Norwegian Ministry
of Climate and Environment

Report

Norway's second Adaptation Communication

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Introduction

With reference to The Paris Agreement Article 7, paragraph 10 and 11 and the decision 9/CMA.1, the enclosed document serves as Norway's second adaptation communication under the Paris Agreement.

The document is a copy of Chapter 3 of Norway's first Biennial Transparency Report (BTR), submitted to the UNFCCC in December 2024. It provides information on among other climate change impact on Norwegian mainland and the Arctic, vulnerability assessment, and adaptation measures planned and implemented.

In 2023 the Norwegian government presented a white paper to the parliament on climate change adaptation: «*A changing climate – united for a climate-resilient society*» (Meld. St. 26, 2022–2023).[1] The white paper outlines Norway's efforts and measures to prepare and adapt nature and society to climate change, aiming to create a climate-resilient society. The adaptation communication is largely based on that report.

[1] Regjeringen: Meld. St. 26 (2022–2023)

1 National circumstances, institutional arrangements and legal frameworks

1.1 National circumstances relevant to adaptation actions

Norway has experienced an increasing frequency of heavy rain causing flood and landslides. This has raised the awareness in the population of the increasing challenges caused by climate change.

Norway is a sub-Arctic country with a long and convoluted coastline combined with a long mountain chain facing a relatively warm ocean surface to the south, west and north. This results in large geographical variations in the present climatic conditions as well as in the projections of future climate change. These variations are found both from coastal to inland and mountainous regions, for ocean and land areas from the southwest to the north and – even more so – from the Norwegian mainland to the Arctic islands (Svalbard and Jan Mayen).

According to the green paper NOU 2010: 10 *Adapting to a changing climate*, Norway is in a good position to adapt to climate change. A report from 2018 finds that the Norwegian society's capacity to adapt has been strengthened since 2010, through changes in laws and regulations, a great increase in production of knowledge, guidance, coordination and, to some extent, resources.[2] The report underlines that national authorities' work on adaptation has increased significantly since 2010, but the efforts are varying across different sectors. The Norwegian Environment Agency put forward the report *Barriers to Climate Adaptation on the Local and Regional Level in 2022*, which reflects some challenges at the local and regional levels for carrying out successful climate adaptation work, cf. chapter 3.2.[3]

In 2022, the Office of the Auditor General of Norway presented the results of its study on the authorities' work on climate change adaptation of infrastructure and buildings.[4] The study shows that the authorities lack sufficient knowledge about the vulnerability of existing buildings and transport infrastructure to future natural hazards. This knowledge gap could hinder the implementation of necessary preventive measures and lead to high societal costs and security risks. Additionally, the study highlighted inadequate coordination among national authorities and a lack of a comprehensive overview of Norway's progress in climate change adaptation.

The implementation of the white paper on climate change adaptation from 2023 is intended to strengthen Norway's adaptive capacity, including the implementation of a new governance system for national adaptation efforts, as well as a national climate impact and vulnerability assessment.

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2 Vestlandsforsking & Cicero: Oppdatering av kunnskap om konsekvenser av klimaendringer i Norge (in Norwegian only)

3 Vestlandsforskning: Barriers to climate adaptation at local and regional level | Western Norway Research Institute

4 Document 3:6 (2021–2022): Riksrevisjonens undersøkelse av myndighetenes arbeid med å tilpasse infrastruktur og bebyggelse til et klima i endring (in Norwegian only)

1.2 Institutional arrangements and governance

A fundamental principle in Norway's adaptation policy is that the actor responsible for a task or function affected by climate change is also responsible for climate change adaptation. In consequence, everyone contributes to climate adaptation work: individuals, households, private businesses, and the public sector.

The public authorities have sector responsibility. This means that all ministries, government agencies and local and regional authorities carry a responsibility for climate change adaptation within their field. All ministries are responsible for assessing whether and, if applicable, how the consequences of a changed climate affect their respective sectors, and for implementing actions to reduce vulnerability. The Ministry of Climate and Environment coordinates the ministries' work and is responsible for the Government's overall efforts to prepare and adapt nature and society to a changing climate.

The Norwegian Environment Agency (NEA) supports the Ministry of Climate and Environment in coordinating these efforts. The agency coordinates the inter-agency cooperation on climate change adaptation and gives guidelines and guidance to the county governors in their climate change adaptation work. It has a particular responsibility for disseminating and sharing knowledge and experience, contribute to competence and capacity building and facilitate cooperation between different public administration levels, sectors and other stakeholders in the field.

The County Governor work to ensure that decisions of the Norwegian Parliament and Government are implemented correctly and is an important link between municipalities and central government authorities. The county plays an important role in supporting and guiding the municipalities in their adaptation efforts. It also guides and coordinates municipal planning within the county, in addition to being the regional planning authority. The municipalities are required to consider climate change adaption and mitigation in their planning activities and exercise of authority.

1.3 Legal and policy frameworks and regulations

In June 2017, the Norwegian Parliament adopted a Climate Change Act, which establishes by law Norway's emission reduction target for 2030 and 2050. According to the act, the government shall submit updated information to the Parliament on how Norway prepares for and adapts to climate change.

Climate change adaptation concerns basic social structures, and a number of laws are therefore relevant, including rules on land use planning, contingency legislation, waterway legislation, legislation regulating various types of infrastructure, natural property legislation etc.

Local and regional planning are essential to meet the challenges related to climate change. The Planning and Building Act provides the framework for planning in Norway. Its foundation is sustainable development. This framework includes tools and requirements for local, regional and national planning. One such tool is the Central Government Planning Guidelines, that defines which areas of national interest to

be implemented in local and regional planning. In 2018, the government adopted new planning guidelines (in Nw.: «*Statlige planretningslinjer for klima- og energiplanlegging og klimatilpasning*») to promote climate change adaption in local and regional planning. An online tool to support the implementation of the guidelines has been developed.

