Analysis

Climate change must be fought – what does PACTA say about the transition risks for banks?

Financial stability, Climate | 19 July 2023 | Tatu Räsänen, Karlo Kauko

AUTHORS



Tatu Räsänen
Economist



Karlo Kauko
Adviser

Climate change is one of the great issues of our time. The need to rapidly reduce carbon dioxide emissions will adversely impact the operations of many companies, and may make old operations unprofitable. This may give rise to credit loss risks for the banks that financed these companies. In Finland's case, the problem is worst with regard to energy production. Loan portfolio risks can be assessed by combining company-specific information on technologies and emissions with corporate loan portfolio data. The loan portfolio transition risk for banks appears to be moderate.



The Finnish version of this article has been published on 14 June 2022.

Eliminate fossil fuels

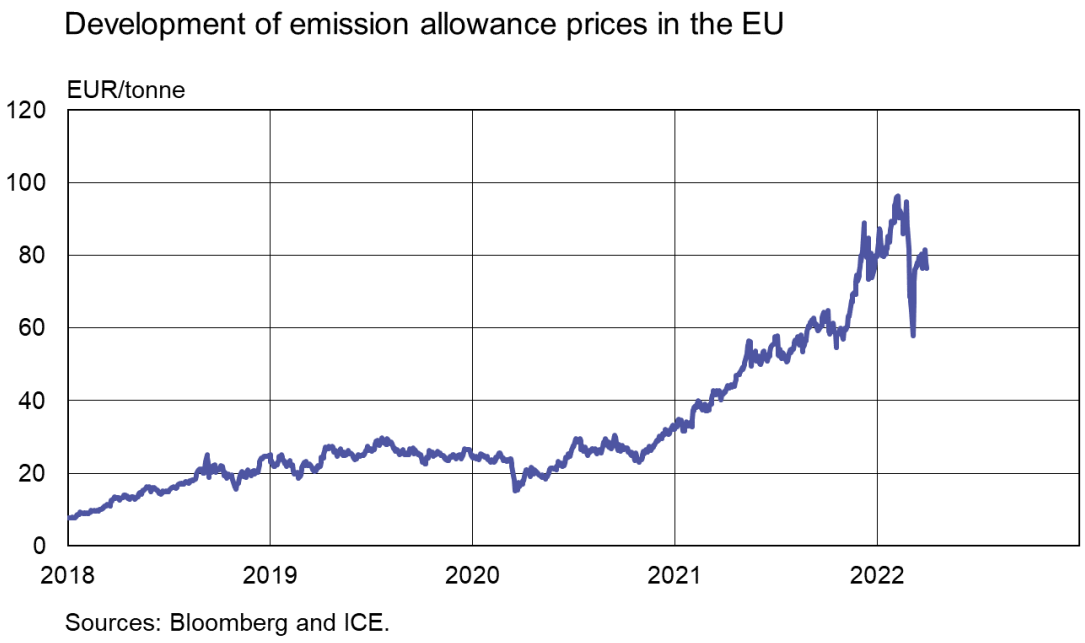
In order to combat climate change, the use of fossil fuels must be limited. Alongside climate change, the war in Ukraine has accelerated the need to reduce our dependence on Russian oil and natural gas. Achieving the goal of reducing greenhouse gases, however, will require major reforms and massive investment in our economy and energy supply. Large-scale investment will require equally large-scale financing. The fight against climate change is therefore largely also a financial market issue, although this aspect is often forgotten.

Economists are fairly unanimous that the polluter should pay a price for environmental damage that reflects the resultant social cost. It is important that all costs are taken into account. Indirect and hard-to-measure but wellbeing-impairing effects should also be included in the costs.

In the European Union, a market-based emissions trading system has been used to achieve pricing corresponding to the costs of greenhouse gases. The emissions trading system covers just under half of Finland's greenhouse gas emissions. Road and sea transport, for example, are outside the system, at least for the time being.

