

Vestergaard, Jakob

**Working Paper**

## How can central banks help mitigate climate change? A money view perspective on green central banking

SECO Working Paper, No. 2022: 3

**Provided in Cooperation with:**

Socio-Economic Research Centre (SECO), Department of Social Sciences and Business, Roskilde University

*Suggested Citation:* Vestergaard, Jakob (2022) : How can central banks help mitigate climate change? A money view perspective on green central banking, SECO Working Paper, No. 2022: 3, ISBN 978-87-7349-042-6, Roskilde University, Department of Social Sciences and Business, Socio-Economic Research Centre (SECO), Roskilde

This Version is available at:

<https://hdl.handle.net/10419/264341>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

## **How can Central Banks Help Mitigate Climate Change?**

### **A Money View Perspective on Green Central Banking**

**Jakob Vestergaard**

## SECO WORKING PAPER 2022: 3

SECO  Socio-Economic Research Centre

Department of Social Sciences and Business, Roskilde University

Universitetsvej 1, 4000 Roskilde, Denmark

<https://ruc.dk/en/seco-working-paper-series>

Email: [lbuur@ruc.dk](mailto:lbuur@ruc.dk)

CAE/SECO working papers ISSN: 2446-337X

ISBN: 978-87-7349-042-6

SECO working papers can be downloaded free of charge from

<https://ruc.dk/en/seco-working-paper-series>

© The authors and SECO, Roskilde 2021.

The SECO working paper series publishes cutting-edge research on contemporary political and socio-economic dynamics in advanced, emerging and developing countries. The Working Papers present on-going research from the projects of both SECO's own researchers and scholars outside Roskilde University. We encourage submissions from scholars studying political and socio-economic processes from different social-science and economic schools of thought. We accept papers that draw on approaches from economic sociology, economic geography, economic anthropology and political economy, as well as ones that employ multi- and inter-disciplinary perspectives.

The CAE Working Papers has from November 1, 2021 been transformed into SECO Working Papers in order to better capture the research on contemporary political and socio-economic dynamics in advanced, emerging and developing countries.

## ABSTRACT

Central banks can potentially influence the investment decisions of private financial institutions, which in turn will create incentives towards green technology adoption and development of lower emission business models. This paper examines how central bankers are engaging with the green transition agenda. To guide the efforts, the paper mobilizes the Money View literature. This enables a comparative assessment of different monetary policy options. The main finding is that a promising way forward for Green Central Banking is to adopt a dual strategy of expanding collateral eligibility through positive screening and widening haircut spreads to change relative incentives in favor of green over brown assets.

## AUTHOR

Jakob Vestergaard (JV) is a scholar of economic governance, with a particular interest in discourse analysis, focusing on how policy norms for economic and social development evolve over time through a complex interplay of economic ideas, professional expertise, standard-setting organizations and governmental techniques. JV holds an MSc in Economics (KU), a PhD in International Political Economy (CBS) and a post doc in Financial Risk and Regulation (LSE).

## WORKING PAPERS IN THE SECO SERIES:

José Jaime Macuane, Lars Buur, Padil Salimo, "Institutional reform and pockets of effectiveness in the Mozambique gas sector", SECO Working Paper 2022: 2.

Jeff Althouse, Bruno Carballa Smichowski, Louison Cahen-Fourot, Cédric Durand, Steven Knauss, "Ecologically unequal exchange and uneven development patterns along global value chains", SECO Working Paper 2022: 1.

## WORKING PAPERS IN THE CAE SERIES 2020-2021:

Wuttke, Tobias, "The automotive industry in developing countries and its contribution to economic development", CAE Working Paper 2021: 2.

Riisgaard, Lone, "Organizing the informal economy as part of the trade union movement in Kenya and Tanzania", CAE Working Paper 2021:1.

Saulich, Christina, "Accessing Global Value Chains: The Politics of Promoting Export-Driven Industrialisation and Upgrading in the Mozambican Cashew Processing Industry". CAE Working Paper 2020: 5.

Riisgaard, Lone, "Worker Organisation and Social Protection amongst Informal Petty Traders in Tanzania", CAE Working Paper 2020: 4.

Torm, Nina, "Social protection and the role of informal worker associations: A cross-sector analysis of urban sites in Kenya and Tanzania", CAE Working Paper 2020: 3.

Azizi, Sameer, "Kenyan-owned firms in the floriculture global value chain: A multi-level analysis of the historical development of local firms", CAE Working Paper 2020: 2.

Jensen, Federico, "Constraints on eco-industrial development in the context of global production networks - the case of Ethiopian eco-industrial parks", CAE Working Paper 2020: 1.

### **Working papers in the CAE series 2019-2017:**

Whitfield, Lindsay, and Cornelia Staritz, "Les entreprises africaines dans les chaînes de valeur mondiales du vêtement: stratégies de valorisation, réseaux diasporiques et marchés de niche à Madagascar", CAE Working Paper 2019: 3.

Itaman, Richard, and Christina Wolf, "Industrial Policy and Monopoly Capitalism in Nigeria: Lessons from the Dangote Business Conglomerate", CAE Working Paper 2019: 2.

Azizi, Sameer Ahmad, "The Kenyan floriculture export industry: Assessing local firms' capabilities in the floriculture global value chain," CAE Working Paper 2019: 1.

Whitfield, Lindsay, and Cornelia Staritz, "Local Firms in Madagascar's Apparel Export Sector: Technological Capabilities and Participation in Global Value Chains," CAE Working Paper 2018: 3.

Staritz, Cornelia, and Lindsay Whitfield, "Local Firms in the Ethiopian Apparel Export Sector: Building Technological Capabilities to Enter Global Value Chains," CAE Working Paper 2018: 2.

Melese, Ayelech Tiruwhat, "Sales Channels, Governance, and Upgrading in Floriculture's Global Value Chains: Implication for Ethiopian-owned Floriculture Firms," CAE Working Paper 2018: 1.

Mulangu, Francis, "Mapping the Technological Capabilities and Competitiveness of Kenyan-Owned Floriculture Firms," CAE Working Paper 2017: 5.

Whitfield, Lindsay, and Cornelia Staritz, "Mapping the Technological Capabilities of Ethiopian owned Firms in the Apparel Global Value Chain," CAE Working Paper 2017: 4.

Staritz, Cornelia, and Lindsay Whitfield, "Made in Ethiopia: The Emergence and Evolution of the Ethiopian Apparel Export Sector," CAE Working Paper 2017: 3.

Melese, Ayelech Tiruwha, "Ethiopian-owned Firms in the Floriculture Global Value Chain: With What Capabilities?" CAE Working Paper 2017: 2.

Staritz, Cornelia, and Lindsay Whitfield, with Ayelech Tiruwha Melese and Francis Mulangu, "What Is Required for African-owned Firms to Enter New Exports Sectors? Conceptualizing Technological Capabilities within Global Value Chains," CAE Working Paper 2017: 1.

# How can Central Banks Help Mitigate Climate Change? A Money View Perspective on Green Central Banking

Jakob Vestergaard

*[T]he global and all-encompassing nature of this historic challenge means that everybody has to consider how they can contribute. This applies in particular to policymakers, including central banks*  
(Isabel Schnabel) <sup>1</sup>

*How can we get elasticity for the projects we favor, and discipline for the projects we oppose?*  
(Perry Mehrling) <sup>2</sup>

## 1. Introduction

A key objective of the Paris Agreement is to make financial flows consistent with a pathway towards low CO<sub>2</sub> emissions (UNFCCC, 2016). It has been estimated that if global warming is to be limited to 1.5 degrees, global emissions will need to reach net-zero by 2050 (Robins et al., 2021). But financial flows are not on that path at all. Despite decades of concerted efforts to promote sustainable finance in the financial sector (Martini, 2021) as well as by governments and international organizations (Engle et al., 2018), there has so far been only modest progress. By some calculations, the financial system is effectively “funding temperature increases of over three degrees centigrade” (Carney, 2020).

