in mitigating climate change.

As part of the green fiscal policy, a portion of state budget expenses is allocated to climate change *mitigation* and *adaptation*. This allocation ensures that resources are directed toward addressing the challenges posed by climate change

Climate change mitigation spending aims to limit greenhouse gas emissions. Examples include transitioning to renewable energy sources, improving energy efficiency, and implementing measures to protect and restore forests and critical ecosystems.

Climate change adaptation costs focus on reducing the vulnerability of social and natural systems to the adverse effects of climate change. Many adaptation measures have been implemented at the local level including planting drought-tolerant crop varieties, enhancing water conservation practices, minimizing wildfire risks, and building robust protection systems against extreme weather events like floods and heatwaves.

Given the vulnerability of many developing countries to climate change impacts, a significant portion of their climate-related expenditures is directed toward adaptation measures. For instance, in Uzbekistan, approximately 95% of total climate costs are allocated to climate change adaptation efforts (as shown in Table 1).

Table 1. Climate expenditures of Uzbekistan

		2020	2021	2022
Mitigation	*(billion sums)*	205.1	535.3	612.7
Adaptation		14 264.8	15 966.3	25 414.8
Mixed (joint) impact		409.0	308.3	274.8
Total		**14 878.9**	**16 809.8**	**26 302.4**
Mitigation	*(%)*	1.4	3.2	2.3
Adaptation		95.9	95.0	96.6
Mixed (joint) impact		2.7	1.8	1.0

Source: *United Nations Development Programme (UNDP), French Development Agency (AFD), & Ministry of Economy and Finance of the Republic of Uzbekistan. (2024). "Climate Public Expenditure and Institutional Review: Uzbekistan"*

In conclusion, fiscal policy holds great importance in the fight against climate change. A growing body of research has evaluated the effectiveness of various green policies, consistently demonstrating the pivotal role that fiscal policy plays in addressing the climate crisis. This efficacy stems from the direct influence that fiscal instruments, such as taxes and budgetary expenditures, can exert on climate-related behavior. It is noteworthy that monetary policy also plays a complementary role in mitigating climate change by indirectly affecting the financial system.

1.3. Green monetary policy

Green monetary policy, also known as *green central banking*, focuses on integrating climate change risks into central banks' core functions. In other words, it assumes that central banks leverage their monetary policy instruments to incentivize environmentally sustainable economic activity and disincentivize practices that harm the environment. A central bank uses its tools (both traditional and non-traditional) to encourage transition to a low-carbon economy. Examples include adjustment of interest rates and reserve requirements for credit allocation (main refinancing operations), macroprudential instruments, quantitative easing, collateral adjustments and other central bank initiatives. These tools can be only used when the following preconditions are met:

- Constantly updated database on CO2 emissions of existing enterprises in the economy;
- Rating agencies (existing credit rating agencies may consider climate risk when evaluating banks' portfolios, or separate climate rating agencies may be established);
- Formation of green financial assets (green bonds).

1.3.1. Green lending initiatives

In response to climate change, the *interest rates* for central banks' main refinancing operations are adjusted based on the carbon intensity level of banks' portfolios. Banks heavily invested in polluting sectors are charged a carbon premium (interest rate + carbon premium), while those heavily invested in clean technologies and sustainable enterprises receive a green discount (interest rate – green discount). This system discourages environmentally damaging activities by raising borrowing costs and incentivizes green projects by lowering capital costs.

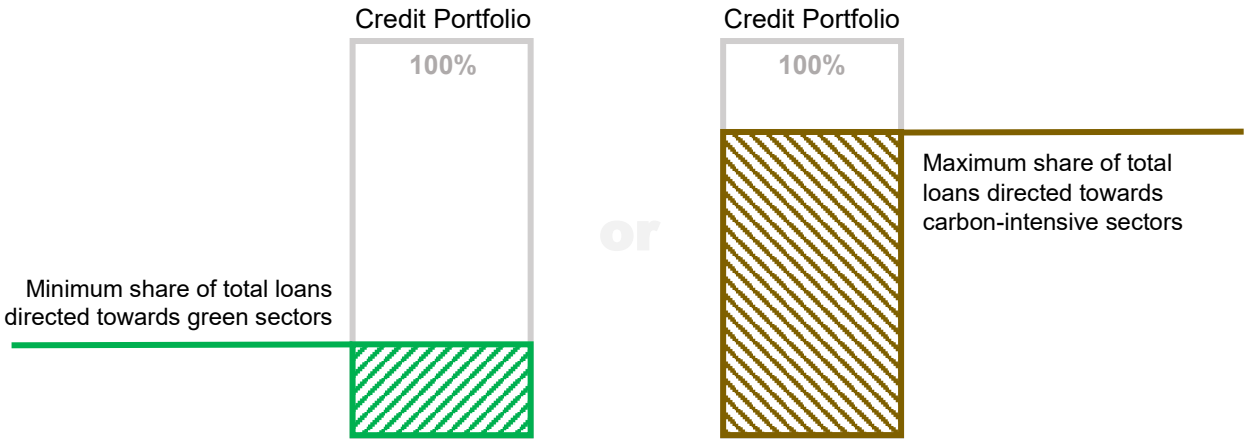
Another tool employed in green central banking is a *collateral framework*, which is traditionally required to be low-risk for liquidity injections. Green monetary policy proposes using interest rates or borrowing limits to incentivize green collateral (e.g., renewable energy companies) and disincentivize brown collateral (e.g., fossil fuels) by making them less attractive.

Minimum and maximum credit quotas [8] are the other tools employed in green monetary policy (Figure 2). Minimum quotas establish a floor for the percentage of loans that banks must allocate to specific sectors, such as renewable energy projects.

For example, in Bangladesh, commercial banks and other financial institutions are required to allocate 5% of their total loan portfolio to green sectors. On the other hand, maximum quotas set the upper limit for lending to carbon-intensive sectors, like fossil fuel extraction.

These tools, combined with *differential reserve requirements*, where banks are required to hold varying levels of reserves based on the environmental impact of their lending activities, can significantly influence bank lending behavior.

