Knowledge and management of transnational climate change risks in selected countries

Summary report, July 2019

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Knowledge and management of transnational climate change risks in selected countries – Summary report

Note – this is an English language summary report. The full report – Utredning om kunnskap og håndtering av grenseoverskridende klimarisiko i utvalgte land – is available in Norwegian language at the home pages (link) of the Norwegian Environmental Agency.

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Introduction

Background

Every year, the consequences of climate change are becoming more and more apparent in most parts of the world, and general awareness of the risk that climate change poses to society and the economy is increasing. In order for the authorities and the business sector to be able to adapt to climate change and mitigate risk, it is important to understand that the consequences of climate change in one part of the world can also have a major impact elsewhere. This is what is meant by 'transnational climate impacts'.

This report examines how transnational physical climate change risks are managed in a selection of European countries, in the EU and in the private sector in general. The report has been prepared by EY on behalf of the Norwegian Environment Agency, with the aim of providing an overview of current knowledge on transnational climate change risks in other countries and of how such risks are managed by central government, the business sector and other relevant actors. The report will provide input on how public and private actors in Norway can continue their work on transnational climate change risks.

The starting point for this study was the Norwegian report published by EY and the Norwegian Environment Agency in 2018 examining the consequences for Norway of transnational climate impacts *(Utredning om konsekvenser for Norge av klimaendringer i andre land)*. This was the first Norwegian study of its kind, and it identified specific risks and opportunities stemming from transnational climate impacts in different sectors and areas of society.

Delimitation and reservations

Currently only a handful of European countries have conducted similar analyses. The study is therefore naturally limited to those countries that have either completed or are working on their own analyses on consequences of transnational climate change impacts. This includes the UK, the Netherlands, Germany, Switzerland, Finland and Sweden. In addition, the European Union is included in the study due to its important international role in climate adaptation work in Europe. Some international intergovernmental organizations will also be reviewed, such as the Nordic Council of Ministers and the Arctic Council, as these have a special transfer value for Norway. The report also includes a separate chapter on the private sector, which examines transnational climate risk management in the business sector.

The study is based on publicly available information and interviews with relevant representatives of the authorities in several of the countries. The information base is not exhaustive, and due to the scope and time frame of the study it was also not possible to conduct interviews for all countries.

The report is not an evaluation of climate adaptation measures and strategies in other countries or business sectors, but a descriptive analysis of available information. In the literature review and in the interviews, EY has sought information that is relevant to the questions; i) What is the status of knowledge on transnational climate change risks? ii) How are identified risks and opportunities managed?

Most definitions of the term 'climate change risks' include both physical risks and transition risks (NOU, 2018; TCFD, 2017). *Physical climate risk* is the risk associated with the consequences of physical changes in the environment. *Transition risk* is the risk associated with the consequences of climate policy and the technological development when transitioning to a low-carbon economy. As climate change can have both short and long-term consequences, physical climate risk is normally categorised in two different time horizons: *acute risk* arises as a result of extreme weather events such as cyclones, hurricanes, heatwaves and floods; *chronic risk* refers to more long-term and systemic effects of climate change, such as a rising sea level and desertification. An additional dimension of climate change that is often also highlighted is the so-called *liability risk*, where both the authorities and businesses can be held legally liable for climate change, either because of their own greenhouse gas emissions or because they have withheld information about the negative impact of their business on the environment.

This report focuses on physical climate risk and the impact of climate change on countries' societies and economies across national and regional borders, so-called *transnational climate change impacts*. No account is taken of transition risk as a result of technological developments or measures and policies aimed at reducing greenhouse gas emissions, unless explicitly emphasised.

How to read and understand the report

The report is structured according to the two questions being addressed, and the chapters are therefore divided into knowledge and management. Chapter 1 – Synthesis – is a compilation of the key aspects of the individual countries, as well as the EU and the private sector. The Synthesis chapter summarises and analyses the status of knowledge and the transnational climate risk management across countries and in the business sector. A detailed description of the status of knowledge and transnational climate risk management for the individual countries, the EU, other international intergovernmental co-operations and the private sector is then presented in separate chapters.

An important premise for understanding the report is to understand the framework for transnational climate change impacts that is used by the EU and the selected countries.

In order to analyse the transnational climate change impacts, the mechanisms that can transfer consequences of climate change across national borders must first be identified. This is done by defining a set of impact pathways that look at how countries are interconnected through flows of resources, capital or people. Transnational climate change impacts arise when a recipient country is impacted by climate change in another country through changes in the flows that connect them, i.e., the *pathway of impact*[1].

The impact pathways used in the analyses of transnational climate change risks in the different countries vary, but they all mainly cover the topics of trade, agriculture/food security, finance, infrastructure, migration and geopolitics/security policy. This is in line with the impact pathway that were used as the basis for a study on the consequences for Norway of climate change in other countries *(Konsekvenser for Norge av klimaendringer i andre land)* conducted by EY on behalf of the Norwegian Environment Agency (2018), see Figure 1.

Figur 1: Overview of impact pathways that can transfer climate change across national borders (EY, 2018)

1 For a more thorough review of the concept see Benze & Carter et al. (2017) Implications for the EU of cross-border climate change impacts,

Synthesis

Chapter 1: Synthesis

1.1 Status of knowledge on transnational climate change impacts

1.1.1 Countries

Status:

The concept of transnational climate change impact is not yet widely used and studies are limited, but a clear upturn has been seen in the last two years. The term 'transnational climate change impact' was defined and introduced in Finland back in 2005 in connection with the preparation of Finland's first national climate adaptation strategy. An analysis followed of how the sectors; agriculture and food production, forestry, water resources, tourism, transport, communication, energy and insurance, would be exposed to the effects of physical climate change in other countries (Ministry of Agriculture and Forestry of Finland, 2005).

Following this, transnational climate change impacts were not explicitly examined at a national level until 2012, when the UK authorities commissioned the report 'International Threats and Opportunities of Climate Change for the UK'. This is the first public report that systematically analyses impact pathways for transnational climate change risks and opportunities. In 2015, the Dutch authorities carried out a similar assessment, and other European countries have also followed suit.

In recent years, research communities in, for example, Finland, the UK and Sweden, have been working actively to further develop the concept through new analyses. A transnational research collaboration has been established in addition to a loose network of researchers who have helped to develop the understanding of transnational climate change impacts.