Against this background, Green Central Banking (GCB) has emerged as a novel approach to climate change mitigation. Central bank policy may potentially be an effective way to engineer major shifts in investment allocation, hence central banks are increasingly called upon to take an active role in greening our financial systems (FT, 2021c). If central banks were to take a pro-active role, proponents argue it could constitute a game-changing moment, that helps set the global economy on a green trajectory. By deploying monetary policy and financial regulation to create relative incentives that favor ownership of green over brown assets, central banks can influence the investment decisions of private financial institutions, which in turn will create incentives towards green technology adoption and development of lower emission business models.

A host of reports have been published by agenda-setting international organizations (BIS, 2020a; IMF, 2019; NGFS, 2019a; UNEP, 2017) and economists are debating the matter intensely (Brunnermeier and Landau, 2020; de Grauwe, 2019; Eichengreen, 2021; Greene, 2021; Mateos y

---

<sup>1</sup> Isabel Schnabel, member of the Executive Board of the European Central Bank (ECB), made this remark in her welcome address to the ECB Symposium on ‘Climate change, financial markets and green growth’, on 14 June 2021 in Frankfurt (Schnabel 2021, p. 1).

<sup>2</sup> Cited from Mehrling (2018, p. 2)

Lago, 2021; Pisani-Ferry, 2021; Tooze, 2019). Historically, central banks have often intervened at large scale in societal crises, financing large wars or economic development efforts which in scale and time span have been comparable to what is required to address climate change mitigation (Rockoff, 2016; van Tilburg and Simic, 2021). And several initiatives indicate that central bankers are beginning to engage actively. Central banks have established a Network for Greening the Financial System (NGFS); the Bank of England has formally adopted a green agenda in its mandate (FT, 2021a); and the European Central Bank has created its own dedicated Climate Change Centre (ECB, 2021), to name just a few examples.

But these are early and mainly symbolic steps, taken in a highly contested terrain. Coexisting with such initiatives is a considerable push-back, not least from within central banks themselves. Prominent central bankers have publicly professed the importance of keeping central banks' green role at a minimum so as not to undermine their commitment to price stability and their independence (Gros, 2020; Knot, 2021; Weidman, 2020; FT, 2021b).

While scholarship on green finance is rich, work on GCB is only just emerging.<sup>3</sup> And, while the few GCB studies that exist yield important insights on the policy instruments that could be deployed, the nascent GCB literature suffer from several shortcomings. First, there has yet been little conceptual and theoretical work on GCB approaches and instruments; second, there has been limited methodological work, on metrics and tools to comparatively assess different GCB policy instruments (with a few notable exceptions; see the work by Monasterolo and colleagues); third, there has been little engagement with GCB as an emerging governmental program, shaped by the interactions of a multitude of actors and techniques and likely to have substantive socio-political effects; and fourth, there is no work yet pondering how a new regime of central banking may influence how we will conceive of the anatomy and dynamics of green economies going forward.

The overall objective of the paper is to address the first of these shortcomings, by assessing the new GCB discourse conceptually, from a policy effectiveness perspective. More specifically, the aim is three-fold: to examine how central banks have engaged with GCB; to identify the conditions of possibility for GCB effectiveness; and to suggest a policy strategy. For the latter purposes, and to be able to assess and discriminate amongst a wide range of monetary policy instruments, identifying the most promising ones for an agenda of GCB – I draw upon the Money View literature.<sup>4</sup> The core finding is that a promising policy strategy would be to combine an expansion of collateral eligibility through positive screening with a widening of haircut spreads to change relative incentives in favor of green over brown assets, reshaping collateral hierarchies in the process.

The paper is structured as follows. We introduce the discourse on GCB by analyzing two authoritative takes on the question of whether and how central banks should engage in promoting a greening of financial systems. First, we discuss Mark Carney's speech at Lloyd's in 2015 and its catalyzing of the voluntary disclosure approach, subsequently championed by the Financial Stability Board (section

---

<sup>3</sup> For reviews of the green finance literature, see Ameli et al (2018); de Carvalho Ferreira et al. (2016); Dikau et al. (2020); Gilchrist et al. (2021); and Kemfert et al. (2020). For the emerging literature on GCB see Battiston and Monasterolo (2019); Breitenfellner et al. (2019); Campiglio (2016); Campiglio et al. (2018); Chenet et al. (2019); Dafermos et al (2018, 2020,;2021); Dikau and Volz (2018; 2019); D'Orazio and Popoyan (2019); Gabor et al (2019); Kern and Fischer (2020); Krogstrup and Oman (2019); McConnell et al (2021); Monnin (2018); Park and Kim (2020); Ryan-Collins (2019); Schoenmaker (2019; 2021); Schwegler et al. (2021); Thioye (2021); Thomä and Hilke (2018).

<sup>4</sup> On the money view, see Mehrling (2011; 2012; 2013a; 2013b; 2014; 2015; 2016; 2017; 2018; 2020).



2). Then we account for the creation of the NGFS and analyze their reflections on how monetary policy instruments may be tailored to shift finance away from brown into green assets (section 3). This is followed by two vignettes on key controversies and fault lines in ongoing debates on GCB. To provide some guidance in discriminating between the various monetary policy instruments being discussed – and to help identify a modality of GCB likely to be effective – we mobilize the *Money View* literature (section 5). The final section offers concluding remarks (section 6).

## 2. New Horizons: Mark Carney and the Disclosure Approach

“The challenges currently posed by climate change pale in significance compared to what might come”, Mark Carney warned in his famous speech at Lloyd’s in London in September 2015 (Carney, 2015, p. 2). “The far-sighted among you”, he suggested, “are anticipating broader global impacts on property, migration and political stability, as well as food and water security” (ibid). “So why isn’t more done to address it?”, the bureaucrat at the apex of the central banking establishment asked an audience of insurers, bankers and investors.<sup>5</sup>

Carney’s speech is often evoked as the starting point of the GCB discourse. His opening warnings matched the sweeping title he had given his talk; “breaking the tragedy of the horizon”. What he was proposing in terms of policy response, was remarkably modest, however. Carney’s key appeal was for a Climate Disclosure Task Force to be established under the auspices of the Financial Stability Board (FSB). A more proactive role for central banks, on the other hand – mobilizing its policy tools for a greening of financial systems – he explicitly rejected, as we shall see.

A few weeks after Carney’s speech, by mid-November, G20 leaders called for the FSB to “engage with public- and private- sector participants on how the financial sector can take account of climate change risks” (G20, 2015, p. 11). And in December 2015, the FSB announced the establishment of the Taskforce for Climate-related Financial Disclosure (TCFD).<sup>6</sup> The approach adopted by the TCFD over the following years was to a large extent foreshadowed by Carney’s remarks at Lloyd’s.

So, what was the approach advocated by Carney as a response to the impending climate crisis? The point of departure for his policy reflections was an identification of the three main “channels through which climate change can affect financial stability” (2015, p. 4): the impact on the value of financial assets that arise from climate- and weather-related events (physical risks); the impact that could arise if parties who have suffered loss of damage from the effects of climate change seek compensation from those they hold responsible (liability risk); and the financial risks which could result from the process of adjustment towards a lower-carbon economy.

To address the potentiality of these three forms of negative impact of climate change on financial stability, Carney suggested establishing an “industry-led disclosure framework”, in the tradition of prior task forces of the FSB, which had showed, he argued, that through such disclosure initiatives the “private industry can improve disclosure and build market discipline without the need for detailed or costly regulatory interventions” (Carney, 2015, p. 10).

