

EXPLORING COMMON SOLUTIONS

ARCTIC ENVIRONMENT MINISTERS' MEETING

11–12 October 2018, Rovaniemi

FINLAND'S
CHAIRMANSHIP
2017–2019



Examples of National Best Practices

This document compiles the examples of national best practices the Chairmanship has received from the Arctic Council Member States. The Member States were instructed to explore best practices - type of solutions of high Arctic relevance for the Arctic environmental challenges with potential to be replicated in other Arctic States.

Examples of these best practices were received from Canada, Finland, Iceland, Norway, Russia, Sweden and U.S.

1. Climate change

Mitigation

Canada

- Building on the momentum of the Paris Agreement, leaders of Canada's federal, provincial and territorial governments adopted the Pan-Canadian Framework on Clean Growth and Climate Change in December 2016. A landmark achievement, the Pan-Canadian Framework is the first climate change plan in Canada's history to include joint and individual commitments by federal, provincial and territorial governments, and to have been developed in consultation with Indigenous Peoples, and with input from businesses, civil society, and Canadians from coast to coast to coast.
- The Pan-Canadian Framework outlines over fifty concrete measures to reduce carbon pollution, help us adapt and become more resilient to the impacts of a changing climate, foster clean technology solutions, and create good jobs that contribute to a stronger economy. These actions span across all sectors of the economy including electricity, built environment, industry, transportation, agriculture and forestry, and waste. The plan sets Canada on a path towards meeting or exceeding its 2030 target.

- Complementing the Pan-Canadian Framework, Canada released its Short Lived Climate Pollutants Strategy in 2017, which outlines a holistic approach to addressing SLCPs through five pillars of enhanced action, including domestic mitigation, science, international engagement, Government of Canada coordination, and collaboration with provinces and territories. Concrete actions under the SLCP Strategy and under the Pan-Canadian Framework on Clean Growth and Climate Change include regulations to reduce methane emissions in the oil and gas sector, and regulations to phase-down the use of hydrofluorocarbons.
- Several actions are targeted at reducing emissions in Canada's North. For example, the Government of Canada announced the creation of an Arctic Energy Fund of \$400 million over ten years (beginning in 2018-19) to address energy security in the Arctic that will include support for replacing old diesel generators with renewable and cleaner sources of energies. Further funds are also available to off-grid Indigenous and northern communities that rely on diesel and fossil fuels to implement renewable energy projects. Transitioning to cleaner energy sources will reduce black carbon emissions and achieve both health and climate benefits for communities.

Finland

- The Climate Act of 2015 provides a legal framework for the implementation of policy responses towards ambitious climate policy targets. For example, it makes the 2050 goal of at least 80% emission reductions legally binding. Several steering instruments, including the Parliamentary Roadmap for Emission Reductions for 2050, the recently updated National Energy and Climate Strategy to 2030, and the Medium-term Climate Policy Plan, guide the progress towards climate policy goals. Emission reduction targets to 2030 are set in line with the EU's 2030 package.
- Finland has pioneered carbon pricing for the past 30 years. In 1990, Finland became the first country in the world to use carbon tax as a climate policy tool. Finland has put a lot of emphasis on designing effective carbon pricing policies, and is committed to phasing out the use of coal for energy by 2029. The Government has recently agreed on measures to encourage early movers so that this could be achieved even earlier.
- Finland was one of the founding members of the Powering Past Coal Alliance, launched at the Bonn climate talks last November. The long-term goal is to become a carbon-neutral society. In line with the Mid-term Climate Policy Plan, carbon neutrality should be possible to achieve by 2045 in Finland by further strengthening the present climate policy.
- In the HINKU project, carbon-neutral municipalities aim for solutions that produce environmental, economic and social benefits. These municipalities are committed to

making every effort to reduce their greenhouse gas emissions by 80% between 2007 and 2030. Climate emissions are reduced by increasing the use of renewable energy and improving energy efficiency. The municipalities also encourage local enterprises and residents to climate action. For Arctic cooperation, the most relevant experiences will be gained from the municipality of Enontekiö in Lapland and Ii in North Ostrobothnia, which won the European Commission's RegionStars award in 2017.