Every 4th year the Ministry of Local Government and Regional Development issues a white paper on national expectations for regional and municipal planning.

The Environmental Impact Assessment framework and various guidelines and policies ensures that vulnerability due to climate change is included in environmental impact assessments.

Pursuant to the Act of 25 June 2010 No. 45 relating to the Municipal Preparedness Duty, Civil Protection Measures and the Norwegian Civil Defence (Civil Protection Act), municipalities have a duty to identify the adverse events that could occur in their municipality, assess the likelihood of these events occurring and assess how they could affect their municipality. The results of this work must also be assessed and compared in a comprehensive risk and vulnerability analysis. Municipalities must draw up contingency plans based on this analysis, have a municipal crisis team and carry out exercises and other skills enhancing measures to ensure they are able to handle adverse events.

Other relevant legislation includes, inter alia:

– the act on Health and Social Preparedness;
– the act relating to food production and food services;
– the act relating to municipal health and care services;
– the act relating to ports and navigable waters;
– the act relating to the control of communicable diseases;
– the Aquaculture Act;
– the Forestry Act;
– the Land Act;
– the Marine Resources Act;
– the Natural Damage Insurance Act;
– the Natural Damage Compensation Act;
– The Natural Damage Act:
– the Nature Diversity Act;
– the Pollution Act;
– the Public Health Act;
– the Railway Act;
– the Road Act;
– the Svalbard Environmental Act; and
– the Water Resources Act.

2 Impacts, risks and vulnerabilities

2.1 Current and projected climate trends and hazards

In Norway, warming is taking place faster than the global average. The average temperature in mainland Norway is now more than 1.2 degrees Celsius higher than at the beginning of the 20th century.[5] The temperature is rising more rapidly on Svalbard than any other place on the planet. In Longyearbyen, the average temperature has increased by more than 4 degrees Celsius since 1991 alone[6] and new records are constantly being set.[7]

The strong warming in the Arctic is linked to the decline of sea ice in the Barents Sea and in the fjords of Svalbard. With less sea ice, the sea becomes more open and darker and absorbs more heat. This, in turn, melts more sea ice. More open and warmer seas will re-radiate heat to the air during large parts of the year, which will further increase warming.[8]

As global warming increases, so does the likelihood of extreme weather and concurrent weather events. The average annual precipitation in Norway has increased by 18 per cent since 1900, and episodes of heavy precipitation have become more intense and more frequent.[9] Higher temperatures also cause more precipitation to fall as rain rather than snow, resulting in among others shorter snow seasons and earlier spring floods. The glaciers also have retreated significantly over the past century.

The trends we are already experiencing, with a warmer and wetter climate, are likely to continue over the next decades.[10] The average annual temperature in Norway may become more than 4 degrees Celsius higher during the 21st century. The biggest change in temperature will be during winter. The increase will be greater the further north you go, with Svalbard potentially becoming up to 10 degrees Celsius warmer.[11]

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5 NCCS (2017): Climate in Norway 2100

6 Scientific Reports: Exceptional warming over the Barents area

7 Science Advances: Global record-breaking recurrence rates indicate more widespread and intense surface air temperature and precipitation extremes

8 NCCS (2019): Climate on Svalbard 2100 – a knowledge base for climate adaptation

9 NCCS (2017): Climate in Norway 2100

10 NCCS (2017): Climate in Norway 2100

11 NCCS (2019): Climate on Svalbard 2100 – a knowledge base for climate adaptation

The average annual precipitation may increase by just under 20 per cent across mainland Norway and by more than 60 per cent in Svalbard during the 21st century.[12] More precipitation, especially over short periods of time, increases the risk of stormwater and of more frequent and extensive rainwater flooding. Periods of heavy precipitation may result in more landslides and debris floods.

In a warmer climate, winter temperatures in parts of the country will fluctuate more around freezing point.[13] This will generally result in more icy conditions and more episodes of snow melting quickly or rain falling on cold ground.

Permafrost[14] is now thawing at an ever-increasing rate and will continue to do so throughout the 21st century. Ice will also retreat or disappear. Norwegian waters and coastal areas are also becoming warmer and more acidic.[15] The sea level along the coast of Norway is now rising by just above three millimetres per year.[16] This is expected to accelerate in future, although land uplift after the last ice age will reduce the effect in some coastal areas.[17]

2.2 Observed and potential impacts of climate change

Climate change has consequences for nature and for society at large. An example is that increased rainfall leads to more frequent floods, landslides and stormwater events, which damage buildings and infrastructure, arable land, outdoor areas and cultural environments. In severe cases, this may also pose a risk to life and health. Other examples are more frequent periods of prolonged drought that pose challenges to agriculture, and heatwaves that are a potential health risk to vulnerable groups. Society is also affected by the ripple effects of climate-related events. For example, roads closed due to flooding can lead to service disruptions and considerable costs for both the public sector and the business sector.

Climate change knows no national borders. An open economy and extensive international trade and cooperation make Norway vulnerable to the effects of climate change in other parts of the world. Climate-related risk interacts closely with other threats and risk factors globally and nationally, complicating the challenges we face. Climate change may, for example, lead to a reduction in global food production, in turn increasing the risk of supply shortages and higher prices for food products that Norway must import.

