

## Green finance, regulation and monetary policy

Key findings of a SUERF conference jointly organised with the Oesterreichische Nationalbank (OeNB) and Vienna University of Economics and Business (WU Wien)

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### Conference Report

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*The dynamic links between the financial system and environmental sustainability have rapidly moved to the center of the public debate. Terms like ‘sustainable finance’, ‘green bonds’, ‘climate-related risks’ are increasingly spread buzzwords among policy-makers, financial practitioners and civil society. The topic exhibits several layers of complexity. First, climate change creates substantial new uncertainties for economic agents, whose repercussions need to be studied. For instance, the potentially large losses faced by insurance firms are pushing them towards a better assessment of physical risks. For investors, climate change might pose both risks and opportunities. Existing investments might dramatically lose in value, some firms might vanish, while others may enter and flourish. Green investment thus goes far beyond ethical behavior and may have very concrete financial drivers. Second, financial and banking regulation can influence the allocation of finance in environmentally friendly or harmful economic activities. Central banks’ monetary policy operations might unintentionally favor environmentally harmful activities. New empirical research findings help to identify such unintended effects and show avenues to correct for them. Finally, innovative green financial instruments might actively encourage investment in climate-saving sectors, R&D and clean technologies.*

*This conference, which was jointly organised by SUERF, the Vienna University of Economics and Business, and the Oesterreichische Nationalbank and hosted by the OeNB, aimed to provide an overview of the current state of research and policy debates on these themes. Non-technical presentations encouraged discussions among academics, policy makers and financial practitioners.*

#### **Climate change is the result of market failures - central banks aim to foster sustainability**

In his opening remarks, **Governor Nowotny** stated that climate change touches on the core mandate of central banks – to maintain price stability and financial stability. According to Nowotny, climate science robustly confirms the human sources of rapidly rising greenhouse gas concentration amid industrial growth based on fossil fuels. Underlying problems are the lacking price for carbon and the fact that future generations will feel the impact rather than current actors. Even so, the need for world-wide action has finally culminated in the Paris Agreement of 2015 signed by 195 parties, which aims to limit the global temperature rise in this century to less than 2 degrees Celsius above pre-industrial levels. The financial community has reluctantly taken an interest in global warming, recognizing that the insurance sector

and – less directly – banks are hit by climate (policy) risks. However, the transition to a sustainable development model also offers opportunities for the financial system given huge investment needs of an estimated 180 billion euro per year in Europe alone. Nowotny alluded to the main policy instrument of supervisors: disclosure of risks with the objective of performing carbon stress tests as well as supporting the process of market creation for “green assets”. Nowotny announced that the OeNB has recently become member of a newly founded international Central Banks and Supervisors Network for Greening the Financial System (NGFS). In his view, the typical mid- to long-term horizon of central banks can contribute to a smooth transition to a sustainable economy. The Governor emphasized how much the OeNB appreciates the fruitful long-standing and close cooperation with SUERF. The

OeNB is looking forward to many future joint events. He also warmly welcomed the very fruitful cooperation with WU Wien in designing the conference scientifically.

**Prof. Jakob de Haan**, President of **SUERF**, Head of Research, **DNB**, and **University of Groningen**, appreciated the opportunity for this joint conference on an important and topical subject and thanked the OeNB for their long-standing and generous support for SUERF. He also welcomed warmly the cooperation with the Vienna University of Economics and Business on board for this event, which continues SUERF's long tradition of acting as a bridge between academia and policy, as well as financial practitioners.

**Limiting temperature rise to 2°C requires a huge effort: need for an integrated socio-ecological perspective**



The opening address was given by **Prof. Sigrid Stagl**, Head of the Institute for Ecological Economics at the **Vienna University of Economics and Business**. Prof. Stagl emphasized the exceptional nature of the current period, characterized by the intense pressure that the global population is exerting on climate dynamics and other planetary boundaries. While some steps towards a more sustainable society were taken in the past, scientific evidence suggests that these will not be enough to contain the rise in the level of global temperature to below 2°C. The respect of planetary boundaries should also be combined with the flourishing of individuals and the satisfaction of their basic needs.

