



**FINANSTILSYNET**

THE FINANCIAL SUPERVISORY  
AUTHORITY OF NORWAY

# CLIMATE RISK AND FINANCIAL INSTITUTIONS

Report

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# CLIMATE RISK AND FINANCIAL INSTITUTIONS

**Financial markets and financial institutions are affected both by physical climate change and by the transition to a low emission society. The climate risk faced by Norwegian financial institutions is not insignificant and could in some scenarios have a bearing on financial stability. The risk of financial instability depends on when and how abruptly climate change occurs, and on how quickly the transition is made to a low emission society.**

**Like other types of risk, climate risk affects the value of insurance obligations, financial assets and loans. In the medium term the risk of financial instability relates in particular to the transition to a low emission society. The Norwegian economy is particularly susceptible to transition risk through its exposure to the oil and gas sector, but industries such as transport, property and agriculture will also be affected.**

## GENERAL NOTES ON FINANCIAL INSTITUTIONS' CLIMATE RISK

Costs related to climate change are associated with the consequences of rising temperatures and with measures taken to mitigate rising temperatures. It is customary to distinguish between costs related to physical changes in the climate and costs related to the transition to a low emission society. Climate risk alludes to the uncertainty posed both by physical changes in the climate – termed physical risk – and by countermeasures and technological developments – termed transition risk.

### PHYSICAL RISK

Physical risk consists of weather-related events such as storms and flooding, as well as more permanent changes such as sea-level rise, higher temperatures and changes in precipitation. These are referred to as acute risks and chronic risks respectively. Calculations of negative impacts of climate change on economic growth are uncertain and vary widely. This is partly

due to the complex nature of the interaction between physical and economic factors. In addition, the most serious impacts of greenhouse gas emissions and temperature increases materialise further into the future than traditional macroeconomic models are designed to handle. Assumptions with regard to technological progress and how much weight should be given to harmful effects far into the future (choice of discount rate) are therefore important in such model calculations. Climate change has already had major economic consequences. The number of natural disasters has increased almost fivefold from the 1970s to the present, and natural disasters are estimated to have caused 1.9 million deaths and USD 2,400 billions' worth of material damage (1970–2012).<sup>1</sup>

Rising temperatures will in general have a negative impact on the international economy. Physical climate risk therefore has elements of systematic risk which cannot be eliminated through risk diversification or via the wider financial markets. Moreover, climate change will impact countries and economies in very different ways. Poor countries are in general most susceptible to the effects of climate change and are in many cases the ones that are least able to adapt. Countries in the Middle East and North Africa are often cited as particularly vulnerable to climate change. Compared with most other economies, the Norwegian economy is relatively little exposed to physical climate effects, and is highly adaptive owing to its political, economic and social robustness.<sup>2</sup>

In Norway's case, physical risk will typically relate to the consequences of increased precipitation, more and larger floods and landslides, and a rising sea level. Financial institutions are in varying degrees exposed to physical risk as a result of climate change, and non-life insurers are likely to be those most directly exposed to that risk. Non-life insurers are in the process of adapting their risk models to a situation in which the frequency and intensity of extreme weather will increase. A number of non-life insurers have joined forces to establish a national database (the Knowledge Bank) of statistics on climate-related damage and claims payments.

### TRANSITION RISK

Transition risk is the uncertainty relating to climate policy measures, their impact and the development of climate-relevant technology. New information on these factors could well lead to sudden and substantial changes in financial asset values, in both a positive and negative direction – also affecting the value of banks and other financial institutions. At the climate summit in 2015, 117 countries reached agreement on the goal to keep global warming well below 2 degrees Celsius compared with pre-industrial levels, and to strive to keep global temperature rise below 1.5 degrees. The UN's IPCC report 2014 summarises results from 31 models and 1,184 scenarios. The report puts the costs of an orderly transition to low emission societies, in which the global temperature rise is kept to 2 degrees, at between 1 and 4 per cent of aggregate consumption in 2030.

Transition risk for Norwegian financial institutions is not insignificant and may in some scenarios have a bearing on financial stability. Unexpected and abrupt climate-related changes, such as a sharp increase in carbon charges, will impair the profitability of carbon-intensive industries. Due to second-round effects, other industries may also be weakened, accompanied by a substantial production fall in the Norwegian economy. In such a scenario, banks' loan losses will increase and pension institutions will see a decline in the value of their securities portfolios. The Norwegian economy is particularly susceptible to transition risk through its exposure to the oil and gas sector, but industries in for example the transport, property and agriculture sectors will also be affected.

### REPORTING OF CLIMATE-RELATED RISK

Efforts to increase our understanding of climate-related risk are progressing internationally as in Norway. A key element is identifying climate-related threats and opportunities. The Task Force on Climate-Related Financial Disclosures (TCFD) published in 2017 recommendations for a framework for reporting climate-related financial risk. It recommends that institutions and investors should report on how they take climate risk on board in their strategy processes,

and how climate-related risk is identified, measured and managed. Banks are encouraged to report climate risk in published reports in the same way as credit risk, liquidity risk, market risk and operational risk. The TCFD report has drawn broad support internationally. In Norway, Norges Bank Investment Management (NBIM), DNB, Storebrand and Oslo Børs, among others, support the recommendations. Finanstilsynet considers the TCFD framework to be a good basis for climate risk reporting. Rules for reporting climate risk in the financial industry that are exclusive to Norway should not be introduced. Norway should preferably await the outcome of the ongoing European regulatory development process. See Finanstilsynet's consultative statement on the report of the Climate Risk Commission.