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12 NCCS (2017): Climate in Norway 2100, NCCS (2019): Climate on Svalbard 2100 – a knowledge base for climate adaptation

13 Projected changes in days with zero-crossings for Norway

14 Deposits and bedrock where the temperature does not exceed 0 degrees Celsius during two consecutive years.

15 Havforskningsinstituttet: Risikoanalyse for de norske havområdene om direkte og indirekte virkninger av klimaendringer på marine økosystemer under ulike utslippsscenarier (in Norwegian only, summary in English), Havforskningsinstituttet: Klimapåvirkning på viktige kystvannsarter (in Norwegian only)

16 IPCC Climate Change 2021: The Physical Science Basis

17 https://www.miljodirektoratet.no/publikasjoner/2024/april-2024/sea-level-rise-and-extremes-in-norway/

The effects of climate change on nature are more severe and extensive than previously expected, and loss and degradation of nature exacerbate the effects of climate change. Climate change has been cited as a negative impact factor for almost 10 per cent of the endangered species in Norway and Norwegian marine areas on the 2021 Red List. Various species of fish and other animals in the ocean and along the coast are migrating further north, altering the conditions for other species in the food chain. For species that already live in high mountain areas or in the Arctic, there are few opportunities for such adaptation. The consequences of this could be vast and unpredictable and change entire terrestrial and marine ecosystems.

There is still uncertainty about how the effects of climate change will affect different social groups in Norway. However, we know that the Indigenous Sámi population, along with their traditions and livelihoods, are already experiencing significant negative impacts in the Arctic. These include higher temperatures and precipitation, permafrost thaw, loss of sea and land ice, changes in snow cover, extreme weather events, and northward shifts of species.

For a more comprehensive description of the impacts of climate change, see chapter 6.3 in NC8.

2.3 Approaches, methodologies and tools, and associated uncertainties and challenges

The Norwegian Centre for Climate Services (NCCS) – a collaboration between the Norwegian Meteorological Institute, The Norwegian Water Resources and Energy Directorate (NVE), NORCE Norwegian Research Centre and the Bjerknes Centre for Climate Research – facilitates and disseminates climate and hydrological observations, projections and products for use in adaptation to climate change, such as county-specific climate profiles. Municipal authorities and other public actors are an important target group for the NCCS, but the knowledge base is also used for researching and studying the effects and consequences of a changed climate.

The NCCS has published the report Climate in Norway 2100, to provide an updated scientific basis for climate adaptation in Norway. The report addresses the causes of climate change and variability, the development of the climate in Norway, and projected climate change through the 21st century. The report also describes methods and uncertainties related to the climate projections.[18] In 2021, work began on new climate projections for Norway based on the sixth assessment report from the UN Intergovernmental Panel on Climate Change. The new climate projections are being analyzed together with updated historical changes in a new Climate in Norway 2100 report, which is scheduled to be released in the fall of 2025.

[18] NCCS (2017): Climate in Norway 2100

The NCCS is developing the national data platform 'Klimakverna' in order to make climate and hydrological projections available and easier to use. A main objective is to better enable the municipalities to take climate change into consideration in their plans and decisions.

All national geospatial information is available from the website *Geonorge*. Still many municipalities find it difficult to get an overview of and access to geospatial information. This is partly due to the complexity of Geonorge and that the municipalities need to access the portals of several directorates to get information about and how to use the data shared through Geonorge. The Government has initiated measures to further develop Geonorge as a sharing platform for geographic data.[19]

Geodata from the Norwegian Public Base of Geospatial Data (DOK) forms an important part of the information basis for municipal and regulatory planning, impact assessments, risk and vulnerability analyses and building applications. DOK is to be used as the basis for planning proposals and building application cases. The Government is constantly working to improve the quality of DOK.

[19] Geonorge: Nasjonal delingsplattform for geodata

3 Adaptation priorities and barriers

3.1 Domestic priorities

The national goal and domestic priorities for climate change adaptation are presented in the white paper to the parliament: «A changing climate – united for a climate-resilient society» (Meld. St. 26, 2022–2023).

Norway has the following national goal for climate change adaptation:

«Society and ecosystems must be prepared for and adapted to climate change».

Norway has the following priority areas in the cross-sectoral climate change adaptation work:

- More knowledge about climate change and climate change adaptation
- Planning as a tool in climate change adaptation
- Nature-based solutions and nature's contribution to climate change adaptation
- Handling stormwater in cities and towns
- Better access to climate and geodata
- Addressing rising sea levels
- Food security in a changing climate
- Safeguard Sami interests and use indigenous peoples' knowledge in climate change adaptation efforts

In addition, Norway priorities climate change adaptation in the following selected areas:

- Nature and the environment
- Floods and landslides
- Buildings, infrastructure and transport
- Agriculture, forestry, fisheries and aquaculture
- Business and industry
- Tourism in a changing climate
- Health
- Foreign, defence and security policy
- Aid and development cooperation

3.2 Barriers to adaptation

For a long time, climate change adaptation work in Norway was primarily focused on the most immediate and visible consequences of climate change, such as natural disaster events and extreme weather events. There has been less focus on areas where the consequences are more indirect and the risk and vulnerability picture is particularly complex, for example due to chains of effects. This picture is changing, and there is increasing awareness and knowledge about the consequences of climate change in other countries and for different societal groups. Additionally, there is growing recognition of the risks that climate change may pose to the economy and welfare in the future. Our understanding of how climate change aggravates threats to international peace and security is also increasing.

Despite these ongoing developments, the knowledge base is still fragmented and there is a significant imbalance in the scope and level of detail between sectors and areas of society. There is for example limited knowledge about the interaction between different risk factors and how the impacts of climate change in one sector may have consequences for others.