EU Member States regularly auction emission allowances. Allowances have also been allocated for free, however, particularly in the early years of the system. Companies can buy the emission allowances they need, and private actors can trade these allowances freely between each other. The emission allowances market is liquid, so prices react quickly to changes in supply and demand. Prices rose sharply in 2021, so the economic impact of the fight against climate change is already a concrete reality. In January 2022, prices were still rising, but the Russian invasion of Ukraine in February caused a sharp, albeit partly temporary, fall in emission allowance prices (see Chart 1). In the longer term, however, allowance prices will likely rise further, as the number of allowances to be auctioned is set to be reduced. High-emission activities will become expensive and thus unprofitable, which is the purpose of the emissions trading system.

Chart 1.



26.6.2023
© Suomen Pankki / (© Bank of Finland)

In the long term, few things threaten the stability of the financial system as seriously as climate change, although risks that will materialise years or even decades from now are difficult to assess (see e.g. ESRB 2021). Paradoxically, reducing emissions may, however, weaken banks and other financial institutions in the short term, making it difficult to finance the necessary measures. Outright bans to stop high-emission business activities would have an immediate effect, but also, as emission allowances become more expensive, many businesses will have to abandon their old operating practices. This will often also mean abandoning old revenue, and the problems this creates are often referred to as 'transition risk'. If, for example, a bank's loan customers have many high-emission activities, the transition risk also becomes part of the bank's credit loss risk.

The actual emissions of business customers alone do not give a full picture of the transition risk associated with loans granted by a bank, but they are much easier to measure objectively than other relevant factors. For example, the potential for customers to develop and adopt alternative operating practices is a substantive but difficult to assess aspect. In any case, the first step in assessing the transition risks of any bank is to map the emission situation of its debtors.

PACTA for Banks toolkit for modelling transition risks

PACTA is an acronym for 'Paris Agreement Capital Transition Assessment'. The following analysis uses the PACTA for Banks software – designed for banks, central banks and banking supervisors –

and its accompanying material. The PACTA for Banks toolkit is used to measure the alignment of loan portfolios with scenarios according to the Paris Agreement[1]. These scenarios are not forecasts, but rather ambitious targets to achieve the set emission reductions. The scenarios have been developed by the International Energy Agency (IEA), of which Finland is a member. They outline, for example, how fossil energy should be replaced in the coming years by energy sources that do not emit greenhouse gases, or how the automotive industry should gradually switch from internal combustion engines to electric vehicles.

As the name suggests, the PACTA for Banks package is designed to support the decision-making of commercial banks, but it can also be used to monitor the transition risk of the banking sector as a whole. For example, the Swedish Financial Supervisory Authority has used the package to assess the aggregate transition risks of several Swedish banks (Finansinspektionen 2022). 2DII has developed a similar package for securities investors, and it has been applied to, among other things, the analysis of the investments of Norwegian pension funds, insurance companies and asset managers (2DII et al., 2022).

ⓘ PACTA - Paris Agreement Capital Transition Assessment

PACTA is a toolkit for scenario modelling of financial sector transition risks, developed by the international think tank 2° Investing Initiative (2DII). There are separate versions of the tool for capital market participants (PACTA for Investors) and for banks, central banks and bank supervisors (PACTA for Banks). Development of the PACTA for Investors toolkit began in 2014 and the first version of the toolkit was released in autumn 2018. The development of the PACTA for Banks toolkit, on the other hand, began in 2018.

This article focuses on the PACTA for Banks toolkit. Using the package requires, in addition to the software code provided by PACTA, information about the scenario to be used, company-specific forecasts of emissions or the composition of production, and information about the bank's receivables from these companies. Much of this material is included in the PACTA package.

Due to its short development history, the PACTA for Bank toolkit does not yet include all of the sectors considered to be most significant for emission reductions, but development work on the toolkit continues. The toolkit is based on open source code.

Most business activities generate so little greenhouse gas emissions that it is not appropriate to include them in analyses concerning the fight against climate change. PACTA includes many of the most important sectors in terms of the need to reduce emissions: energy production, steel industry, cement manufacturing, automotive industry and aviation. The software does not calculate credit loss forecasts; the analysis instead produces substantive information about banks' credit portfolios.