- Many sectors in Finland have introduced clean air solutions to reduce the emissions of black carbon that accelerates climate change, both by companies and through guidance by policy instruments and public authorities. For example, energy efficiency in energy generation has been increased, and incineration processes improved, and emissions from transport have been reduced in both terrestrial and maritime transport and in industry. Key issues in terms of the Arctic include LNG projects (terminals, vessels, energy production) and on-site measurements to monitor the impact of emission reductions.
- European vehicle and non-road engine emission standards are among the most ambitious in the world. Finland has been and is implementing these standards according to the agreed timetable. Following the introduction of the emission limits and consequently diesel particulate filters, significant reductions in black carbon emissions are already taking place in the transport sector. This development is accelerated via financing programs to promote the use of low-emission technologies, alternative fuels as well as scrapping programs for old vehicles.
- Finland is currently drafting a comprehensive National Air Pollution Control Program as part of the National Emissions Ceilings Directive (NEC) of the European Union. Black carbon, among others, is also addressed in the program and many actions can be foreseen to target emission sources and sectors emitting black carbon.
- In Finland, determined efforts are being made to move towards a low-carbon built environment. In 2017, criteria were published for the procurement and design of low-carbon public buildings. The emergence of 'hybrid models' of heating with, for example, heat pumps and solar energy in single houses will reduce heating based on the use of oil and solid fuels and thereby contribute to both climate change mitigation and the reduction of black carbon emissions. Further development of wood building and increased use of wood has a significant role in improving the carbon balance. Wood used in building substitutes for unrenovable natural resources and sequesters carbon in the structures for a long time. Building is on the increase in many areas of the Arctic, which is why a development project on carbon-neutral Arctic building was launched in 2018. A steering system is being developed by which CO₂ emission limits will be set for buildings during the 2020s. Development work is done in active cooperation with Sweden and the European Commission.

- In broad areas and many fields in the Arctic there is potential to increase the use of low-emission and renewable energy and fuels. More extensive use of low-carbon and renewable fuels and propulsion systems is the key means to reduce emissions in all modes of transport. Development work and use of alternative fuels using biowaste has made rapid progress in Finland. To achieve significant emission reductions in maritime transport, heavy fuel oil needs to be replaced by other propulsion systems.
- Various means have been adopted in Finland to reduce emissions from transport. However, further measures are needed to be able to halve transport emissions by 2030 and achieve carbon-free transport by 2045. The best way to reduce emissions from road transport is by increasing the share of renewable fuels and improving the energy efficiency of transport systems and vehicles. The mobility habits of people can be influenced by the design of community structures and transport pricing. Support payments, changes to taxation, regulation, and promoting mass transportation and transport as a service are also needed. Technological advancement offers new opportunities for the introduction of sustainable means of mobility. Finland is among the leaders in introducing digital transport services (MaaS, Mobility as a Service). The network of electric vehicle charging stations to be developed in Finnish Lapland is highly important due to the long distances.
- In maritime transport emissions are reduced by improving the energy efficiency of vessels and using electricity-powered vessels especially for shorter distances. Finland has also developed a rotor sail that makes use of windpower, which enables to reduce the fuel consumption by several percentages. Digital solutions including those for route planning and optimising the logistics chain and vessel operation mean important opportunities for higher efficiency in maritime transport. Many Finnish companies develop and offer solutions based on digitalisation for maritime transport.
- Emissions from maritime transport can also be reduced through automation because this is expected to reduce fuel consumption. Finland is a trailblazer in developing maritime transport automation. The One Sea autonomous maritime ecosystem project launched in Finland in 2016 aims to create the world's first ecosystem of unmanned autonomous ships by 2025. As part of the project, the world's first freely accessible testing area for autonomous vessels was opened in Finland in 2017.

Iceland

- The Icelandic Government announced a new Climate Action Plan in September 2018, intended to boost efforts in cutting net emissions. The plan consists of 34 Government measures, ranging from an increase in reforestation to a ban on new registration of fossil fuel cars by 2030. The new measures are intended to help Iceland meet its Paris Agreement targets for 2030 and reach the government's ambitious aim to make Iceland carbon neutral

before 2040. The main emphasis of the new plan is on two measures: 1) to phase out fossil fuels in transport, and 2) to increase carbon sequestration in land use, by afforestation, revegetation and restoration of wetlands. Climate mitigation measures will get a substantial increase in funding – almost 7 billion Icelandic krónur in the period 2019-2023. A general carbon tax, already in place, will be gradually increased.

- Electricity and heating in Iceland are provided for 100% by renewable energy, hydro and geothermal. This is not only due to ample resources of renewable energy, but inter alia to government-supported systematic search for geothermal resources outside obvious geothermal fields. Iceland has for decades conducted a programme under the auspices of the UN University for students from developing countries and economies in transition to study the harnessing of geothermal energy. An expansion of the use of renewable energy in the Arctic would help communities to be self-sufficient for energy and send an important signal from communities that face more rapid climate change than most parts of the world.
- Land use, land use change and forestry (LULUCF) is an important aspect of climate mitigation in Iceland. Efforts are made to halt emissions from land, such as by reclaiming drained wetlands, and to increase carbon uptake, such as by afforestation and revegetation. Opportunities for climate mitigation exist throughout the Arctic, but are complex to assess and seize upon.