The aim is thus to reach the ‘safe and just space for humanity’ that satisfies social objectives while respecting ecological constraints. In order to achieve this goal, there is the need to move to an integrated socio-ecological perspective, properly framing economic dynamics within the larger biophysical basis in which it takes place.

**How to solve the gridlock between policy makers and the private sector?**

The first keynote speech was presented by **Stefano Battiston**, Professor of Banking at the **University of Zurich**, and director of the **FINEXUS center on Financial Networks and Sustainability**. He discussed the relation between climate risks and financial stability from the point of view of financial interconnectedness. He had four key messages.

1. Climate is not yet another type of exogenous shock but the relation between climate policy and players' expectations is characterized by circularity. Indeed, climate policy implementation is affected by market players' perception of the introduction of the climate policy itself.
2. In the presence of scientific, technological, policy and political shocks, market players may not fully anticipate climate related price shocks, thus leading to price volatility and mispricing. This has implications for financial stability and thus for the role of central banks.
3. We are confronted with a gridlock that awaits to be solved. Indeed, the EU has embraced a low-carbon transition path, but the investment challenge is well beyond the capacity of the public sector. Increasing financial disclosure would not be sufficient to move the market towards climate-risk aware investment decisions but market players need credible signals from policy-makers to calculate the expected cash-flows from investments.
4. Usable metrics for portfolios' climate risk and impact assessment already exist and can help financial authorities and private institutions to better assess risk, but more research is needed.

## Climate stress tests help to create risk awareness

Battiston then presented the first climate stress test of investors' portfolios to unlock the gridlock. The climate stress test is based on peer-reviewed research, co-developed in collaboration with researchers at WU<sup>1</sup>, and provides a framework to assess portfolios' exposure to climate risks and impact of climate action (i.e. mitigation and adaptation) to bridge information and financing gaps. In particular, the climate stress-test allows to i) integrate climate risk (physical and policy) into standard financial risk measures (e.g. Value-at-Risk); ii) classify banks' individual projects and derive overall portfolios' contribution to climate adaptation/vulnerability, and iii) introduce a workflow to mainstream the climate risk management and impact assessment at every stage of the credit cycle.

The application of the climate stress-test to real portfolios (e.g. commercial and development banks) shows that financial actors are highly exposed to price changes that could affect large asset classes, in particular in the case of pension funds and investment funds. However, the effects on portfolio gains and losses depend on the timing and magnitude of climate policies and range from capital reallocation, distributive effects, aggregate and potential systemic effects. Indeed, individual exposures to climate risks due to portfolio allocations on carbon-intensive assets and sectors could be amplified by financial interconnectedness.

Battiston noted that the nexus between financial interconnectedness and financial stability is widely recognized today, and it is not only an urgent societal issue but also a fundamental scientific question with high-rank status. Therefore, more academic research is needed, supported by public and private funding, and by collaboration with central banks and policy-makers. To conclude, he discussed the implications of climate stress test results for central banks, highlighting the role of macro-prudential regulation to prevent the buildup of systemic climate-finance risks, and the need to exploit

synergies and collaborations between academic research and regulators.

## Climate change and the transition to a low-carbon economy: risks and opportunities for investors

The first panel session was moderated by **Irene Monasterolo** and aimed at understanding to what extent climate change could represent a risk for investors' portfolios, and how to move from risks to opportunities. The session hosted four speakers: **Angela Koepl**, environmental economist at the **Austrian Institute of Economic Research (WIFO)**, **Jakob Thomae**, managing director of **2° Investing Initiative (2dii)**; **Frank Packer**, regional adviser at the **Bank for International Settlements (BIS)**; and **Simon Dietz**, professor of environmental policy at the **London School of Economics (LSE)**.