The analysis uses both Finnish MFI loan data and PACTA data on emissions and technologies, which are company-specific. Loans from Finnish MFIs to companies and other entities are derived from the Luoti[2] data for Finland in the Eurosystem's AnaCredit database. The data used describe the situation at the end of 2020. Included are branches of foreign credit institutions in Finland, but not subsidiaries or branches of Finnish banks abroad. Also included are loans granted abroad, but only if they were granted from a branch located in Finland.

An algorithm in the software package searches by name for companies that can be found in both datasets, and combines the data concerning them. Finally, the software calculates how the analyst's own loan portfolio aligns with Paris Climate Agreement scenarios[3] included in PACTA.

Energy supply transition risks for Finnish MFIs – What does PACTA say?

In the case of Finland, the results for energy production are the most interesting and important from an emissions reduction perspective, as greenhouse gas emissions from energy supply were higher than from all industrial sectors combined in 2019[4]. The sector is also important because of its high level of debt. In the light of the Luoti data, loans to energy production companies are many times larger than loans to all the other sectors included in PACTA combined. Several billions in loans have been granted to energy producers, so credit losses in extreme scenarios would pose a risk to the stability of the banking system.

In PACTA's calculations, every loan granted to an energy-producing company is classified as financing of production technology. If a company uses several forms of production, the loans granted are allocated to the forms of production in proportion to energy production capacity, therefore not in proportion to the investment financing required for production.

Results of the analysis are presented in Chart 2, which enables a comparison of the forms of energy production in Finnish MFIs' credit portfolio by mode of production, energy production capacity in the EU countries, and the targets according to the scenario containing the 2°C climate warming assumption (Beyond 2°C Scenario, B2DS). Considering the current situation, the

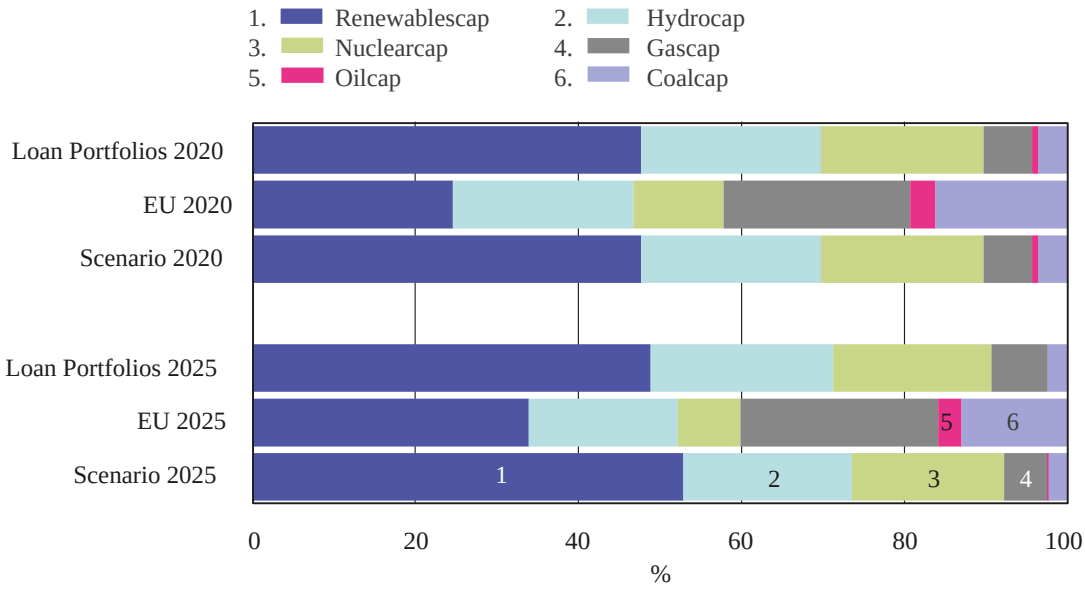
scenario in question has one particularly realistic feature: the scenario does not assume that use of natural gas will increase during the transition period from the situation in 2020, which indeed is unlikely to happen as the EU endeavours to reduce the use of fuels imported from Russia.