In 2021, CICERO, Western Norway Research Institute, and Nordland Research Institute, on behalf of Norwegian Environment Agency, conducted a study on barriers to climate change adaptation at the local and regional levels in Norway. The report showed that in municipalities, barriers to climate change adaptation include lack of political will, insufficient financial and personnel resources, and challenges in translating knowledge between the national and local levels. Especially small municipalities struggle with climate change adaptation.[20]

[20] Western Norway Research Institute: Barriers to climate adaptation at local and regional level |

4 Adaptation strategies, policies, plans, goals and actions to integrate adaptation into national policies and strategies

4.1 Implementation of adaptation actions in accordance with the global goal on adaptation

Since the release of Norway's 8th National Communication in December 2022, Norway has passed several milestones in its work related to climate change adaptation, the most important being the white paper presented by the government to the parliament in June 2023: «*A changing climate – united for a climate-resilient society*» (Meld. St. 26, 2022–2023). The parliament (Stortinget) adopted the white paper on January 16, 2024.

4.2 Adaptation goals, actions, objectives, undertakings, efforts, plans

The white paper presents Norway's national goal and priorities for climate change adaptation, as listed under chapter 3.1. It also contains a total of 70 measures to achieve these priorities across various sectors.

An important objective of the white paper is to establish a better governance system for national adaptation efforts, which will help ensure that climate considerations are routinely assessed and systematically implemented in all sectors, and that a more uniform and coordinated approach is taken to this work. The governance system therefore has a cyclical approach with procedures for developing national climate vulnerability analyses, updating climate change adaptation policy, reporting and regular evaluation of the efforts.

The white paper includes several measures to strengthen knowledge about climate change adaptation, including a system for climate vulnerability analysis every four years and an expert committee to obtain more knowledge about the socio-economic consequences of climate change.

4.3 How best available science, gender perspectives and indigenous, traditional and local knowledge are integrated into adaptation

The adaptation strategies and policies are striving to be based on best available science. One of the priority areas in the white paper is to safeguard Sami interests and use indigenous peoples' knowledge in climate change adaptation efforts.

The white paper on climate change adaptation also addresses consequences of climate change for social justice. It states that the government will obtain more knowledge about the potential impacts of climate change and climate change adaptation on social and gender inequality in different sectors in Norway.

4.4 Development priorities related to climate change adaptation and impacts

Norway's climate change-related support to developing countries is described in Norway's first BTR, chapter 4.

4.5 Plans leading to mitigation co-benefits

Nature-based solutions, as described in section 4.7, can contribute to both adaptation and mitigation. Robust and healthy ecosystems can, for example, contribute to temperature regulation and carbon sequestration.

4.6 Efforts to integrate climate change into development efforts, plans, policies and programming

The web-based information portal klimatilpasning.no was established in 2008. The portal supports the Norwegian society in preparing for the consequences of climate change. Local level practitioners are the main target group. The website provides tools and information on climate change adaptation from different sectors. An online tool supports municipalities and county municipalities in adhering to the central government planning guidelines on adaptation. The Norwegian Environment Agency develops and maintains the website on behalf of the sectoral authorities.

The Norwegian Environment Agency regularly organises seminars and webinars on adaptation with other stakeholders. Through webinars, the agency reaches local level practitioners across the country, as well as the County Governor, county municipalities, the national authorities, the private sector and research institutions.

A grant scheme to support regional and local authorities in their climate change adaptation work was established in 2015 by the Ministry of Climate and Environment and is administered by the Norwegian Environment Agency. Support is given to projects designed to strengthen the knowledge base on which municipalities build their climate change adaptation measures. Between 2015 and 2022, a total of approximately 45 million Norwegian kroner were distributed among about 140 different projects.

The Norwegian Water Resources and Energy Directorate (NVE) offers advisory, technical and financial support in the planning and construction of structural protection measures. A project archive contributes to sharing knowledge from completed projects that have been supported through the grant scheme. Between 2015 and 2022, NVE distributed a total of approximately 2,8 billion Norwegian kroner towards several structural protection measures against floods and landslides across the country.

4.7 Nature-based solutions to climate change adaptation

The white paper on climate change adaptation highlights the importance of nature-based solutions for climate change adaptation. Resilient and healthy ecosystems can provide important ecosystem services such as temperature regulation, flood mitigation, landslide prevention, protection of groundwater, protection of coastal areas from rising sea levels and erosion.

Nature-based solutions for climate change adaptation are increasingly employed. In recent years, many stream reopenings and watercourse measures have been implemented to limit damage from stormwater, flooding, erosion, and other consequences of climate change. Nature-based solutions are however still less used than more technical and 'grey' solutions. The lack of evaluations, effect analyses and long-term monitoring of implemented nature-based actions may be an obstacle to both public and private actors adopting such solutions. More knowledge about how well nature-based solutions work for different purposes is therefore needed to increase the adoption of nature-based solutions in climate change adaptation. Decision-makers and project developers also need better guidance and greater competence about both the benefits and limitations of nature-based solutions for climate change adaptation. The white paper from 2023 therefore states that the government will increase knowledge and develop relevant tools and guidance for the use of nature-based solutions in climate change adaptation. The white paper also states that the government will promote the use of nature-based solutions for flood and landslide protection wherever appropriate. Part of this is solved through joint Nordic cooperation in a four-year program on Nature-based solutions in the Nordic countries, which Norway has initiated.

The planning guidelines to promote climate change adaptation in local and regional planning (in Norwegian: «Statlige planretningslinjer for klima- og energiplanlegging og klimatilpasning»), includes guidelines on how to use nature-based solutions in climate change adaptation.

