

Consequences for Norway of transnational climate impacts

Executive Summary

Many impacts of climate change are local in nature, but can have economic and social consequences that transcend borders, and affect countries in addition to the direct effects of physical climate change. For Norway, transnational climate impacts represent both risks and new opportunities. Looking ahead, towards the mid and late 21st century, it is however clear that in sum, potential risks far outweigh the opportunities, both in terms of magnitude, confidence and likelihood.

Among the most critical risks identified in the report are the humanitarian consequences of climate change that are causing a growing need for Norwegian development assistance and emergency relief. There is ample evidence of the links between climate impacts, humanitarian crises and poverty among people living in vulnerable areas. In addition, climate change can also act as a driver for social and political destabilization, and in extreme cases violent conflict. It is expected that climate change will be a lead factor in causing extensive refugee crises. As such, transnational climate impacts could have significant consequences for Norwegian national security and immigration policy.

Furthermore, it is expected that climate change will lead to a gradual weakening of global productivity, which may cause increased volatility and higher prices on several commodities in the Norwegian market. Such risk is particularly evident within agriculture, a sector that is highly exposed to climate impacts, and where Norway is currently importing the majority of its consumption. Transnational climate impacts will have major consequences for Norway, despite the fact that several of Norway's closest trade and cooperation partners are considered to be relatively robust in the face of climate change and have high adaptive capacity.

In cooperation with:



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Background

Climate change affects natural and human systems globally, with consequences already visible in many parts of the world.

Drought and floods make land infertile and uninhabitable. Rising sea levels and storm surge threatens coastal communities and infrastructure. Changing temperature and precipitation patterns can cause crop failure, spread of infectious diseases, and increased risk of wildfires. These are just some examples from a long list of climate change impacts and their direct physical consequences. In addition, social and economic structures worldwide are also affected by an even longer list of indirect impacts.

In a world that is ever more connected and globalized, such indirect impacts will not be isolated to the areas where climate impacts occur, but may have consequences that can reach far beyond any single country's borders. As a result, it is becoming increasingly important both for Norwegian government and businesses to consider, not only the direct consequences of climate change for Norway, but also how climate change impacts in other parts of the world might affect Norwegian people, economy and nature - so called transnational climate impact.

Such impacts may occur through Norway's foreign links and connections in international systems, including trade and financial markets, energy and transport infrastructure, the flow of people across borders and its geopolitical relations. These connections represent networks that can transfer climate risk across borders. Some consequences may occur suddenly and spontaneously. For instance, within finance where networks are wireless and global, a hurricane in the Mexican gulf could have immediate ramifications for the stock valuation of Norwegian oil and gas companies. Other consequences may occur indirectly or gradually over a longer period of time, such as decline in winter tourism at Norwegian ski resorts due to higher temperatures and less snow.

Objective, methodology and structure

The report offers a broad and high level overview of transnational climate impacts that can have consequences, either as risks or opportunities, for Norwegian societal functions and business. The purpose is to indicate where risks and opportunities will arise for Norway towards the mid and late 21st century. Findings are intended to offer guidance and as such provide basis for further research and analysis to understand specific impacts and causal effects in more detail.

Transnational climate impacts are assessed and measured on the basis of climate vulnerability and links between different countries. The methodological approach to assessing risks and opportunities for Norway has involved analyzing the strength of

connections between Norway and other countries in different areas, factoring in expected climate impacts and vulnerability in those countries. The report looks at different forms of international connections within six thematic areas: Trade, agriculture and fisheries, finance, infrastructure, humans, and geopolitics. Within each theme we have assessed i) how Norway is connected to other countries and where those connections are strongest, ii) how and to what extent connected countries are directly impacted by climate change, and iii) what risks and opportunities for Norway might arise in the medium and long term as a result of climate impacts in connected countries.