In the upper part of the graph, we see that in the 2020 baseline, Finnish MFIs financed significantly more renewable energy sources than the corresponding share of these forms of production in the European Union, according to PACTA data. The financing of gas and coal power, in particular, has been relatively low in Finland compared with the situation in other EU countries. This may be misleading, as many coal-fired power plants are owned by municipal energy institutions, and loans granted to municipalities are not included in the data used. The use of heat generated as a by-product in district heating does not adversely impact calculations, but as the plants produce energy in two forms, interpreting the results becomes more difficult. The high share of renewable energy sources may also be due to the fact that they are often capital-intensive, so the initial investment has required substantial financing.

The lower part of the chart shows the projected situation as well as the target situation of the B2DS scenario for 2025. To achieve the necessary changes in the composition of loan portfolios in order to realise the scenario, the share of renewable energy sources, in particular, should be increased in loan portfolios. The change in five years seems small, but this may be partly due to the fact that the loan portfolio is assumed to be unchanged in the calculations.

Chart 2.

Energy Sector Loans Granted by the Finnish MFIs and the Current and the Projected Future Technology Mixes for the Energy Sector in the EU



Sources: PACTA, Luoti-data and Bank of Finland calculations.

26.6.2023
© Suomen Pankki / (© Bank of Finland)

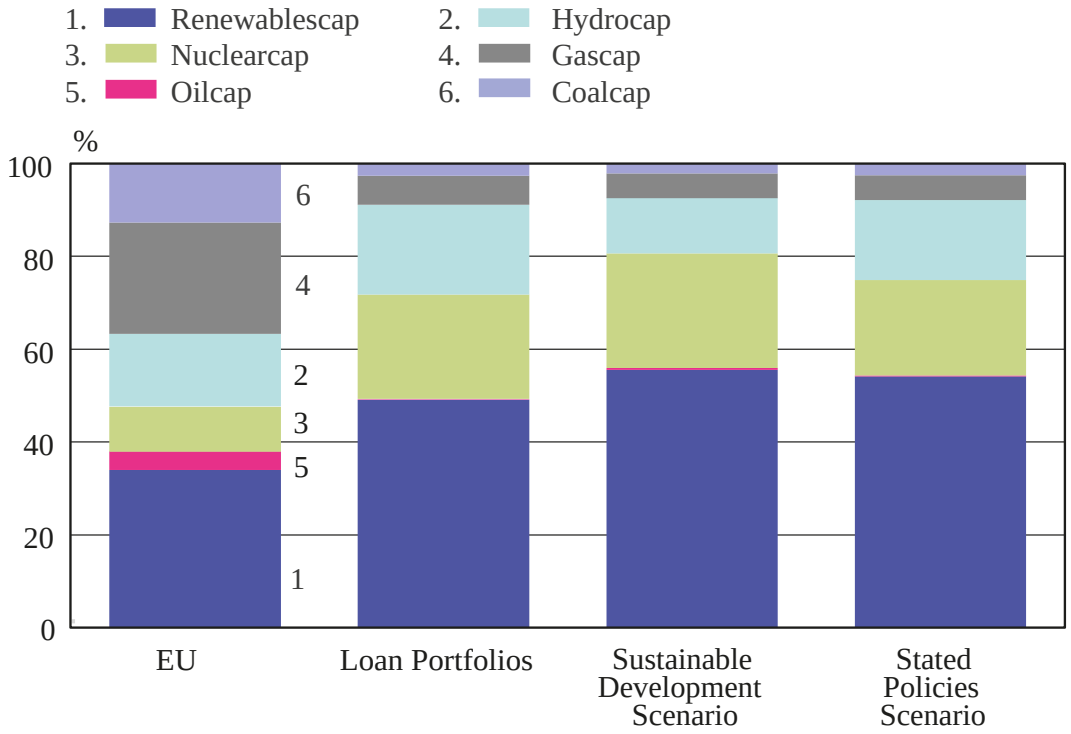
Chart 3 compares two other scenarios, the reality of energy production and the distribution of Finnish banks' loans to the energy sector.