---

<sup>5</sup> At the time of giving this talk, Mark Carney was governor of the Bank of England and Chairman of the Financial Stability Board, the club of G20 central bankers. Before those appointments, Carney had been governor of the Bank of Canada.

<sup>6</sup> Several factors helped secure this outcome: Carney’s participation in preparing the G20 summit in November that year; his personal attendance at the summit; and his function as chairman of the Financial Stability Board.

Carney was explicit in rejecting a more proactive approach. “Some have suggested”, he noted, that “we ought to accelerate the financing of a low carbon economy by adjusting the capital regime for banks and insurers” (Carney, 2015, pp. 8-9). “That is flawed”, Carney ascertained. “More properly, our role can be in developing the framework that help the market itself to adjust efficiently” (ibid.). Michael Bloomberg, who had been appointed Chairman of the TCFD, echoed Carney’s emphasis on the defensive agenda, professing to use industry-led disclosure of climate risks as a strategy to help protect the financial system from the consequences of climate change. The TCFD is intended, he said, “to build considerations of the effects of climate change into routine business and financial decisions” (Bloomberg, cited in TCFD, 2021, p. 34).

In June 2017, the TCFD issued its recommendations for the sustainability disclosures of companies in four registers: governance, strategy, risk management and metrics. Not officially backed by any regulatory efforts, the suggested disclosures were voluntary. Moreover, it was largely qualitative and subjective in its format.

The TCFD has achieved considerable dissemination. More than 2000 large companies across the world have adopted its reporting format and it has been incorporated into a range of other sustainability-related disclosure frameworks.<sup>7</sup> Inspired by these early achievements the TCFD stresses in its latest status report that it aims at taking the full step towards becoming a “global reporting standard” (TCFD, 2021, p. 18).

But dissemination does not necessarily translate straightforwardly into impact. Bingler et al. (2021, p. 1) recently examined whether voluntary TCFD reporting did in fact result in “better climate risk management”. Using artificial intelligence (AI) methods, they analyze the annual reports of more than 800 TCFD-supporting companies in the period from 2014 to 2020, examining whether there is a notable impact of the launch of the TDFC in 2017.<sup>8</sup> They find only a “slight or negligible increase of approximately 1.9 percentage points in information disclosed as required by the TCFD categories after the launch of the recommendations in 2017 to 2020” (Bingler et al., 2021, p. 11). Remarkably, “most of this overall increase is due to increased governance and risk management disclosure”, whereas there is “hardly any increase in strategy and metrics targets”, the categories that would have provided “the most essential and material information to stakeholders”, Bingler and colleagues observe (ibid.):

*Our analysis of TCFD reporting illustrates how voluntary disclosure commitments seem to suffer from cheap talk, in the sense that announcing TCFD support does not lead to an increase in disclosures, and cherry-picking, in the sense that companies prefer disclosure on non-material categories” (Bingler et al., 2021, pp. 18-19)*

---

<sup>7</sup> Disclosure frameworks that have incorporated TCFD recommendations include the Carbon Disclosure Project (CDP), the Climate Disclosures Standards Board (CDSB), the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB), see Bingler et al (2021, p. 1).

<sup>8</sup> Challenges, normally inherent in transforming textual material on company disclosures into numerical data, are overcome by introducing ClimateBERT, “the first context-based algorithm to identify climate-related financial information from TCFD reports” (Bingler et al., 2021, p. 2). ClimateBERT is an adaption of the BERT model, the authors explain, “a deep neural network currently seen as the state-of-the-art method for many tasks in natural language processing” (ibid.).

There is little climate change mitigation impact (if any) of the voluntary disclosure approach championed by the TCFD, in other words.

In its latest status report, the TCFD noted that “the top-cited issue by preparers on implementing the Metrics and Targets recommendation was the lack of standardized industry metrics” – with several financial sector respondents submitting as their primary concern the absence of “reliable and consistent data on which metrics could be calculated” (TCFD, 2020, p. 50). Although these issues were duly noted, little was offered in terms of prospective remedies.

Despite these fundamental shortcomings, Marc Carney has doubled down. Five years after his famous speech at Lloyd’s, he has reiterated his strong preference for an industry-led, disclosure-based approach.<sup>9</sup> But he now argues that the time has come for the G20 to call for the TCFD to become a *mandatory* climate reporting standard for businesses worldwide.

### **3. Retrofitting Monetary Policy: the Proactive Approach**

#### **3.1 The Network for Greening the Financial System**

In 2017, a network of central banks concerned with greening finance was created. The NGFS was established by eight founding members with a secretariat hosted by Banque de France. In just a few years, the NGFS has exploded its membership. The membership now stands at 101 central banks and financial supervisory authorities across five continents, from the US Federal Reserve to the Abu Dhabi Financial Services Regulatory Authority.<sup>10</sup>

While the TCFD has stressed that NGFS members have “collectively pledged support” for their recommendations (TCDF, 2021, p. 11), it is important to stress that the overall orientation of the NGFS is more proactive than the TCFD. In its mission statement, the NGFS stresses that its overarching purpose is to help strengthen “the global response required to meet the goals of the Paris agreement” and, importantly, to enhance the role of the financial system in “mobilizing capital for green and low-carbon investments” (NGFS, 2021b). To deliver on these objectives, the NGFS “defines and promotes best practices to be implemented within and outside of the Membership”, and conducts “analytical work on green finance” (ibid.).

The NGFS has engaged both with the defensive agenda – pondering how to best prepare for and tackle the potential negative consequences of climate change for financial stability – as well as with the proactive agenda. The proactive GCB agenda is essentially concerned with using monetary policy tools and financial regulation to foster a greening of financial systems.<sup>11</sup>

Among the most important contributions of the NGFS was the publication in March 2021 of a comprehensive report reviewing monetary policy options for a world subject to global warming (NGFS, 2021a). It was the first time that ‘official’ central banking discourse took a leap from defensive approaches – focused on protecting the financial system from the consequences of climate

---

<sup>9</sup> Carney resumed his public reflections on the relation between central banks and climate change in 2020, in a series of lectures broadcasted by the BBC (Carney, 2020).

<sup>10</sup> In addition to the 101 full members, there are 16 intergovernmental organizations participating as ‘observers’, including the Bank of International Settlement, the Basel Committee, the Financial Stability Board, the IMF, and the World Bank.

<sup>11</sup> Seen from that perspective, one is tempted to argue that the more defensive-oriented thinking is not really green, given that the primary objective is financial stability, not climate change mitigation.

change – to a proactive approach, envisaging and systemically assessing different ways that monetary policy instruments could be calibrated to actively support climate change mitigation.

The nine options that the NGFS identified as monetary policy tools that could be calibrated in ways that could foster a greening of financial systems came in three overall categories: credit operations, collateral policy and asset purchases (see Table 1.):

**Table 1. Green monetary policy options**

Category	Monetary policy instruments
Credit operations	1/ Adjust pricing to reflect counterparties’ climate-related lending 2/ Adjust pricing to reflect the composition of pledged collateral 3/ Adjust counterparties’ eligibility
Collateral policy	4/ Adjust haircuts 5/ Negative screening 6/ Positive screening 7/ Align collateral pools with a climate-related objective
Asset purchases	8/ Tilt purchases 9/ Negative screening

Source: NGFS 2021a

A particularly interesting finding of the NGFS report was that for five of the nine policy options reviewed – adjusting pricing to lending benchmark, adjusting haircuts, positive screening, aligning collateral pools and tilting purchases – there would be a noticeable climate change mitigation effect *without* a significant compromising effect on monetary policy effectiveness.

