

»» Green finance – green banking

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Green finance is more than the financing of green investment. It comprises elements such as the environmentally and climate-friendly design of the financial system as a whole and the management of environmental and climate risks in finance institutions, for example. All climate-policy measures directed at the banking sector, however, must be evaluated for their economic efficiency and should not be a substitute for targeted climate policy in the sectors originally responsible for greenhouse gas emissions. Credit institutions for their part are called upon to examine whether they are appropriately positioned in light of the long-term risks of climate change – as well as the opportunities potentially arising from ambitious climate policy.

Sustainable finance and green finance

In the past two years, two main impulses have driven the theme of sustainable and green finance. One of them was the adoption of the UN Sustainable Development Goals (SDGs) in September 2015, which aim to end global poverty and protect the planet. Realising the SDGs, which comprise environmental and climate protection targets, requires enormous amounts of funding. According to Schmidt-Traub (2015), around 1.5 to 2.5% of annual global gross domestic product will be needed for infrastructure, clean energy, water, sanitation and agriculture until the year 2030.

A few weeks later, at the 21st Conference of the Parties to the U.N. Framework Convention on Climate Change in December 2015, 195 countries for the first time adopted a legally binding agreement on climate action that commits them to holding the increase in the global average temperature to well below 2°C above preindustrial levels. Article 2.1.c) of the Paris Agreement formulates an explicit creative mandate for policymakers with regard to the financial sector: ‘Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development’.

Many stakeholders, especially from civil society, see a particular obligation for the financial sector in the transition to a sustainable, two-degree world: Financial institutions must not hamper the transition process (e.g. by financing fossil fuel sectors) and should make the appropriate products and financial resources available for the intended transition.

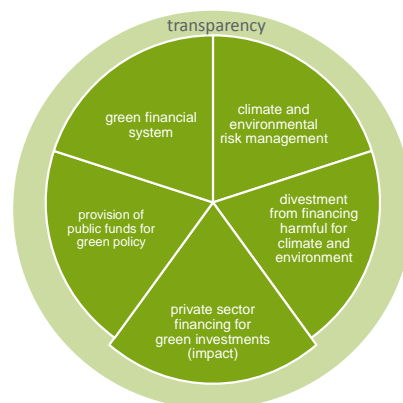
The UN resolution on the SDGs makes no reference to sustainable finance nor to green finance, and the Paris Agreement only mentions climate finance. In the broadest sense, green finance refers to environmental and climate finance schemes while sustainable finance also covers

aspects of economic and social sustainability. Because its concepts are already much more developed, the following will focus on green finance.

The Green Finance Study Group established under China’s G20 presidency in 2016 defines green finance as the ‘financing of investments that provide environmental benefits in the broader context of environmentally sustainable development’, thereby placing a relatively narrow focus on providing funds for investment (G20 Green Finance Study Group 2016).

The following diagram displays a more comprehensive understanding of green finance based on Lindenberg (2014).¹ The left part shows two essential fields of green finance activity for policymakers: the design of the financial system and the provision of public funds. The right part displays the fields of activity of finance institutions. First, they should examine whether their risk management is appropriately set up to respond to identifiable climate and environmental risks. Second, they should refrain from or end (divestment) financing operations that cause indefensible damage to the climate and environment with the ultimate aim of gaining scope for new products (and volumes) that actively contribute to a green and sustainable economy (impact).

Figure: Fields of activity for green finance



Source: Own rendition, based on Lindenberg (2014).

Both lines of action of policymakers and the financial sector must adhere to the principle of transparency in order to adequately inform stakeholders – including customers, capital investors and the general public – about the current status, risks and developments.

Climate risks to finance institutions and financial market stability

Table A-1 shows the main climate risks to companies and

society on the basis of the risk categories listed in the recently published final report of the Task Force on Climate-Related Financial Disclosures (TCFD 2017, p. 5ff.). First, there are direct physical climate risks (such as storm damage to buildings) and indirect financial risks arising from climate damage to companies, such as generation losses in a power plant shut down for lack of cooling water during extended drought periods caused by climate change.