- The first bar shows the distribution of forms of energy production in the European Union in 2025.
- The second bar shows the distribution of Finnish MFIs' loans between energy-producing companies by mode of production in 2025.

The last two bars show the targets for the International Energy Agency's scenarios for 2025. The scenarios are the Sustainable Development Scenario (SDS) and the Stated Policies Scenario (SPS).

Chart 3.

Projected Energy Production Capacity in the EU countries, Energy Sector Loans Granted by the Finnish MFIs in 2025 and Targets of the Selected Scenarios for the Year 2025



Sources: PACTA, Luoti-data and Bank of Finland calculations.

26.6.2023
© Suomen Pankki / (© Bank of Finland)

SDS = Sustainable Development Scenario (set of measures in accordance with the Paris Agreement for different forms of energy production); SPS = Stated Policies Scenario (measures announced in 2019), see PACTA (2020b)

According to these results, the loan portfolios of banks operating in Finland would already be quite close to the targets in the mid-2020s. In particular, the share of coal power in banks' loan portfolios is low in Finland and the share of renewables is high compared to the target state of the scenarios. In order to achieve the scenario targets, MFIs' loan portfolios should include even more loans to renewable energy sources.

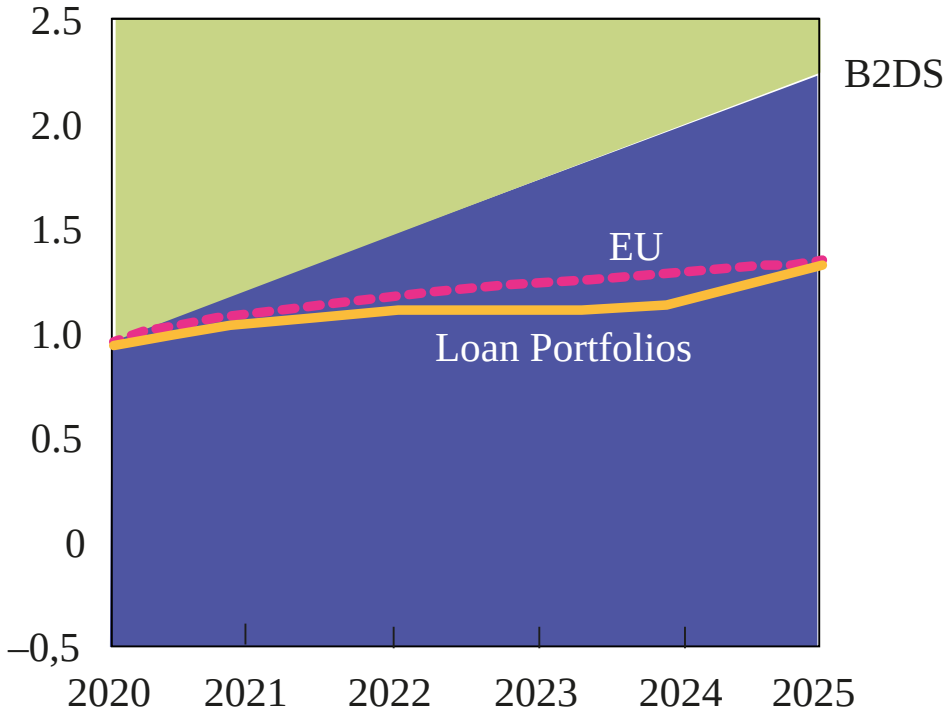
Based on the analysis, the loan portfolio of Finnish MFIs would appear to be closer to the target

state of the scenarios than the current EU level of energy production. In Finland, the share of coal and gas, in particular, is significantly lower than in Europe in general. On the other hand, the share of renewables and nuclear power is higher.

Chart 4 shows how, in the B2DS scenario, renewable energy production would have to increase by 2025 to limit global warming to 2°C in line with the scenario assumptions. Both the current forecast for EU energy production and the distribution of forms of energy production in Finnish banks' loan portfolios are falling well short of the ambitious targets of the B2DS scenario. In other words, current EU energy production and the loan portfolios of Finnish MFIs will contain more climate-polluting energy sources by 2025 than would be the case in line with the scenario. The transition risks are therefore high, viewed from this perspective.