As a testament to its significance, the report was discussed in an editorial in the *Financial Times* shortly after it had been published. In remarkably direct headline, stating that ‘Central banks should turn green’, the editors spoke of a green revolution in central banking being under way, citing the NGFS report as a sign of “how far things have come” since Carney’s speech in 2015 (FT, 2021c). The *Financial Times* editors further supported a proactive approach by refuting a standard counterargument that central bank interventions should always be ‘market neutral’. When it comes to climate change, “the market is not neutral but distorted”, the editors noted, “by the failure to fully price environmental harms and all central banking affects distribution and capital allocation” (ibid.).<sup>12</sup> While the NGFS report is clearly important in providing a range of monetary policy options, its main weakness is that it is more of an extensive menu than a policy strategy, however. On closer scrutiny, not all the options identified are suitable, as we shall see (in section 5).

#### 4. Controversies and Fault Lines

The GCB agenda has met considerable intellectual pushback. Key figures in macro-financial governance debates, from Daniel Gros to Barry Eichengreen and Robert Skidelsky, have stressed the

<sup>12</sup> There is an emerging literature on the carbon-bias of central bank practices; see Dafermos et al. (2021a; 2021b).

dangers for central banks in taking on the climate change mitigation challenge.<sup>13</sup> The pushback is not just intellectual, however. Recent developments in England and Sweden illustrate that the resistance to GCB is manifest in policy too. To shed light on the controversies and fault lines in debates on GCB, we now consider the aftermath of the adoption of a green mandate for the Bank of England. This is followed by a summary and reflection on a remarkable speech given by Isabel Schnabel, German member of the governing council of the ECB, problematizing central bankers' allegiance to the principle of market neutrality. Together, these two vignettes yield insight into the controversies and fault lines of GCB discourse.

#### **4.1 Pushback from a Frontrunner? Muting the Mandate**

In early March 2021, the Bank of England was given an explicit climate mandate. This was just a few weeks before the NGFS launched its monetary policy options-report. The endorsement of the NGFS report by the Financial Times had been tempered only by an acknowledgement that central bankers could never be “primary actors” in climate change mitigation. They would always need to act only to support the general economic policies of the government and only in cases with broad political support, the editors said. This condition was fully met in the case of the Bank of England after it had been given an explicit climate mandate. With the NGFS toolkit at its disposal, two crucial conditions of possibility for a proactive approach to GCB were in place, in other words.

Just a few months later, there were significant signs that the BoE would in fact be taking a proactive approach. Andrew Hauser, the BoE's executive director of markets, outlined how the Bank's Corporate Bond Purchases Scheme could be retailored to proactively incentivize the transition to a net-zero carbon economy, explicitly taking inspiration from the NGFS report (Hauser, 2021).

Later in the year, the prospects for GCB in England looked considerably bleaker, however. An announcement by the Prudential Regulation Authority of the Bank of England strongly indicated that the BoE establishment were not on board after all. Considering whether it should force banks to hold extra capital to cover risks from climate change, it came out in favor of a defensive approach to climate change issues, distancing itself from the proactive agenda. “Steering the move to a low-carbon economy” is not a task for the BoE but “the responsibility of government”, it was stressed (see FT, 2021g).

If climate change mitigation cannot be pursued through financial regulation measures – the path of lesser resistance, compared to monetary policy – the likelihood that monetary policy instruments will be calibrated to meet such ends is infinitely small. While it is difficult not to see in this the hand of the Bank's new chief economist, Huw Pill, known to be orthodox on monetary policy (FT, 2021f), his appointment likely reflects the majority opinion on these issues within BoE management. The announced policy stance gives a troubling indication of the likely trajectory for the BoE's green mandate in the coming years.

---

<sup>13</sup> A key locus of these debates has been the *Project Syndicate* platform, see Gros (2021); Eichengreen (2021); Skidelsky (2021).

## 4.2 Heresy at the Heart of European Central Banking? Contesting Market Neutrality

In parallel with these moves away from a proactive approach in the Bank of England, there are ongoing debates in the central banking establishment that point in a different direction, testifying to how contested GCB is.

A prominent case in point are the debates on the limitations of market neutrality as guiding principle for central bank practices. A speech by Isabel Schnabel, a German member of the ECB's governing council, questioned the market neutrality principle in ways that would have been difficult to imagine just a few years ago. "While the concept of market neutrality is related to the Treaty", Schnabel notes, "it is not *per se* a rule in primary law" (Schnabel, 2021, p. 29). The Treaty does explicitly stipulate that "the ECB should pursue its mandate by favoring an efficient allocation of resources", Schnabel explains, but the link between market neutrality and efficient allocation of resources breaks down when there are substantial externalities at play, such as when "missing or insufficient carbon pricing mechanisms continue to distort the pricing of climate risks by financial markets, thus decelerating the green transition" (Schnabel 2021, p. 7). In this situation, market neutrality leads us astray:

*If the market misprices the risks associated with climate change, adhering to the market neutrality principle may instead support a market structure that hampers an efficient allocation of resources. In view of such market failures, it seems appropriate to replace the market neutrality principle by a market efficiency principle. Such a principle would explicitly recognize that a supposedly 'neutral' market allocation may be suboptimal in the presence of externalities (Schnabel, 2021, p. 33)*

Schnabel's remarks are well taken, but from a Money View perspective, rethinking central banking requires more than substituting market efficiency for market neutrality as the overarching ideal. While important and indispensable, this type of contestation of 'market neutrality' will be a half-measure. If proactive, GCB is to stand a chance against deep-rooted convictions about central bank independence and against the widespread notion that price stability should always be at the pinnacle of hierarchies of central banking objectives, a shift in policy paradigm is needed. And this is what the Money View can underpin and inform.

In more concrete terms, two things are needed if a proactive approach to GCB is to gain traction. First, an intellectual armoury is needed, that can fundamentally challenge the current conventional wisdom on central banking, and second; a policy strategy for GCB that is theoretically informed and feasible to implement. Revisiting the GCB agenda from a *Money View* perspective can deliver a new theoretical foundation for thinking about monetary policy, as well as theory-based guidance on devising a policy strategy likely to be effective.

## 5. A Money View Perspective on GCB

Distinguishing between what constitutes appropriate policy in normal times and crisis times is standard in central banking discourse. In normal times, principles of market neutrality and effectiveness of monetary policy transmission take precedence. But in times of crisis, the preservation of financial stability necessitates a departure from those guiding principles (Goodhart et al., 2014).

There is an extensive literature on central banks acting as lenders of last resort in periods of market stress. From a Money View perspective, the crucial objective for central banks in such circumstances becomes to prevent liquidity strains from erupting into a market liquidity crisis – or, if that fails, to contain and manage the liquidity crisis in the best possible way.<sup>14</sup>

But GCB disrupts this neat duality of central banking in normal vs crisis times. When it becomes a core objective of central banks to steer capital in such a way that it accelerates the transition towards a low-carbon emission economy, a combination of the two standard logics of central bank intervention is needed. On the one hand, central banks should operate in a manner that renders market allocation efficient vis-à-vis the objective of promoting a green transition. On the other hand, central banks need to take into account the market liquidity effects of their interventions, seeking to avoid inadvertent liquidity strains in key parts of the financial system. Liquidity is imperative both from a financial stability and a green transition perspective. Transformation toward low-carbon emission economies will be facilitated by liquidity lubrication and impeded by liquidity strain.

In the following, I argue that the conceptual framework of the Money View can help identify which combination of monetary policy tools may strengthen the relative incentives for investing in green assets without causing liquidity strain. More specifically, I identify a policy mix that meets the three-fold objective of (i) having a substantive mitigating effect on climate change, (ii) entailing no, or only a modestly negative, impact on monetary policy effectiveness, and (iii) not causing a contraction of collateral space, with potential negative consequences for market liquidity.