Norway

- Norwegian solutions that could be considered for replication are the policies for electrification of the transport sector, including sea transport, and the national expert committee established to assess climate related risks to Norway's economy, including to financial stability. With regard to meteorology, Norway's national Climate Service Centre would be an example of potential interest for replication.
- In June 2017, the Storting adopted a Climate Change Act which establishes by law Norway's emission reduction target for 2030 and 2050, see box 1. The act will have an overarching function in addition to existing environmental legislation. The Climate Change Act introduces a system of five-year reviews of Norway's climate targets, based on the same principle as the Paris Agreement. In addition the act introduces an annual reporting mechanism. The Government shall each year submit to the Parliament updated information on status and progress in achieving the climate targets under the law, and how Norway prepares for and adapts to climate change. Information on the expected effect of the proposed budget on greenhouse gas emissions and projections of emissions and removals are also compulsory elements of the annual reporting mechanism.

- Over 80 per cent of Norway's domestic emissions is subject to mandatory emissions trading (EUETS) or a tax on greenhouse gases, or both. CO2 taxes were introduced in 1991 as a step towards a cost-effective policy to limit emissions of greenhouse gases. The CO2 tax is now levied on about 60 per cent of total greenhouse gas emissions. The standard CO2 tax was NOK 450 per tonne in 2017 and was increased to 500 kroner per tonne in 2018. In its White Paper on the 2030 Climate Strategy the Government states that it will consider the introduction of a flat tax on all non-ETS emissions.
- A CO2 offshore tax regime was introduced in 1991. The tax regime includes emissions from burning of natural gas and oil and venting in the production phase on the Norwegian Continental Shelf. The CO2 tax on petroleum activities has been the most important instrument for reducing emissions in the petroleum sector to date, and the impact has been significant.
- Sea transport is an important source of greenhouse gas emissions in the Arctic. At the national level, Norway implements all relevant provisions of the IMO to limit or reduce emissions. In addition, Norway has promoted the introduction of battery-electric car ferries through public procurement as a climate measure. Development of more energy-efficient technologies for shipping is also enhanced through research and development programmes under the Research Council of Norway, Innovation Norway and Enova.
- Changes in the vehicle purchase tax towards a system that rewards vehicles with low CO2 emissions and penalizing vehicles with high emissions has contributed to reduced emissions from new cars. The White Paper on Climate Policy (Report no. 21 (2011-2012)) to the Norwegian Parliament adopted a target where the average emissions from new passenger cars in 2020 shall not exceed an average of 85 grams CO2/km. In the broad climate agreement the majority in the Norwegian Parliament took note of this goal. From January to November 2017, the average type-approved CO2 emission from new passenger cars sold has been about 83 grams CO2/km.
- In Norway, most Arctic residents live in urban areas. The government has increased its efforts to achieve the goal that the growth in passenger traffic in urban areas shall be met by public transport, cycling and walking. Mobility in urban areas has been improved through targeted investments, better public transport and future-oriented solutions. The nine largest urban areas either have urban environment agreements, urban growth agreements or a reward scheme for public transport, which all share the same common goal of zero growth in passenger traffic by car.
- The Climate and Energy Fund is a government fund. Capital, totaling about NOK 2.8 billion in 2018, is transferred to the fund each year. The state enterprise Enova manages the Climate and Energy Fund. From 2017, Enova's focus has been shifted more towards climate-related activities and innovation, in line with the new agreement for the period

2017–2020. Enova now puts greater emphasis on reducing emissions from the transport sector and other sectors, which are not part of the emissions trading system, and on innovative solutions adapted to a low-emission society.

- Reductions in GHGs and black carbon is promoted by stimulating the shift to alternative vehicle technologies and modes of transportation, and through transportation efficiency measures. Norway's strategy to ensure a rapid transition to electric mobility includes several efforts to improve charging infrastructure. The Norwegian Ministry for Transport and Communication is working on an updated plan of action for the provision of infrastructure for so called alternative fuels – which includes electricity and hydrogen. The Norwegian Government is working on a plan of action for making public transport fossil-free by 2025. The political target of fossil-free public transport was set in the political platform of the current government. The Norwegian government has launched its maritime strategy, whereas a key element is wider use of green fuels. A regulatory framework for public procurement entered into force January 2018. Both specific and general regulations. Particular requirements for emission is set out for vehicles, as well an obligation to
- Some cities like Oslo and Bergen already have exchange programs and give subsidies to residents who exchange their old wood stoves. Lately more cities take part in the exchange program and more money (Bergen funds 50 mill. NOK) has become available from the counties. Burn right campaigns are being organised all over the country in cooperation with the fire brigade. A best practice on environment for all public procurement policy.