Figure 2. Minimum and maximum credit quotas



Source: *Authors' own construction.*

Overall, while various green monetary policy tools exist globally, their mechanisms often share a common foundation: integrating climate considerations into the requirements for financial assets used by central banks in their monetary operations.

The role of central banks in green lending has been a topic of extensive debate. Critics argue that central banks should maintain their traditional focus on price and financial stability, leaving climate action primarily to fiscal policy. This perspective arises from concerns that the application of green monetary and credit measures might disrupt the market mechanism, create conflicts of interest, and ultimately lead to situations contrary to both price stability and financial stability.

However, proponents contend that central banks possess a cost-effective solution for addressing climate change through their own instruments. While clean technologies, such as solar panels, are often expensive to implement and may discourage corporate investment, central banks can exert influence over borrowing costs. By making subtle adjustments to the functioning of the financial system, they can create incentives for investment in green projects. This strategic approach remains a key rationale for central banks' involvement in climate-related initiatives.

[8] ***The credit quota*** *is expressed as a percentage (%) of the total credit funds in the bank's loan portfolio. It serves to limit the amount of credit that the bank can allocate to specific sectors of the economy.*

1.3.2. Green macroprudential instruments

In contrast to monetary policy, which primarily targets inflation and economic growth, macroprudential tools, utilized by central banks and financial regulators, are aimed at ensuring the stability of the financial system by preventing the accumulation of excessive systemic risks. In the context of climate change, they are designed to mitigate environmental risks in the financial system.

Capital requirements can serve as part of green macroprudential instruments. Counter-cyclical capital buffers (CCBs) act like brakes for banks. In booms, they hold more capital to weather potential loan defaults, but are relaxed in downturns to boost lending. This helps stabilize the financial system. Green buffers target banks heavily invested in fossil fuels. Easy credit fuels asset price inflation, potentially creating a "carbon bubble" – a situation where fossil fuel assets become overvalued.[9] By requiring banks to hold extra capital during economic booms, *green counter-cyclical capital buffers* (GCCBs) aim to shield the financial system from the potential burst of this bubble, which could trigger significant losses if fossil fuel asset values crash. Moreover, the *leverage ratio* can be a green macroprudential tool. Lower capital needs for eco-friendly loans nudge banks to lend more in sustainable sectors, while higher requirements for polluting assets make them less attractive, pushing banks towards a greener portfolio.

When it comes to *liquidity instruments,* liquidity coverage ratio (LCR) requires banks to hold a stock of highly liquid assets (HQLA) sufficient to meet their short-term cash needs (typically 30 days) under a stress scenario. This helps ensure banks have enough resources to survive temporary liquidity issues and prevent them from becoming a source of financial instability. In the context of green macroprudential policy, the types of assets considered "high-quality" could be reevaluated to favor those less exposed to climate risks. For example, bonds issued by companies transitioning to clean energy might be considered more desirable HQLA compared to those linked to fossil fuel industries.

Another tool used by central banks to conduct green macroprudential policies is *climate stress tests*. These simulations assess how financial institutions will perform under different climate change scenarios[10]. By evaluating the resilience of financial institutions to climate change, these stress tests require banks to conduct thorough assessments. Identifying and reporting potential financial risks related to climate change to the central bank encourages banks to be more responsible in considering climate risks in their operations.

There is also a *green communication policy* that is separate from central bank lending practices or macroprudential policy instruments. These include the development of a climate taxonomy,[11] the creation of a climate-related data collection and database within the financial system, research, workshops, and guidelines for financial system actors to operate in a climate-sensitive manner.

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[9] de Greiff, K., Delis, M., & Ongena, S. (2018). Being stranded on the carbon bubble. Climate Policy Risk and the Pricing of Bank Loans. CEPR Discussion Papers.
[10] UNEP FI's Comprehensive Good Practice Guide to Climate Stress Testing.
[11] Climate taxonomy is a system that defines clear categories and criteria related to climate-related activities and investments.

However, report by climate finance experts calls for central banks to move beyond focusing on safeguarding the financial-system[12]. They emphasize the need for active risk management and application of abovementioned green monetary tools to ensure financial system stability, as individual firms may not be able to handle these risks effectively on their own.

1.3.3. Conflict of interest in conducting green monetary policy

While greening monetary policy can help mitigate climate-related issues, many central banks are hesitant to adopt this approach. Because the application of such a policy can create a conflict of interests. Specifically, the climate-related goals and the measures taken to ensure price and financial stability—both central to the main objectives of central banks—sometimes clash. Prioritizing one objective may come at the expense of the other. For instance, pursuing carbon neutrality[13] can disrupt lending mechanisms (market neutrality[14]) and undermine the signaling function of market prices. Consequently, most central banks do not fully endorse this policy.

On the one hand, market neutrality presents inherent bias of market mechanisms towards favoring carbon-intensive industries, as traditional market pricing solely reflects production costs and consumer demand. A recent study reveals the existence of this bias in the financial system, with European banks deriving over 60% of their income from loans to carbon-intensive companies.[15] This aligns with the fact that the energy sector, the biggest greenhouse gas emitter (as shown in Figure 3), also receives the most bank financing. This suggests that the financial system might be unintentionally favoring polluting industries.

On the other hand, choosing the path of carbon neutrality does not correspond to the main goals of the central bank. When the central bank determines which sectors to lend to, not through market mechanisms, but through regulation, it disables the signaling function of the market. This can put the financial system at risk, restricting the allocation of limited financial resources to the most profitable investment projects.

Furthermore, the carbon neutrality approach is likely to make it difficult for central banks to achieve their goal of price stability. Because such a policy can cause both demand-side and supply-side inflation. Making it more difficult to provide credit to certain sectors will put pressure on inflation by increasing their costs. In addition, policies to promote the use of clean energy sources may increase the demand for credit for such energy resources and lead to demand-pull inflation by temporarily raising interest rates.