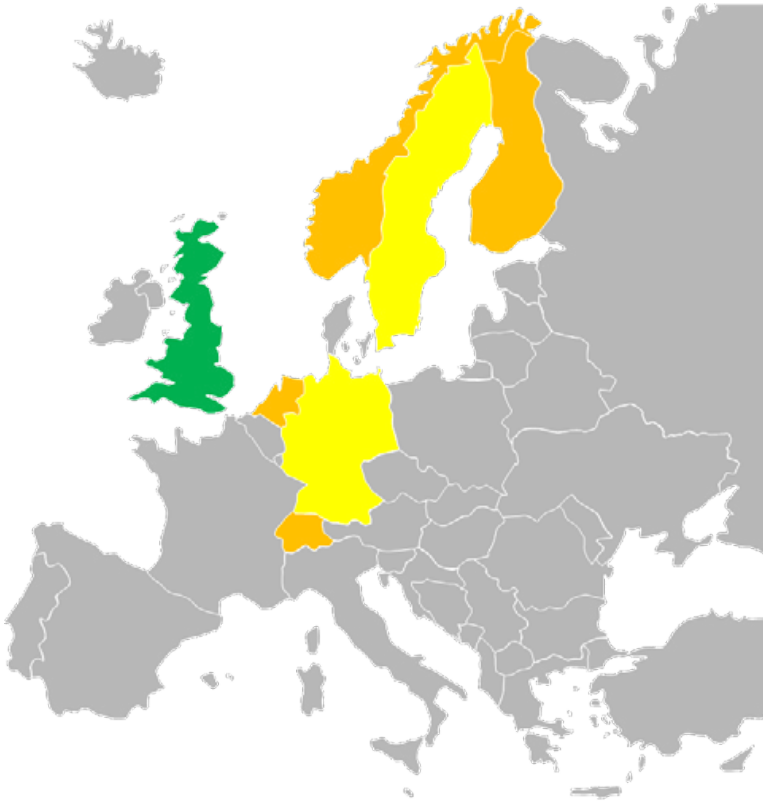

Figure 2: Shows the results of our survey on knowledge and management of transnational climate change impacts in Europe:

- Analysis conducted of transnational climate change risks and findings incorporated into national adaptation strategy
- Analysis conducted
- In the process of conducting analysis
- No signs of future or existing analyses

It is mainly countries in Northern Europe that have carried out analyses of the risks and opportunities associated with transnational climate change impacts. In 2016, the EU Commission presented a new risk and vulnerability analysis, which for the first time included transnational climate change impacts. The EU analysis has helped expose the concept to a larger audience. In 2016, the theme was also put on the agenda in Switzerland following pressure from the business community, which called for information on transnational climate change risks in relation to trade, international value chains and imports of input factors that are important for Swiss business. For example, cocoa is a commodity that is particularly susceptible to climate change and is particularly important for the Swiss chocolate industry. In Norway, a study was published in 2018 on the consequences of climate change in other countries. Since then, similar efforts have also been initiated in Germany and Sweden, both of which are expected to publish their reports in 2019.

There is no evidence to suggest that any other countries are either planning or have already conducted such assessments. Figure 2 shows the current status; of the 31 countries in the EU and the EEA, only the six countries included in this survey[2] as well as Norway have carried out or started own analyses of transnational climate change risks.

Approach and scope:

Most risk analyses use the same framework, with some minor variations. Most analyses more or less follow the same approach, with literature studies adapted to an analytical framework with a view to mapping out specific areas of risk and opportunity, and overall estimates of scope and probability. The majority of countries also use the same impact pathway, i.e., mechanisms that can transfer climate risk from one country to another; trade, agriculture and food supply, finance, infrastructure, people and geopolitics. This applies to the countries that have already carried out analyses (UK, Netherlands, Finland and Norway) as well as those that are in the process of carrying out or completing their analyses (Germany, Switzerland and Sweden).

The Netherlands' study includes a biophysical impact pathway, which deals with changes in plant life and wildlife as well as issues related to watercourse management. The biophysical impact pathway defines the impact that is transferred through natural systems. The Netherlands recognises the impact of the proliferation of alien animal and plant species as a consequence of climate change, or in the management of common transnational water resources, but has not identified any significant risks through the biophysical impact pathway. More emphasis is placed on the aspect they refer to as 'natural infrastructure', particularly the economic consequences of low water levels in transboundary rivers, which are important commercial transport routes for the Netherlands. In addition, the risk of flood is also highlighted in connection with faulty German dykes, which also protect Dutch lands. In the analyses conducted by the UK, Finland and Norway, such 'biophysical' issues are to some extent incorporated into other impact pathway such as 'health' due to the spread of new insects and animal species, or 'agriculture' due to changes in growth conditions for various tree species.

Finland has also identified a cognitive impact pathway, in order to describe how direct physical climate risks are communicated and perceived. The Finnish analysis argues that the serious consequences of climate change in the global south will also have a negative psychological impact on societies in the global north. The UK has highlighted a similar psychological effect of transnational risks in the analyses of the impact pathway 'health'. In addition, the Norwegian report points out that liability risks related to managing climate change can affect national reputations, both domestically and internationally.

Only Germany has adopted a more quantitative approach. This was decided in a dialogue between representatives of the administration, the business community and non-governmental organisations. The German analysis is mainly limited to climate change impacts through the trade pathway. The actors involved had a common desire to map the global value chain for German industry and how it is exposed to climate change risks. In the analysis, data on climate change and German trade statistics were linked and used as an information basis for an economic trading model that provided quantitative estimates and projections of the consequences of climate change for the commercial economy in Germany.

The UK and the EU have conducted separate analyses to map out how the business sector is exposed to climate change risks through their long and complex value chains. In order to supplement the overall analysis of transnational climate change risks through the trade pathway, the UK conducted a separate analysis on the exposure of its business sector to transnational climate change risks from international value chains. The EU Commission (DG Climate Action) has also carried out an analysis to map the business sector's exposure to climate change risks.