Sweden

- Long-term climate framework. In June 2017, parties representing more than 80 percent of the Swedish Parliament together adopted a climate policy framework. The framework includes a climate act, the establishment of an expert climate policy council and new ambitious climate targets. Sweden is to have net zero emissions by 2045 at latest, and negative emissions thereafter. The framework is expected to create a stable and long-term policy environment, which is crucial for a successful green transition, e.g. by informing companies' investment plans.
- Carbon pricing. Carbon pricing including a tax on carbon has been at the centre of Swedish climate policy since 1991. Fuels are subject to both carbon and energy tax, which is indexed to take into consideration both the development of the consumer price index as well as gross domestic product (GDP), so as to ensure that the taxes effectiveness is not diminished.

- Broad engagement from stakeholders. All parts of society need to contribute to a green transition in order for us to reach the goals of the Paris Agreement. The Swedish Government has taken steps to engage a large number of actors. One example is the initiative Fossil free Sweden, through which companies in sectors such as cement, mining, forestry, steel and aviation have developed their own pathways to reach carbon neutrality. Another example is the Government’s climate investment programme “the Climate leap” which so far has granted support to 1900 climate projects throughout Sweden.
- System solutions. One Swedish success story is how the country has been able to switch from heating homes and buildings individually with fossil fuels, reducing greenhouse gas emissions in that sector by around 90 percent since 1990, to using biomass and expanding district heating. Notably waste-to-heat has been expanded in order to create heat, resulting in significant reduction of emissions from waste as well.
- Cooperation between actors for innovative solutions. Sweden’s largest steel producer, largest iron pellets producer and a large energy company have come together and, with support from Government, initiated the project “Hybrit” which aims to develop fossil-free steel by replacing coking coal, traditionally needed for ore-based steel making, with hydrogen. The project is based in Luleå in northern Sweden, and takes advantage of the know-how and experience within industry and innovation which can be found in the Swedish Arctic.
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Adaptation

Canada

- Adaptation and climate resilience is one of the four pillars of the Pan-Canadian Framework. Initiatives under this pillar include the launch of an Indigenous Community-Based Climate Monitoring program to support Indigenous Peoples in developing climate impact monitoring projects and initiatives, and the development of a Northern Adaptation Strategy which will identify priorities for action on climate change in the North and set the stage for a new collaborative approach to addressing adaptation throughout the North. Additional federal actions include programs that support climate change adaptation initiatives, such as the community-led Climate Change Preparedness in the North program, and Climate Change and Health Adaptation for Northern First Nations and Inuit Communities program, and the Northern Transportation Adaptation Initiative.
- As part of the Government of Canada’s efforts to build climate resilience in the North, a Canadian Centre for Climate Services (CCCS) is being established to provide access to reliable, useful and timely climate data, information and tools to support adaptation

decision-making. Additionally, training, support, and user engagement will be provided to help ensure the uptake and consideration of climate data and information in decision-making. The CCCS will foster a collaborative approach to climate services via partnerships with Canadian regional climate organizations to shape and deliver services across the country.

- Canada also launched a \$2 billion Disaster Mitigation and Adaptation Fund, which will enable communities to better manage the risk associated with current and future natural hazards, like floods, droughts and wildfires.

Finland

- Climate and weather services are among Finland's strong fields of expertise. They are in many ways connected to the needs relating to climate change adaptation and risk management in the Arctic from the perspective of private individuals and businesses and activities and planning by the public authorities. Forecasts concerning the Arctic can be further improved through cooperation between countries. In addition, Finland has strong expertise in forecasting and observing ice conditions and operating in various kinds of ice situations, including those relating to the prevention of ice and slush ice flood risks and oil spills.
- The methods used in Finland to manage flood risks are of very high international standard. They are comprised of hydrometeorological modelling and monitoring of factors affecting the flood risk, flood forecasts, weather services, water situation and flood warning services, risk assessment, preparedness, cooperation between authorities in flood prevention, and rescue operations and flood communication. The Flood Centre is a joint service of the Finnish Environment Institute and Finnish Meteorological Institute that is responsible for water situation and flood warning services and their development together with the Centres for Economic Development, Transport and the Environment and Emergency Response Centres. In determining the flood situation, wide use is made of remote sensing and other advanced technologies, especially in the Arctic. Warnings by the Flood Centre are important for timely flood prevention and cooperation between the authorities required for this. The Finnish-Swedish Transboundary River Commission has an important role in launching and maintaining cooperation between the public authorities of the two states, and through this such cooperation extends across the national borders.
- Transboundary cooperation is a key issue in risk management in the Arctic. The Finnish-Swedish Transboundary River Commission established by the Agreement between Finland and Sweden Concerning Transboundary Rivers promotes cooperation between the countries in water issues and develops environmental cooperation in the transboundary river area. The Commission has an important role in initiating and maintaining cooperation