Based on annual reports for 2017, the TCFD found that non-financial firms were more likely to disclose climate-related variables and objectives than financial institutions. However, financial institutions were more open about how they incorporate climate risk into their risk management. Whereas many institutions publish climate-related financial information, relatively few examine possible economic consequences of climate risk.

The Norwegian Climate Foundation surveyed in autumn 2018 Norwegian financial actors' and listed companies' handling of climate risk. The survey illustrates the wide variation in entities' approach to climate risk. It shows that 30 per cent of banks, 40 per cent of life insurers and 50 per cent of non-life insurers have analysed potential impacts of climate change on their business models. Less than 20 per cent of financial institutions have used scenarios when analysing climate risk. However, 40 per cent of them report concrete plans for developing this type of tool.

**BOX 1: Network for Greening the Financial System (NGFS)**

The NGFS is a network of central banks and financial supervisory authorities that share experience and best practices, contribute to the management of environmental and climate risk in the financial sector, and mobilise the financial industry to work for a sustainable economy. The network's object is to define and promote best practices both within and outside the NGFS. As at April 2019, the network comprised 34 members and five observers. Both Norges Bank and Finanstilsynet are members.

The NGFS published its first comprehensive report\* in April 2019. The report makes four recommendations to central banks and supervisory authorities:

- To integrate climate-related financial risks into financial stability monitoring and into their supervision of individual entities.
- To integrate sustainability into their own portfolio management.
- To collaborate to bridge the data gaps and share available climate-risk data.
- To strengthen their own knowledge and understanding of climate risk, and to share this knowledge.

A further two recommendations are not primarily directed at central banks and supervisory authorities, but at policymakers. The NGFS highlights the importance of a robust and internationally consistent framework for disclosure of climate-related financial risks, and supports the principles drawn up by the TCFD. In addition, the NGFS encourages regulators to develop a classification system to identify which economic activities contribute to the transition to a sustainable economy and how far such activities are exposed to climate-related risk (physical risk and transition risk).

The NGFS is preparing recommendations in a number of areas along with a handbook for supervisors and financial institutions on managing climate-related risk. The NGFS will develop and publish scenarios and a guide on how to apply them in scenario analyses and stress tests of climate-related risk. Finanstilsynet participates in drawing up recommendations for managing climate-related risk, and in developing scenario analyses and stress tests. The network will also publish best practices for including sustainability criteria in central banks' portfolio management.

\* <https://www.fsb-tcfd.org/publications/tcfd-2018-status-report/>

**FINANCIAL INSTITUTIONS' EXPOSURES AND SCENARIO ANALYSES**

A prerequisite for scenario analyses is the ability to identify climate-sensitive industries. As yet no universally accepted classification of climate-sensitive industries exists, due in part to the limited availability of data and the absence of a well-defined unit of measurement for climate sensitivity.

Exposure analyses are a useful first step in determining how susceptible financial institutions are to climate risk. Battiston et al. (2017) define a framework based on five climate-sensitive sectors<sup>3</sup>: fossil fuel, utilities, energy-intensive, transport and real estate/housing (table 1). The selection of sectors is based inter alia on their volume of greenhouse gas emissions, their role in the energy supply chain and whether they are exposed to substantial risk of carbon leakage. The framework defined by Battiston et al. largely mirrors similar exposure analyses conducted by the UK financial supervisory authority and the Dutch central bank. The Dutch central bank also points to agriculture as a climate-sensitive sector. A disadvantage of such exposure analyses is that they disregard differences within sectors, as elaborated on in the latest report on financial stability from the European central bank.

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**Table 1: Examples of climate-sensitive sectors based on Battiston et al.'s framework**

Main sector	Subsector	Physical risk	Transition risk
<b>Energy</b>	<ul style="list-style-type: none"> <li>- Fossil fuel</li> <li>- Energy-intensive</li> <li>- Utilities</li> </ul>	<ul style="list-style-type: none"> <li>- Damage to plant</li> <li>- Production downtime</li> </ul>	<ul style="list-style-type: none"> <li>- Stricter emission requirements</li> <li>- Change in commodity prices</li> <li>- Changed requirements from customers and other stakeholders</li> </ul>
<b>Transport</b>	<ul style="list-style-type: none"> <li>- Infrastructure (ports and harbours)</li> <li>- Cars</li> </ul>	<ul style="list-style-type: none"> <li>- Damage to infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>- Stricter emission requirements for fossil-powered cars</li> <li>- Restrictions on use of diesel-powered cars</li> </ul>
<b>Real estate/housing</b>	<ul style="list-style-type: none"> <li>- Housing</li> <li>- Commercial property</li> </ul>	<ul style="list-style-type: none"> <li>- Damage to properties</li> </ul>	<ul style="list-style-type: none"> <li>- Stricter requirements on energy efficiency</li> </ul>

In order to attain the climate objectives set, use of fossil energy must be sharply reduced. This can be done through higher carbon prices, direct regulation or technological development. 88 of the countries that have acceded to the Paris Agreement have declared that they are planning, or considering, the introduction of carbon pricing in order to honour their climate obligations. As at April 2018, there were 51 such initiatives, consisting of 25 emissions trading systems (ETs) and 26 carbon taxes.<sup>4</sup> The overall value of ETs and carbon taxes under these systems increased by 56 per cent from 2017 to 2018.