## 5.1 Essentials of the Money View

From a money view perspective, the interventions of central banks are seen as either providing elasticity or enforcing discipline on the monetary system (Mehrling, 2015; 2016). The core distinction between elasticity and discipline can be expressed also in terms of expansion and contraction of market liquidity. When central banks provide elasticity to the system, market liquidity expands; when they provide discipline, market liquidity contracts.<sup>15</sup>

In Perry Mehrling’s terminology, the discipline dimension of central bank practices relates directly to the ‘settlement constraint’ that all actors in the monetary system are subject to.<sup>16</sup> “[C]entral banks can relax or tighten the banking system’s reserve constraint”, Mehrling explains, thereby “lowering or raising the cost of putting off the day of reckoning” (Mehrling, 2016, p. 4). “That’s what monetary policy is all about”, he notes. “Central banks change the settlement constraint faced by the banking system, and the banking system changes the settlement constraint faced by the rest of us” (ibid.).

The reserve requirement is not the only instrument by means of which central banks can affect the settlement constraint of banks, however. In their NBER-study of the comparative performance of interest rates and haircuts as tools of monetary policy, Ashcraft and colleagues found that “a reduction in the haircut of an asset unambiguously lowers its required return and can ease the funding constraints on all assets” (Ashcraft et al., 2011, p. 143)

---

<sup>14</sup> For more on this, from a Money View perspective, see Vestergaard and Gabor (2021).

<sup>15</sup> For a comparative analysis of how the flux of money creation in private banks and central banks is balanced by the discipline of funding, through (three) different mechanisms of ‘reflux’, see Mehrling (2019).

<sup>16</sup> This relates closely to Hyman Minsky’s notion of a “survival constraint” (see Mehrling, 2017).

From a Money View perspective, each of the two main dimensions of collateral policy – asset eligibility and haircuts – should be seen through a lens of elasticity and discipline. That is, as instruments that can both be tailored to engender one of two main dynamics of expansion or contraction, depending on financial market conditions and the desired policy outcomes. In some situations, it will be pertinent for central banks to devise collateral policies that achieve a collateral expansion (e.g., to ameliorate liquidity strains), whereas in other situations a collateral contraction may be desirable (e.g., to moderate a credit boom).

Looking first at haircuts, they can be used to provide both discipline and elasticity. Lower haircuts relax the settlement constraint for banks, while higher haircuts tighten it. A higher haircut means margin calls, i.e., that additional collateral must be pledged, whereas a lower haircut means that less collateral is required (for a given amount of credit). For asset eligibility there is a similar story. By increasing the range of assets eligible in their credit operations, central banks can exert an expansionary effect on collateral space and market liquidity, and if eligibility is decreased, the result instead will be contractionary.

If the two key tools of collateral policy – haircuts and asset eligibility – are calibrated consistently, an expansion or contraction of market liquidity can be accomplished. However, if *not* carefully calibrated but instead put to the service of opposing objectives, changes in the parameters of these two policy instruments may also work against one another, making it difficult to discern the net effect on market liquidity (see Table 2.). If the central bank increases its haircuts, this will have contractionary effect on market liquidity and may dominate the expansionary effect of a prior broadening of collateral asset eligibility. Ambivalent collateral policy will lead to ambiguous effects on market liquidity, in other words.<sup>17</sup>

**Table 2. Market liquidity effects of collateral policy**

		Haircuts	
		<i>Lower</i>	<i>Higher</i>
Collateral eligibility	<i>Broader</i>	Expansion	-/+
	<i>Narrower</i>	-/+	Contraction

## 5.2 Three Important Lessons for GCB

The Money View perspective allows us to see that some of the NGFS options are not conducive to the objective of preserving market liquidity. First, it is of paramount importance that green monetary policies don't cause contraction of collateral assets eligible for credit operations with the central bank. This means that negative screening should be avoided. Negative screening of brown assets will reduce the pool of eligible assets, since there are too little high quality green assets in circulation for it to be plausible that positive screening could more than offset the contractionary effect on collateral space of negative screening. The way forward, instead, is to reshape collateral hierarchies, favoring green

<sup>17</sup> For an interpretation of the European Central Banks' response to the European sovereign debt crisis as ambivalent in this manner, see Vestergaard and Gabor (2021).



assets, while disfavoring (but not excluding) brown assets.<sup>18</sup> When the haircut on an asset is reduced, easing the required return, “real investment in the asset increases” (Ashcraft et al., 2011, p. 157).<sup>19</sup> Second, for purposes of achieving elasticity in one direction, and discipline in another, interest rates are too blunt a tool, since they are targeted at the level of the counterparty, not at the level of the asset. Last but not least, when it comes to asset purchases, positive screening should only be pursued against a high standard for what counts as green and brown assets, respectively. If central banks use monetary policy tools to provide financial incentives but fail to do the governance groundwork in terms of ensuring that they are tailored to proper standards and benchmarks, there would be considerable risk of inadvertently boosting greenwashing in finance.

### 5.3 Using Haircut Spreads to Reshape Collateral Hierarchies

When we approach collateral policies from the perspective of GCB objectives, we do not need elasticity *or* discipline. We need elasticity for the green assets that we wish to promote, and discipline for the brown projects we oppose, to paraphrase Perry Mehrling (see epigraph). But is this even possible? Can we achieve elasticity in one direction and discipline in another? Can we instigate a collateral expansion in green assets and a collateral contraction in brown assets?

The answer is affirmative. Just as money can be seen as a hierarchy of promises to pay, collateral too can be understood in hierarchical terms. We can understand collateral as a spectrum of assets that have different weight when actors meet requirements to secure their borrowing with the central bank. The key question for our concerns then becomes how we may reshape collateral hierarchies in a manner that favor green assets and disfavor brown assets. How can central banks shape collateral hierarchies such that green assets ascend while brown assets descend?

Haircuts can be calibrated in a way that penalizes brown assets and rewards green assets in credit operations with central banks. A haircut spread is the difference in haircut assigned for assets that are in the same liquidity category (and have the same residual maturity) but have different credit ratings.<sup>20</sup>

---

<sup>18</sup> In addition to the concern with the contractionary effects of negative screening, there is also the problem that negative screening may short-circuit ongoing transition efforts of carbon-intensive companies.

<sup>19</sup> Ashcraft et al. (2011, p. 158) also examined the effects of lowering haircuts for many assets at the same time, finding that this “increases output in both the current and future time periods” (Ashcraft et al., 2011, p. 158).

<sup>20</sup> More specifically, it is the difference in haircuts with a low (B to BBB-) and a (A to AAA) high credit rating.

**Table 3. Haircuts for different asset categories (fixed coupon)**

<b>Credit quality</b>	<b>Residual maturity</b>	<b>LC1: Central government debt</b>	<b>LC2: Other government debt</b>	<b>LC3: Covered banks bonds and corporate bonds</b>	<b>LC4: Unsecured bank debt</b>
High (AAA to A-)	0-1	0.5	1.0	1.0	6.5
	1-3	1.0	1.5	2.0	8.5
	3-5	1.5	2.5	3.0	11.0
	5-7	2.25	3.5	4.5	12.5
	7-9	3.0	4.5	6.0	14.0
	>10	4.5	8.0	9.0	17.0
Low (B+ to BBB-)	0-1	4.0	7.0	8.0	13.0
	1-3	7.5	10.0	15.0	24.5
	3-5	11.25	15.5	22.5	32.5
	5-7	13.0	16.0	26.0	36.0
	7-9	13.5	18.5	27.0	37.0
	>10	13.75	22.5	27.5	37.5

Source: Schoenmaker (2019), based on Annex X of the guideline (ECB/2015/510) on the implementation of Eurosystem monetary policy framework (ECB/2014/60)