Risks

The risks and opportunities identified in the various countries are very similar, but the emphasis varies. For example, there is a broad consensus that climate change poses a global risk of increased price volatility and fluctuations in the supply of goods in general and agricultural goods in particular. All studies also point out the risk of decreasing productivity and uncertainty in global food systems. All countries that import raw materials view this as a threat, while the Netherlands, which is a net exporter of agricultural products, concluded that there was a low risk to food security and considerable opportunities for export. Similarly, many countries point out that climate change will affect the insurance market, but this is only highlighted as an opportunity in the UK, since UK companies are leaders in the reinsurance industry[3] and sell services in the global market.

2 Finland, the UK, Germany, the Netherlands, Switzerland and Sweden

3 Reinsurance is a practice in which an insurance company protects itself against loss risk by taking out insurance in which some of its obligations are transferred to other insurance companies. This is especially common for companies that face a risk of large payouts for accidents, for example from extreme weather.

The risk of damage to infrastructure related to transport, energy and ICT as a result of climate change is emphasised by all the countries, but with a different focus. Finland mainly focuses on electricity and logistics networks, while the Netherlands is particularly concerned with the risks to ICT networks. In terms of the risks to power markets and the access to energy supplies, the UK, the Netherlands and Finland all point out that climate change in other countries can lead to greater volatility and supply shocks. The Dutch study also notes that climate change can have negative consequences for their import of fossil fuels, including coal from Colombia and gas from Russia.

There is broad agreement on the consequences of climate change for geopolitical stability and migration, and all countries emphasise the authorities' responsibility for adaptation through development aid and international cooperation. All analyses highlight the correlation between climate change and increased geopolitical uncertainty, and there is general agreement that climate change is a risk multiplier that can contribute to the destabilisation of vulnerable countries. All of the countries are also aware of the potential challenges associated with climate change impacts on global migration flows. This is further linked to development cooperation, and a need for more humanitarian assistance as well as targeted aid to reduce or prevent climate-related disasters and conflicts. For example, both the UK and the Netherlands argue for more international aid cooperation in order to strengthen social and political robustness, particularly in relation to water security in drought-prone areas. All countries point out that climate change in the Arctic has a geopolitical dimension. The UK and the Netherlands see economic opportunities, while Finland primarily views climate change in the Arctic as a source of more geopolitical turmoil.

Overall, it appears that the analyses largely share a common understanding of the physical climate risks, adapted to national conditions. The various national studies identify a large number of congruent transnational risk factors. The analyses are also based on much of the same research on the impacts of climate change on society and the economy. Much of the unique analysis and variation between the countries is the result of general risks being assessed against specific national conditions. Exposure to transnational climate risk and adaptive capacity vary between the countries, as does the extent to which they are exposed to climate change at a national level.

As such, it may be useful to incorporate the transnational aspects into an overarching assessment of direct (as opposed to transnational or indirect) physical climate impacts on national sectors. The large degree of congruent risk across countries indicates that there may be a large potential for coordinating both the knowledge and management of risks and opportunities internationally.

The UK has the most systematic approach to synthesising transnational and national assessments of the physical climate risks. In the UK's 'Climate Change Risk Assessment' from 2017 (herein referred to as CCRA 2017), the consequences of both the national and transnational physical climate impacts were investigated. These were assembled in a synthesis report analysing how national and transnational climate change risks impact on each other. Thus, the transnational impact pathways are more closely linked to national systems and provide a more comprehensive picture of the total risk. For example, the risk to global food production is assessed in the context of the consequences of climate change for national agriculture and infrastructure. Such analyses help to identify the most important sources of climate risk. For example, it is estimated in the UK that the scope of transnational climate change risks in several areas is just as extensive, or potentially more so, as the scope of direct physical climate risks.

Although none of the other countries in the study have a similar process, a systematic synthesis of the national and international aspects of physical climate risk is clearly beneficial. More countries are likely to adopt such an approach in the future. The EU, for its part, uses a partially integrated approach in which the internal and external risks are assessed collectively, and similar integration has also been discussed in Finland.

Opportunities

Far fewer opportunities are identified than risk factors, and the opportunities are often less extensive and less well understood than the risks. All countries' analyses have less of a focus on opportunities stemming from climate change in other countries than on the areas of risk. The understanding of opportunities is generally less well defined and developed. The analyses place a large emphasis on the need for national competence and expertise to address climate change. Both the UK and the Netherlands point out that there is considerable scope for the export of climate adaptation technology, solutions for water and waste management, biotechnology, etc. The UK also highlights its expertise in the field of health, which can be integrated into international aid work.

1.1.2 The EU and other intergovernmental organizations:

The EU plays a particularly important role in expanding knowledge about transnational climate change impacts, mainly through funding, coordination and facilitation of research work in Europe, and the dissemination of analyses and communication of issues to a wider European audience.

The European climate vulnerability and risk analysis is very comprehensive and includes transnational impacts both internally within the EU and from other parts of the world. At an overarching level, the European Environment Agency (EEA) has integrated the perspective of transnational climate change impacts into its climate vulnerability and risk analysis from 2016 as sub-chapters (European Environment Agency, 2017).

The approach that was used to identify transnational risks and opportunities is the same as that used for the aforementioned country analyses, and includes on the whole the same impact pathways. This covers the area that the EEA's report refers to as external or international climate risks, i.e., the impact of climate change in countries *outside* the EU. In addition, the report includes what it calls internal climate risks, which encompass analyses for the EU sectors of energy, health, trade, transport and tourism. Although these sectors are internal at the EU level, they are largely transnational for individual countries.

Analyses at the EU level are useful for mapping national transnational risks, as there is significant concordance between transnational climate change impacts at the national and European levels. Knowledge from the European analysis on both external and internal risks is highly relevant for sector analyses at the national level, and is used, for example, in both the Norwegian study on transnational climate change risks and in the UK's latest analysis of international climate change risks, 'Climate Change Risk Assessment 2017'. The European vulnerability and risk analysis has also been important for communicating issues related to transnational climate change impacts to several European countries.

Being able to exploit existing networks and coordinate research and experience at the European level is a strength for the EU. The EU benefits from relatively large budgets and the ability to draw on research communities throughout Europe. For example, the sub-chapters on transnational climate change impacts in the EEA's vulnerability and risk analysis are written by researchers who have contributed to the national analyses in Finland and the UK, and the report was funded by research grants under the EU's adaptation strategy. The EU's adaptation strategy also includes ongoing efforts to coordinate and fund academic basic research aimed at building an understanding of transnational climate change impacts.