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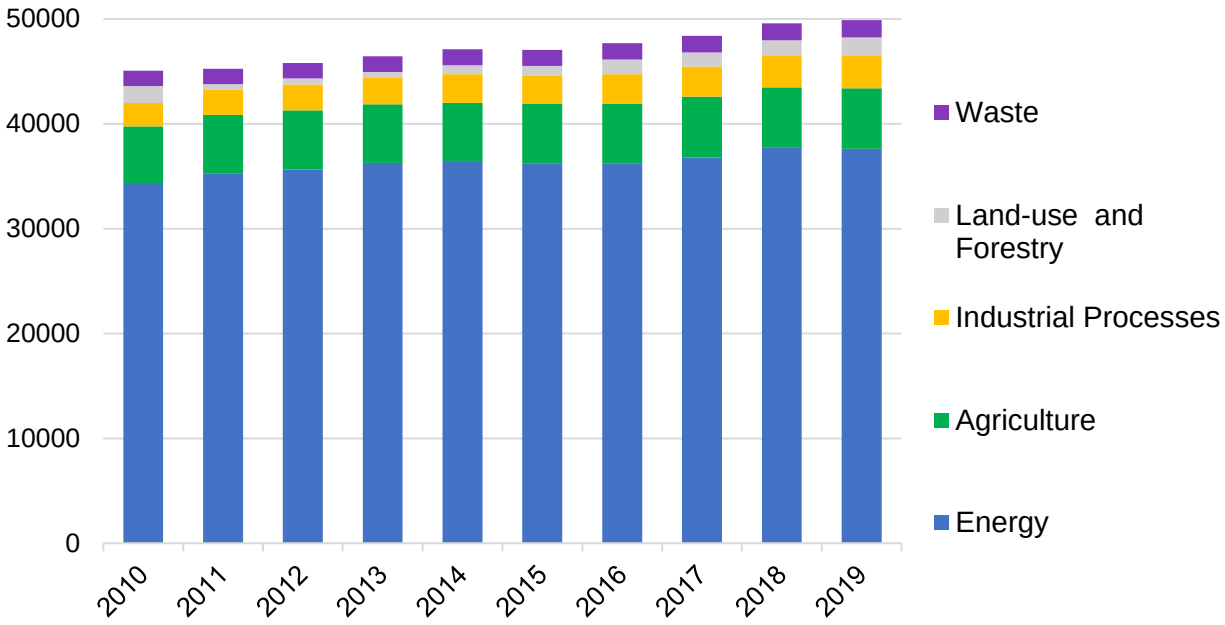
[12] Songwe V, Stern N, Bhattacharya A (2022) Finance for climate action: Scaling up investment for climate and development. London: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science.

[13] Carbon neutrality (also known as climate neutrality) refers to the principle that the financial system should not favor sectors that contribute to climate pollution. To achieve this, the measures mentioned earlier will be employed, and credit allocation will be categorized based on carbon intensity levels.

[14] Market neutrality implies equal provision of financing resources for all sectors, without any discounts or additional premiums set for specific sectors.

[15] European Central Bank (ECB) / European Systemic Risk Board (ESRB). (2023, December). Towards macroprudential frameworks for managing climate risk.

Figure 3. The share of World Greenhouse Gas Emissions by sectors *(mln tonns of CO_2)*



***Source**: "Climate Watch Historical GHG Emissions" 2022. Washington: World Resource Institute.*

Moreover, the shift from a market-neutral to a climate-neutral approach is also a potential threat to central banks' credibility. Market actors' trust could be undermined if central bank actions are perceived as favoring specific sectors or industries during the transition. This concern likely contributes to the Federal Reserve's conservative approach on green central banking practices. Chair Jerome H. Powell (2023)[16] explicitly emphasized this point, stating: *"The Federal Reserve is not and will not be a 'climate policymaker.' Decisions about policies to address climate change must be made by the elected branches of government... It is not the Fed's role to tell banks which businesses they can and cannot lend to."*

Climate change is already preventing central banks from meeting their goals. This increases the need to take action against climate change. However, the scientific community has not reached a consensus on which authorities should take part in this struggle in the main and complementary roles.

Overall, green monetary policy offers promise for climate action, but central banks face a balancing act: ensuring price stability and financial stability while navigating potential market distortions and maintaining their credibility in a climate-conscious world.

[16] *Powell, J. H. (2023, October 24). Statement by Chair Jerome H. Powell on Principles for Climate-Related Financial Risk Management for Large Financial Institutions*

II. FOREIGN EXPERIENCE

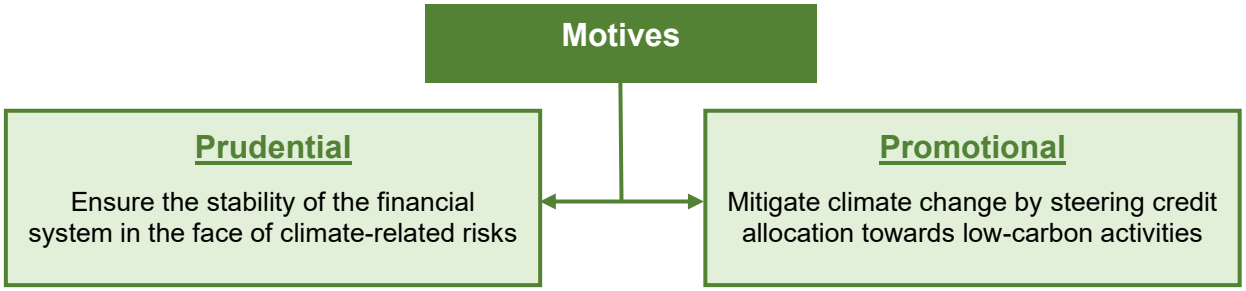
Countries exhibit significant variation in their preferred policy instruments to address climate change. Some nations rely more on fiscal instruments to incentivize a transition towards a low-carbon economy, while others prioritize adjustments to monetary or structural policies to promote environmentally friendly practices across various sectors. However, in real life the most prevalent approach involves a combination of tools from two or even all three policy domains – fiscal, structural, and monetary – to achieve comprehensive climate action.