Second, there are what are referred to as transition risks resulting from changes in policies (regulatory risk), technologies and consumer preferences (including reputation risks to companies) in response to climate change. A climate-related transition risk for a company would be, for example, a strong rise in the price of CO₂ emissions that devalues its assets (e.g. fossil fuel deposits), significantly raises its production costs (e.g. electricity-intensive processes) or leads to a tangible loss of sales volume (e.g. consumers moving from combustion engines to electric motors).

Transition risks would require banks to revalue their shares, bonds and other claims against companies in the oil, coal and natural gas industry (upstream and downstream). Reinforced by second-round effects in the financial sector and the overall business cycle, such stranded assets could even threaten the stability of the entire financial market. This is known as the carbon bubble concept.

Climate risks to credit institutions

Direct physical climate risks to credit institutions may take the form of electricity supply interruptions and overheated office buildings. In both cases, appropriate precautionary measures can be adopted in due time, but they would also cause additional costs.

The more relevant risks to credit institutions are financial risks indirectly resulting from physical climate risks and climate damage. In many cases, these are liability risks and thus affect the insurance industry most of all. But they also play a role for credit institutions, as shown by the following example from project finance:

Today it is customary to analyse project-related climate risks in the context of the due diligence process and, if necessary, adopt measures to mitigate the bank's financial risk. In the above example of a power plant, a project finance operation may require a higher debt service coverage ratio from the cash flow in order to ensure that credit liabilities can be paid even amid growing cooling water scarcity.

A higher debt service coverage ratio may also be a reasonable approach to address the third risk category: transaction risks. It involves building up an additional buffer in case the borrower faces significantly rising costs as a result of higher prices of CO₂ emission allowances determined by climate policy.

With a view to long-term climate risks, it is impossible to dismiss an argument put forward by Mark Carney, Governor

of the Bank of England and Chairman of the Financial Stability Board (FSB), during a much-noted speech he gave at Lloyds' of London in September 2015. He pointed out that the catastrophic – physical – impacts of climate change will be felt beyond the traditional horizons of most actors, that is, beyond the business cycle, the political cycle and the horizons of technocratic authorities ('Tragedy of the Horizon', Carney 2015).

For the long-term risks in particular, the special importance of the TCFD recommendations (2017) needs to be recognised: In its final report, the task force set up by the Financial Stability Board recommended a globally uniform standard for climate-relevant disclosure obligations in the context of mainstream financial filings. Comprehensive disclosure of climate-related risks should enable the financial system – above all, investors, banks and insurers – to efficiently price inherent climate-related risks and thus fulfil their function of efficient capital allocation. At the same time, the transition to a low-carbon economy would also present new business potential and this is where the arguments shift to the opportunity perspective. The purpose of the TCFD transparency standard for carbon risks in the various asset classes is to provide the framework for the (financial) markets to be able to adjust efficiently to climate risks.

With a view to short- to medium-term risks, many credit institutions are probably less likely to incur major financing risks in connection with the Paris Agreement and its follow-on process. It must be noted in any case that bank analysts are quite experienced in dealing with politics as a risk factor and their analysis horizon may in fact be longer than the planning horizon of politicians who have incentives to care only for their legislative term or for the period until the next election date.

One way for a bank to reassess climate risks in its exposure is to perform a targeted portfolio level analysis of risks from climate change and climate policy, for example as a specific focus of sector analyses.²

Climate risk to financial market stability

Available scenario analyses show that a carbon bubble appears hardly realistic. The German Federal Ministry of Finance has commissioned an assessment of the carbon bubble risk for Germany and Europe (Lutz and Stadelmann 2016). The experts analysed the impact of a price of EUR 99/tCO₂ for a sample of German equity funds – a very ambitious level given the current price of approximately EUR 8/tCO₂ in the European Emissions Trading System. From this they derive a roughly estimated cost range of around 2 to 5% of GDP. This extreme scenario, according to Lutz und Stadelmann, however, is still on a viable level that in itself is most likely to pose only a limited risk to financial market stability. The ten heaviest historic daily losses in the DAX, for example, had larger effects.