The EU's voluntary Interreg collaboration is an international arena for developing and exchanging knowledge on climate change impacts at a regional level. One example is the Interreg North Sea Region (NSR), where Norway is also a participant. In 2016, a comprehensive assessment of climate change risks in the region was carried out with contributions from a regional network of researchers. Although the motivation behind this collaboration is to better manage direct physical climate impacts in the individual countries, some of the sectors that are covered, such as fishing and infrastructure, nonetheless contain a transnational dimension.

Intergovernmental organizations, such as the Arctic Council, can also play a role in generating knowledge about transnational climate change impacts. The Arctic Council has conducted analyses showing how socio-economic conditions are affected by climate change, for example increased transport and trade through the northern areas and an increased risk of negative impacts on vulnerable nature due to a growth in human activity. The Council also provides knowledge on social aspects, adaptability and how climate change could affect indigenous peoples and communities in general in the region.

1.1.3 Private sector

Awareness of climate change risks in the business sector has grown in recent years. Studies show that an increasing number of companies recognise climate change as a risk to their own operations. Similarly, investors are also steadily demanding more information on climate change risks from companies in order to better understand the risks in their investment portfolios.

From a transnational perspective, climate change risk primarily relates to the impacts on companies' business models through international value chains, finance and insurance. These three areas constitute the main pathways in which climate change risks can be transferred to and between companies across national borders. Companies will face different physical risk factors depending on the types of goods and services they need and where in the world they operate. However, they will still share value chains, finance, and insurance as the as common impact pathways, which allow for a degree of uniformity in approach to mapping, analysing and responding to physical climate risks.

The 'Task Force for Climate-related Financial Disclosure' (TCFD) facilitates better management and reporting of climate change risks in the private sector. In order to meet the market's need for information on climate change risks, the G20's Financial Stability Board appointed the expert committee TCFD. In 2017, the committee presented a framework for company reporting on climate change risks across sectors – both physical climate risks and transition risks, i.e., companies' risks as a result of the regulatory, technological or market changes in the transition to a low-emission society.

The knowledge status in the private sector is indicated by the extent to which companies report externally on the climate change risks they are exposed to, in line with other types of risk. The finance sector assumes risk through financing, often from several industries, and therefore requires information on the types of risks that the companies they invest in are exposed to. In a survey of 400 institutional investors conducted by EY in 2018, as much as 92% stated that climate risk impacts on their investment decisions, which is an increase of 13% from the previous year (EY, 2018-b).

Company reporting shows that Norwegian companies have a poorer understanding of climate change risks than companies in other countries. EY has conducted an analysis of the status of climate risk reporting in accordance with the TCFD framework among listed companies globally. The analysis shows that Norway has one of the worst scores of all countries, both on average and across sectors. The companies in the Norwegian sample (Oslo Stock Exchange's benchmark index) score an average of 21% in complying with the TCFD recommendations. This puts Norway below the

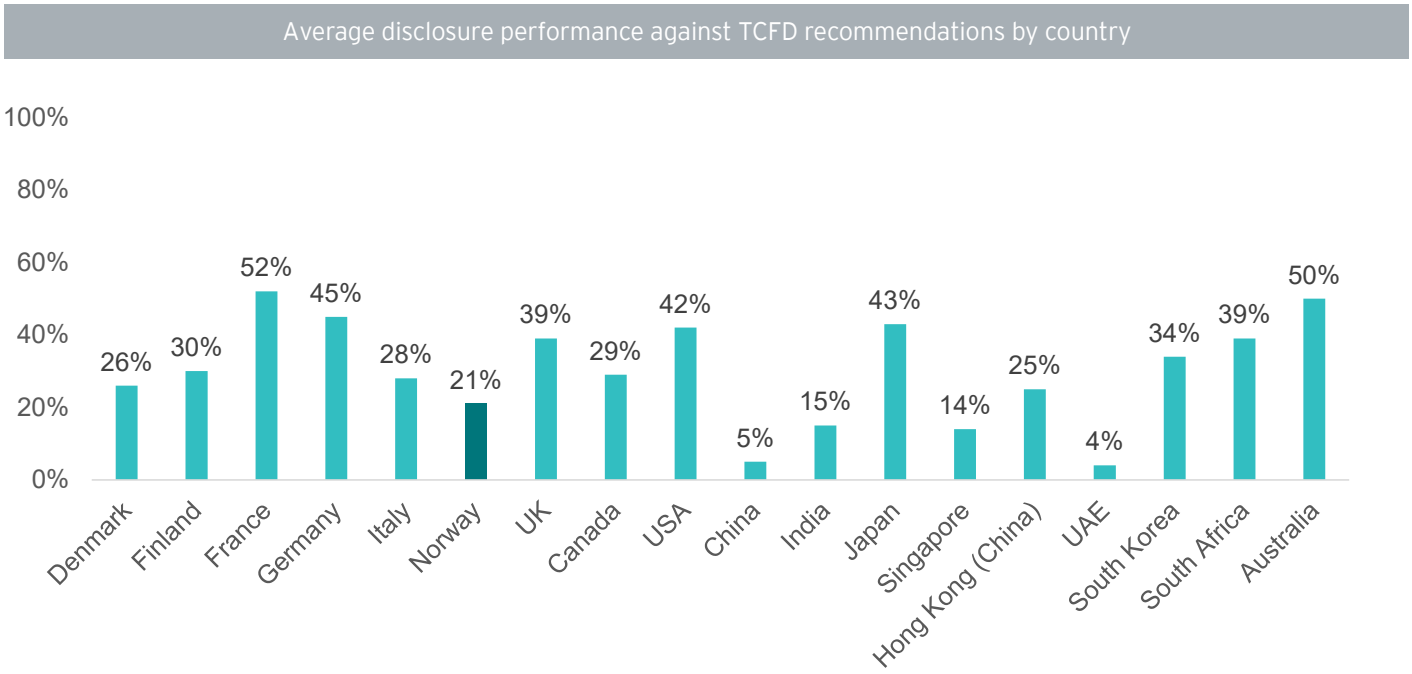

Figure 3: Shows the extent to which listed companies in selected countries report on climate change risks in accordance with the main recommendations from the TCFD (EY, 2018-c).

global average of 33%, and well behind high-scoring countries in Europe, such as France with 56%. This suggests that the Norwegian business sector can potentially have large gaps in its knowledge on its exposure to climate change risks, both nationally and in global value chains (EY, 2018-c).