The emergence of climate transition risks has prompted central banks to acknowledge climate change as a systemic threat, which in turn led to a rise in "green central banking" practices. World central banks (currently 138) joined the Network for Greening the Financial System to make finance greener and support sustainable investments. Since 2020, there has been a surge in research examining how central banks can tackle climate change. This growing body of research highlights that more and more central banks are now considering climate change in their work. However, green central banking experiences vary across advanced and developing countries according to their motives in contributing to tackle climate issues. The motives for taking climate-related financial policies can be classified into two categories (Figure 4).

Prudential motives focus on mitigating risks to the traditional goals of central banks, such as financial stability and price stability. In this context, climate change is seen as a potential threat to these goals. By taking action to address climate-related risks (e.g., green capital buffers), central banks are acting out of prudential motives to safeguard the financial system.

Promotional motives go beyond the traditional mandate of central banks and focus on promoting a specific policy objective. In this case, the promotional motive is to accelerate the transition towards a low-carbon economy. This could involve using tools like green lending quotas or preferential interest rates for environmentally friendly projects. It is recognized that promotional motives can be challenging to the concept of independence of central banks, which is typically focused on maintaining neutrality in economic policy.

Figure 4. Classification of motives for climate-related financial policies



Source: *Baer, M., Campiglio, E., & Deyris, J. (2021). It takes two to dance: Institutional dynamics and climate-related financial policies. Ecological Economics, 190, 107210.*

Figure 5 demonstrates the contrasting experiences of advanced and developing economies in the realm of green central banking.

Central banks play a crucial role in maintaining economic stability, but their specific responsibilities can differ between developed and developing economies. Developed economies often have central banks with a narrow remit, focusing primarily on price and financial stability. This allows for a more targeted approach to policy decisions and promotes central bank independence. Hence, central banks in advanced economies have traditionally focused on conservative banking principles, prioritizing market neutrality over climate neutrality. This focus leads them to be driven by only prudential motives when considering climate change action.

In contrast, developing economies frequently grant their central banks a wider remit. These central banks, in addition to price and financial stability, may also be tasked with promoting economic growth, financial inclusion, and exchange rate stability to attract foreign investment and trade. This broader mandate, while potentially fostering economic development, can make central banks more susceptible to political influence as they juggle multiple, sometimes conflicting, objectives.

Figure 5. Green monetary policy in advanced and developing countries

Advanced economies	Developing economies
	Higher vulnerability to physical risks More exposed to immediate climate change risks because of higher reliance on agriculture and limited infrastructure
Narrow remit of Central banks Central banks focus solely on their primary mandates of price stability and financial stability	**Wider remit of Central banks** Central banks normally play active roles to support governments' economic policies
Prudential risks *(conservative approach)* Which, focus on mitigating risks to the traditional goals of central banks, such as financial stability and price stability	**Promotional risks** *(progressive approach)* Which, go beyond the traditional mandate of central banks and focus on promotiing a specific policy objective

Source: *Authors' own construction*

While tracking green financial flows is easy, measuring their real-world impact on the economy and people's lives is a complex challenge. Several independent organizations like the Climate Policy Assessment Tool,[17] Climate Action Tracker,[18] and Climate Change Performance Index[19] track government climate actions. They assess effectiveness and provide policy recommendations. Evaluating the impact of central bank actions in promoting green initiatives is even more challenging because isolating the impact of green monetary policies alone from the effects of other environmental policies is difficult. This scorecard by the non-profit organization, Positive Money is an attempt to address this gap. It annually assesses the impact of central bank policies on green initiatives.[20]

[17] *The model developed jointly by the International Monetary Fund (IMF) and the World Bank aims to quantify the impact of climate change mitigation measures.*
[18] *It is an independent scientific project that aims to monitor the progress of international climate action in reducing greenhouse gas emissions, aligning with the goals of the Paris Agreement.*
[19] *It is a rating system developed by the German organization for environment and development (Germanwatch) to enhance transparency in international climate policy.*
[20] *Positive money. (2022). The Green Central Banking Scorecard.*

2.1. The Federal Reserve System

FRS initiated its climate action in 2020 by joining the NGFS community, and the Financial Stability Board developed a roadmap to tackle climate-related financial risks. "The Report on climate-related Financial risks" [21] of 2021 provided recommendations to enhance climate-related data collection, establishing transparency standards, and ensuring that bank management considers climate factors in decision-making. However, the report does not specify deadlines for implementing these recommendations. Moreover, FRS remains the last major central bank to adopt climate scenario analyses.

- In September 2022, FZT announced the development of a pilot program on climate scenario analysis.[22]
- Guidance for this pilot program was released in early 2023,[23] and results are expected to be announced by the end of the year[24].
- In 2023, the "Principles for climate-related financial risk management for large financial institutions" [25] was issued. These guidelines are for big banks (over $100 billion in assets) to help them manage the financial risks of climate change, including extreme weather events and the shift to a greener economy.

According to Climate Change Performance Index [26] climate actions in the US were rated as "very low" ranking 57th place out of 67 countries. According to the report, green government policies mainly were held by fiscal authorities. However, they were not sufficient and even not compatible with the Paris Agreement target. Similarly, the 2022 Green Central Banking Scorecard rated the FRS's actions on climate change a low "D" (A+ to F scale) indicating that FRS is lagging behind in adjusting central banking operations. It suggests, they have primarily focused on modest-impact measures like pilot climate scenario programs, with no implementation of any green monetary policy tools.

Overall, the climate actions undertaken by the FRS can be primarily characterized by prudence, reflecting a pragmatic orientation rather than a proactive stance toward addressing climate change. A key rationale behind the FRS's commitment to maintain its traditional mandates is to preserve its independence, as deviating from these mandates could undermine the FRS's credibility.