The report is based on collection, review and analysis of relevant literature, and has not involved any original research. Risks and opportunities are evaluated only as consequences of physical climate impacts, all other things being equal. As such, findings do not reflect any potential influence from climate mitigation and adaptation measures, nor technological and regulatory development, beyond what is assumed in the UN Intergovernmental Panel on Climate Change (IPCC)'s climate scenario, RCP 6.0

Projections of future risk and opportunity in the report are based on an assumption of 2 - 3,7°C rise in global mean temperature by year 2100. The IPCC RCP 6.0 scenario, which assumes medium high average temperature increase was chosen because it represents a future that is roughly in line with the international ambition level and climate policy commitments of the Paris Agreement. It does however not take into account the potentially most severe consequences of climate change that are associated with a high-emission scenario in which the world continues without significant transition to low-emission technologies.

Findings in the report offer knowledge that can inform strategic planning of climate adaptation. Intended users of the report include decision makers in both public and private sector as well as non-governmental organizations. Different users will have different perspectives and thus varying considerations regarding the significance of themes and findings. In this respect, we hope that the report and its analytical framework will provide basis for new and more detailed studies in the future. An important output of the assessment that led to this report are the identified evidence gaps in academic literature and room for further research. This is summarized at the end of each thematic chapter. Notwithstanding, it is important to say that lack of complete evidence or certainty should not be used as an excuse by government and businesses for inaction regarding the expected consequences of transnational climate impacts. As the report shows, that would be both a risky and costly choice.

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Main findings

The following sections provide a brief summary of the most important risks and opportunities identified in the report. The matrix on page 4 shows an overview of all risks and opportunities we have considered by year 2050, ranked by the degree of impact (from low to very high) and the confidence or certainty as to whether the event will occur (from low to high). The weighting was done using objective categories of impact based on economic, social and environmental criteria. The assessment of confidence concerns both the quality of data and research and the probability where relevant. A more detailed explanation of the evaluation criteria and process can be found in the report's Chapter 2, "Hvordan lese og forstå rapporten".

Climate change will likely lead to higher import prices on commodities produced in vulnerable countries, for example clothing and textile. According to the IPCC, climate change could reduce global GDP by up to 2 percent by 2050. Countries that are more vulnerable to climate change will be hit harder, which could lead to disparities in international trade and more expensive imports on a variety of goods. One example is the Norwegian imports of textiles and clothing, which are largely imported from South Asian countries including India and Bangladesh that are particularly vulnerable to flooding, rising sea level, and extreme weather events. It is estimated that in these countries climate change could lead to a reduction in GDP of more than 6 percent, and a reduction in total textile exports of up to 10 percent by 2060

Melting of the Arctic sea ice is opening up new transport routes and offers trade-related gains, but at the same time poses severe risk to the fragile nature and ecosystems in the region, and potentially risk for new geopolitical challenges. A complete opening of the Arctic Ocean between Europe and Asia could lead to a sharp increase in shipping traffic and strengthen Norwegian trade with Asian countries by up to 7 percent. Northern Norway would become a favorable place for port activity and other ship services. Nonetheless, increased ship traffic will also mean more pollution of air and sea in highly vulnerable natural areas, along with a heightened risk of environmental disasters associated with oil and gas transportation and/ or extraction. This will in turn strengthen the need for international environmental cooperation in the Arctic. Access to new resources and trade opportunities could also become a source of geopolitical risk, and as such influence the need for Norwegian strategic presence in the High North. To date, international cooperation and dialogue has however contributed to keeping a relatively low conflict level in the Arctic.

Declining agricultural productivity as a result of climate change can lead to higher food prices and reduced access to several goods, but it also presents Norwegian agriculture with a competitive advantage. At the global level, agriculture is highly exposed to the adverse effects of climate change. Climate impacts like temperature increase, changing precipitation patterns, drought, and floods can all lead to soil degradation and poor growth conditions for many crops including important staple foods. There will likely be a sharp decline in global agricultural productivity as a consequence of climate change, causing food prices to rise. Local climate impacts in Norway may however result in advantageous growth conditions for important agricultural produce, including wheat, and increase the potential for production in the short to medium term. Nevertheless, Norwegian import dependency of agricultural products will continue to be high and climate change overall will likely result in higher prices on a variety of goods such as fruit and vegetables, and especially luxury goods including coffee and cocoa. For example, it is estimated that the production of Arabica coffee, which currently accounts for 70 percent of all coffee produced, can be reduced by up to 90 percent by 2080 due to climate change. Livestock and aquaculture will also be affected as the price of imported feedstuffs and especially soy may increase significantly.