Other analyses arrive at comparable results: Oehri et al. (2015) put the cost of a CO₂ price of CHF 120/tCO₂ for the

Swiss equity fund market at up to 1.1 % of GDP. Battiston et al. (2016) calculated the negative effects of a complete devaluation of enterprises in climate-sensitive sectors on the equity investments of the 50 largest listed EU banks. They did not see any systemic climate-induced risks to financial market stability here either, provided ambitious climate policy was announced early and implemented within a reliable framework.

The key finding is therefore that climate change will not endanger financial market stability so long as climate-policy measures with a high degree of intervention are implemented not abruptly but in reasonable adjustment phases. That is precisely what should be expected, given the interests of (energy-intensive) enterprises and their employees, and in the interests of the aggregate economy. Much indicates that the measures required for sustainable, climate-compatible business practices will likely be decided and implemented continuously over the next years and decades. That will leave the affected enterprises and their financiers time to adjust to the changed conditions.

How credit institutions can contribute to green finance

The right side of the diagram shows that, from a bank's point of view, green finance goes beyond managing climate risks and involves asking whether certain carbon emission-intensive projects or sectors should be banned from the portfolio or new lending (divestment). A further green finance dimension is impact, i.e. the volume of finance provided to protect the climate, and the measurable effects it produces. The latter often involves the even farther-reaching demand that finance institutions should adopt a steering approach that ensures that their financing operations are compatible with the climate target agreed in Paris in 2015 of limiting global warming to a maximum of two degrees compared with preindustrial levels (2-degree compatibility).³

Divestment

It can be observed that foundations, pension funds and municipalities are increasingly committed to selling shares and bonds issued by enterprises that make money from extracting and burning fossil fuels and then investing at least part of the funds recovered in renewable energy sources (Häßler 2016). This decision is motivated by the responsible actors' own ethical principles but also by the drive to save their reputation, as public opinion is putting growing pressure on financial market actors to sell or avoid carbon emission-intensive capital market products.⁴

Arabella Advisors (2016) quantify the value of fixed assets of institutions and individuals that have committed in some form to divesting from enterprises in the fossil fuel sector at USD 5,000 billion.⁵ The now enhanced recognition that taking into account climate or other ESG factors⁶ when making a capital investment does not mean lower returns is certainly useful here. One example from the corresponding literature is the analysis conducted by Blackrock (2016, p. 11), which found that integrating climate factors into the investment process carries with it an upside potential with a low downside risk.

For one thing, the effect of climate-related divestment on the climate will crucially depend on how broadly it is practised nationally and internationally, since otherwise it would mean simply replacing one financier by another. For another, it is important to determine what will be done with the freed up resources, to what extent they will be available for additional climate finance and what climate impact can be expected.

Impact and 2-degree compatibility

The most common measure of negative climate impacts of financings is their carbon footprint.⁷ For credit institutions, this includes the greenhouse gas emissions of the projects they finance. In a similar way, the carbon footprint avoided can be used to measure the positive climate impact of a financing operation or co-financed project. KfW, for example, regularly reports about the carbon emissions reduced by its promotional programmes for renewable energy and energy-efficient construction and refurbishment. The annual evaluation of the renewable energy programme also serves as a basis for impact reporting on the green bonds issued by KfW in reference to these commitments.⁸

The demand for compatibility of finance sector activities with the two-degree climate target seems obvious but comes with some fundamental as well as methodological problems. For example, an approach based on carbon footprints or emission quantities raises the following questions: what criteria can and should be applied to distribute among finance institutions the maximum global greenhouse gas emission budget determined on the basis of the 2-degree target? How to deal with the fact that credit institutions have different business models and products and operate in different regions and sectors? Should credit institutions be allowed to trade emission budgets allocated to them? Should a project co-financed in a country that can prove it has a fully 2-degree compatible climate policy (e.g. through a comprehensive climate tax) be rated the same as a project in a country that has no ambitious climate policy whatsoever?