between public authorities of the two states. Environmental issues are high on the agenda in the work of the Finnish-Norwegian Transboundary Water Commission as well. The regulation of Lake Inarijärvi includes collaborative efforts by three states (Finland, Russia and Norway) aimed, on the one hand, to reduce the adverse impacts of the regulation on the natural environment in both Lake Inarijärvi and the River Paatsjoki and, on the other, to act in a way that promotes climate change adaptation. Transboundary cooperation contributes to the preservation of biodiversity and preventing pollution in the frontier water areas.

- Finland's conservation area network has been developed to protect biodiversity and its adaptation to the changing conditions. The connected, statutory network of nature conservation areas and sections of the comprehensive and diverse ecological network in state-owned lands established by decisions of Metsähallitus (a state enterprise administering state-owned lands and waters) are highly efficient in preserving biodiversity and species transition. The most functional and connected part of Finland's nature conservation area network is in northern Lapland. The network of ecological connections is composed of statutory nature conservation areas, areas protected on a voluntary basis and nature, landscape, recreation and game animal sites in areas used for forestry. Connected networks of nature conservation areas enable the movement of species from one area to another, increase carbon sinks and carbon sequestration to the peat layer and growing stock, and improve the natural retention of flood waters and water purification in mire and wetland areas with a functioning water economy.
- Metsähallitus has developed a practical operating model and classification based on spatial data for the optimisation of carbon sequestration and storage in areas used for forestry purposes. Through this method, the most recent research information in support of climate change mitigation can be transferred to the forest compartment level and practical forestry operations.

Iceland

- In 2018 the Third Scientific Assessment of the Impact of Climate Change on Iceland was published, as mandated by the Ministry for the Environment and Natural Resources. The Assessment is not only a report on the occurring and likely impacts of climate change, but also carries suggestions for adaptation, such as on spatial planning and construction in response to increase in sea level and higher risk of flooding. One aspect that has been subject to a special study in Iceland is the impact of climate change on the harnessing of renewable energy, particularly on hydro.

Norway

- The Norwegian Government has appointed an expert commission to assess climate-related risk factors and their significance for the Norwegian economy, including financial stability. The commission will cover both risks to the economy from climate change and measures to counter it. The commission is asked to assess how national-level climate risk can be most effectively analysed and described. It is also asked to identify key global climate-related risk factors, and consider their importance for the Norwegian economy and financial stability. It will also consider a possible methodology for giving private and public entities, including financial institutions, a technical basis for analysing and managing climate risk in the best possible way. In its work, the commission shall take into account that the consequences of likely climate change and of the global community's efforts to counteract or adapt to such change may have different timeframes. The commission has been asked to deliver its recommendation to the Ministry of Finance by December 2018.
- The Norwegian portal for climate change adaptation (CCA) is intended to support the society in Norway in preparing for the consequences of climate change. The portal offers comprehensive information about ongoing work on climate change adaptation in Norway, lessons learned and relevant research, developments and publications. The major target group for the Norwegian Climate Adaptation web portal, re-launched on 2 May 2016, is planners and decision makers in Norway. The portal provides knowledge, guidance and sharing of experiences of climate change adaptation. An example database has been developed including various examples on how to work on climate change adaptation (CCA) particularly on local and regional level, for example how to consider CCA in planning processes and on how to carry out specific CCA measures like green/blue solutions.
<http://www.klimatilpasning.no/infosider/english/>
- The Norwegian Center for Climate Services (NCCS), provides decision makers in Norway with information relevant for climate adaptation. The NCCS is a collaboration between the Norwegian Meteorological Institute, the Norwegian Water Resources and Energy Directorate, Uni Research and the Bjerknes Centre for Climate Research. In 2017, the NCCS launched the report *Climate in Norway 2100 NCCS – a knowledge base for climate adaptation*. This report is a condensed English version of the Norwegian report "Klima i Norge 2100", published in 2015 to provide an updated scientific basis for climate adaptation in Norway. Projected climate change through the 21st century is described under various assumptions for future emissions of greenhouse gases. The NCCS are developing so-called climate profiles for Norway at the County level, describing the projected future regional climate changes from present towards the end of this century. A report covering Svalbard has also been produced by NCCS.