There is much uncertainty as to what level the price of carbon needs to reach in order to achieve the climate objectives set. There is also much uncertainty as to whether the actual carbon price in various countries will mirror this level ahead. A strong increase in carbon prices will dampen demand for fossil energy sources and very probably reduce oil and gas prices (excluding carbon taxes). Direct regulation aimed at dampening the use of fossil energy sources and developing new environment-friendly technology will concurrently impair profitability in the oil and gas sector. Given its large oil sector, Norway could be particularly exposed to risk related to the transition to a low emission society.

The goal of reduced CO<sub>2</sub> emissions and reduced local air pollution affects vehicle emission regulation. Several countries have introduced restrictions on driving diesel-powered cars and are contemplating a ban on sales of new petrol and diesel cars. Land-based haulage and shipping are also subject to tighter environmental requirements, and manufacturing

industry that uses oil as an input may also be facing tighter requirements. All this will affect the industries mentioned directly, but will also affect the oil industry owing to reduced demand for oil.

Higher energy efficiency requirements may affect the value of property portfolios. Although property accounts for a limited portion of greenhouse gas emissions, it represents about 40 per cent of Norwegian energy consumption and thus has considerable potential for energy efficiency gains.<sup>5</sup> Tighter technical building regulations have contributed to more efficient energy use in new buildings. Where the existing building stock is concerned, changes can also be expected in regulations and regulatory measures designed to reduce energy consumption. This is in keeping with Norway's goal to achieve an energy saving of 10 TWh in the existing building stock by 2030. Government or market requirements may cause properties with a high energy consumption or substantial carbon imprint to fall in value. Physical risk also affects the value of property portfolios.

There is an essential difference between scenarios for analysis of physical risk as opposed to transition risk. In scenarios involving physical climate change, the bulk of the effects are assumed to surface many years into the future. In a transition scenario, impacts and harmful effects will be seen at a far earlier stage.

Norway's Climate Risk Commission emphasises that climate-related risk takes in situations of substantial and fundamental uncertainty since knowledge is lacking of the probability distributions of various outcomes, and also knowledge of what outcomes are

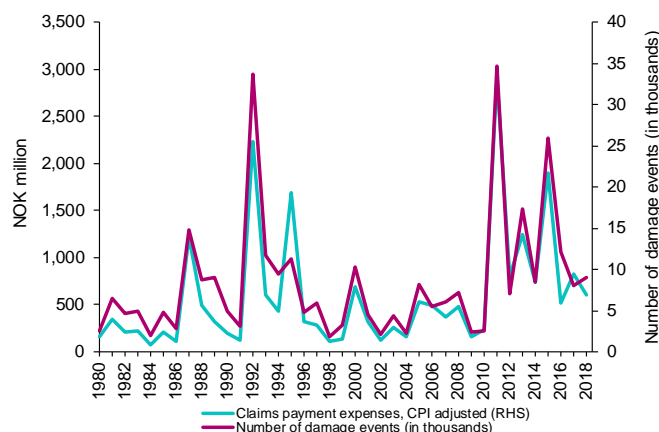
## CLIMATE RISK AND FINANCIAL INSTITUTIONS

possible. In such situations the traditional risk models used by banks and other financial institutions do not work. Through scenario analyses and stress tests, banks and other financial institutions can analyse their business models and strategies against a variety of suppositions regarding climate-related risk. Supervisory authorities can employ corresponding analyses in their assessment of financial stability and capital requirements. Designing scenarios that present a range of possible outcomes for various combinations of physical risk and transition risk is central to this work.

The TCFD recommends institutions to stress test their business models against reasonable scenarios for climate policy, in particular against a scenario in which the temperature increase is limited in line with the ambitions of the Paris Agreement. Such scenarios attach importance to transition risk related to technological developments and decisions at the political level. In 2018, the Dutch central bank published, as the first central bank or supervisory authority to do so, the results of a climate stress test. The stress test contains four scenarios shaped as combinations of active or passive climate policy, with or without technological breakthroughs. The scenarios incorporate a substantial weakening of the Dutch economy in general, and sizeable impacts on the values of climate-sensitive exposures. Dutch financial institutions' exposure to carbon-intensive industries was calculated at 5 per cent for insurers and 13 per cent for banks. Housing and commercial property are omitted from the calculations due to the lack of data needed to calculate energy consumption in those segments. Calculated losses range from 1 to 3 per cent of the banks' aggregate total assets and up to almost 11 per cent of insurers' aggregate total assets. Pension funds' losses were calculated at between 3 and 10 per cent of aggregate total assets. A weaker macroeconomic trend explains the bulk of these losses. A large portion of the losses arises in industries that traditionally are not regarded as climate sensitive.