A conceivable alternative to a quantitative approach is a price approach. In calculating projects they wish to co-finance, credit institutions would have to apply a shadow price for their greenhouse gas emissions that would implicitly make the projects more costly and potentially exclude particularly energy or greenhouse gas-intensive projects. What price would be applied here? In order to ensure a level playing field, how can an identical shadow price be enforced in all credit institutions nationally and globally? How can duplicate pricing be prevented when a real emission price overlaps with a shadow price applied by a bank?

Another option would be to apply a sector-based approach, i.e. to ban specific critical sectors and areas or prescribe quality standards. 'Classic' approaches include, for example, non-governmental organisations' demand for all credit institutions (and insurers) to divest from coal power plant projects and for lenders to ensure that forestry projects they finance meet the criteria of the Forest Stewardship Council. Under this very raw approach, how can the 2-degree compa-

tibility of the overall system of sectoral and quality requirements be secured? Given the historic emissions (of the industrialised countries), would it be fair to prevent developing countries from moving up to a similar level of development using affordable fossil fuel resources of their own by denying them access to the necessary funding sources? Would it be fair to deny developing countries adequate compensation for additional investment expenditure they would incur from using renewable energy sources?

Transparency

Full transparency is an essential contribution of the banking sector to climate-friendly development. One of the forerunners in promoting transparency about climate risks is the French Energy Transition Law of 2015, which now requires investors with total assets of EUR 500 million or more to publish climate reports.⁹ Just one year earlier, the Montreal Carbon Pledge was launched, which sees investors voluntarily commit to reporting on the carbon footprints of their investment portfolios.¹⁰

Nonetheless, because of their broader outreach, the decisive factor for more transparency on climate risks will be the proposals of the TCFD and their resonance across the finance sector. As of June 2017, more than 100 enterprises already announced their endorsement of the recommendations of the TCFD.¹¹

Toolbox for 'greening' banks

Table A-2 systematically shows various levers which not just credit institutions themselves but other relevant actors also have to directly or indirectly strengthen the contribution of banks to green finance (e.g. by influencing credit demand).

What is the economic rationale of the levers depicted in the table? From an economic perspective, unchecked greenhouse gas emissions and the resulting damage to the climate are the consequence of external effects. Emitters can use the atmosphere as a sink for their greenhouse gases without a market mechanism regulating this use and with the result that third parties must bear the costs which their emissions cause. The environmentally 'optimal' solution would be to have suitable mechanisms through which to directly charge the external costs to the polluters who cause them so that they can include them in their calculations.¹²

The first best mechanism would therefore be a greenhouse gas emission tax set at an appropriate level (or alternatively an appropriate quantity control mechanism such as the EU Emissions Trading System). Should such a tax be unenforceable in the political process or involve excessively high transaction costs for measurement, collection etc., the second best solution in terms of economic efficiency could be to tax the production of particularly greenhouse gas-intensive goods. But this approach already produces a distortion because the only incentive for protecting the climate consists in reducing the quantity of the taxed good produced (Endres 2000, p. 144). Taxing the input of capital – or in more general terms, influencing the use of the factor capital – in the pro-

duction of goods that harm the climate can at best be the third best approach to correcting environmental externalities as it is even more distant from the actual source of the external effects.

It is therefore clear that green finance measures can play only a supportive role for original climate and sustainability policy. Banks' lending decisions cannot substitute necessary action on climate policy that directly targets greenhouse gas emissions. Reflecting this recognition, the first key barrier to green banking listed in a UNEP report (2016, p. 5) is 'a lack of real economy demand, stemming from the presence of unmitigated externalities or policy uncertainty'.

Climate policy measures that target financial markets directly are economically efficient when the financial system is also failing in relation to the economic model. One example of this would be if, for historic reasons and because of institutional inertia, the efforts finance institutions undertake to analyse the climate risks of lending operations were inadequate in light of the actual threat situation. An allocationally inefficient approach, in turn, would be to lower regulatory capital requirements for credit institutions on climate-friendly loans (or, conversely, to raise them for 'brown' investments).

Outlook

From an economic perspective, the various actors should be required to care for the efficiency of the numerous levers for greening the banking sector in comparison with alternative measures, many of which inherently lie outside the banking and finance sector. Measures in the finance sector must not become a substitute for targeted climate policy in the sectors (or products) that are originally responsible for greenhouse gas emissions.