U.S./ National Oceanographic and Atmospheric Administration (NOAA):

- NOAA's National Weather Service (NWS) co-produces knowledge with Alaska Native TK holders to deliver meaningful weather forecast products and to strengthen the adaptive capacity of Arctic communities. For example, NWS Alaska Region and Alaska Native sea ice experts, in collaboration with additional U.S. government and academic scientists, produce weekly reports for the Sea Ice for Walrus Outlook (SIWO). From April through June, SIWO provides information on weather and sea ice conditions relevant to walrus in the northern Bering Sea and southern Chukchi Sea regions of Alaska as a resource for Alaska Native subsistence hunters, coastal communities, and others interested in sea ice and walrus.

Sweden

- About the Rossby Centre. The Rossby Centre at SMHI develops and applies climate models for research on climate and climate change. Research activities at the Rossby Centre focus on increasing understanding of relevant climate processes and their formulation in climate models aiming at improving knowledge about future climate change. The group works both with global models for addressing the full climate system and with more detailed high-resolution regional climate models used for regional and local applications. One regional foci of the group is the European and North-Atlantic sector as well as the Arctic, and the interaction between these areas. Notably, impact on the European climate from rapid climate change in the Arctic is one research topic addressed. The Rossby Centre, which was established in 1997, is an internationally renowned research group that is also a key provider of information and data resulting from their long-term climate simulations. This includes, high-resolution regional climate projections for future climate from the Rossby Centre currently has more than 3000 users, including climate scientists and others working with climate change and climate change impacts, from all over the world. As an example, regional climate model data from the Rossby Centre for Northern Scandinavia and the wider Arctic region has been used for studies on sea-ice, snow cover, mountain glaciers, reindeer herding and renewable energy.
- The Swedish National Knowledge Centre for Climate Change Adaptation. The Swedish National Knowledge Centre for Climate Change Adaptation provides tools and information to help society cope with a changing climate and link science, policy and practice, bringing together the decision makers, businesses, research providers and organisations. The Centre collects, develops and shares research, information from authorities and learning examples to facilitate sound decision making. The Centre was established in 2012 and is based at the Swedish Meteorological and Hydrological Institute, SMHI. The Swedish portal for climate change adaptation disseminates information and knowledge about adaptation from across society, and is run by the Network for Adaptation, which consists of several

Swedish authorities. The portal is intended to support society and citizens preparing for climate change consequences and offers comprehensive information and support within a number of areas. The portal in English is found at: <http://www.klimatanpassning.se/en>. One of the authorities that actively participate in the Network is the Sami Parliament of Sweden. The portal contains information about climate change and its effects in the Arctic region, as well as showcases examples of adaptation work here.

- The national strategy of adaptation to climate change. The national strategy of adaptation to climate change (NAS) was approved by the Government in March 2018. The strategy outlines mechanisms for coordination, monitoring, evaluation and review. As a result of the NAS an expert council on adaptation tasked with evaluating adaptation progress has been established at the Swedish Meteorological and Hydrological Institute (SMHI). The National Board on Planning, Building and Housing has also been given a formal responsibility to coordinate adaptation within physical planning. Furthermore an ordinance (SFS 2018:1428) has been approved which mandates 32 national authorities and the County Administrative Boards (CAB) to initiate, support and follow up on adaptation within their area of responsibility, including to develop action plans. The ordinance enters into force by 1 January 2019. The Government has also issued amendments to the Planning and Building Act proposed in NAS and approved by the Riksdag in June 2018. The changes in legislation require the municipalities to give their views in the master plan on the risk of damage to the built environment that may followed by climate-related risks, slides, erosion and floods. The municipalities will also give their views on how such risks can diminish or cease. The law changes also give municipalities the put demands on land permeability in the detailed planning rules.

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2. Biodiversity

Canada

- To achieve the goal of conserving 17% of terrestrial areas and inland waters, Canada initiated the Pathway to Target 1 program, working with a National Steering Committee from across all levels of government, an Indigenous Circle of Experts, a National Advisory Panel and a Local Government Advisory Group. This initiative will develop guidance for establishing and coordinating a network of terrestrial protected areas, Indigenous protected and conserved areas, and other conservation measures across Canada.
- Co-management and Indigenous Protected areas, especially as they could be implemented in the Canadian Arctic Region, have gained traction over the last few years in Canada and elsewhere as a means to reconcile Indigenous cultural and spiritual values with environmental management requirements. Indigenous protected areas are based on the

idea of a protected area explicitly designed to accommodate and support an Indigenous vision of a working landscape. This kind of designation has the potential to usher a broader, more meaningful set of northern benefits and bring definition to the idea of a conservation economy.