Nature-based solutions are also an important topic in two white papers from 2024. In a white paper on floods and landslides, the government announced that it will increase knowledge about the effects and costs of nature-based solutions for stormwater, floods, and landslides, consider a management model for forests that protect against natural damage, and consider various options for strengthening the compliance with the rules on buffer zones along watercourses. Nature-based solutions are also highlighted in the white paper from 2024 on biodiversity, where they are part of the global targets 8 and 11 form the Kunming-Montreal biodiversity framework, and the national contributions to these targets.[21]

[21] Regjeringen: Meld. St. 35 (2023–2024) (in Norwegian only)

4.8 Stakeholder involvement

As described under section 1.2, the municipal and county authorities have key tasks when it comes to adapting to climate change. They must take climate change into account in areas such as land-use planning, pollution, nature management and civil protection and emergency preparedness. The county governors provide advice and guidance on municipal planning and coordination of the work on civil protection and emergency preparedness. The Governor of Svalbard is the Government's highest representative on Svalbard. One of the Governor's tasks is to assess the impact of climate change, taking into account its consequences for the administration of Svalbard.

The business community and NGOs are important contributors and valuable partners for the authorities in their work on climate change adaptation, nationally, regionally and locally. The business sector plays an important role in developing technology and other solutions and making it attractive to invest in climate change adaptation. NGOs contribute, among other things, to ensuring that different groups and stakeholders' interests are safeguarded in the adaptation work, and are an important channel for engaging and mobilising people in the work. They also contribute operationally, including in emergency preparedness and by developing and disseminating knowledge. However, the Norwegian government does not have a systematic overview of these private initiatives.

5 Progress on implementation of adaptation

5.1 Implementation of the actions identified

The government is in the process of following up the white paper on climate change adaptation. The Ministry of Climate and Environment has the overall responsibility for following up on the report, and the other ministries are following up on the measures in their respective areas.

The following presents the status of the implementation of the priorities listed under section 3.1.

5.1.1 More knowledge about climate change and climate change adaptation

The Ministry of Climate and Environment has tasked the Norwegian Environment Agency with developing climate vulnerability analysis. It has also appointed an expert committee to obtain more knowledge about the socio-economic consequences of climate change for vulnerable sectors and regions, and identify priority areas where there is good potential to reduce climate-related risk, assessed in relation to the cost of actions. Both the climate vulnerability analysis and the expert committee will be concluded in 2026.

5.1.2 Planning as a tool in climate change adaptation

Land-use planning provides the framework for using and protecting land and is an important tool for adapting nature and society to a changing climate. As the local planning authority, the municipality is responsible for ensuring that land is managed and developed in a way that makes it resilient and adapted to the climate of the future. The Planning and Building Act and Regulations on technical requirements for construction works (TEK17) are pivotal to land-use plans and building development in the municipalities. The white paper on climate change adaptation states that the government will consider stipulating regulations in the Planning and Building Act, which specify the minimum to be emphasised in the risk and vulnerability analysis when preparing plans for development, including climate considerations and property of significance from a security perspective. The Ministry of Local Government and Regional Development and the Ministry of Justice and Public Security are in the process of developing a legislative proposal.

The white paper also states that the government will review the safety requirements against natural hazards in TEK17. A working group has been established with members from relevant agencies to examine, among other things, whether the safety requirements in TEK17 are at an appropriate level and how the requirements can better account for future climate changes. These requirements in TEK17 apply mainly to new construction works.

The Ministry of Local Government and Regional Development is also in the process of developing new guidelines for updating land-use plans where there is new knowledge about hazard areas.

5.1.3 Nature-based solutions and nature's contribution to climate change adaptation

As described in chapter 4.7 the government will provide more knowledge about nature-based solutions. This is followed up through participation in the Nordic Council of Ministers' four-year program (2021–2024) on nature-based solutions. Six projects map the use of nature-based solutions in the Nordic region, collect examples and experiences, and develop guidelines for best practices. Norway, through the Norwegian Environment Agency, leads the program and will utilize and disseminate this knowledge to municipalities and relevant stakeholders.

5.1.4 Better access to climate and geodata

As mentioned under chapter 2.3, The Norwegian Centre for Climate Services (NCCS) is developing the platform 'Klimakverna' to make climate and hydrological projections available. In addition, the Norwegian Mapping Authority is working to improve the quality of the Norwegian Public Base of Geospatial Data (DOK).

5.1.5 Managing urban stormwater

Increased precipitation leads to more frequent and intense stormwater events and more frequent damage to buildings and infrastructure, arable land and heritage sites. The damage recovery is cumbersome and costly. As a follow-up on the measures proposed in the Storm Water report presented in 2015 (NOU 2015: 16), the Government has made changes in the Planning and Building Act regarding regulation for stormwater. The planning and building authorities in the municipalities have been given legal authority to demand that building owners carry out measures to deal with stormwater, both for new constructions and on properties that have been fully or partially developed. The Government is also considering changes in the Pollution Act and associated regulations, as well as pros and cons of a separate stormwater fee to fund stormwater measures.

5.1.6 Addressing rising sea levels

As a coastal nation, Norway is particularly vulnerable to sea level rise and storm surges. Natural assets, agricultural land, infrastructure, buildings and the cultural environment along the coast will be among the areas affected.