In any case, what does appear to be justified and geared to achieving economic efficiency, however, is to require credit institutions to examine whether they are appropriately positioned in view of the identifiable risks of climate change, especially the long-term ones, and also the opportunities potentially arising from ambitious climate policy.

In addition, credit institutions should also examine in what ways they could meaningfully support national and international climate policy – either separately or in cooperation with other banks. Inevitably, these will not be the economically most efficient climate-policy measures because the responsibility for reducing greenhouse gas emissions lies with other sectors.

But banks can still support climate policy in many different ways. For example, the banking industry does not need to wait for the state to develop definitions for green investment or standards for ambitious green bonds. Credit institutions can do this separately or in a concerted initiative. Examples include the IDFC's Green Finance Mapping and the Green Bonds Principles of the International Capital Market Association.¹³

Credit institutions can also contribute to lowering greenhouse gas emissions in their own narrower sphere of influence, e.g. by making their operation carbon neutral (especially business travel and electricity and heat consumption), through climate divestment in their own investment policy, by issuing green bonds, or by considering climate-friendly options in their due diligence of projects proposed to them for finance.¹⁴ Measures of this type are motivated by the voluntary assumption of responsibility for the world's climate by a company – in this case, by a credit institution.

When a credit institution voluntarily aligns its financing commitments with their presumed compatibility with a two-degree world, then this, too, is a legitimate business decision. What does appear problematic, however, is a scenario in which such an approach is made mandatory for the entire banking sector – as a substitute for lack of progress in original climate policy. That could create avoidable economic distortions and raise critical ethical implications. ■

Table A-1: Climate risks: systematisation and examples

	Companies	Society
(Direct) physical risks		
Climatic	Storm damage to buildings	Heat-related deaths from prolonged heat waves (e.g. Europe 2013)
Geological	Harvest losses	Regional famine from high harvest losses due to persistent drought
Ecosystemic		
(Indirect) economic effects from	physical risks	
	Electricity production losses due to cooling water scarcity resulting from persistent drought	Regional GDP losses resulting from high flood damage
	Liability risk of large carbon emitters	
	Rising insurance claims	
Transition risks		
Tougher climate policy	('stranded assets')	('carbon bubble')
New technologies	Rising CO ₂ prices jeopardise electricity from fossil fuels as a business model	Abrupt toughening of climate policy leads to high write-downs in financial institutions on claims and holdings in the fossil fuel sector; reinforced by second-round effects, the financial sector goes into crisis
Changes in consumer preferences	Rising demand for e-mobility undermines combustion engine as a business model	

Note on liability risk of large carbon emitters: One example is the action for damages brought before the Higher District Court of Hamm, Germany by a farmer from Peru against the electricity utility RWE for damaging the climate. <http://www.sueddeutsche.de/wirtschaft/prozess-angst-vor-der-flut-1.3747262>

Source: Own rendition, based on TCFD (2017).

Table A-2: Lever for promoting green finance from banks

	Mobilisation of funds for environmental and climate protection (including adaptation)	Demobilisation of financings that harm the environment and climate	Promotion of environmental and climate risk management at project level	Promotion of environmental and climate risk management at portfolio level
Government: environmental and climate policy	Promotional funds, e.g. for electricity from renewables, energy efficiency investments and e-mobility	Carbon taxes; compulsory minimum efficiency standards for new buildings or motor vehicles	Promotional funds for energy advice to enterprises	
Government: fiscal policy	Tax relief, e.g. for electricity from renewables, energy efficiency investments or e-mobility	Reduction of subsidies that are harmful to the climate (e.g. tax cuts for diesel fuel)		
Financial market regulation	Lower minimum capital requirements for green investments (or higher for 'brown' investments)	Requirement to disclose climate risks (e.g. section 173 of French Energy Transition Act)	Joint legal liability of credit institutions for co-financed projects (e.g. Brazil)	Obligation to integrate climate policy scenarios into banks' stress tests
Credit institution	Target quota or volumes for green finance (e.g. KfW); new green savings and lending products and risk instruments (e.g. www.danishclimateinvestmentfund.com), green ABS, green bonds	Divestment from sectors potentially harmful to the environment and climate	In-depth environmental, climate and social impact assessment of planned financings (e.g. http://www.equator-principles.com/)	Appraisal of new commitments for '2-degree compatibility'; integration of questions for customers' preferences on environmental, social and governance aspects in advisory talks