The speakers addressed three interconnected research questions for green finance, i.e.:

1. Would a paradigm change for the energy system help investors and policy-makers managing the transition to a low-carbon economy?
2. Under which conditions could climate-related financial disclosure effectively contribute to aligning the financial system to sustainability? In particular, what role could climate risk and impact metrics and standards for green bonds play in this process?
3. What lessons could be learnt from a pilot initiative aimed at tracking carbon-intensive companies' carbon management and emissions performance?

This information is relevant for policy makers to introduce coherent and effective policies for the low-carbon transition; for investors to align their portfolio management strategies to the Paris Agreement and the Sustainable Development Goals; and for central banks

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<sup>1</sup> Battiston S., Mandel A, Monasterolo I., Schuetze F. & G. Visentin (2017). A Climate stress-test of the EU financial system. *Nature Climate Change*, 7, 283–288. Monasterolo, I., Jiani I. Zheng and Battiston, S. (2018). How green is China's development finance? A new methodology for development finance's climate risks assessment. Under review on *China and the World Economy Journal*.

and regulators to assess sources of climate risks for price and financial stability, and to identify proper tools to mitigate them.

**The global energy system needs a fundamental paradigm shift – green finance has a central role**

First, it was highlighted that the Paris Agreement called for a deep system-wide transformation to make finance flows consistent with a low Greenhouse Gases emission pathway and a climate resilient development (Article 2.1c). The Paris Agreement is a signal for investors to avoid fossil lock-in investments, putting pressure on the profitability of fossil fuels-based industries. The transition to a low-carbon economy could introduce both risks and opportunities for investors. However, in order to mitigate risks and exploit opportunities, a paradigm shift for the energy system based on interconnected stocks and flows and systemic thinking are needed.

Green finance is central in this paradigm shift. Nevertheless, it requires a regulatory framework to i) mainstream climate information into investors’ decision making, ii) identify climate risks and opportunities for investors within a systemic approach, and iii) implement a forward looking analysis of portfolios (i.e. aligned to the 2°C scenario).

**What is a “green” investment? The need for disclosure, taxonomies and metrics**

Then, the role of climate-related financial disclosure was addressed in terms of metrics and methods, as well as in terms of standards and labelling.

On the one hand, scenario analysis and stress testing for climate-risk disclosure would allow governments to set targets to decarbonize the economy, and investors to identify portfolio strategies to manage the potential mispricing of long-term risks related to the low-carbon energy transition. However, according to the 2° Investing Initiative’s experience, current obstacles to disclosure are a lack of shared evidence on short term material impacts for regulators, missing standards on metrics for

investors, and the absence of reference scenarios for issuers. A novel approach for disclosure based on climate stress tests and scenario analysis, using physical asset-level data that links economic activity to financial instruments, could reduce the costs and time needed for disclosure and ensure the comparability of results.

On the other hand, the introduction of a harmonized taxonomy for green investments is fundamental to inform divesting strategies. In the case of green bonds, institutions and mechanisms of certification could decrease investor uncertainty on the environmental benefits of green bonds and avoid “green-washing”. This point is crucial because it is still unclear to what extent green bonds could provide a hedge against environmental risks that investors are expected to price in their portfolios’ strategies. Indeed, research shows that on average, green bonds are more, not less exposed to environmentally related risks than traditional bonds. Therefore, the introduction of a common language and harmonized taxonomy for green bonds, such as that promoted by the European Investment Bank and the China Green Finance Committee<sup>2</sup>, is needed to increase clarity for investors and avoid unintended effects. In addition, current green bond labels could be enhanced to reflect environmental risks.