EIOPA included a natural disaster risk scenario in its 2018 stress test for insurers. However, none of the

**Chart 1: Number of natural damage events and claims payment expenses resulting from natural damage events**



Sources: Finance Norway and the Norwegian Natural Perils Pool

sub-scenarios involved Norway. EIOPA has subsequently established a sustainable finance network for the purpose of improving the modelling of natural disaster risk.

Under the auspices of the European supervisory collaboration and the NGFS, work is in progress on drawing up relevant scenarios for climate risk analyses and developing models to analyse the economic effects of the various scenarios. Finanstilsynet is keeping abreast of this process.

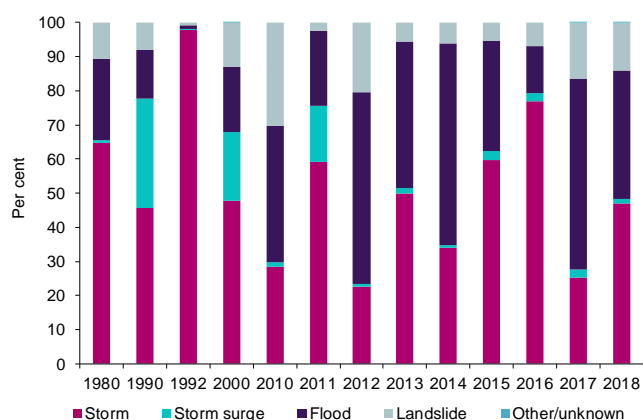
### CLIMATE RISK FACED BY NON-LIFE INSURERS AND PENSION INSTITUTIONS

#### NON-LIFE INSURERS ARE DIRECTLY EXPOSED TO PHYSICAL RISK

Non-life insurers are directly exposed to physical risk as a result of climate change. An extreme weather event cannot be traced back to climate change alone, but climate change implies that the frequency and intensity of extreme weather will increase.<sup>6</sup> More extreme weather will most likely bring larger and more frequent claims payments. A higher frequency of claims and increased claims payment expenses globally could also affect the price of insurance in Norway through the premiums that non-life insurers have to pay for reinsurance in the international reinsurance market. Like pension institutions, non-life insurers are exposed to climate risk through their role as asset managers.

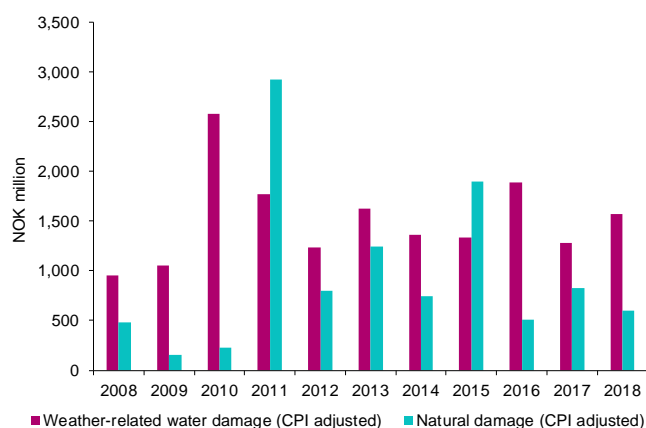
## CLIMATE RISK AND FINANCIAL INSTITUTIONS

**Chart 2: Distribution of natural damage (measured as a share of total natural damage claims payments)**



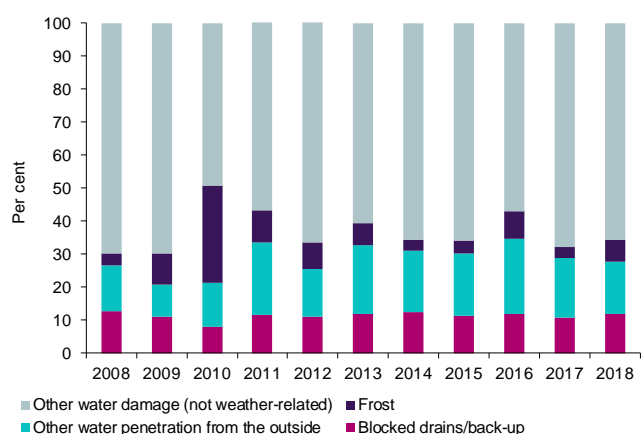
Sources: Finance Norway and the Norwegian Natural Perils Pool

**Chart 3: Claims payment expenses resulting from weather-related water damage and natural damage**



Source: Finance Norway

**Chart 4: Distribution of water damage (measured as a share of total water damage claims payments)**



Source: Finance Norway

The natural damage insurance scheme for non-life insurers puts Norway in a special position internationally. The Norwegian natural damage insurance scheme is statutory, and all non-life insurers that write fire insurance in Norway are members of the Norwegian Natural Perils Pool (Norsk Naturskadepool). This means that buildings and contents that are insured against fire are automatically insured against natural damage. The pool covers natural damage resulting from landslide, storm, flood, storm surge, earthquake and volcanic eruption. The premium rate is identical irrespective of where in Norway the insured is resident/registered, even though some areas are far more susceptible to natural damage than others.