A long-term perspective is required when planning measures along the coast, and this complex challenge requires a good cooperation between state authorities. The Norwegian Environment Agency has therefore been tasked with considering how the authorities' efforts to address rising sea levels can be improved. In April 2024, the Norwegian Environment Agency released the report «*Sea Level Rise and Extremes in Norway*» which describes how the sea is expected to rise along the Norwegian coast towards the middle and end of this century and further towards the year 2300.[22] Based on this report, The Norwegian Directorate for Civil Protection (DSB)

[22] Sea-Level Rise and Extremes in Norway – miljodirektoratet.no

has updated their advice and recommendations on how municipalities should take sea level rise into account in their spatial planning.[23]

5.1.7 Food security in a changing climate

Climate change has consequences for food production both in Norway and globally. Major fluctuations in global food production could contribute to conflicts, which may in turn challenge food security, including for parts of the Norwegian population. New geopolitical challenges exacerbate the situation.

Food production must be adapted to prevent damage caused by climate change, but also to take advantage of the opportunities that the changes may entail. Climate change induced variations are given increased emphasis in scientific advice and management. The government is working to continue the three pillars of Norwegian food security: maintaining the production base, continuous production of food and well-functioning trade systems. This is happening through policy development and in following-up on the Soil Conservation Strategy.

5.1.8 Safeguard Sami interests and use indigenous peoples' knowledge in climate change adaptation efforts

One of the priority areas in the white paper on climate change adaptation is to safeguard Sami interests and use indigenous peoples' knowledge in climate change adaptation efforts. The Saami Council and the Sámi Parliament have published the report *Climate Change in Sápmi – an overview and a Path Forward.* The report shows that climate change is resulting in complex cascading impacts and challenges for Sápmi, and have major consequences for Sami culture and business activity.[24] The Government will obtain more knowledge about how climate change affects Sami culture and business activity, traditions, way of life and health.

Through the Constitution, the Norwegian authorities are obliged to ensure that the Sami people can preserve and develop their language, culture and way of life. In addition to statutory consultations, the Government will also involve the Sami Parliament and the Norwegian Reindeer Herders' Association in climate change adaptation work, where relevant. The Government will also include indigenous knowledge/árbediehtu in its climate change adaptation work, including its work on national climate vulnerability analyses.

The working group on climate adaptation in reindeer husbandry was established under the reindeer husbandry agreement, with representatives appointed by the Norwegian Reindeer Herders' Association and the state. According to the mandate, the working group is to assess how traditional knowledge can be incorporated as a basis in climate adaptation efforts. The working group delivered its report in December 2023. The recommendations from the working group are being followed up by the parties to the reindeer husbandry agreement.

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[23] Havnivåstigning og høye vannstander | Direktoratet for samfunnssikkerhet og beredskap

[24] Climate Change in Sápmi an overview and a Path Forward

5.1.9 Nature and cultural environment

The government has recently put forward a white paper on biodiversity Meld. St. 35 (2023–2024) *Bærekraftig bruk og bevaring av natur – Norsk handlingsplan for naturmangfold.* The White paper is the Norwegian National Biodiversity Strategy and Action Plan (NBSAP) and shows how Norway will contribute to the global targets for biodiversity under the Kunming-Montreal Global biodiversity Framework of CBD (Convention on biodiversity). Many of the proposals and national targets will contribute to stabilize or improve the ecological conditions and integrity of the ecosystems, and thereby their resilience to climate change, and their ability to contribute towards mitigation.

Cultural environments are among other things exposed to damage from events such as floods, landslides, heatwaves, droughts, and storm surges due to increased temperatures, higher humidity, and more precipitation. The Directorate for Cultural Heritage follows up on the Directorate's climate strategy for cultural heritage management (2021–2030). This contributes to the government's ambition to help prevent and reduce the loss of and damage to cultural environments as a result of climate change. Important activities include mapping of risks, measures and development of guidance for land use planning and building management.

5.1.10 National security, civil protection and emergency preparedness,

Climate change affects civil protection in a number of ways. The increased intensity and frequency of extreme weather increases the risk of serious natural events and can threaten life and health, material assets and critical infrastructure.

Climate change will affect several critical social functions, as well as essential national functions. The government is working on a comprehensive preparedness report that it plans to present to the parliament in the autumn of 2024.

Norway has a new tool to alert the population via mobile phones. With Emergency Alert, Norwegian authorities can send warnings and information directly to the public's mobile phones in acute and serious situations where there is a danger to life and health. The goal of Emergency Alert is to quickly reach the population with important information that can save lives and health in acute and serious incidents, such as events with radioactive releases, severe terrorism, or other accident and disaster situations.

5.1.11 Floods and landslides

The Ministry of Energy presented a white paper on floods and landslides in 2024.[25] The white paper covers all phases of work related to floods and landslides – from prevention, through crisis management during an extreme event, to the phase after an event. Prevention includes both physical measures to reduce risks from natural hazards and measures such as mapping, spatial planning, monitoring, and early warning systems. The government will strengthen its efforts in the prevention of risks from floods and landslides, to increase the safety of its citizens.

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[25] Sterkare førebygging av flaum og skred – regjeringen.no (in Norwegian only)

5.1.12 Forest fire

The Ministry of Justice and Public Security recently presented a white paper on fire and rescue service.[26] The Government will ensure that there is sufficient forest fire preparedness with forest fire helicopters with commander support and effective forest fire surveillance. The Government will promote Nordic, European and international cooperation on handling large forest fires.

5.1.13 Buildings, infrastructure and transport

The effects of climate change are causing increased risk on buildings, infrastructure and transport. To ensure safe infrastructure, climate change adaptation must form an integral part of the planning, construction, operation and maintenance of the infrastructure. For example, climate change must be taken into account in the location of roads and railways and when dimensioning culverts, manholes and ditches so that they can cope with increased amounts of water. Furthermore, climate change causes more frequent damage to infrastructure with subsequent repair needs and costs. Climate change may also increase the need to maintain infrastructure that is outdated, undersized or in poor condition.