Finally, the importance of metrics and criteria to assess the carbon intensity of companies and portfolios was discussed in relation to the results of the Transition Pathways Initiative<sup>3</sup>. Several carbon-intensive companies have already taken initial steps for disclosure, such as recognizing climate change as significant and material risk, disclosing operational and some value-chain emissions, and setting initial energy emission targets. However, advanced steps, such as setting long-term emissions targets or assigning boardroom responsibility for climate change, are embraced only by a minority of firms. Achieving these company targets would allow carbon-intensive companies to align with the 2°C target. Thus, investors and other stakeholders could play a relevant role in portfolio de-carbonization, by getting companies to set long-term corporate targets, and holding them accountable for delivery of announced targets.

<sup>2</sup> <https://goo.gl/C8mUzf>

<sup>3</sup> <https://goo.gl/CbmJyL>



All speakers agreed on the need to strengthen the dialogue and collaboration between academic research, central banks and regulators in order to promote advances on green finance, and to provide relevant and timely information to policy-makers and investors. In particular, the panelists identified three promising areas for collaboration: (i) the development of climate stress tests of central banks' and financial actors' portfolios; (ii) research on green labelling and standards; (iii) research on the pricing in of carbon risks into financial market prices.

In conclusion, three messages for central banks in relation to green finance could be taken away: (i) Central banks could play a key role to raise awareness of environmental and climate-related risk in financial markets, also through regulation. (ii) An interdisciplinary approach is important to provide a comprehensive assessment of the exposure to climate risks of the various actors in the financial system, also through collaboration between academia and policy-makers (e.g. for the analysis of supervisory data). (iii) Both the micro and macro-prudential implications of investors' exposures to climate risks should be considered to preserve financial stability.

### **Huge funding needs for the transition to a low-carbon economy**



The second keynote speech was given by **Christian Thimann**, Senior Advisor to the Chairman at **AXA** and Chairman of the **High-Level Expert Group (HLEG) on Sustainable Finance**. He started by stressing the relevance of the financial system in supporting the achievement of a sustainable prosperity. The main

question will be how to mobilise the required funding to invest in green infrastructure, sustainable cities, low-carbon energy, and so on. This is more important than the exposure of the financial system to climate-related risks. Neither of these questions are currently included in a systematic way into regulatory frameworks. The HLEG has concluded that a complete restructuring of the rules governing the financial system is not necessary. However, no single simple switch is available to make the financial system sustainable. It is necessary to go through every piece of regulation and identify the areas in which changes are needed. This has been the aim of the HLEG, which formulated four broad areas of recommendation to the European Commission.

### **Greening the financial system requires a comprehensive strategy**

First, it has listed some key recommendations, which include the development a common sustainability taxonomy at the EU level; a strengthening of the disclosure of environmental risks; a strengthening of investors' duties; and strengthened supervisory engagement.

Second, the HLEG has provided some sectoral recommendations. Thimann focused in particular on the banking sector, insurance companies and the credit ratings industry. All the financial actors in these sectors should be supported in integrating ESG and climate-related considerations more closely in their risk assessment frameworks, as these can be financially material. This would help banks and insurance companies in investing with a longer-term perspective, and banks to be better protected from the risks attached to high-carbon lending. In its current form, Basel regulation might penalise banks that engage in long-term lending. Insurance companies would benefit from regulatory incentives that allow them to invest in equity more easily.

Third, the HLEG has drafted some cross-cutting recommendations, two of which were discussed in detail by Thimann. For one thing, given the crucial importance of benchmarks in orienting investments and evaluating the relative performance of asset managers, benchmark providers should be encouraged to disclose to what

extent they take into account climate-related risks. For another, policy-makers should put in place a set of measures oriented at limiting the impact of short-termism in the financial sector. While low-carbon physical investment is oriented towards the long term, a substantial proportion of financial investments follow day-by-day, or even shorter-term, objectives.