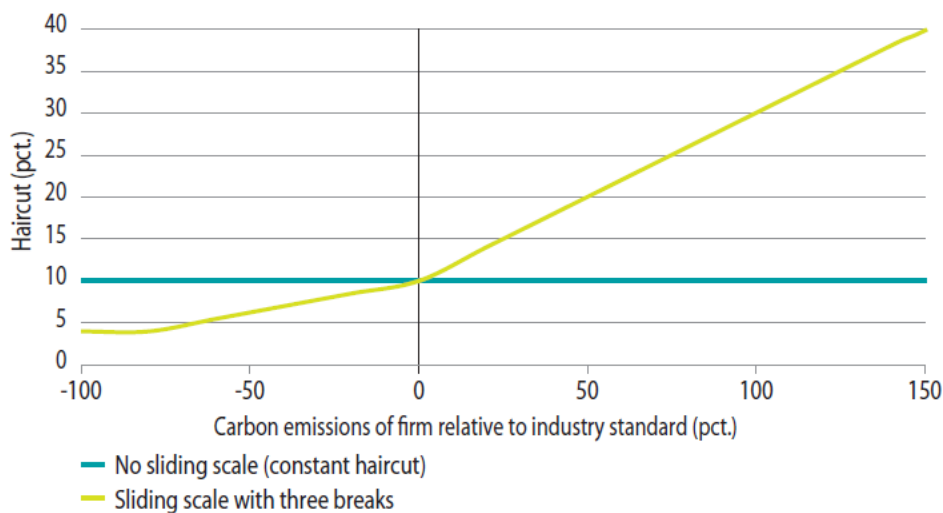
Note: LC = liquidity category.

The three dimensions that currently determine collateral hierarchies are the residual maturity of the asset, the liquidity category to which they belong, and the credit rating of the asset. For each of the asset categories, the haircut spreads can be widened on a register of greenness vs brownness of assets, adding a fourth dimension to the differentiation of haircuts.

How may such a fourth dimension of haircuts be introduced, giving collateral hierarchies a strong green component? There are two main approaches to this suggested in the literature, both of which differentiate haircuts in accordance with the carbon footprint of assets.<sup>21</sup> The NGFS proposed a so-called sliding scale approach (see Figure 1.), by which “firms operating in the same economic sector” would be subject to a “haircut add-on (or discount)” that could be applied “to the assets issued by the comparatively more (or less) carbon-intensive firm” (NGFS, 2021a, p. 36). “Such a scheme would yield a continuous incentive for firms to reduce their emissions”, the NGFS notes, “while safeguarding a level playing field across sectors and sectoral neutrality” (ibid.).

<sup>21</sup> See also the discussion by McConnell et al. (2021).

**Figure 1. The sliding scale approach to green haircuts**



Source: NGFS (2021a, p. 36)

Schoenmaker has suggested an alternative model, by which haircuts would be linked to an estimate of the carbon-intensity of assets (Schoenmaker, 2019). In Schoenmaker’s proposal, assets are assigned a carbon category (low, medium, high) depending on their level of carbon emissions relative to sales (Schoenmaker, 2019, p. 12). On the basis of these categories, assets are then assigned an additional haircut of 0.1 % for medium-carbon assets and 0.2 % for high-carbon assets (with no additional haircut assigned for low-carbon assets).

I propose a third modality, which is similar to Schoenmaker’s, but more comprehensive in terms of coverage and impact. By using the EU taxonomy of green economic activities, it would be possible to take into consideration not just climate change mitigation and adaptation, but also the four other urgent environmental objectives (pollution; biodiversity; forests; and water).

The taxonomy could be used in a manner that would establish tertiles of assets, as in the model suggested by Schoenmaker, but here using the Screening Criteria (SC) and the Do No Significant Harm (DNSH) criteria as two thresholds that define what constitutes a green, a grey and a brown asset. An asset that meets the SCs for one of the environmental objectives without violating the DNSH criteria of any of the other, would constitute a green asset, while assets that violate a DNSH threshold of any of the six objectives would constitute a brown asset. All assets in between would count as grey assets.

How could such a system be calibrated? The following table illustrate what the haircuts would be for assets that are otherwise similar (same residual maturity and same credit rating), but have different environmental performance (green, grey, brown). The rule applied is that grey assets are subjected to the haircut that currently prevails, whereas green assets are rewarded by a 50 % reduction of the haircut that would otherwise have been applied, and brown assets are penalized by a 50 % increase in the haircut. In the table, there are listed the modified haircuts for the type of assets that they are most relevant for, namely corporate bonds (ie., liquidity category 3):

**Table 4. Green collateral haircuts for corporate bonds (category 3, fixed coupon)**

<b>Credit quality</b>	<b>Residual maturity</b>	<b>Green (&gt;SC)</b>	<b>Grey</b>	<b>Brown (&lt;DNSH)</b>
High (AAA to A-)	0-1	0.5	1.0	1.5
	1-3	1.0	2.0	3.0
	3-5	1.5	3.0	4.5
	5-7	2.25	4.5	6.75
	7-9	3.0	6.0	9.0
	>10	4.5	9.0	13.5
Low (B+ to BBB-)	0-1	4.0	8.0	12.0
	1-3	7.5	15.0	22.5
	3-5	11.25	22.5	33.75
	5-7	13.0	26.0	39.0
	7-9	13.5	27.0	40.5
	>10	13.75	27.5	41.25

There is reason to expect haircuts differentiated in this manner to have substantive reallocation effects. It is difficult, of course, to predict with precision the scope of the impact of skewing incentives as proposed. In Schoenmaker’s estimate, his suggested haircut differentiation would result in an estimated 44 % reduction of the carbon footprint of a central banks’ corporate bond portfolio (Schoenmaker, 2019, pp. 14-15). The haircut spreads proposed here are larger than Schoenmaker’s, so it is not unreasonable to suggest that the impact on central banks corporate carbon exposure would be considerable.

## 6. Concluding remarks

The very notion of using monetary policy instruments to skew incentives in favor of green assets and against brown assets, the essence of green monetary policy, violates the principle that central bank operations should be ‘market neutral’ – and much of the political resistance from central bankers coalesces around this notion. In their discussion of the NGFS report on green monetary policy, however, the editors of the Financial Times confronted such reasoning by refuting the standard argument that central bank interventions should and must always be ‘market neutral’. When it comes to climate change, they noted, “the market is not neutral but distorted by the failure to fully price environmental harms and all central banking affects distribution and capital allocation” (FT, 2021). Dafermos et al. (2020) have argued that if central banks refuse to “distort” markets that are obviously out of sync with the Paris agreement, they then effectively reproduce and reinforce the lacking ability of financial markets to tackle the climate crisis. This, in turn, undermines whatever other initiatives and policies governments launch to foster a green transition of our economies.

Critiques of ‘market neutrality’ arguments in the context of debates on GCB are gaining traction, also to some extent within the central banking establishment. Isabel Schnabel, German economist and member of the governing council of the European Central Bank, suggested abandoning the market neutrality principle in favor of a market efficiency principle. The pressure for GCB is likely to mount

in coming years and it is by no means unlikely that eventually central banks will be forced by public opinion to engage in a proactive manner. When that moment comes, the approach outlined here could be a useful way forward.

The NGFS have published an important analytical contribution to debates on GCB with its assessment of how a range of monetary policy instruments could be deployed to promote a transition to a low-carbon emissions economy (NGFS, 2021a). We noted, however, a number of shortcomings. First, the NGFS assessment is informed mainly by a concern with monetary policy effectiveness, at the expense of other crucial objectives, such as market liquidity. Second, being more of a menu of options, the report stops short of reflecting on the relative usefulness of the different monetary policy instruments it identifies. This is unfortunate, since not all of them are equally promising, and some of them even potentially counterproductive.