The Ministry of Transport included consideration for climate change adaptation in the National Transport Plan (NTP) 2025–2036. The plan serves as a tool for coordination, investigation, management and prioritisation, and is normally rolled out every four years. During the planning period in NTP, the Government will base its prioritisation of resources on the following:

– we shall preserve existing transport infrastructure,
– we shall improve transport infrastructure where possible and better utilise the capacity of the existing infrastructure and transport services,
– we shall construct new infrastructure when necessary.

The Government's prioritisation of operation and maintenance is a crucial step toward adapting transport infrastructure to a changing climate.

The government will review the safety requirements against natural hazards in Regulations on technical requirements for construction works. These requirements apply mainly to new construction works.

5.1.14 Agriculture, forestry, fisheries and aquaculture

The agricultural sector must be equipped to ensure the necessary production and climate change adaptation, while reducing its environmental impact. The Government is working on climate change adaptation measures and climate-resilient farming methods that can contribute to achieving agricultural policy goals and the national target for climate change adaptation, and safeguard other social interests. The government is also planning to prepare a mandate and appoint a broadly composed working group with members from research, industry and the public administration to review climate change adaptation in agriculture.

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[26] Meld. St. 16 (2023–2024) – regjeringen.no (in Norwegian only)

More knowledge is needed about the impact of climate change on fisheries and aquaculture, as well as the measures required to address these consequences. The government has taken several initiatives to increase knowledge about the observed and future impacts of climate change on the ocean and marine stocks.

Adaptation measures in forestry pose particular challenges due to the forest's long rotation period. The trees planted today must withstand the climate in 70–100 years, while at the same time being adapted to today's climate. The Government work with several forest management measures that make forests more resilient to climate change and prevent forest damage.

5.1.15 Business and industry

By exploiting the market opportunities that emerge in a changing climate, the business sector can contribute to better and more affordable adaptation in other sectors while maintaining or increasing its value creation. The Government is working to achieve good overall framework conditions for value creation, innovation and restructuring that enable companies to implement adaptation measures, change business practice in line with changed conditions and exploit the opportunities that climate change presents.

5.1.16 Health

Heatwaves, droughts, forest fires, extreme weather, reduced access to food and clean drinking water and changes in insect-borne diseases are examples of how climate change can impact health and health systems.[27]

In Report No 15 to the Storting (2022–2023) Folkehelsemeldinga – Nasjonal strategi for utjamning av sociale helseforskjellar ('Public Health Report – National Strategy for reducing social inequalities in health' – in Norwegian only)[28], the Government emphasises the connection between climate change and public health. The Norwegian Public Health Institute has started a work to assess how climate change may affect morbidity and mortality in Norway.

5.1.17 Foreign, defence and security policy

In the new long-term plan for the defence sector for the period 2025–2036, cf. the Storting's consideration of Recommendation 426 S (2023–2024) (to Proposition 87 S (2023–2024)), it is emphasized that climate change, technological development, and a more complex threat landscape are changing what is required to defend Norway. The defence sector must therefore adapt to a rapidly evolving world.

5.1.18 Aid and development cooperation

Norway's climate change-related support to developing countries is described in chapter 4 in Norway's first BTR.

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27 The 2022 report of the Lancet Countdown on health and climate change: health at the mercy of fossil fuels – The Lancet

28 Meld. St. 15 (2022–2023) – regjeringen.no (in Norwegian only)

5.2 Steps taken to formulate, implement, publish and update national and regional frameworks

In the white paper on climate change adaptation, the Government introduced procedures for updating the national climate change adaptation policy every four year, so that its efforts can be adjusted if new knowledge about risk and vulnerability or other relevant considerations so indicate. The Ministry of Climate and Environment will coordinate the work of updating policy. This work will be carried out in collaboration with the sector ministries, which are responsible for addressing climate change in their respective areas.

The Norwegian Directorate for Civil Protection (DSB) has started the development of a digital solution for better preparation of risk and vulnerability analyses (ROS analyses) for spatial planning (Digiros). This will help ensure that climate change considerations are taken into account in the municipalities.

5.3 Implementation of adaptation actions identified in current and past adaptation communications

Norway reported its first adaptation communication in 2021 and it reflected the chapter on climate change impact and adaption reported in Norway's 7th National Communication. Norway reported on climate change impact and adaption in its 8th National Communication in 2022. Norway's second adaptation communication reflects the chapter on adaptation in BTR1.

5.4 Implementation of adaptation actions identified in the adaptation component of NDCs, as applicable

This is not relevant for Norway.

5.5 Coordination activities and changes in regulations, policies and planning

The Ministry of Climate and Environment is responsible for coordinating the work on climate change adaptation within the Government. The responsible parties in the various ministries meet regularly to collaborate and coordinate the work.

The Norwegian Environment Agency coordinates an interagency group on climate change adaptation.

The Ministry of Local Government and Regional Development assigns tasks related to climate change adaptation to the counties, and coordinate these with the other ministries.

6 Monitoring and evaluation of adaptation actions and processes

6.1 Domestic systems to monitor and evaluate the implementation of adaptation actions

The Norwegian Climate and Environment Ministry is responsible for the overall reporting of the climate change policy in Norway, including reporting on adaptation progress. The national Climate Change Act commits the government to providing annual reports to the parliament on the status regarding adaptation. The government gives this account of the status of the work on climate change adaptation in the sectors, including reporting on how the plan for national climate change adaptation work is followed up, in the report climate status and plan.