Finally, Thimann highlighted several possible pitfalls and risks. First, while more regulation is needed, policy-makers should steer away from ‘soviet-style economic planning and remain open to both emerging technological innovations and diversity in the application of policies depending on the socio-economic context. Second, there is the risk of discussing excessively the risks attached to a low-carbon transition, while the biggest risk is the lack of investment. The debate should focus on how to mobilise the required finance. Third, ‘visible’ actors (companies, banks, pension funds and insurance companies) risk being overcharged compared to the ‘invisible’ ones (e.g. hedge funds, high-frequency traders). Fourth, the focus should not be exclusively on climate-related themes, as is often the case. Other environmental issues - such as water, fishing, or biodiversity – should not be overlooked. Agriculture is a particularly pressing issue. Fifth, there are competitiveness concerns for actors operating in long-term oriented regulatory contexts compared to those based in contexts with prevalence of short-term thinking.

### **How to align financial regulation with climate-friendly incentives?**

The second panel, chaired by **Emanuele Campiglio**, focused on financial regulation and climate-related incentives. The aim of the panel was to discuss what potential role financial regulation could play in mitigating climate-related risks. The three speakers were **Francesco Mazzaferro**, Head of the Secretariat of the **European Systemic Risk Board (ESRB)**; **Josh Ryan-Collins**, Head of Research of the **Institute for Innovation and Public Purpose (IIPP) at University College London**; and **Olaf Slejpen**, Director of the Supervision Policy Division of **De Nederlandsche Bank (DNB)**.

The structure and content of the panel mirrored the current debate around the adjustment of capital

requirements for private banks to account for climate-related financial risks. The European Commission, first with the report of the High-Level Expert Group on Sustainable Finance and later with its Sustainable Finance Action Plan, plans to explore the option of introducing ‘green-supporting’ or ‘brown-penalising’ capital adjustment factors. The strengths and weaknesses of these policy proposals are currently being debated.

There was agreement among the panellists on the potential financial risks attached to both climate change impacts (physical risks) and the transition to a 2°C-compatible economic system (transition risks). There was also a broad agreement on the pertinence of including them into prudential regulatory frameworks, if solid evidence of the systemic relevance of climate-related financial risks were to be produced. However, it was also noted that, despite ongoing research on the topic, this evidence is currently unavailable.

Panellists expressed concerns whether, in the event that systemic climate-related risk were indeed to be identified, differentiated capital requirements would be the best instrument to use. The precedent of the supporting factor for small and medium enterprises (SMEs) provides mixed evidence on the effectiveness of such measure in steering bank credit creation.

Panellists’ opinions differed on what could provide a suitable policy alternative. One panellist argued that measures included in Pillar II of the Basel supervisory framework (e.g. capital add-ons) might be more effective than those in Pillar I. Another panellist hinted instead to more pro-active stances by central banks in guiding bank credit, as is the case in some emerging economies. The point that government fiscal policy (e.g. through the implementation of a carbon price) should be leading the policy process was also put forward.

There seemed to be agreement that, if capital requirements were to be implemented, a brown-penalising factor would be a more appropriate choice than a green-supporting factor. It was noted that low-carbon sectors also feature several elements of risk. Reducing capital requirements on loans to low-carbon activities could get into conflict with regulators’ prudential objectives by facilitating a ‘green bubble’. However, the green-supporting factor currently seems to

have more support by both European policy-makers and private financial institutions.

### **How could monetary policy make their policies and operations greener? Should they?**

The third panel, chaired by **Ernest Gnan**, Counsel to the Board and Head of Economics, **OeNB**, and Secretary General, **SUERF**, focused on how central banks might incorporate green considerations into their monetary policy-related economic analysis and implementation as well as in their official and own reserve management. Three speakers contributed a variety of arguments and views on these issues: **Misa Tanaka**, Head of Research at the **Bank of England**, **Pierre Monnin**, fellow with the **Council on Economic Policies (CEP)**, and **Guido Schotten**, economic policy advisor at **De Nederlandsche Bank**.