Of single events in Norway over the last 40 years, the New Year storm in 1992, Storm Dagmar in 2011 and Storm Nina in 2015 have resulted in the largest claims payment expenses arising from natural damage (chart 1). Again in 2018, storm and flood accounted for the largest share of natural damage (measured in terms of claims payment expenses) arising in Norway (chart 2). Climate change is expected to lead to greater likelihood of natural damage such as flood, storm surge and landslide in Norway; see NOU (Norwegian Official Report) 2019: 4.

Water damage due to precipitation or frost is not covered by the natural damage insurance scheme and must be covered by other insurance such as building insurance under the respective fire insurance policy. Claims payment expenses for weather-related water damage have risen since 2008 and are, with the exception of 2011 and 2015, considerably higher than claims payments expenses covered by the natural damage insurance scheme (chart 3). Heavy precipitation and flash floods are expected to rise in volume and to occur more frequently than previously (NOU 2018: 17). Towns are particularly vulnerable due to the concentration of infrastructure and economic assets.

Weather-related water damage such as blocked drains, other water penetration from the outside and frost accounts in total for almost 40 per cent of all water

damage (chart 4). The bulk of reported water damage is due to traditional pipe leakages from water and drainage pipes due to faulty installation, wear and tear, and old pipes. The average age of water pipe installations in Norwegian houses is rising, and more and more leakages are expected in the years ahead. The report of the National Commission on Surface Water, see NOU 2015: 16, states that almost 60 per cent of Norwegian local authorities consider the capacity of the drainage system to be insufficient to handle the precipitation expected in the future.

### **BOX 2: Evaluation of the present natural damage insurance scheme**

On 17 November 2017, a committee was appointed by the Ministry of Justice and Preparedness to evaluate aspects of the natural damage insurance scheme. The Natural Damage Insurance Committee was to evaluate whether the scheme functioned as intended, taking into account the increased risk of natural damage in the future. The committee delivered its evaluation on 6 February 2019, see NOU 2019: 4. The report has been circulated for comment with the deadline for comment set at 2 September 2019.

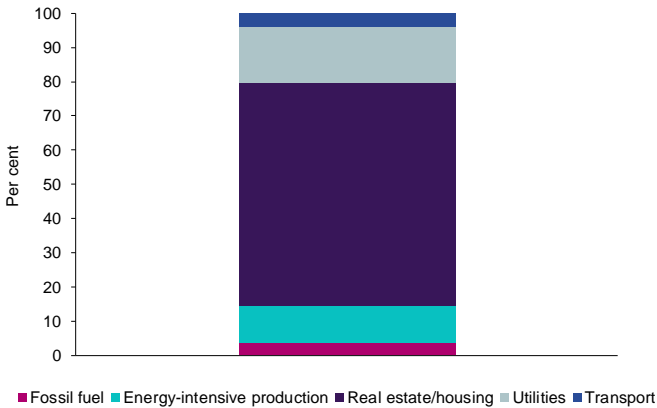
Inasmuch as natural damage premium earned has exceeded claims payments over time, a significant natural damage capital has accumulated at non-life insurers. A majority of the Natural Damage Insurance Committee considers the premiums paid by policyholders to have been excessive over time and that insurers' natural damage capital is larger than necessary. The committee majority is agreed on the need for a new model with a common fund-based solution. Under the new model, net natural damage premium after deduction for net natural damage claims payments, which has hitherto been set aside as natural damage capital at the individual non-life insurer, will henceforth be transferred to a common fund under the Norwegian Natural Perils Pool. Return on the natural damage capital

will accrue to the Fund and not to the non-life insurer concerned as at present.

Insurers will be able to use the capital as a risk mitigation technique and reduce the solvency capital requirement for natural disaster risk. According to the committee's majority, the change will secure better competition in the non-life market and prevent excessive premiums being collected from the individual insurance policyholder.

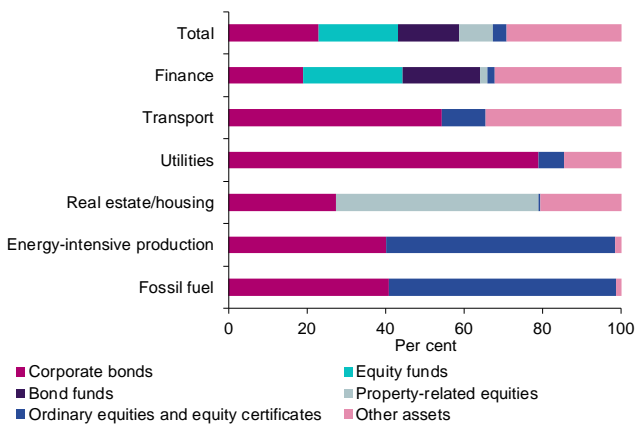
The Climate Risk Commission considers that an overall assessment of the scheme should be made once the Natural Damage Insurance Committee has delivered its recommendation. It states in its report that the scheme's solidarity principle gives policyholders little incentive to invest in damage prevention measures. It also states that the scheme's present alignment gives local authorities little incentive to take natural damage risk into account in their land use planning. In the view of the Natural Damage Insurance Committee, the criticism regarding the absence of incentives to promote prevention addresses aspects of the scheme that ensue from the scheme's underlying principles. The committee considers this to be extraneous to the group's mandate and has therefore not taken a view on the said criticism. Most of the bodies consulted on the report of the Climate Risk Commission that comment on the natural damage insurance scheme support the recommendation of an overall assessment. The revised national budget for 2019 states that the government will consider whether conflicting considerations call for a review of the natural damage insurance scheme as recommended by the Natural Damage Insurance Committee.