[21] *Financial Stability Oversight Council [FSOC]. (2021, October 21). Report on climate-related financial risk 2021.*
[22] *In terms of scope, while a stress test focuses on a specific climate variable, a scenario analysis examines the impact of multiple variables on the financial system more broadly.*
[23] *Board of Governors of the Federal Reserve System. (2023, January 17). Pilot Climate Scenario Analysis (CSA) Exercise: Participant Instructions.*
[24] *Gibson, M. S. (2023, July 17). Statement by Michael S. Gibson, Director of Supervision and Regulation, Board of Governors of the Federal Reserve System.*
[25] *Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, & Office of the Comptroller of the Currency. (2023, October 24). Principles for climate-related financial risk management for large financial institutions [Press release].*
[26] *Climate Change Performance Index (CCPI) is an annual index published by Germanwatch that assesses a country's efforts to combat climate change across four categories: greenhouse gas emissions, renewable energy use, energy use, and climate policy. The countries the CCPI covered are responsible for more than 90% of all GHG emissions.*

2.2. The European Central Bank

The European Council adopted conclusions on climate change in 2019, setting climate goals of achieving a climate-neutral Union until 2050. Beyond the primary objective of the EU the ECB shall also support the general economic policies of the EU. This serves as the legal base for the ECB to "green" the monetary policy.

- Actions started in 2020 when the ECB announced that sustainability-linked bonds become eligible as central bank collateral[27];
- In 2021 the ECB presented climate action plan with an ambitious roadmap[28];
- The actual actions started being taken after the press-release[29] of 2022 in which exact steps to incorporate climate-change concern into monetary instruments of the ECB were determined (corporate bond purchases, collateral framework, disclosure requirements and risk management)

The actions taken by the ECB to support the global fight against climate change has been studied by the expertise and researches. The overall results can be summarized that some actions resulted in desired outcomes while some other did not align with the expectations.

For example, it is reported that decarbonizing the corporate sector purchase programme (CSPP) might have only small effects which might not be long-lasting. Furthermore, there is a likelihood that green monetary policy might offset the benefits that come from the existing carbon market of the EU, the Emissions Trading System.[30] Additionally, studies by the ECB on temporary green QEs suggest they might be effective in reducing harmful emissions, but have a limited impact on the total amount of pollution (stock of pollution).[31] However, changes in the ECB collateral framework have a considerable impact on encouraging fossil fuel companies to issue green bonds and overall increasing green investment.[32]

Moreover, natural disasters were more attributable to inflationary pressures in the EU in the recent years depriving the ECB of some green instruments. Yet, this shows that climate change hinders central banks to reach their inflationary targets, even more increasing the significance of climate considerations.

Overall, among the five countries and regions receiving high ratings for Climate Policy indicators in CCPI Rating, in 2024, the European Union stands alongside Denmark, Brazil, and Germany. Climate policies have been implemented by both monetary and fiscal authorities, the latter mainly being promotional (the extension of ECT1 and introduction of ETS2) and the former emphasizing basically prudential measures. However, the EU's contribution remains insufficient to contribute to the 1.5°C objective of the Paris Agreement considering its share for global GHG.

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[27] *https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200922~482e4a5a90.en.html*
[28] *https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708_1~f104919225.en.html*
[29] *https://www.ecb.europa.eu/press/pr/date/2022/html/ecb.pr220704~4f48a72462.en.html*
[30] *Daniel, G. R. O. S., & SHAMSFAKHR, F. (2023). Shades of Green Monetary Policy-Would a green tilt help?.*
[31] *Ferrari, A., & Landi, V. N. (2024). Whatever it takes to save the planet? Central banks and unconventional green policy. Macroeconomic Dynamics, 28(2), 299-324.*
[32] *DOBKOWITZ, S., HÜTTL, P., KRIWOLUZKY, A., & WITTICH, J. (2023). Climate Change and Monetary Policy: Risks, instruments, & chances.*

According to the rating by 'Positive Money' among G20 countries, ECB ranks fourth in terms of climate action. This achievement is attributed to the simultaneous consideration of green lending initiatives,[33] and ECB's commitment to a carbon-neutral approach.

2.3. The Reserve Bank of India

India's well-designed policies stand out for their effectiveness[34]. Because India has implemented various policies to promote clean energy in both power and transportation sectors. Power-focused initiatives include the National Solar Mission (2010), feed-in tariffs, utility power purchase obligations, and fiscal incentives like solar project subsidies and tax breaks. To decarbonize the transportation sector, the government introduced the Faster Adoption and Manufacturing of Electric (and Hybrid) Vehicles in India (FAME-II) scheme (2019-2021).[35]

Since 2015, the Reserve Bank of India (RBI) has prioritized lending to the renewable energy sector and reduced the cost of loans to this sector. And from 2020, the lower limit of lending for the renewable energy production sector has been doubled (to 300 million rupees ≈ 3.6 million US dollars). As a result, by 2022, the share of sectors with high emissions of greenhouse gases (responsible for 60 percent of total greenhouse gas emissions) in total lending was 12 percent. [36]

In April 2021, the RBI joined the NGFS. Three reasons were outlined by the RBI why it should incorporate climate change concerns Firstly, climate change threatens price stability by disrupting food production and causing extreme weather events, leading to potential inflation problems. Secondly, the RBI, as the lender of last resort, needs to consider the financial stability risks posed by climate change, as it could lead to losses for financial institutions. Finally, the recent COVID-19 stimulus programs offer an opportunity to promote a sustainable economic future. Instead of terminating these packages, they can be shifted to encourage investments in climate-friendly technologies.

Concerning data collection, banks are required to report loans by industry, but not the specific breakdown of their investments. Additionally, they do not collect data on the carbon intensity of their lending portfolios. Researchers can still gain insights by comparing industry lending with sectoral emissions data. Overall, national and Refinitiv loan data is used to form climate database.