The session addressed several questions:

- (i) through which channels climate change may affect the economic environment in which monetary policy operates, and what the implications may be for monetary policy;
- (ii) whether and how monetary policy operations, in particular asset purchases and eligibility rules for collateral in open market operations, currently exhibit a bias toward “brown” assets;
- (iii) whether central banks should correct for any such bias, and to what extent this would be practically feasible;
- (iv) whether and how central banks should even go beyond such correction of a brown bias, if any, and themselves favour green assets in their monetary policy operations;
- (v) to what extent this would be covered by central banks’ mandates, what would be potential risks for incorporating green secondary objectives in their mandates, and what would be a useful division of responsibilities with other areas of economic policy;

- (vi) how and to what extent central banks might apply green and sustainable principles in the management of official and own reserves.

### **Climate change and low-carbon adjustment imply shocks and volatility – early preparation is key**

Regarding the first theme, panellists pointed out several channels through which climate change may affect the economic environment within monetary policy operates. First, more volatile temperatures may change seasonal patterns in output and prices and make food and biofuel prices more volatile. As a result, economic data might become more noisy and it may become harder to identify underlying inflationary pressure. Second, weather-related catastrophes may become more frequent. The resulting negative output shock is likely to be larger and more persistent if losses are uninsured. Depending on the supply/demand side components of such shocks, monetary policy may need to respond accordingly. Finally, in the medium- to long-run, higher temperature may reduce labour productivity, reduce capital accumulation through long-term damage to capital and land, and reduce TFP growth by diverting resources towards adaptation to climate change. Thus, the Phillips curve might shift. Overall, climate change will likely increase uncertainty facing both economic agents and economic policy makers, rendering private agents’ and policy makers’ decisions more difficult and prone to errors. To avoid any unnecessary turbulence, transition to a low-carbon economy should be prepared early, be planned well in advance and be communicated transparently. Several central banks, including the Bank of England and De Nederlandsche Bank, are currently working actively to incorporate climate-related risks, energy transition and climate policies into forecasting and stress-testing economic models.

### **Do current central bank operations favour “brown” sectors?**

On the second theme, panellists quoted empirical work which documents that the ECB’s and Bank of England’s corporate bond purchase program is skewed towards high-carbon sectors, such as electricity and gas,

manufacturing and transport. To take the example of the Bank of England, this resulted from the fact that the Bank purchased only investment grade bonds, denominated in GBP, of firms that make a material contribution to economic activity in the UK, and that purchases were allocated to match the proportion of total outstanding eligible issuance accounted for by each sector. Also for the ECB's corporate sector purchase programme (CSPP), a strong bias towards brown sectors has been shown empirically. However, due to their narrow focus on corporate bonds, these studies neglect the impact of the far more substantial purchases of supranational development banks by the ECB, which may overcompensate the bias introduced by the CSPP. There was also disagreement among the panel to what extent this actually put low-carbon sectors at a disadvantage in terms of financing costs compared to high-carbon sectors. To take again the example of the Bank of England, the announcement of the Bank of England's corporate bonds purchase scheme (CBPS) sharply reduced all investment grade corporate bond spreads, both eligible and ineligible. Indeed, upon the following announcement of the list of bonds eligible for the purchase program, yield spreads between eligible and non-eligible corporate bonds widened markedly. However, this effect dissipated quickly, and overall the CBPS reduced spreads of eligible over ineligible investment grade corporate bonds by a mere 2-5 basis points. So, any unintended effect of favouring high-carbon sectors in terms of financing costs differentiation was likely small.

### **Practical limitations to correcting for brown biases in central banks' operations**

Regarding the third topic, central bank representatives on the panel emphasised practical limitations: For now, there is simply not enough volume of green bonds available to satisfy central banks' required volumes. Excluding high-carbon assets would, at prevailing conditions, curtail the range of eligible assets, and thus unduly limit central banks' ability to stimulate aggregate demand. This triggered a discussion of which comes first: available supply of bonds or demand from central banks. For example, the ECB with its ABS purchase program explicitly aimed at developing issuance activity

in this market segment, by creating a constant stream of demand by the central bank. While in the case of the ABSPP this aim was ultimately not achieved, similar considerations could nevertheless be applied to green assets.