Chart 4.

B2DS scenario target level for renewable energy production, energy production in the EU, and renewable energy production of companies financed by Finnish MFIs in 2020–2025



In order to arhieve the targets, development should remain in the green.

Sources: PACTA, Luoti-data and Bank of Finland calculations.

26.6.2023

© Suomen Pankki / (© Bank of Finland)

In order to achieve the targets, development should remain in the green zone.

There are three main problems in interpreting the results.

- A straightforward interpretation of the results is at least almost based on the implicit assumption that all forms of production would require equally heavy investment, and that the share of bank financing would be roughly the same in all energy production investments.[5] This assumption is partly problematic, because most of the costs of, for example, wind power and nuclear power are capital costs caused by heavy investment, while the costs, for example, of gas and peat power are mostly fuel costs, for which it is not necessary to obtain financing years before sales revenue is obtained from the electricity (Vakkilainen & Kivistö 2017, p. 11). Calculated in megawatts, banks have quite probably financed more electricity production based on fossil energy than one might assume based on simple, euro-denominated results, because more capacity is obtained with one euro invested if the power source is fossil fuels.
- It is not assumed that the transformation of energy production will affect to which companies the banks lend, so only changes in technology shares within the same company are reflected in the results. Investments in the renewal of the energy system must be financed, and bank loans will be probably used for this, so in reality the change in energy production will affect banks' loan portfolios. Often this means reallocating loans between companies, but this has not been taken into account in these calculations. For example, a wind power company in the process of being established, for which loans had already been provisionally agreed in 2020, would have no impact on the results. Similarly, if a company that only uses fossil fuels is downsizing, it will probably pay off its old loans without replacing them, but this change in the loan portfolio would also not affect the results of this analysis. According to the results, however, the share of coal power is decreasing, even though the analysis has ignored the endogeneity of loan portfolios, i.e. their dependence on economic structures.
- Information on the investments and production planned by companies is invariably incomplete.

Other industries

In addition to energy supply companies, the PACTA data also includes companies operating in Finland from certain other industries, but both the number of companies and the loans granted to them are significantly smaller than in the energy supply industry. In the automotive industry, for example, there are two companies that have a factory in Finland. There are also two cement manufacturers. There are four steel industry companies in this data set. In the case of airlines, there is, of course, no information on the location of 'factories', and the international nature of the operations makes it difficult to determine the location of the emission source. Many airlines primarily use leased aircraft and do not use bank financing to purchase aircraft, so the direct transition risk of banks is rather small. Many small and medium-sized enterprises found in the loan portfolios of MFIs are missing from the PACTA data, even though they may be active in the industries covered by PACTA.

If the analysis is restricted to the above-mentioned industries, Finnish MFIs have, in the light of the Luoti data, granted most loans to cement and concrete manufacturing and the metal industry.

Finnish banks also have a surprising amount of loans granted to vehicle manufacturing. These loans have, moreover, largely been granted to companies for whose activities there are no data in PACTA. These companies are usually very specialised and often quite small. Many of them modify vehicles for a specific purpose rather than manufacture them.

A few industries central to the climate issue, such as real estate, agriculture and sea transport, are completely missing from the PACTA data. For example, the loan portfolio of private, Finnish housing corporations from Finnish credit institutions was, according to Financial Supervisory Authority statistics, EUR 15.8 billion[6] at the end of 2021, which was clearly more than the loan portfolio of the energy supply industry. The heating of buildings is a significant, albeit indirect emission source in the case of electrically heated buildings and those connected to the district heating network, so in extreme situations there may be a significant transition risk even for housing corporation loans.

Conclusions

Fighting climate change is necessary, among other reasons, to avoid financial and banking crises, but paradoxically these measures may, in the short term, even increase banks' credit loss risks, as banks have receivables from companies whose operating models are becoming obsolete. The risks are greatest for those banks that have a large amount of receivables from companies whose operations have been based on the utilisation of fossil fuels. This so-called transition risk is significant if indebted companies are unable to change their technologies, and if raising the prices of products would cause customers to substantially reduce the use of the companies' products.