As part of the governance system for climate change adaptation, the Norwegian Environment Agency is responsible for developing national climate change vulnerability analyses, in cooperation with relevant sector authorities and other actors. The analyses should be updated at least every four years, and the first analysis is expected to be completed by the end of 2026.

The climate change vulnerability analysis is intended to provide an overview of current knowledge about the consequences of a changing climate for society. The analysis should include risks that span national borders and areas of society. Interaction between climate-related risk and other social development drivers should also be addressed. In the first instance, national climate change vulnerability analyses should primarily focus on vulnerability at a more overarching level. However, the analysis may also include topics that impact individual sectors in particular and may be used as a starting point for sector-specific and thematically defined analyses.

6.2 The effectiveness and sustainability of adaptation actions

The government has appointed an expert committee to obtain more knowledge about the socio-economic consequences of climate change for vulnerable sectors and regions, and identify priority areas where there is good potential to reduce climate-related risk, assessed in relation to the cost of actions. The expert committee will provide information on effectiveness and sustainability of adaptation action.

7 Information related to averting, minimizing and addressing loss and damage associated with climate change impacts

The white paper on floods and landslides addresses averting, minimizing and addressing loss and damage related to flood and landslides. Good monitoring and warning as a preventive measure against flood and landslide damage will become increasingly important. NVE, in cooperation with, among others, the Norwegian Meteorological Institute and the Norwegian Public Roads Administration, is further developing the national alert service so that natural hazard warnings better match the risks and consequences of events and not just the likelihood of an event occurring.

The Ministry of Justice and Public Security is responsible for the natural disaster insurance scheme. It provides individuals with security if houses, homes, or other insured items are destroyed in natural disasters and is an important part of society's preparedness for natural disasters. Several actors have pointed out that the current incentives pose challenges and that the incentive models for prevention should be improved so that more profitable climate change adaptation actions are implemented. The Ministry of Justice and Public Security has sent a proposal for a new natural disaster insurance law for consultation. The goal is that the new law, together with new regulations on natural disaster insurance, will provide a good and updated regulatory framework.

8 Cooperation, good practices, experience and lessons learned

8.1 Efforts to share information, good practices, experience and lessons learned

13 urban municipalities are collaborating through «The front runner»-network, established in 2015 and coordinated by the Norwegian Environment Agency. The network develops knowledge on climate change adaptation at the local level and shares knowledge and competence among the participating cities through joint projects. The network was evaluated in 2019 after the first strategy period. A second strategy period of five years started in 2020.

An improved cross-sectoral cooperation has been established related to natural hazards, including climate change. Naturfareforum (translates to «The Natural Hazards Forum», albeit in Norwegian only) was established in 2016 as a follow-up of the collaboration initiated through the Research and Development (R&D) program «Naturfare, infrastruktur, flom og skred» (translates to «Natural hazards, infrastructures, floods and landslides» and abbreviated NIFS, albeit in Norwegian only). The aim is to improve cooperation between national, regional and local actors in managing natural hazards, including the impact of climate change. Naturfareforum works on identifying gaps and the potential for improvement related to the society's management of risk related to natural hazards, and initiate projects or working groups on cross-sectoral issues. The network is organised with a secretariat consisting of DSB, NVE, the Norwegian Public Roads Administration, and a steering committee where a number of directorates and other national level actors, as well as KS and the Norwegian Environment Agency, are represented.

Naturfareforum acts as the national platform for the global Sendai Framework for Disaster Risk Reduction. As part of the work on the Knowledge Bank, a platform for collating natural hazard information from all relevant sources, a new Section of the Civil Protection Act came into force on 1 May 2021. The legal provision authorises DSB to process confidential personal data on natural and water damage from insurance companies and make them available to municipalities and other relevant public bodies where this is necessary to prevent and reduce the consequences of undesirable incidents. In addition to the public authorities, organisations in both the private and voluntary sector make important contributions to the climate change adaptation work. The Norwegian Association of Local and Regional Authorities support municipalities and county authorities in their work and carry out various capacity building and support activities related to climate change adaptation, including networks.

8.2 Strengthening scientific research and knowledge

8.2.1 Strengthening scientific research and knowledge related to climate, including research and systematic observation and early warning systems, to inform climate services and decision-making

Increasing understanding of climate change and providing a foundation for successful climate change adaptation is highlighted in the white paper Meld. St. 4 (2018–2019) *Long-term plan for research and higher education* (2019–2028).

The Norwegian Climate Service Center has developed climate projections for Norway up to 2100 and county-specific climate profiles for all counties in the country. New data on extreme precipitation was released in March 2022. In 2021, work began on new climate projections for Norway based on the sixth assessment report from the UN's Intergovernmental Panel on Climate Change (IPCC). The new climate projections will be analyzed together with updated historical changes in a new Climate in Norway 2100 report, which is scheduled to be released in the fall of 2025.

8.2.2 Strengthening scientific research and knowledge related to vulnerability and adaptation

Several actors provide funding for knowledge development on climate change adaptation in Norway. Key actors are the Research Council of Norway and the EU Framework Programme for Research and Innovation, Horizon Europe. The Research Council invests in research and innovation through different portfolios. One of these portfolios deals specifically with climate and polar research, but research and innovation in the field of climate change are also included in several of the other portfolios. The sectoral principle for research entails that each ministry must have an overview of its research needs in the short and long term, and fund such research, both through the Research Council of Norway and other channels.

Adaptation to climate change is one of five EU missions towards 2030. Under the mission, researchers, civil society actors and citizens will jointly develop and test solutions for transformative adaptation to climate change.

The Ministry of Climate and Environment has tasked the Norwegian Environment Agency with developing climate vulnerability analysis, see more information under chapter 6.

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