**Chart 5: Life insurers’ distribution of climate-sensitive investments\* (measured as a share of total climate-sensitive investments)**



\* Based on Battiston et al's framework (2017). Source: Finanstillsynet, Solvency II quarterly reporting at company level as at 31 Dec. 2018

**Chart 6: Life insurers’ distribution of climate-sensitive investments\* based on type of investment**



\* Based on Battiston et al's framework (2017). Source: Finanstillsynet, Solvency II quarterly reporting at company level as at 31 Dec. 2018

### PENSION INSTITUTIONS ARE MAINLY EXPOSED TO CLIMATE RISK THROUGH THEIR ASSET MANAGEMENT

Climate risk affects pension institutions (life insurers and pension funds) through their various exposures, mainly through asset management. The institutions’ exposure to transition risk stems from uncertainty regarding climate policy measures, repricing of assets for carbon-intensive industries and transition to new climate-relevant technology. The TCFD recommends that asset managers provide an assessment of how their investment strategy is likely to be impacted by

the transition to a low emission society. Physical risk may also affect pension institutions. Weather-related events may reduce the value of financial assets such as bonds, equities and directly owned property.

Based on the framework defined by Battiston et al. (2017), EIOPA (Financial Stability Report, December 2018) points out that Norwegian, Icelandic and Dutch insurers have a relatively high proportion of investments exposed to sectors considered to be particularly susceptible to climate-related transition risk compared with their counterparts elsewhere in Europe. About 16 per cent of Norwegian insurers’ total investments are placed in what is considered under the framework of Battiston et al. to be climate-sensitive sectors as compared with an average for European insurers as at 31 March 2018 of about 10 per cent.

A high proportion of investments defined as climate sensitive under the Battiston et al. framework relates to housing or property in general (chart 5). Norwegian life insurers’ property investments consist mainly of bonds and equities issued by commercial property companies (chart 6). Further, life insurers’ high exposure to the financial sector may compel them to recognise losses due to climate events affecting these exposures. The greater the exposure of the overall financial sector to climate risk, either directly or indirectly through exposures to other financial institutions, the harder the industry could be hit by climate-related events.

### CLIMATE RISK FACED BY BANKS BANKS ARE EXPOSED TO CLIMATE RISK MAINLY VIA THEIR LENDING

Climate risk affects banks through their exposures to households, firms, financial counterparties and the market in general. All three main types of risk faced by banks – credit risk, market risk and operational risk – are impacted, but to varying degrees.

Banks are exposed to credit risk due to the possibility that households, firms and financial counterparties will default on their loans. Climate-related events and transition risk related to climate may contribute to

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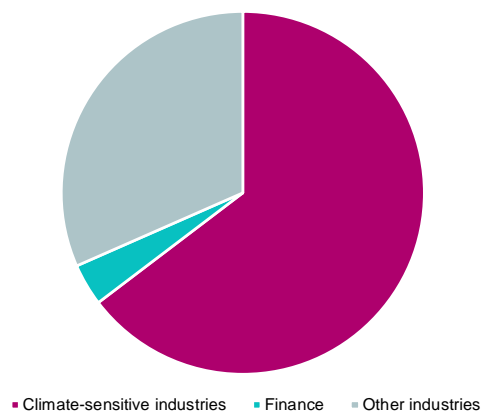
increasing the probability of default by borrowers in exposed areas and industries. Moreover, loss given default of loans secured for example against property may increase where the value of a property is negatively affected by such events.

Physical events such as flood, may cause heavy damage to buildings and infrastructure. There are direct expenses related to such damage, but there may also be financial problems for firms due to reduced production and turnover. This could increase banks' credit risk due to the increased likelihood of default by the borrowers concerned. Banks' loss given default may, as mentioned, also rise due to reduced collateral values. The impact of physical risk on banks' credit risk will to some degree depend on whether, and to what extent, damage ensuing from the physical risk is insured against. As mentioned under the account of non-life insurers, Norway marks itself out internationally with its statutory natural damage insurance scheme. The natural damage insurance scheme may reduce the likelihood of Norwegian non-life insurers withdrawing from areas facing increased risk of natural damage due to climate change than is the case in other countries. This could in turn curb the impact of physical climate risk on banks' credit risk.

Transition risk will impact banks' credit risk to a greater degree than physical risk. Credit risk is affected inasmuch as banks have loans to firms in industries where earnings could fall substantially as a result of the transition to a low emission society. This may, as previously mentioned, for example include firms in industries connected to oil and transport. These industries are exposed to higher direct and indirect taxes, and to changes in client preferences.