- With the spirit and practice of reconciliation, the modern-day land claim agreements, used in Canada since 1975, have greatly contributed to the relationships between Indigenous people and federal, provincial and territorial governments. These nationwide agreements have changed the way parks and protected areas are planned, established and managed in Canada.
 - An example of co-management is the Torngat Mountains National Park, home to the Torngat Mountains caribou herd, which is currently led by an all-Inuit Cooperative Management Board. The Board advises Parks Canada on the administration of the park where Indigenous knowledge works hand in hand with modern science.
 - Recently, Canada announced the protection of 110,000 square kilometres of ocean, through the protection of Tallurutiup Imanga, or Lancaster Sound, an arctic marine area of Nunavut, extremely rich in biodiversity and that has been used by Inuit since time immemorial.
 - An Indigenous protected area could be a model for partnership in the North Water Polynya (Pikialasorsuaq) to protect this fragile ecosystem that is central for Inuit hunting and harvesting, as recommended in the report of the Pikialasorsuaq Commission. Further discussions however need to take place between the Government of Canada and Inuit leaders to determine what mechanism would be the best fit for partnership in future management of the Pikialasorsuaq.
- Canada recognizes the importance of resilient Arctic aquatic and terrestrial ecosystems, and the need to ensure the conservation, protection, restoration and sustainable use of Arctic resources to support resilient ecosystems. To achieve this goal, Canada believes that it is of primary importance to support the long-term sustainability and monitoring of migratory birds, aquatic species and other transboundary species. Understanding the biodiversity found in the Arctic, and assessing the conservation status of those species is the primary step in achieving this goal. A clear picture of the state of Arctic biodiversity requires leveraging all knowledge systems available, including Indigenous knowledge.
 - One such community led effort, co-led by Environment and Climate Change Canada and the communities of Arviat and Coral Harbour, is pairing Inuit knowledge and scientific evaluation to sustainably co-manage abundant Arctic light geese. This project, which is part of the Arctic Migratory Birds Initiative under CAFF, is a concrete demonstration of the valuable results obtained when partnering Indigenous knowledge and scientific research and involving communities in designing management strategies.

Finland

- We have significantly contributed to the protection of the Northern nature in Finland. Almost 30 % of the County of Lapland is protected, and almost 40 % above the Arctic Circle. In Finland, the use of protected areas for recreation and tourism has increased. In addition to National parks and other protected areas, the forests outside these areas are widely used for recreation. We have legislation on everyman's right, which means that everyone in Finland has the right to enjoy outdoor pursuits regardless of who owns or occupies an area.
- Nature-based solutions in matters such as land use and water retention and the positive impacts of the nature conservation area network are the key instruments in Finland to protect the vulnerable Arctic nature, while also developing regional economies. Tourism has an important role in making nature protection measures more readily acceptable. Sustainable use of areas for tourism is a key issue when using nature conservation areas. Making use of the protected areas, which also benefits the regional economies through nature tourism, requires guidance and an adequate infrastructure, and its impacts need to be duly monitored. Work on this has been done in Finland on a long-term basis, which is a condition both for developing nature tourism and for managing any adverse side-effects it may have.
- Finland has engaged in cooperation with the Saami people based on the Akwé: Kon Guidelines under Article 8 of the UN Convention on Biological Diversity, especially in the context of the management plans of protected and wilderness areas located in the Saami Homeland.
- Finland's Invasive Alien Species Portal (<http://vieraslajit.fi/>) promotes the combatting and prevention of invasive alien species by providing information on the species, their adverse impacts, means to prevent and safely dispose of them, etc. Through the portal anyone can report observations of invasive alien species. The observations are compiled on a map to facilitate the monitoring and prevention measures that may be taken later on.

Iceland

- The National Park of Vatnajökull is the largest in Europe outside Russia, aiming to conserve wilderness areas comprising Iceland's largest glaciers and its surroundings and its vulnerable biota. The park's management structure aims to ensure the participation of local residents in decision-making. Efforts are made to ensure that traditional use of resources can continue and coexist with conservation efforts. The Vatnajökull National Park aims to teach visitors about climate change and its impact, inter alia by showcasing how the many outlet glaciers of the main ice cap have retreated in recent years and decades.