### **Practical steps towards greening central banks' monetary policy operations**

On the fourth theme, there was agreement that current financial market financing flows do not yet reflect the needed transition to a low-carbon economy. Financial prices do not adequately reflect the needed shift in production structures. What are the implications for central banks' role? One line of argument taken in the panel and in the following discussion with the audience was that central banks importantly influence the cost of funding through interest rates. With their current bias towards brown finance, central banks cement existing financial market misalignments. A promising avenue to widen eligibility for green assets is to separately and explicitly consider climate-related financial risks, if climate-related risks were to be substantial and not fully reflected in credit ratings. Pursuing this approach, however, requires further development in methodologies for assessing climate-related financial risks; work on this is currently being completed and is soon going to be published by the three panellists and co-authors.

In practice, central banks might include climate risk considerations in their monetary policy operations by (i) a re-evaluation of risk-return profiles (use of external credit ratings that account for climate risk, integration of climate risk in internal risk assessments); (ii) higher haircuts for climate-risky assets as well as eligibility criteria that account for climate risk; and (iii) using sustainability indices for asset purchase allocations. By doing so, central banks would send a strong signal to financial markets the effects of which might go far beyond the mere portfolio flow effects.

### **Are green policies covered by central bank mandates?**

This led to the fifth theme: compatibility with central bank mandates. Among the panel and in the audience, there were three different views on this:



- (i) A first view was that, in order to correct for financial markets' current distortions which hamper the transition to a low-carbon economy, central banks should support climate goals, as long as this does not conflict with price stability. Article 3 of the EU Treaty was quoted, according to which the Eurosystem, without prejudice to price stability, should support the EU's general economic policies, including environmental sustainability.
- (ii) Central bankers held against this that incorporating environmental and sustainability considerations in central banks' objective function would dilute their focus on consumer price and financial stability. The secondary objective in Article 3 of the EU Treaty are so broad and diverse that it would be impossible for the central bank to decide on which among these many goals to support in practice, all the more so since there might be trade-offs between the various secondary goals. Embarking on such an approach would open a dangerous Pandora's box. The difficult choices and potentially strong distributional effects of "green" monetary policy operations would overstretch the scope of an independent technocratic institution, whose democratic accountability requires a clear and narrow mandate. Overextending the mandate would ultimately risk central bank independence. Furthermore, the Tinbergen principle reminds us that with one instrument, central banks cannot and should not pursue several objectives. The role of monetary policy in supporting a smooth transition to a low-carbon economy will require further study. Normally, the focus of monetary policy is on business cycle frequencies of 2-3 years. Even regarding the incorporation of financial cycles, which are far longer, in monetary policy considerations there is no consensus. Monetary policy is usually not geared towards addressing long-term structural issues.

- (iii) A third view held by some in the audience was that central bank mandates should be more fundamentally questioned. These representatives called for going back to an approach like the one prevailing in many countries in the post-war era until the 1970s, which actively involved central banks in industrial and sectoral policies.

#### **Case study DNB: current practical limits to central banks' green own investment policies**

Regarding the sixth and final theme, the DNB's approach to include green investments in their own account portfolio was presented. This might be the area where central banks could most easily implement green policies quickly. However, as the DNB example showed, such policies currently quickly find their limits in the lack of supply of suitable issues, both in terms of overall volumes and more specifically in maturities offered. Again, the question of which should come first – supply by issuers or demand by central banks – was raised.

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*Feedback by participants signalled that the aim of the conference, namely to bring views from academia, policy makers and the financial sector together for a fruitful exchange, was achieved. The strong involvement of NGOs and think tanks among speakers, the audience and in the very lively questions and answers sessions reflected the open nature of these discussions, which is useful and necessary to enhance public awareness of, and create solutions to, these complex and interdisciplinary topics, in which financial aspects are just one, albeit an important, element.*

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A conference photo album is available at:  
[www.suerf.org/gallery](http://www.suerf.org/gallery)