For Finnish banks, perhaps the most problematic industry is energy production. The loan portfolio for this industry amounts to billions of euros, i.e. several per cent of all loans granted to companies. A bank takes on an increasing credit loss risk if it finances a power plant company whose operations are based entirely on fossil fuels.

Simple comparison calculations between the situation in 2020 and the target scenario show that, as a rule, the loan portfolios of Finnish banks are already relatively close to the targets with regard to energy production financing, so the transition risk appears to be moderate. The level of loans granted for coal power, in particular, is low. For the other sectors included in PACTA, the banks' problem is in any case much smaller in euro terms, as the loan portfolio is a fraction of the financing granted to energy production.

The toolkit cannot be used to analyse the extent to which companies could raise prices and pass on the rising costs of emissions to their customers without depressing demand. If customers do not consider an increasingly expensive product to be necessary, they will sharply reduce their

purchases. If there is no substitute product and the need to use the product is great, costs may be passed on to customers. A truly in-depth analysis of transition risks would also take into account this fact, which is much more difficult to assess.

Sources

ESRB (2021) Climate-related risk and financial stability, ECB/ESRB Project Team on climate risk monitoring, July 2021; https://www.esrb.europa.eu/pub/pdf/reports/esrb.climateriskfinancialstability202107~79c10eba1a.en.pdf?71a273dc36a85ef05c8bed530466f900.

Finansinspektionen (2022) Transition risks in the banks' loan portfolios – an application of PACTA, https://www.fi.se/contentassets/ca8c6ae951b4417cbeb6ee4f26022735/omstallningsrisker-bankers-laneportfoljer-pacta-eng.pdf.

PACTA (2020a) – PACTA for banks methodology document – climate scenario analysis for corporate lending portfolios, 18.9.2020; https://www.transitionmonitor.com/wp-content/uploads/2020/09/PACTA.

PACTA (2020b) PACTA for Banks Scenarios - Formatted scenarios provided as part of the PACTA for Banks Toolkit, 15.9.2020; https://www.transitionmonitor.com/wp-content/uploads/2020/09/Scenario-Supporting-document.pdf.

Vakkilainen, Esa & Kivistö, Aija (2017) Sähkön tuotantokustannusvertailu, Lappeenrannan teknillinen yliopisto LES, Energiatekniikka, Tutkimusraportti 66.

2DII, Norwegian Ministry of Finance, Norwegian Ministry of Climate and Environment (2022) Heading North? Assessing the Alignment of Norway's Financial Sector with the Paris Agreement, https://2degrees-investing.org/resource/assessing-the-alignment-of-norways-financial-sector-with-the-paris-agreement/.

Notes

1. See, for example https://ym.fi/en/paris-climate-change-agreement. ↑
2. The loans of Finnish MFIs to enterprises and other entities have been obtained from the Luoti data collection that represents the Finnish implementation of the Eurosystem's AnaCredit database. ↑
3. The Paris Climate Agreement sets ambitious targets that would limit the global average temperature rise to well below +2°C compared to pre-industrial levels. Alongside this, the signatory countries will pursue efforts to limit the global average temperature rise to ↑

+1.5°C above pre-industrial levels. Achieving these targets will require significant green transition investments across a number of sectors. Therefore, for example, a high share of fossil fuel production financing in a loan portfolio means that the loan portfolio is far from the target level of the Paris Climate Agreement scenarios. By contrast, financing investments in renewable forms of energy production, for example, brings a loan portfolio closer to the target levels of the scenarios.

4. Statistics Finland, greenhouse gases. ↑
5. PACTA (2020a), p 40. ↑
6. The figure does not include loans granted in Finland by foreign banks, even for those banks that have branches in Finland. ↑

The opinions expressed in this article are those of the authors and do not necessarily represent the views of the Bank of Finland.

Keywords

, banks, climate change