Higher ocean temperatures could lead to fish migrating northwards, thus increasing the catch potential for the Norwegian fishing industry, but not without risk. Higher sea temperatures will cause fish stocks to migrate away from the equator and pull north towards and into the Arctic Ocean. According to the IPCC, northern regions could see a 30-70 percent increase in catch base by 2055, while in tropical areas around the equator it could be reduced by 40-60 percent. This could represent an enormous opportunity for Norwegian fisheries, which is currently Norway's third largest export industry. Notwithstanding, there are also challenges. At the global level climate change will likely cause a reduction in total fish stocks due to temperature increase, ocean acidification, and so-called 'marine dead zones'. In the longer term, there is also a risk that temperature increase and loss of suitable fish habitats in combination can lead to fish stocks migrating out of Norwegian fishing zones.

Norwegian investments in other countries, both Foreign Direct Investment and stocks and bonds portfolios, are exposed to climate risk. Mark Carney, Governor of the Bank of England and chairman of the G20's Financial Stability Board, has made clear warnings about the potential for a climate-related

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financial crisis, caused by dramatic fall in the valuation of fossil-based energy and industrial companies, panic sales of stocks, and continued rise in insurance payouts for loss and damages from extreme weather events, drought and flooding. Norwegian investments are also highly exposed to such risk. Particularly evident is the physical climate risk to property and assets held abroad by Norwegian companies or individuals.

Droughts, floods and extreme weather events in highly vulnerable countries can lead to humanitarian crises and dramatically increase the need for disaster response and relief, and support for climate change adaptation measures.

It is extremely likely that in highly vulnerable countries, especially in Africa, the Middle East and Asia, more and more people will lose their lives due to adverse climate impacts including flooding, drought, extreme heat, water scarcity and increasingly frequent and more violent storms. Climate change will push more people into poverty and insecure living conditions, with threats of disease, malnutrition and hunger. Climate impacts can also directly trigger or worsen humanitarian crises, where emergency relief will be urgently needed and thus put pressure on the Norwegian capacity and commitment to support.

Climate change impacts may trigger and aggravate international refugee crises, which in turn can lead to an increase in the number of displaced migrants seeking asylum in Norway. Despite the fact that 'climate refugees' is not yet a recognized phenomenon within the UN Refugee Convention,

climate-related events such as flood, drought and extreme weather, have either directly or indirectly been important drivers of displacement for many of the world's 65 million registered refugees. Although estimates vary by definitions, climate change impacts could deteriorate living conditions for hundreds of millions of people to the point where they are forced to leave their homes. This means that in the future one can expect more international refugee crises and larger flows of migrants coming to Norway from regions especially vulnerable to climate change.

Climate change can have a destabilizing effect and cause conflict both within and between states, with potential implications for Norwegian security efforts through the UN and NATO. As more areas globally become less habitable and livelihoods are lost as a result of changing climatic conditions, this could lead to increased competition for land or resources both in and between states. Furthermore, this can increase tension levels and the risk of violent conflict. Drought and water scarcity for example can be both an underlying and triggering factor for conflict. Several analyses of the war in Syria point out the socially destabilizing effect of years of drought and failing crops in the lead-up to the civil war. More climate-related conflicts could consequently put pressure on Norwegian participation in military operations led by the UN. NATO has also integrated climate change into its strategic framework, which may mean that Norway would have to take an active role in any military response to climate-related disasters and conflicts.