These shortcomings are all the more problematic in that the discourse on GCB is met with fierce resistance from many within the central banking community. To help navigate this rugged terrain, I mobilized the Money View literature. By doing so, I was able to discriminate between the policy options listed by the NGFS, identifying the ones most likely to be effective. In essence, the way forward for an effective form of GCB is to adopt a dual strategy of expanding collateral eligibility through positive screening and widening haircut spreads to change relative incentives in favor of green over brown assets. Both elements are important. The first since no major transformation of investment allocation is possible in a context of contracting market liquidity. And the latter because it is the most effective way to reshape existing collateral hierarchies, the *sine qua non* for GCB.

I discussed two approaches to accomplishing a widening of haircut spreads and proposed a third. First, a sliding scale approach could be adopted, using industry emission averages as a benchmark around which haircuts are increased, for assets with higher-than-average carbon emissions, or decreased, for assets with lower-than-average emissions. Second, haircuts could be tilted according to the carbon-intensity of the assets, as proposed by Schoenmaker (2019). Third, technical screening criteria for green and brown economic activities developed in the EU taxonomy could be used as an upper and lower threshold for differentiated haircuts. I advocated the latter option on the grounds that it would anchor GCB in a comprehensive and ambitious classification of green economic activities. It is important that GCB does not stand alone, of course. Carbon pricing is essential, as is green public investment. But it is not unreasonable to surmise that strong financial incentives created by environmentally differentiated haircuts, calibrated against proper standards for what constitutes green and brown assets, respectively, would cause a significant contribution towards a greening of finance.

## References

- Ashcraft, A., Gârleanu, N. and Pedersen, L. (2011) “Two monetary tools: interest rates and haircuts” in Acemoglu and Woodford (eds.), *NBER Macroeconomics Annual 2010*, vol. 25, pp. 143-180.
- Battiston, S., and Monasterolo, I. (2019) “How could the ECB’s monetary policy support the sustainable finance transition?”, *Mimeo*, University of Zurich.
- Bingler, J.A., Kraus, M. and Leippold, M. (2021) “Cheap talk and cherry-picking: What ClimateBert has to say on corporate climate risk disclosures”.
- BIS (2020a) “The green swan. Central banking and financial stability in the age of climate change”, Bank for International Settlements.
- Breitenfellner, A., Pointner, W. and Schubert, H. (2019) “The potential contribution of central banks to green finance”, *Vierteljahrshefte zur Wirtschaftsforschung*, vol. 88 (2), pp. 55-71.
- Brunnermeier, M. and Landau, J-P, (2020) “Central banks and climate change”, *VoxEU*, January 15, 2021. Available at: <https://voxeu.org/article/central-banks-and-climate-change>.
- Campiglio, E. (2016) “Beyond carbon pricing: the role of banking and monetary policy in financing the transition to a low-carbon economy. *Ecological economics*, 121: 220-230.
- Campiglio, E., Dafermos, Y., Monnin, P., Ryan-Collins, J., Schotten, G. and Tanaka, M. (2018) “Climate change challenges for central banks and financial regulators”, *Nature Climate Change*, vol. 8, pp. 462-468.
- Carney, M. (2015). “Breaking the tragedy of the horizon: climate change and financial stability”. Speech at Lloyd’s of London, London, 29 September 2015.
- Carney, M. (2020) “From climate crisis to real prosperity”, The Reith Lectures 2020: Mark Carney – How we get what we value, *BBC*.
- Chenet, H., Ryan-Collins, J., and van Lerven, F. (2019) “Climate-related financial policy in a world of radical uncertainty: towards a precautionary approach”, *UCL Working Paper*, 2019-13, Institute for Innovation and Public Purpose, London: University College London.
- Dafermos, Y., Nikolaidi, M. and Galanis, G. (2018) “Climate change, financial stability, and monetary policy”, *Ecological Economics*, vol. 152, pp. 219-234.
- Dafermos, Y., Gabor, D., Nikolaidi, M., Pawloff, A. and van Lerven, F. (2020). *Decarbonizing is easy. Beyond market neutrality in the ECBs corporate QE*. New Economics Foundation, October 2020.
- Dafermos, Y., Gabor, D., Nikolaidi, M., Pawloff, A. and van Lerven, F. (2021). *Greening the Eurosystem collateral framework. How to decarbonize the ECBs monetary policy*. New Economics Foundation, March 2021.
- de Carvalho Ferreira, M.R., Sombreiro, V., Kimura, H. and de Moraes Barboza, F.L. (2016) “A systematic review of literature about finance and sustainability”, *Journal of Sustainable Finance and Investment*, vol. 6 (2).

- de Grauwe, P. (2019) “Green money without inflation, in Kemfert, Schäfer, Semmler and Zaklan” (eds), *Green Finance: the Macro perspective*.
- Dikau, S., and Volz, U. (2019) “Central Banking, Climate Change, and Green Finance” in *Handbook of Green Finance*, J. D. Sachs, W. T. Woo, N. Yoshino, and F. Taghizadeh-Hesary (eds.), Singapore, Springer.
- Dikau, S., and Volz, U. (2018) “Central banks mandates, sustainability objectives and the promotion of green finance”, *Conference Paper*, presented at the NGFS-Bundesbank-CEP conference on ‘Scaling up green finance: the role of central banks’, Berlin 8-9 November, 2018.
- D’Orazio, P. and Popoyan, L. (2019) “Fostering green investments and tackling climate-related financial risks: which role for macroprudential policies?”, *Ecological Economics*, vol. 160, pp. 25-37.
- ECB (2021) “The ECB sets up climate change centre”, *Press release*, European Central Bank, January 25, 2021.
- Eichengreen, B. (2021) “New-Model Central Banks”, *Project Syndicate*, February 9, 2021.
- Engle, N., C. Brandon, S. Hallegatte, P. Hannam, and Heine, D. (2018) “Strategic Use of Climate Finance to Maximize Climate Action: A Guiding Framework”, World Bank, Washington, DC.
- FT (2021a) “Bank of England given new mandate to buy ‘green’ bonds”, *Financial Times*, March 3, 2021.
- FT (2021b) “ECB set to disappoint climate change campaigners: limited enthusiasm on central bank’s governing council for green asset purchases”, *Financial Times*, February 21, 2021.
- FT (2021c) “Central banks should turn green”, Editorial, *Financial Times*, April 5, 2021.
- FT (2021d) “What does green mean? Investors grapple with data and definitions”, *Financial Times*, May 24, 2021.
- FT (2021e) “Greenwashing in finance: Europe’s push to police ESG investing”, *Financial Times*, March 20, 2021.
- FT (2021f) “New BoE chief economist backs limits on quantitative easing”, *Financial Times*, September 1, 2021.
- FT (2021g) “Bank of England considers capital rules for banks to cover climate risks”, *Financial Times*, October 28, 2021.
- Gabor, D., Dafermos, Y., Nikolaidi, M., Rice, P., van Lerven, F., Kerslake, R., Pettifor, A. and Jakobs, M. (2019). *Finance and climate change: a progressive green finance strategy for the UK*. Report of the independent panel commissioned by Shadow Chancellor of the Exchequer, John McDonnell MP.
- Gilchrist, D., Yu, J., and Zhang, R. (2021) “The limits of green financing: A survey of the literature in the context of green bonds and green loans”, *Sustainability*, vol. 13. doi.org/10.3390/su13020478.
- Goodhart, CAE, Gabor, D., Ertürk, I., and Vestergaard, J. (2014) “Central banking at a crossroads: Europe and beyond”, Anthem Press.
- Greene, M. (2021) “How the Fed could go green faster”, *Project Syndicate*, April 9, 2021.