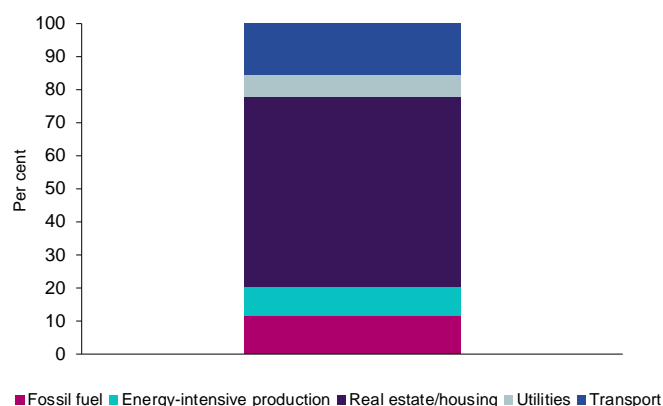
65 per cent of Norwegian banks' total loans (including unutilised credit limits) are to firms in industries which under Battiston et al.'s framework (2017) are considered to be climate sensitive (chart 7). As in the case of insurance, loans to property are the clearly largest climate-sensitive exposures measured under this framework, accounting for 77 per cent of total climate-sensitive loans (chart 8). How exposed

**Chart 7: Loans to climate-sensitive industries\* as a share of total loans to firms as at 31 December 2018**



\* Based on Battiston et al.'s framework (2017). Source: Finanstilsynet

**Chart 8: Distribution of loans to climate-sensitive industries\* as a share of total climate-sensitive loans as at 31 December 2018**



\* Based on Battiston et al.'s framework (2017). Source: Finanstilsynet

banks' loans to property actually are in this context is, however, highly uncertain. It will depend, among other things, on how large a share of property-related exposures fails to meet given energy standards. Transport and fossil fuel are the two industries which, next to property, account for the largest share of banks' loans to climate-sensitive industries under the Battiston framework.

Banks also have exposures to climate-sensitive industries other than those defined in the Battiston framework et al., for example agriculture. However, loans to the agriculture sector accounted for only

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**Table 2: Examples of climate-related risk at banks**

	Credit risk	Market risk	Operational risk
<b>Physical risk</b>	<p>Extreme weather causes damage to properties and infrastructure – economic losses. This increases the probability of default and larger losses for banks owing to reduced collateral values.</p> <p>Extreme weather affects agriculture, increases the probability of default and inflicts heavier losses on banks.</p>	<p>Extreme weather impacts macroeconomic conditions, resulting in bond repricing. Extreme weather events may cause damage to plant, halting production. This will affect equity prices.</p>	<p>Extreme weather may result in increased operating expenses. The price of energy and insurance goes up. Extreme weather events may cause disruptions to banks' service offering.</p>
<b>Transition risk</b>	<p>Stricter requirements on energy efficiency impact property portfolios.</p> <p>Stricter emission requirements for cars impact car loan portfolios.</p> <p>Stricter emission requirements, for example increased carbon prices, for the energy sector impact industries such as oil and coal, and banks' exposures to these industries.</p> <p>Changing customer preferences impact the earnings of firms and sectors that have not adapted to the transition to a low emission society. This in turn impacts banks' exposures to those sectors.</p>	<p>The transition to a low emission society impacts prices of energy and commodities, and the price of bonds, equities and derivative contracts related to carbon-intensive industries.</p>	<p>Reputation risk as a result of increased focus on the climate among customers and other stakeholders.</p>

Source: Based on BoE Transition in thinking of the impact of climate change on the UK banking sector.

about 2 per cent of banks' total loans granted to firms at the end of 2018.

In addition to the direct effect of exposures to climate-sensitive industries, exposures may also impact banks' other loan portfolios indirectly. Loans to households earning wage income in climate-sensitive industries may pose increased credit risk if jobs in these industries disappear since the debt servicing capacity of the affected borrowers will be reduced.

Market risk is risk associated with movements in market prices such as equity prices, fixed-income and commodity prices. Banks are exposed to market risk through investments in financial instruments such as equities, bonds, CDs and derivatives. Norwegian banks' securities portfolios constitute a small proportion of their balance sheet compared with loans, and large portions of the securities portfolio comprise exposures to other financial institutions. Direct exposure to climate risk is thus viewed as more limited for this aspect of banks' activities.

Operational risk is the risk of financial loss or loss of reputation as a result of failure of internal processes, including human error and systemic faults, and losses due to external factors. Extreme weather events may impact office premises, processes and employees. The price of energy and insurance may increase. Transition risk in the form of reputation risk may increase as a result of higher awareness of the climate on the part of banks' clients and other stakeholders.

Table 2 provides examples of the impact of, respectively, physical risk and transition risk on banks' credit risk, market risk and operational risk.

### BOX 2: Green loans

More and more investors are looking for green investments, and mutual funds and other institutional investors with green mandates are increasingly demanding green bonds.