Risks and opportunities in 2050 given a 2 - 3.7C temperature increase scenario

Legend

 Trade	 Finance	 Infrastructure
 Agriculture and fisheries	 People	 Geopolitics
 Risk	 Opportunity	 Humanitarian

Magnitude	Very high	<ul style="list-style-type: none">  Climate change could lead to more economic and political isolationism  Higher risk for ICT system disruption and disturbances 	<ul style="list-style-type: none">  Price increase on food, textiles and manufactured goods  Lower returns on Norwegian foreign investments  Risk of damages to infrastructure critical for export of Norwegian oil and gas  Climate change can contribute to raising global and regional conflict levels, having implications for Norwegian security commitments through UN and NATO  Extreme heat in southern latitudes can make Norway a more attractive destination for tourism  Strengthened relative competitiveness and trade benefits  Increased demand for Norwegian maritime and ship yard services 	<ul style="list-style-type: none">  More shipping traffic in the Arctic brings ecological and biodiversity risks to an already vulnerable region  Price increase on many imported goods due to lower productivity  Declining growth in global food production will cause higher import prices for Norway and make domestic production more important  Environmental impacts of increased human activity in the Arctic will call for more international collaboration  Likely a dramatic increase in the need and for emergency relief and climate change adaptation support in developing countries  Direct trade gains related to opening of new arctic trade routes  Climate impacts in other countries could create a rise in demand for Norwegian fish and produce  Changes in the European energy market can cause increase in demand for Norwegian hydro and gas power  More climate refugees can put increased pressure on Norwegian migration policy.
	High	<ul style="list-style-type: none">  Norwegian oil and gas infrastructure abroad is exposed to adverse physical climate impacts  More expensive fruits and vegetables can have negative consequences for nutrition and public health  Climate change can increase the risk of terrorism  Increase in demand for Norwegian trade infrastructure and services in the High North  Relatively low climate risk could make Norway a more attractive investment destination  Improved competitiveness for Norwegian fisheries and aquaculture  Increased need for refugee family reunions and support to vulnerable people in countries with strong cultural ties to Norway 	<ul style="list-style-type: none">  Real estate investments are particularly exposed to physical climate risk  Inflation on imported goods like fruits and vegetables and especially luxury goods like coffee and cocoa.  More crop failures and higher uncertainty can cause shocks in price and supply  Norway has high dependency on soy-based foodstuffs, which are particularly exposed to climate risk  Norway could increasingly be held financially accountable for historic emissions and its contribution to global climate change  Export and investment opportunities related to climate adaptation technologies in vulnerable countries 	
	Moderate	<ul style="list-style-type: none">  Opening of the Arctic sea ice will bring new geopolitical challenges, however focus on international dialog and cooperation can keep tension low  Higher price volatility due to transport disruptions  Higher climate risk in global reinsurance market  Meat import prices could see considerable increase given lower productivity, water stress and competition for land  Climate-related fish migration can provoke renegotiation of marine resource treaties  Increased need for emergency response and preparedness services in the Arctic  Climate change impacts can force changes in global trade regimes, including new opportunities for adaptation technology  The value of Norwegian forestry assets will go up, but in the longer term overall production from forestry is expected to decline  Norway could become a more attractive destination for labor migration  Opening up of the Arctic and High North creates new growth opportunities in the tourism sector  Climate change might cause an increase in «last chance tourism» 	<ul style="list-style-type: none">  Foodstuffs imports are especially vulnerable to climate risk, and could thus increase costs for livestock and aquaculture farming  Higher risk of damage and disruption of connected transnational power grids can have consequences for energy supply  Risk of loss and damage from extreme weather impacts on land based transport infrastructure  Winter tourism will face climate-related challenges all across Europe, although Norway is relatively well placed in the shorter term 	
	Low	<ul style="list-style-type: none">  Higher risk of climate-related infectious diseases spreading across Europe, somewhat contained by robust health infrastructure  Higher infection risk from food imports  Norwegian adaptive capacity and favorable climate conditions offers new opportunities for hosting green data centers 		

Confidence Low

Moderate

High

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