The RBI is exploring ways to address climate change as a potential financial risk. Central bank is conducting research on green finance, developing regulatory frameworks, organizing discussions on this topic and taking some other prudential measures. The

[33] *In particular, presently, the issue of placing climate-related quantity and quality restrictions on the loan portfolio of banks and issues of green targeted lending are being promoted.*
[34] *https://www.weforum.org/agenda/2024/02/climate-policy-india/*
[35] *World Bank. (2023). Reality Check: Lessons from 25 Policies Advancing a Low-Carbon Future. Climate Change and Development Series. Washington, DC: World Bank.*
[36] *Vaze, P., Kumar, N., Colenbrander, S., Burge, L., & Sharma, N. (2022, March 17). Identifying, managing and disclosing climate-related financial risks: options for the Reserve Bank of India. Climate Bonds Initiative, ODI, and AUCTUSESG.*

Reserve Bank of India established a Sustainable Finance Group (SFG) in May 2021, which is responsible for issues related to climate change. Minimum credit quotas to encourage lending to renewable sector was set.[37] Additionally, RBI is considering to include ESG disclosures[38] for banks to manage climate risks and requirements of climate stress tests.[39]

Overall, India's climate policies ranked high (7 out of 67) as of 2022, but overshadowed by coal reliance & slow renewables. Experts push for faster progress: less coal, more renewables, earlier net-zero target (until 2050, not 2070) and sustainable infrastructure. While India ranked medium (12th) [40] among G20 countries for monetary policies to decarbonize the economy, most actions are risk-focused (prudential) and haven't all been fully implemented.

[37] *Reserve Bank of India. Master Directions – Priority Sector Lending (PSL) – Targets and Classification.*
[38] ***ESG disclosure** refers to a voluntary or mandatory public report by which banks communicate their environmental, social, and governance (ESG) risks, strategies, and performance to a wide range of stakeholders.*
[39] *Reserve Bank of India. Publications – Perspectives, December 28, 2021*
[40] *Barmes, D., & Eames, N. (2022). The Green Central Banking Scorecard: Positive Money.*

III. GREEN FINANCE IN UZBEKISTAN

3.1. Climate risks

Climate change has become a pressing issue in Uzbekistan. Dust storms, floods, and extreme temperatures (both hot and cold) are causing significant damage to the country's agricultural production, infrastructure, and overall economy. This concern is echoed by the World Bank and the Asian Development Bank, which have both highlighted the severe impact of climate change on Uzbekistan's economic development. Notably, the average temperature in Uzbekistan has risen even faster than the global average. Prolonged periods of these extreme weather events lead to a cascade of problems, including droughts, water scarcity, and reduced agricultural productivity.[41]

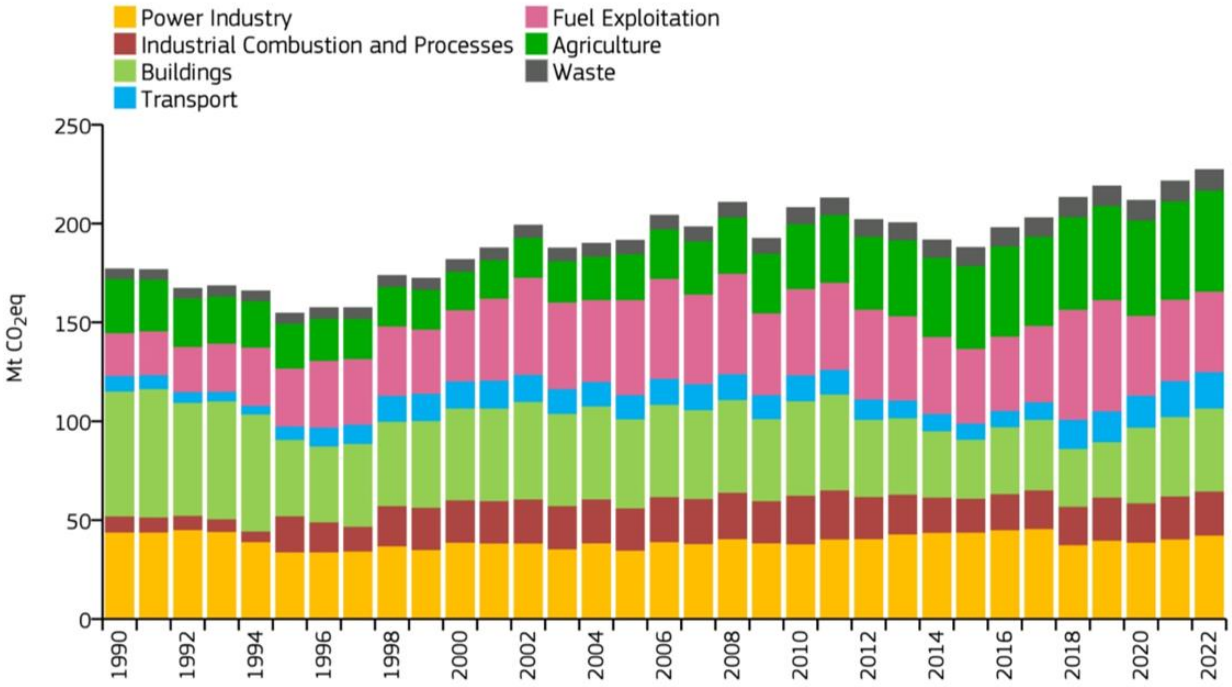
Natural disasters inflict an annual cost of approximately $92 million USD on Uzbekistan, representing 0.2% of the country's GDP[42]. This economic burden disproportionately impacts the nation's most vulnerable populations, particularly those in the agricultural sector. With a quarter of the workforce employed in agriculture, a sector highly susceptible to climate change and critical to the national economy, the World Bank's 2023 report on Uzbekistan's climate and development issued a warning, stating that Uzbekistan's development prospects would be severely compromised unless urgent action is taken to address climate change.[43]

Uzbekistan is a developing economy in which agriculture plays a major role: it accounts for more than 25 percent of the country's GDP [44] and employs more than a quarter of the total workforce. This increases the vulnerability of the financial system to the physical risks of climate change, as agricultural production is directly dependent on weather conditions. In addition, in the conditions of Uzbekistan, the risks of the transitional period of climate change are also an urgent issue. Because production relies mainly on oil and natural gas sources. More than 80 percent of greenhouse gas emissions in Uzbekistan fall on the energy sector [45] (Figure 6). One of the risks of the transition period is that many assets in this sector will become obsolete due to the measures taken to transition to a low-carbon economy.

The underdeveloped state of Uzbekistan's insurance market further exacerbates the financial system's vulnerability to climate risks. According to a 2022 report by the United Nations Development Programme and the Insurance and Risk Finance Facility, Uzbekistan faces significant challenges in managing natural disaster risks. Notably, the country lacks a unified mechanism for financing disaster risk reduction efforts. Currently, climate change risks are primarily addressed through state budget allocations and financial assistance from international organizations.