Joint initiatives of credit institutions (e.g. through banking associations)	Development of new business models and financing approaches (e.g. www.unepfi.org/positive-impact/); development of standards (z. B. www.icmagroup.org/ -> Green Bond Principles)	Launch of climate divestment initiatives, e.g. http://divestinvest.org/	Development of standards for project-related environmental, climate and social impact assessment (eg. http://www.equator-principles.com/)	Development of taxonomy and stress tests for climate risks (www.eib.europa.eu/about/global-cooperation/climate/finance-mainstreaming.htm)
Bank customers	Active demand for green products for capital investment	Review of fund investments for negative climate impacts (e.g. www.climetrics-rating.org)	Use of complaints mechanisms offered by credit institutions	Active demand for climate-related risk management in capital investment

Note on joint legal liability of credit institutions: Brazil is currently still the only country where such joint liability applies ('lender environmental liability'), cf. Sampaio et al. (2016). Note on target quota for green finance at KfW: In its sustainability guidelines, KfW Group set itself the target that the priority area of climate change action and environmental protection should make up around one third of the group's total new commitment volume (<https://www.kfw.de/nachhaltigkeit/migration/Nachhaltigkeitsleitsätze-der-KfW-Bankengruppe.pdf>).

Source: Own rendition, based on TCFD (2017).

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¹ The EU High-Level Expert Group on Sustainable Finance has formulated a similarly comprehensive definition of sustainable finance (2017).

² For example, the WRI / UNEP-FI Portfolio Carbon Initiative (2012) contains a conceptual framework that guides finance institutions and investors in identifying, assessing and managing climate risks. The Cambridge Centre for Sustainable Finance (2016) lists numerous international best-practice examples of environment and climate-related risk analyses by finance institutions.

³ The initiative 'Science Based Targets' of CDP, WRI, WWF and UNGC, for example, operates in this context. <http://sciencebasedtargets.org>

⁴ Cf. for example <http://divestinvest.org/>

⁵ For comparison: The Allianz Global Wealth Report 2017 estimates global gross financial assets of households at just under EUR 170 trillion (Brandmeir et al. 2017).

⁶ ESG: Environmental, social and governance criteria.

⁷ In this context, the carbon footprint measures the greenhouse gas emissions expected over a period of a year or during the term of the financed projects and allocates them to the relevant equity and debt capital providers in relation to their funding share.

⁸ See [www.kfw.de/KfW-Konzern/Service/Download-Center/Konzernthemen-\(D\)/Research/Evaluationen/](http://www.kfw.de/KfW-Konzern/Service/Download-Center/Konzernthemen-(D)/Research/Evaluationen/) and www.kfw.de/KfW-Konzern/Newsroom/Aktuelles/News/News-Details_410816.html.

⁹ https://ec.europa.eu/environment/ecoap/about-eco-innovation/business-fundings/investors-assess-climate-risk-france_de dated 30 March 2016.

¹⁰ <http://montrealpledge.org/>

¹¹ www.fsb-tcfd.org/publications/final-tcfd-recommendations-reportstatement-support-june-2017

¹² Cf. Endres (2000, p. 19ff.), Endres (2017).

¹³ www.idfc.org/Our-Program/green-finance-mapping.aspx and www.icmagroup.org/Regulatory-Policy-and-Market-Practice/green-social-and-sustainability-bonds/

¹⁴ KfW Development Bank, for example, appraises new projects for their relevance in regard to reducing greenhouse gas emissions and climate change adaptation, cf. https://www.kfw-entwicklungsbank.de/PDF/Download-Center/PDF-Dokumente-Richtlinien/Nachhaltigkeitsrichtlinie_EN.pdf.