The business community has a better understanding of transition risk, but there is an increasing focus on physical climate risk. Although companies are increasingly focusing on climate risk, many companies' understanding and reporting of physical climate risk is still inadequate. The TCFD recommends scenario planning as a tool to map future physical risk. This is done by plotting possible courses of development for a business in line with different levels of global warming, and the consequences of this. The information from such an analysis can then be used in strategic planning. Relatively few companies are currently using climate scenarios to assess how they will be affected by physical climate change.

Transnational climate change impacts are also poorly understood, since few businesses take a value chain perspective to climate risk. Long and complex value chains are one of the main pathways for the transfer of climate change risks for business. However, relatively few companies map out the consequences of climate change in relation to

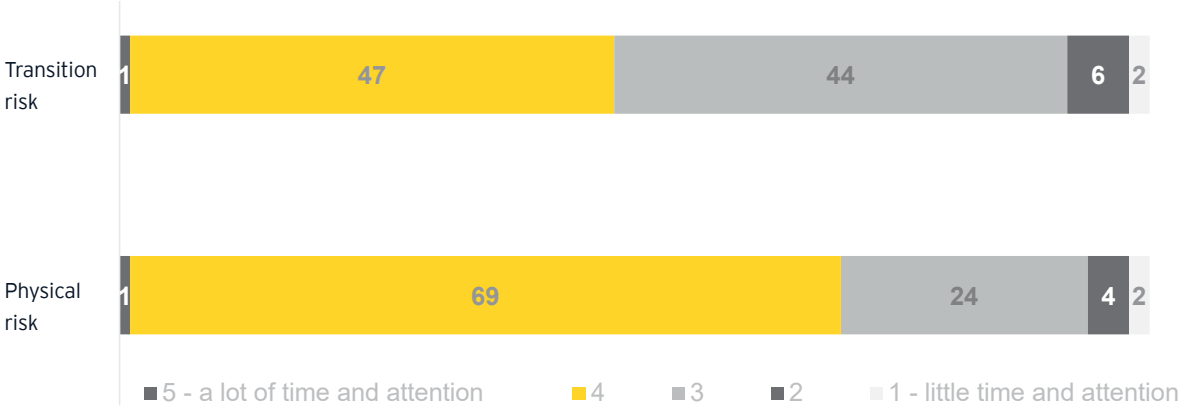

Figure 4: The figure shows a percentage distribution of how the investors answered the question: 'Over the next two years, how much time and attention will you give to evaluating the transition risk and physical climate risk in your investment decisions?' (EY, 2018-b)

their supply chains or imported input factors. This means that companies are less likely to intercept transnational climate change risks, which is an indication of their significant lack of understanding of climate risk (Goldstein et al., 2018).

The finance industry also calls for more information on physical climate risk, and is increasingly using its own risk assessment tools to provide sufficient information about companies. EY's investor survey (2018-b) showed this year, for the first time, that investors are increasingly demanding information on the physical climate risk as opposed to transition risk (see Figure 4). Finding good-quality information can often be a challenge for financial institutions, especially when it comes to large investment portfolios. In addition, companies' self-reporting of physical climate risk is often limited. A number of investors and financial institutions therefore use natural disaster indices, indices that measure vulnerability to climate change and other types of climate data as a basis for assessing and estimating the risks of climate change in their investment portfolio.

The insurance industry possesses data on damage caused by weather-related events and plays an important role in mapping and pricing climate risk for the business sector. The insurance industry needs to have a good understanding of risk in order to develop its products and services. The insurance industry records a vast number of climate-related loss and damage cases in the business sector, and this represents a large volume of data on physical climate risk in different industries and areas. As this information is important for the correct pricing of insurance products, it is generally considered to be business-sensitive information, but there are examples of measures where the insurance industry has entered into agreements to share climate risk data with a view to aiding public efforts in climate adaptation.

1.2 Status of transnational climate impact management

1.2.1 Countries:

To date, few countries have implemented specific measures or devised their own strategies aimed at transnational climate change impacts. The countries that have carried out studies of transnational climate change impacts have identified few specific measures that directly address identified risk factors. An analysis by the EU Commission (2018) show that cooperation between European countries is primarily focused on the joint management of nature and water resources, and other issues that are related to shared infrastructure and natural capitals that cross national borders.

All countries acknowledge the importance of working across sectors and administrative levels to address the complex risk picture. This is highlighted in the adaptation strategies of the Netherlands, the UK and Finland, among others, which all emphasise the value of working on adaptation across different sectors and administrative areas, with local and regional authorities in the country and with the EU. Finland calls attention to a dedicated monitoring group for climate adaptation, consisting of representatives from relevant ministries and social partners, whose role is to provide input and contribute to the evaluation of the Finnish adaptation plan. In the Netherlands, the report on transnational risks also recommends incorporating the topic of climate adaptation into a national group for finance and security advisory services, consisting of representatives from various ministries.

All countries describe communication and information work as an important measure for raising awareness of the risks and opportunities associated with transnational climate change impacts across sectors. The analysis shows that the countries agree that it is important to communicate the results to stakeholders in public administration, the private sector and civil society. Some countries have organised workshops and talks for different stakeholder groups. Nevertheless, there does not appear to be any specific strategies for carrying out this work, or any indication that this is prioritised in the form of budgets and dedicated resources.

The UK has made the most progress in incorporating analyses of transnational climate change risks into its adaptation work. The UK has the most systematic process for incorporating transnational climate change risks into the national adaptation plan. According to the UK's Climate Change Act of 2008, the national climate change risks should be assessed every five years, with the findings forming the basis for the government's national climate adaptation plan.

The UK maps the status of managing identified risks and opportunities in order to make recommendations on appropriate measures. As previously mentioned, the UK process incorporates transnational and national aspects of climate change impacts into the synthesis report CCRA 2017. The report outlines the current management of identified risks and opportunities. The analysis of climate risk management in the public sector covers both national administration and measures at the EU level. In combination with the risk assessments, this information provides the basis for an assessment of the need for further measures. For each individual risk or opportunity, an assessment is made of whether to maintain current measures, whether there is a need for more research or whether there is a need for more action.