[41] *Climate Risk Country Profile: Uzbekistan (2021): The World Bank Group and the Asian Development Bank.*
[42] *Country Climate and Development Report: Uzbekistan (2023). World Bank Group.*
[43] *Country Climate and Development Report: Uzbekistan (2023). World Bank Group.*
[44] *https://www.trade.gov/country-commercial-guides/uzbekistan-agricultural-sectors*
[45] *Crippa, M., Guizzardi, D., Pagani, F., et al. (2023). GHG emissions of all world countries: Report of the European Commission, Joint Research Centre (JRC): Publications Office of the European Union, Luxembourg.*

Figure 6. Greenhouse Gas Emissions across Economic Sectors in Uzbekistan



Source: *Emissions Database for Global Atmospheric Research.*

The impact assessment study conducted by the World Bank and the Global Facility for Disaster Reduction and Recovery estimated probable maximum losses from climate change in Uzbekistan. These losses were equivalent to 3.2 percent of Uzbekistan's GDP in the year 2020. [46]

3.2. Climate policies

Recognizing the global impact of climate change, Uzbekistan has taken significant steps towards environmental sustainability. They involve active participation in international agreements like the UNFCCC, Kyoto Protocol, and Paris Agreement and ambitious national strategies such as the Strategy on the Transition of the Republic of Uzbekistan to the 'Green' Economy for the Period of 2019–2030 and Uzbekistan-2030 strategies set concrete targets for a greener future.

Notably, the country aims for a significant 35% reduction in greenhouse gas emissions by 2030 compared to 2010 levels, alongside a substantial increase in renewable energy use, targeting a 40% share in the energy mix by the same year.

Since 2024, CCPI index included Uzbekistan in its ranking.[47] According to the report, despite Uzbekistan's commitment to reducing emissions and increasing renewable energy (seen in its updated NDC[48] and Green Economy Strategy), the CCPI ranks them low due to heavy reliance on natural gas and limited renewable capacity.

[46] *Inclusive Insurance and risk financing in Uzbekistan. Snapshot and way forward (2022). United Nations Development Program [UNDP] & Insurance and Risk Finance Facility [IRFF].*
[47] *Germanwatch & NewClimate Institute. (2024). Climate Change Performance Index 2024.*
[48] *NDC (Nationally Determined Contribution) – is a climate action plan to reduce emissions and adapt to climate impacts. All members of the Paris Agreement are required to draw up an NDC and update it every five years.*

While the country has ambitious plans, experts urge faster action on renewables, particularly solar energy, to achieve a more substantial green transition.

Figure 7. Major steps taken by Uzbekistan to tackle climate change

Note: *[1] United Nations Framework Convention on Climate Change*
[2] Nationally Determined Contribution
[3] The Strategy on the Transition of the Republic of Uzbekistan to the 'Green' Economy for the Period of 2019–2030
[4] Network for Greening the Financial System

3.3. Central Bank and Climate Change

The Central Bank of Uzbekistan (CBU) has three main objectives in its mandate: maintaining price stability, a stable banking system, and a stable payment system.[49] Since Uzbekistan adopted an Inflation Targeting regime of monetary policy in 2020, the performance of these latter two objectives should not conflict with the primary goal of price stability.

The CBU is not mandated with other objectives such as supporting general economic policies, which is frequently seen as a typical function of many central banks in developing countries. This likely explains the CBU's conservative stance on the green transition so far. However, CBU plays a crucial role in the country's pursuit of carbon neutrality by 2060 for three main reasons.

Firstly, climate risks threaten the CBU's ability to achieve its targets.

Secondly, businesses are already demonstrating significant willingness to participate in green sectors.

Thirdly, state budgets alone cannot finance all climate actions, making the private sector's role crucial in funding Uzbekistan's transition to a green economy.

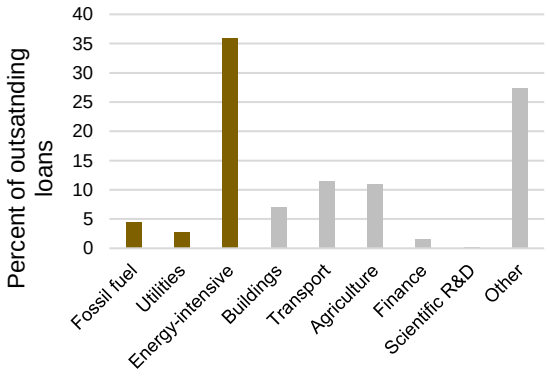
1. Climate risks pose a significant challenge to the central bank's ability to achieve its objectives in the long-term. Higher average temperatures cause non-linear upwards inflationary pressures[50] making it even harder to reach its inflation target of 5%.

Moreover, people severely affected by physical risks are likely to default on their loans which expose banks to credit risk. Generally, climate change poses a significant threat to financial stability. From increased loan defaults due to weather-damaged businesses and infrastructure, to reduced collateral value from extreme weather events, climate risks can weaken banks' financial health. Disruptions from climate events can further hinder efficient operations, while market volatility triggered by both physical and transition risks makes managing investment portfolios challenging.

[49] Law of the Republic of Uzbekistan "On the Central Bank of the Republic of Uzbekistan" (Article 5)
[50] Kotz, M., Kuik, F., Lis, E., & Nickel, C. (2023). The impact of global warming on inflation: averages, seasonality and extremes.

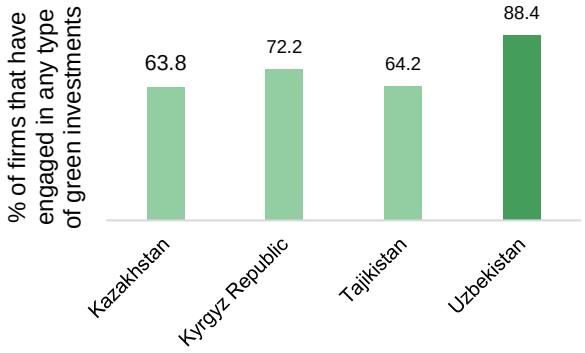
An analysis reveals that a significant portion, 42%, of Uzbekistan's bank loans were directed towards energy-intensive industries by the end of 2022 (Figure 8). This heavy reliance presents a challenge, as market volatility caused by transition risks makes it difficult to manage investment portfolios, increases economic uncertainty, and ultimately threatens to trigger an economic downturn.