Green bonds are securities on a par with ordinary bonds. The difference is that the funds raised are earmarked for projects with a positive effect on the climate and environment, and that contribute to climate change adaptation (so-called environmentally appropriate purposes); see NOU 2018: 5. These may for example be projects related to renewable energy, energy efficiency, sustainable waste treatment, sustainable land use, preservation of biological diversity and clean transport. In January 2015, Oslo Børs became the world's first stock exchange to post a list specifically for green bonds. In order for a loan to be included in the green list, the project concerned must have been subject to independent assessment. A further requirement is that the independent assessment of the project is publicised to provide investors with insight into the project's environmental aspects. As at May 2019, four Norwegian credit institutions have issued green bonds on Oslo Børs, viz. DNB Bank, Kommunalbanken, Sunndal Sparebank and SpareBank 1 Boligkreditt.

As yet no common standard for the definition of green loans exists. The International Capital Markets Association (ICMA) has drawn up principles for green bonds, termed the Green Bond Principles (GBP). Other similar initiatives are to be found, such as the Climate Bond Initiative, adherence to which is voluntary. In Norway the CICERO Centre for International Climate Research and DNV GL are the main active entities in the market involved in facilitating and certifying green bonds; see NOU 2018: 5. The absence of common standards makes it demanding for investors and customers to find their way around, and increases the risk of

being marketed as green, so-called 'green-washing'. An EU standard on green bonds\* to remedy this problem is in process.

More and more banks are offering so-called green mortgages and green car loans. The interest rate on these loans is up to 0.1 percentage point better than on ordinary loans. Here too, international initiatives have been taken to draw up common standards. In 2018, the European body for mortgages and covered bonds (EMF-ECBC) launched a pilot project involving a number of European banks called the Energy Efficient Mortgages Action Plan (EeMAP). This work led to a common definition of an energy-efficient or green mortgage. Finance Norway is participating in this process on behalf of the Norwegian financial industry\*\*

\* [https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance\\_en](https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance_en)

\*\*<https://www.finansnorge.no/aktuelt/nyheter/2019/04/etablerer-hub-for-gronne-boliglan/> (in Norwegian only)

### FURTHER WORK ON CLIMATE RISK

Finanstilsynet's main mission is to promote financial stability and well-functioning markets. As in the case of other risk factors, the financial industry's handling of climate risk should be followed up primarily through supervision of entities' risk assessments and financial position. The integration of climate risk into supervisory activities is high on the agenda of financial supervisory authorities internationally, and work on developing supervisory roles to monitor climate risk is in progress.

Finanstilsynet expects entities' risk management systems to cover all significant risks, including risks related to the impact of climate changes and the transition to a low emission society. Risk related to climate change and transition brings increased uncertainty in terms of the economy and the financial industry. Financial institutions are expected to identify and to address risk factors that may affect earnings in the short, medium and long term.

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Insurers should at least annually, as an integral part of their risk management system, carry out their own risk and solvency assessment (ORSA). Finanstilsynet will in the period ahead place increasing emphasis on insurers' assessment of risk related to climate change. Finanstilsynet will also follow up banks' handling of climate risk, including their policies for assessing climate risk in their lending processes, and their assessment of climate risk in the internal capital adequacy assessment process (ICAAP). Finanstilsynet will also focus on ensuring that the financial industry, in its marketing of so-called green investment products, gives customers correct and complete information on products' characteristics and costs.

There is a need for better knowledge on how various industries and regions will be impacted by climate change and the transition to a low emission economy. Work on measuring and modelling economic consequences of climate change, and on measures for financial institutions and financial markets, is in progress internationally, albeit at an early stage. The same is true of the development of relevant scenarios for use in scenario analyses and stress tests for climate risk. Finanstilsynet participates for example in the European supervisory effort and in the Network for Greening the Financial System (NGFS) on developing such a methodology.

- Finanstilsynet's consultative statement to the Climate Risk Committee's report
- Financial Stability Report (EIOPA December 2018)
- Financial Stability Review (ECB May 2019)
- Battiston et al. (2017): "A climate stress-test of the financial system"

## REFERENCES:

- The Dutch FSA's stress test (2018):  
[https://www.dnb.nl/en/binaries/OFS\\_Najaar\\_2018\\_ENG\\_tcm47-379387.PDF](https://www.dnb.nl/en/binaries/OFS_Najaar_2018_ENG_tcm47-379387.PDF) and  
[https://www.dnb.nl/en/binaries/Working%20paper%20No.%20625\\_tcm47-382291.pdf](https://www.dnb.nl/en/binaries/Working%20paper%20No.%20625_tcm47-382291.pdf)
- NOU 2015: 16
- NOU 2018: 5
- NOU 2018: 17
- NOU 2019: 4

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### NOTES:

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<sup>1</sup> World Meteorological Organization: Atlas of Mortality and Economic Losses from Weather and Climate Extremes 1970–2012 (2015).

<sup>2</sup> See discussion in the Climate Risk Commission's report p. 67, and the Global Adaptation Index, University of Notre Dame.

<sup>3</sup> With a basis in the EU's statistical classification of

economic activities – NACE Rev. 2 fourth level.

<sup>4</sup> State and Trends of Carbon Pricing 2018, World Bank Group.

<sup>5</sup> Roadmap for Green Competitiveness in the Norwegian Financial Sector – Finance Norway

<sup>6</sup> MET (<https://www.met.no/nyhetsarkiv/varmere-og-vatere-i-norge>) (in Norwegian only)

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