The UK analysis of risk management emphasises international and cross-sectoral cooperation as an important measure. The analysis of risk management status in the CCRA report shows that transnational climate change risks call for highly effective coordination and exchange of information across administrative areas, internationally

and multilaterally. It states that the EU will be an important arena for addressing several of the identified risks, such as migration, energy and food security, and that it will be important to involve international institutions at the EU level in order to better manage multiple risks.

The CCRA report also states that Brexit will lead to greater uncertainty in relation to transnational climate risk management. The UK analysis was completed before the outcome of the Brexit vote, and therefore indicates that the risk assessment could be changed as a result of the vote on leaving the Union.

Figure SR.1: Top six areas of inter-related climate change risks for the United Kingdom

Source: ASC synthesis of the main areas of risk and opportunity within the chapters of the Evidence Report.
Notes: Future magnitude is based on a combination of climate change and other drivers of risk (e.g. demographic change), taking account of how current adaptation policies and plans across the UK are likely to reduce risks.

Figure 5: The figure shows the UK's overarching climate risk assessment, which incorporates both national and transnational climate risks. The overarching recommendations are shown to the right.

Of the identified transnational risks, food security and migration are highlighted as areas most in need of further measures. As shown in Figure 5, the UK analysis concludes that the absence of a national approach to safeguarding climate robustness in the UK food system means that there is a need for more action. Measures to monitor the national and international food systems are recommended, as well as research to better understand the risks and opportunities associated with the climate change impacts on global food systems and UK food security.

Migration is also highlighted as an area where more action is needed. A more pro-active strategy is proposed, as well as cooperation with other countries to strengthen the UK's ability to manage large-scale migration flows while protecting human rights. More research is also recommended on security policy risk due to the impacts of climate change on stability, conflict and other geopolitical factors. A special emphasis is placed on the need for more insight into and focus on how climate change affects the balance between long-term assistance and capacity building on the one hand, and urgent interventions, such as crisis response, humanitarian aid and peacekeeping operations, on the other.

Of the identified risks, only food security is included in the national adaptation plan. Of the risks identified in the CCRA only the issue of food-security was followed up in the national adaptation plan. However, the adaptation plan concludes that climate change in other countries will have little impact on food security due to the UK's openness to trade, robust domestic production and self-sufficiency in food supplies. This conclusion therefore points in the opposite direction to the recommendations put forward in the CCRA. Nevertheless, the adaptation plan still contains provisions for own food security analysis, in which climate change is one of the main challenges to be examined.

Several countries are planning to include analyses of risks and opportunities in updates of their national adaptation policy. Germany, Switzerland and Sweden state that their studies will form the basis for their future national adaptation plans, but cannot yet point to a clear plan of action or examples of specific measures that will be considered. Finland is also in the process of evaluating its own climate adaptation plan from 2014. Representatives from several ministries and the most important labour unions are working together in a separate risk monitoring council that assesses the need for further adaptation measures in the light of updated climate risk analyses.

1.2.2 The EU and other intergovernmental organizations:

As an international organisation, the EU has a particularly important role in transnational climate risk management. The EU coordinates and facilitates cooperation across national borders and within a number of key sectors such as agriculture, fisheries, infrastructure, finance and insurance. In addition, the EU countries have common external policies for security cooperation, development aid and migration.

The EU approach is to incorporate climate adaptation into key policy areas with the aim of strengthening overall climate robustness for all EU and EEA countries. The EU's adaptation strategy is focused on integration (mainstreaming) as a political instrument, where aspects related to climate adaptation are incorporated into existing sector policies and the EU's external policies. The EU's current adaptation strategy was adopted in 2013 and was neither motivated nor informed by knowledge of transnational climate change impacts. It does not therefore directly address the risks identified in the EU's risk and vulnerability analysis (published in 2017). The strategy nevertheless highlights a number of adaptation measures for policy areas and sectors which have strong transnational dimensions.

The external EU policy addresses transnational climate change risks through development aid, migration and security policies. Beyond the borders of the Union, the EU is working to incorporate climate adaptation into its development and security policies. Likely consequences of climate change are, for example, part of the analytical framework used in the planning of aid projects or security analyses and warning systems for conflict.

The EU's migration policy also recognises the risk of increased refugee flows due to climate change. This is viewed in the context of preventive aid and security policy measures aimed at reducing risk. Separate plans are also being considered to better equip the EU's migration system to accommodate large numbers of refugees and protect their rights, whilst also reducing the risk of human smuggling.

In sector policy areas, climate risk is incorporated into the framework for financing and executing joint projects. Much of the EU budget is allocated through the so-called EU funds for different purposes, such as regional development, agriculture, fisheries and social policy. The allocation of these funds also allows for the funding of various climate measures.

For example, through the agricultural fund, extra funding may be granted for implementing adaptation measures, or through the development fund, support can be obtained to invest in technology that can improve climate robustness. Estimates show that in the period 2014–2017, approximately EUR 62.1 billion – which corresponds to 14% of the total fund – was allocated to projects categorised as climate adaptation.

Much of the funding also goes to joint infrastructure projects in which climate adaptation is particularly important. There are separate guidelines for studying and managing climate change risks for joint infrastructure projects in the EU, especially those related to critical networks such as roads, railways, airports and power lines.

The EU funds and coordinates research on climate change in transnational EU sectors. The EU's strategy has also facilitated funding and coordination of research on the consequences of climate change for EU sectors that are transnational in nature. In particular, the Joint Research Coordination (JRC) programme has played an important role in the development of studies on the consequences of climate change in the European energy sector, tourism, infrastructure, health and forestry.

The EU adaptation strategy proposes measures to promote a more robust response to climate change in the finance and insurance industry. The strategy promotes climate-robust investments by facilitating new forms of financing, better market information and correct pricing of climate change risks in the insurance market.

The EU's capital markets union gives access to, among other things, new investment instruments in climate-robust infrastructure for the insurance industry. A new body has also been proposed to assist market players in pricing insurance premiums for climate-related non-life insurance, devising risk management strategies and coordinating data on damage and losses in order to improve the industry's understanding of climate change risks. The EU Commission has recently launched an action plan for financing sustainable growth, where one of the proposals is to create a common framework for the classification of green investments, including climate adaptation (European Commission, 2018).