Figure 8. Exposure of Uzbek banks to transition risk across sectors (2022)



Source: *World bank analysis based on CBU data.*

Figure 9. Share of firms that engaged in any green investment in the past three years



Source: *Lootty et al. 2022.*
Note: *Share of private firms in manufacturing and services based on 2019 Enterprise Survey.*

2. According to the Country Climate and Development Report of World Bank,[51] Uzbek businesses are surprisingly more engaged in green practices compared to other countries in the region. Despite climate change being a relatively new policy focus for the government, nearly 90% of Uzbek firms were already investing in green initiatives by 2019 (Figure 9). This can be evidence that green monetary policy practices might be welcomed by the economic players. Therefore, CBU's use of green monetary policy tools offers a promising approach to promoting a sustainable economy in Uzbekistan.

Specifically, it is preferable to reward "green" sectors rather than penalizing "brown" ones when using these tools. Brown sectors, though unsustainable, are still too significant to abruptly force businesses and households to switch away, which in turn could destabilize the financial system. Instead, a rewarding approach would make green sectors more attractive, encouraging a natural shift away from unsustainable industries.

3. Private financing is an essential component for funding the transition to a green economy. Sole reliance on state budgets to address a challenge as immense as climate change is not only inadequate, but can also lead to misallocation of limited resources.

Strained by rising government expenditures and declining revenue from natural resources, Uzbekistan has experienced a string of negative budget balances in the past six years. This has led to a steady accumulation of national debt. Financing Uzbekistan's ambitious sustainable development goals and climate action initiatives, estimated to require over $6 billion annually, exceeds the capacity of state resources alone.[52]

[51] *Country Climate and Development Report: Uzbekistan (2023). World Bank Group.*
[52] *Financing Uzbekistan's green transition: Capital market development and opportunities for green bond issuance (2023). Organization for Economic Co-operation and Development (OECD).*

The solution to this problem lies in the diversification of funding sources.[53] The Central Bank, through its financial instruments, can indirectly influence the investment patterns of the private sector, encouraging greater participation in green projects.

In October 2022, Uzbekistan became the member of the NGFS to learn from international experiences on climate change. A climate change dashboard was developed to assess the impact of climate change risks on financial stability for Uzbekistan.[54] The Department of Financial Stability at CBU has been exploring the integration of climate stress tests into its macro stress tests.

The CBU's stress test (2023-2025) identified climate change as a risk to agriculture (25% of 2022 GDP). The test simulated how droughts and rising temperatures could impact agricultural production and lead to loan defaults by banks heavily invested there (11% of total loans). This underlines the need for climate risk strategies for both agriculture and the financial system's long-term sustainability.

Presently, a climate stress test is being developed by the CBU, that focuses on all other economic industries.[55] However, the central bank is facing challenges to conduct climate stress tests due to the scarcity of climate-related data, particularly data on atmospheric carbon emissions and corporate financial reports.[56]

While the CBU plays an important role in addressing climate change given Uzbekistan's situation, some fundamental prerequisites need to be met (by both government and monetary authorities) before it can adjust its operations to decarbonize the financial system:

- Development of a national database on the carbon intensity of enterprises and organizations;
- Promotion of green financial instruments (green bonds);
- Capital market development;
- Organization of economic activity in the country without energy subsidies.[57]

Currently, the CBU with the support of World Bank Group is preparing a multi-year strategy for the period of 2024-2027 in order to incorporate climate-related financial risks in the management of banking sector. The actions include issuing guidelines for climate-risk management, creating a green dashboard, fostering cooperation with both international and national authorities on climate finance, organizing First Conference on Sustainability to raise awareness and others.

Overall, the planned actions to be taken are mainly preventive rather than promotional. Monetary policy serves as a supportive rather than a primary tool for addressing economic challenges. Building up trust and institutional credibility is essential for the CBU to make its monetary policy effective. Therefore, even while recognizing the importance of climate-related financial risks, the CBU prioritizes its core mandates.

[53] *Country Climate and Development Report: Uzbekistan (2023). World Bank Group.*
[54] *Central Bank of Uzbekistan. (2024, May). Financial Stability Report.*
[55] *Central Bank of Uzbekistan. (2022, May). Financial Stability Report.*
[56] *Central Bank of Uzbekistan. (2023, October). Financial Stability Report.*
[57] *The continued existence of energy subsidies in Uzbekistan could potentially offset the environmental benefits pursued through green monetary policy.*

CONCLUSION

Climate change presents a significant financial risk through both immediate disruptions (material risks) and long-term economic shifts (transitionary risks). Central banks play a crucial role in addressing this challenge by integrating climate-related risks into their monetary policy frameworks.

Central banks can indirectly influence the climate-conscious behavior of businesses and individuals through their influence on the financial system. By setting interest rates, shaping loan distribution across sectors, and overseeing banking activities, central banks determine the overall health and stability of the financial system. This, in turn, affects the ability to finance real-world economic activity and its resilience to climate change impacts.

In recent years, many central banks have begun exploring and implementing "green" monetary policy approaches. These approaches vary by country, with some central banks actively participating in the fight against climate change and aiming for carbon neutrality. Others take a more conservative stance, focusing on mitigating and preventing the consequences of climate change.

For central banks recognized as independent bodies in monetary policy (not agents of the government), ensuring climate actions don't conflict with their core tasks is crucial. This requires coordination with fiscal policy to achieve a "green" economic transition. Fiscal policy can drive progress, while monetary policy safeguards those gains and prevents backsliding.

The Central Bank of Uzbekistan aims to ensure a climate-resilient financial system. They achieve this not by directly regulating financial flows, but by encouraging the banking system to operate with climate risks in mind.

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