- Gros, D. (2020) “The dangerous allure of green central banking”, *Project Syndicate*, December 18, 2020.
- G20 (2015). “G20 Leaders’ Communiqué”, *Antalya summit*, 15-16 November, 2015.
- Hauser, A. (2021) “It’s not easy being green, but that shouldn’t stop us: how central banks can use their monetary policy portfolio to support orderly transition to net zero, Bank of England”, *Speech given at Bloomberg*, May 21, 2021.
- IMF (2019) “Climate change and financial risk. Central banks and regulators are starting to factor in climate change”, *Finance and Development*, vol. 58 (4), pp. 26-30.
- Kempf, C., Schäfer, D. and Semmler, W. (2020) “Great green transition and finance”, *Review of European Economy Policy*, vol. 55 (3), pp. 181-186.
- Kern, A. and Fischer, P.G. (2020) “Central banking and climate change, in Fischer” (eds.), *Making the financial system sustainable*. Cambridge University Press.
- Knot, K. (2021) “Getting the green deal done. How to mobilize sustainable finance”, *Conference Speech*, Bruegel, 21 February 2021.
- Krogstrup, S. and Oman, W. (2019) “Macroeconomic and financial policies for climate change mitigation: a review of the literature”, *Working Paper*, No 140, Danish Central Bank.
- Martini, A. (2021) “Socially responsible investing: from the ethical origins to the sustainable development framework of the European Union”, *Environment, Development and Sustainability*, doi.org/10.1007/s10668-021-01375-3.
- Mateos y Lago, I. (2021) “The changing climate of central banking”, *Project Syndicate*, April 16, 2021.
- McConnell, A., Yanovski, B. and Lessmann, K. (2021) “Central bank collateral as a green monetary policy”, *Climate Policy*, DOI: 10.1080/14693062.2021.2012112.
- Mehrling, P. (2011) “The New Lombard Street”, Princeton University Press.
- Mehrling, P. (2012) “Three Principles for Market-Based Credit Regulation”, *American Economic Review*, vol. 102 (3), pp. 107-112.
- Mehrling, P. (2013a) “Insights from Walter Bagehot”, in West and Whaples (eds.), *The Economic Crisis in Retrospect: Explanations by Great Economists*, pp. 13-42. Elgar.
- Mehrling, P. (2013b) “The inherent hierarch of money”, in Taylor, Rezai, and Michl (eds.), *Social Fairness and Economics: Economic Essays in the Spirit of Duncan Foley* (pp. 394-404), Routledge.
- Mehrling, P. (2014) “Why central banking should be re-imagined, in BIS (2014), Rethinking the lender of last resort”, Bank of International Settlements.
- Mehrling, P. (2015) “Discipline and Elasticity in the Global Swap Network”, *International Journal of Political Economy*, vol. 44 (4), pp. 311-324.
- Mehrling, P. (2016) “Re-theorizing liquidity, in Desan” (ed.), *Inside money: liquidity as a matter of design*.
- Mehrling, P. (2017) “Financialization and its discontents”, *Finance and Society*.



- Mehrling, P. (2018) “Where is politics in the Money View?”, *Money View blogpost*, December 17, 2018. Available at: <https://sites.bu.edu/perry/2018/12/17/where-is-politics-in-the-money-view-2/>
- Mehrling, P. (2020) “Payment vs funding: the law of reflux for today”, *INET Working Paper*, no. 113. New York: Institute for New Economic Thinking.
- Monasterolo, I. and Raberto, M. (2017) “Is There a Role for Central Banks in the Low-Carbon Transition? A Stock-Flow Consistent Modelling Approach” (November 21, 2017). Available at SSRN: <https://ssrn.com/abstract=3075247> or <http://dx.doi.org/10.2139/ssrn.3075247>.
- Monasterolo, I. and Raberto, M. (2018) “The EIRIN flow of funds Behavioral Model of Green Fiscal Policies and Green Sovereign Bonds”, *Ecological Economics*, vol. 144, pp. 228-243.
- Monnin, P. (2018) “Central banks should reflect climate risks in monetary policy operations”, *SUERF Policy Note*, no. 41, The European Money and Finance Forum.
- NGFS (2019a) “Macroeconomic and financial stability. Implications of climate change”, *Technical supplement to the First comprehensive report*. Network for Greening the Financial System, July 2019.
- NGFS (2021a) “Adapting central bank operations to a hotter world. Reviewing some options”, *Technical Document*, Network for Greening the Financial System, March 2021.
- NGFS (2021b) “Origin and purpose”, *Network for Greening the Financial System*. Available at: <https://www.ngfs.net/en/about-us/governance/origin-and-purpose> (last accessed 27 November 2021).
- Park, H., and Kim, J.D. (2020) “Transition towards green banking: role of financial regulators and financial institutions”, *Asian Journal of Sustainability and Social Responsibility*, vol. 5, p.5.
- Pisani- Ferry, J. (2021) “Central banking’s brave new world”, *Project Syndicate*, February 23, 2021.
- Robins, N., Dikau, S and Volz, U. (2021) “Net-zero central banking: a new phase in greening the financial system”, London: Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy, LSE, and Centre for Sustainable Finance, SOAS, University of London.
- Rockoff, H. (2016) “The US Economy in WWII as a Model for Coping with Climate Change”, *NBER Working Paper*, no. 22590. National Bureau of Economic Research.
- Schoenmaker, D. (2019) “Greening Monetary Policy”, *Working Paper*, Bruegel, issue 02.
- Schoenmaker, D. (2021). “Greening monetary policy”, *Climate Policy*, 21 (4), pp. 581-592.
- Skidelsky, R. (2021). Should central banks have a green mandate? July 19, 2021, Project Syndicate.
- Schnabel, I. (2021). “From market neutrality to market efficiency”, Welcome address at the ECB-DG Research Symposium on “Climate change, financial markets and green growth”, European Central Bank.
- TCFD (2020) “Task-force on climate-related disclosures: 2020 Status report”, October 2020, TCFD.
- TCFD (2021) “Task-force on climate-related disclosures: Overview”, March 2021, TCFD.
- Thioye, M. (2021) “Making green bonds serve the climate goals”, *United Nations Environment Programme Finance Initiative (UNEP-FI)*, April 2021.

- Thomä, J., and Hilke, A. (2018) “The Green Supporting Factor: Quantifying the Impact on European Banks and Green Finance”, *2° Investing Initiative*, Berlin.
- Tooze, A., (2019) “Why Central Banks Need to Step Up on Global Warming”, *Foreign Policy*, July.
- UNEP (2017) “On the role of central banks in enhancing green finance”, United Nations Environment Program (UNEP), *Inquiry Working Paper*, 17/01.
- UNFCCC (2016) “Paris Agreement”, *UN Framework Convention on Climate Change* (UNFCCC), New York.
- van Tilburg, R. and Simic, A. (2021) “Every avenue available: Lessons from monetary history for tackling climate change”, Utrecht: Sustainable Finance Lab.
- Vestergaard, J. and Gabor, D. (2021) “Central banks caught between market liquidity and fiscal disciplining. A Money View perspective on collateral policy”, *INET Working Paper* 170, December 2021. New York: Institute for New Economic Thinking.
- Weidman, J. (2020) “How central banks should address climate change”, *Financial Times*, November 19, 2020.

The Socio-Economic Research Centre (SECO) is an interdisciplinary centre conducting research on contemporary political and socio-economic dynamics in advanced, emerging and developing countries in the intersections between economic sociology, political economy and heterodox economics with a particular focus on:

- The nature, pace and outcomes of processes of capitalist transformation
- The social and financial challenges of transitioning to a net-zero carbon economy
- The political economy of natural-resource extraction, with implications for political instability
- The objectives and effects of changing economic policies, from industrial policy to financial regulation



SOCIO-ECONOMIC RESEARCH CENTRE

ROSKILDE UNIVERSITY  
UNIVERSITETSVEJ 1, POSTBOX 260  
4000 ROSKILDE, DENMARK