Furthermore, the introduction of a common European framework for reporting on climate change risks in the finance industry is discussed. The proposal is inspired by the aforementioned TCFD framework (described in Chapter 5).

The EU's evaluation of its own strategy emphasises the major lack of research on and management of transnational climate change risks. The EU is in the process of updating the adaptation strategy and, as part of this process, carried out an evaluation in which one of the conclusions was that transnational climate change risks had become more important and prominent than when the current adaptation strategy was adopted in 2013. There is therefore a need for more insight into how climate change will affect the EU's transnational sectors, both internally in the EU and in its interaction with other parts of the world. The new adaptation strategy is also likely to contain even clearer guidelines for how transnational risks should be managed in and between the EU and EEA member states.

When it comes to climate risk management, it is argued that international conditions need to be reflected in the climate adaptation strategy to a greater extent, and that further investigations are needed to assess the consequences for the EU of physical climate changes in third countries via pathways such as value chains, migration, trade and finance. The EU also maintains that climate change and climate adaptation have not been sufficiently incorporated into international policies in the areas of trade, security and development aid, and that there will be a need to seek more knowledge and measures in order to understand and address related climate change risks (European Commission, 2018).

Climate adaptation is a public common good that can be reinforced through several EU and EEA countries implementing adaptation measures. The EU defines climate adaptation as a common good that is strengthened through the national adaptation efforts of several countries. When countries in the EU and the EEA implement measures for climate adaptation, this will intensify the overall effort as it also improves the climate robustness for the EU as a whole. In turn, this helps to reduce transnational climate change risks for individual countries. This is especially true for the areas that the EU has defined as common economic sectors.

International coordination at a European level can lead to synergies, especially in the management of international risks outside the EU. In the same way as for knowledge on transnational climate change risks, international cooperation also has clear benefits for climate risk management. Since many of the identified risks are common to countries, and by definition exist outside a country's or a region's borders, it is natural to also coordinate the risk management. This perhaps particularly applies to the risk factors that the EEA has defined as international or external to the EU, including migration, geopolitics, security and development aid, and, not least, trade. These are areas that are largely coordinated and managed through international institutions such as the UN system, the World Bank and the WTO.

Other intergovernmental organizations can also serve as a useful forum for coordinating regional adaptation work. The intergovernmental organizations examined in this report, such as the Arctic Council and the Nordic Council of Ministers, have no formal decision-making powers, but can facilitate member states' coordination of their regulations when faced with common challenges. This makes them suitable arenas for member states to work together to address transnational climate change risks.

The Arctic Council has been a driving force for measures in the member states to address the risks arising from climate change and increased human activity in the Arctic, partly through requirements for emergency preparedness and rescue capacity, as well as standards and regulations for increasing safety and minimising risk.

1.2.3 Private sector:

An increasing understanding of climate change risks in the business sector has led to private companies starting to implement measures to monitor and manage transnational climate change impacts. As mentioned in the previous section on knowledge status (1.1), transnational climate change impacts in the business sector primarily concern risks and opportunities associated with companies' value and supply chains, finance and insurance.

Few companies have implemented risk-reducing measures aimed at the value chain, due to their lack of knowledge about climate change risks. Research has shown that businesses do not generally put many resources into climate adaptation as they do not fully recognise the consequences of climate change and the effects it can have on their value chains. It is not surprising that relatively few companies have carried out specific measures, plans, strategies or capital investments in adaptation technology to address transnational climate change risks.

For companies that have implemented measures, the most common method is to incorporate climate change risks into the direct follow-up of suppliers. To reduce climate change risks in the value chain, some companies choose an approach that entails close operational control over their suppliers by setting requirements (for example for climate reporting), checking compliance with these requirements, and training and dialogue. The purpose is to help the suppliers to understand the extent of climate change risks and facilitate improved conditions that increase their capacity for managing such risks (CDP, 2018).

Leading companies incorporate climate risk management into their sustainability and social responsibility strategies, with goals for value creation for the company, the environment and society. The common feature of companies that manage climate risks most effectively is that they address identified risks and opportunities through clear priorities in a corporate strategy for sustainability and corporate social responsibility. Strategies that underpin an understanding of how their various stakeholder groups — such as local communities, employees and investors — are affected by climate change and what it means for the company's business, will be best placed to manage risk in a way that improves climate robustness and joint value creation.

A good example is the multinational food company General Mills, which in an analysis of how the company is affected by climate change found that they may be exposed to water shortages in several areas as a result of climate-related drought. To address this risk, they have devised a strategy to reduce their own water consumption in vulnerable areas, whilst also investing in expertise and infrastructure to ensure

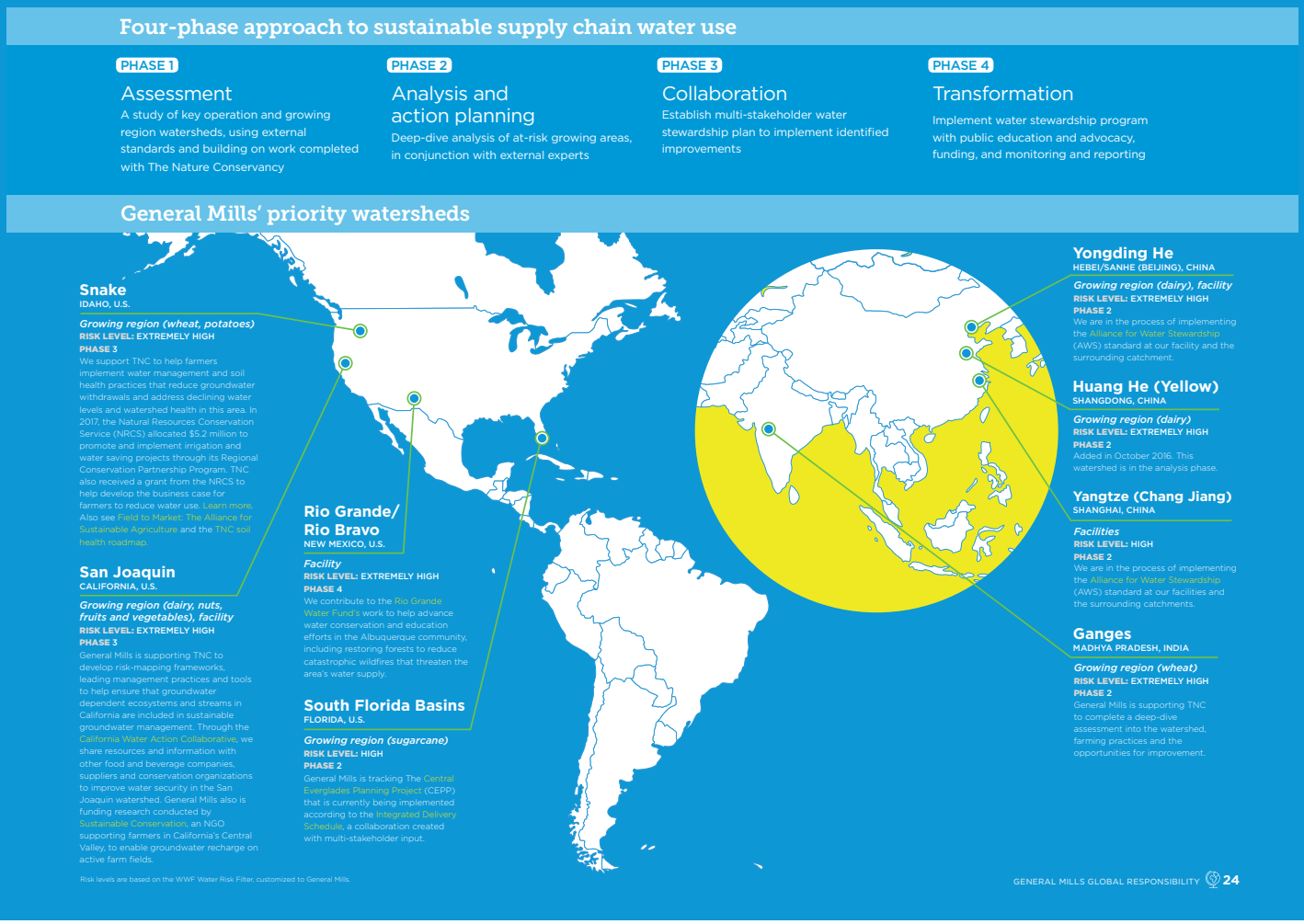

Figure 6: The image is extracted from General Mills' annual report (2017) and shows the company's strategy for reducing the risk of water shortages due to climate change.

more responsible utilisation of water resources. Other companies are also working to ensure sustainable access to vulnerable input factors. For example, in the cocoa and coffee industry, a number of companies are working actively, either individually or through trade associations such as the World Cocoa Foundation (WCF) and Fairtrade, to contribute to a sustainable and climate-robust adaptation for the primary goods producers. Such business initiatives are also found in a number of other industries and areas, often in partnership with public authorities or civil society organisations.

Several companies have integrated climate change into their disaster preparedness plans. Through good routines and plans for responses to natural disasters, companies can ensure operational continuity whilst making a positive contribution to the local communities in which they operate. An example of this was Coca Cola's work on the island of Puerto Rico following Hurricane Maria in 2017, where they claimed that effective preparedness procedures and ability to respond enabled them to actively contribute to the clean-up and reinstatement of infrastructure services such as water and electricity.

The finance industry contributes to climate robustness through conscious investments and active ownership. By possessing knowledge of how companies manage climate risk and plan for long-term value creation in the face of climate change and climate policy, the finance industry is able to prioritise companies that can demonstrate effective measures aimed at climate robustness. A growing number of investors are also taking a more active approach through so-called 'active ownership', where they use their position as owner or creditor to promote measures related to climate adaptation and sustainability to the company in which they are investing.

The insurance industry maps and reduces risk through its products. Insurance companies sell services that price risk for climate-related events, thereby helping to reduce climate change risks faced by both private and public actors. They can also take a more active role, in which they provide guidance and assistance for their clients in reducing the physical climate risk and loss from natural damage. As in the finance industry, insurance companies can also make strategic investments or undertake active ownership in companies that are under their control (ShareAction, 2018).

References

- CDP. (2018). Closing the Gap: Scaling up sustainable supply chains. Available at: https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/003/014/original/CDP_Supply_Chain_Report_2018.pdf?1518084325
- Committee on Climate Change. (2016). UK Climate Change Risk Assessment 2017. Available at: https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf
- European Commission. (2018). Communication from the commission: Action Plan: Financing Sustainable Growth. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018DC0097&from=EN
- European Environment Agency. (2017). Climate change, impacts and vulnerability in Europe 2016 – An indicator-based report.
- EY. (2018-a). Konsekvenser for Norge av klimaendringer i andre land.
- EY. (2018-b). Does your nonfinancial reporting tell your value creation story? Available at: https://www.ey.com/en_gl/assurance/does-nonfinancial-reporting-tell-value-creation-story
- EY. (2018-c). Climate Risk Disclosure Barometer 2018. Available at: https://www.ey.com/Publication/vwLUAssets/ey-carbon-risk-disclosure-barometer-2018/$File/ey-carbon-risk-disclosure-barometer-2018.pdf
- General Mills. (2018). Global Growth and Returns: 2017 Annual Report.
- Goldstein, A.; Turner, W. R.; Gladstone, J.; Hole, D. G. (2018). The private sector's climate change risk and adaptation blind spots. Available at: https://www.nature.com/articles/s41558-018-0340-5
- Ministry of Agriculture and Forestry of Finland. (2005). Finland's National Strategy for Adaptation to Climate Change. Available at: http://ilmastotyokalut.fi/files/2014/10/MMMjulkaisu2005_1a-1.pdf
- NOU 2018:17. Klimarisiko og norsk økonomi. Available at: https://www.regjeringen.no/en/dokumenter/nou-2018-17/id2622043/sec3
- ShareAction. (2018). Got it covered? Insurance in a changing climate. Available at: https://aodproject.net/wp-content/uploads/2018/05/AODP-Got-It-Covered-Insurance-Report-2018.pdf
- Task Force on Climate Related Financial Disclosures (TCFD.) (2017). Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures. Available at https://www.fsb-tcfd.org/publications/final-recommendations-report/

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