- A tourist boom in Iceland in recent years has been a double-edged sword for nature conservation and the conservation of biodiversity. On one hand it has vastly increased the value of Iceland's wilderness and natural wonders, as these are the main attraction for foreign tourists. On the other hand, increased traffic has increased stress on many natural habitats, and even contributed to degradation, such as damage to vegetation from off-road driving, and even hiking. This has led to efforts to improve management and facilities at heavily visited conservation areas and other sensitive areas. One concern is the effect of cruise ships and maritime tourism on birds at bird cliffs. The Arctic is likely to attract an increasing number of tourists, especially tourists keen to experience wilderness and little touched nature. This can be positive, as it increases awareness of the unique nature of the Arctic and can bring employment and income for Arctic communities. But it also poses challenges for local communities and nature conservation. A study of best practices in tourism in the Arctic can help organize it in a way that benefits conservation and local communities.
- National legislation on discharges of ballast water within the Icelandic pollution jurisdiction was enforced by regulation no. 515 the year 2010. The general rule is that ballast water must not be discharged within Iceland's pollution jurisdiction. Discharging ballast water, is however, authorised after it has been treated in accordance with requirements in Article 7 of Regulation no. 515/2010 i.e. the ballast water has been treated in accordance with Standard D1 (rinsing out) or D2 (cleaning) in the OSPAR guidelines and/or in the BWM agreement (international agreement about the control and the management of ballast water in ships and sediments in it). According to this either a cleaning system has to be on board the ship, a system approved by relevant authorities, or a rinsing out has taken place which ensures at least 95% volumetric exchange of water in all the ballast tanks in use. According to marine scientists, number of alien species in marine waters around Iceland are relatively low compared to many other regions. Most of them have probably been transported by ballast water. Rising sea temperatures make it possible for some species to survive and reproduce.

Norway

- The integrated management plans for the Barents Sea–Lofoten area and the Norwegian Sea are important tools for overall adaptation of the framework for activities in Arctic seas to changes in the climate, environmental conditions and patterns of activity. The management plans are contributing to an integrated, resilient management regime that incorporates climate change considerations. A range of measures to protect particularly valuable areas and reduce pressure on the environment and the risk of accidents and pollution have been adopted within the framework of the management plans, in response to the observed and expected increase in the level of activity in our northern seas.
- The MAREANO programme maps depth and topography, sediment composition, biodiversity, habitats and biotopes as well as pollution in the seabed in Norwegian offshore areas.

MAREANO improves the knowledge base for ecosystem based management by answering questions such as:

- How is the seascape of the Norwegian continental shelf?
 - What does the seabed consist of?
 - How is the biodiversity distributed on the seabed?
 - How are habitats and biotopes distributed on the seabed?
 - What is the relationship between the physical environment, biodiversity and biological resources?
 - How much contaminants are stored in the bottom sediments?
- The comprehensive protection regime and strict environmental rules set out in the Svalbard Environmental Protection Act and regulations under the Act are contributing to a high level of protection for species and ecosystems in the Norwegian High Arctic. The protected areas cover 65 % of Svalbards land area of the islands and 87 % of its territorial waters. The strong emphasis on conservation of intact ecosystems also make nature more resilient to the impacts of climate change. A number of measures have already been introduced in Svalbard in response to the decline in the extent of the sea ice, which has made some areas more accessible and exposed vulnerable species and habitats to more traffic and human activity. This includes prohibition for ships sailing within the protected areas of Svalbard from carrying heavy bunker oil.

Russia

- Realizing the inevitability of the ongoing climate change, Russia set the task to develop and implement a system of territorial regulation of nature management in the Russian Arctic in order to preserve its unique biological diversity and preserve the traditional way of life for the indigenous population. At the moment, documents have been prepared and are at different stages of agreement for the creation of new Protected Areas that will help solve these problems.
- Russia is the first country of the Arctic Council, which carried out such work and applied a systemic approach immediately for the whole water area of the Arctic seas (Russian part), as a single natural system, including the White Sea, Barents Sea, Kara Sea, Laptev Sea, East Siberian Sea, partially Chukchi Sea and Bering Sea. The survey covered an area of more than 600 million hectares (the area of the sea part is 400.61 million hectares). As a result, the allocated system includes 47 districts with a total area of 114.511.700 hectares (24.8% of the area of the Russian Arctic seas). These areas are very different in size and proposed protecting/limiting measures for the certain types of use.
- The allocation of a system of valuable marine biodiversity in the Russian Arctic (sea GAP-analysis) has been completed. The system includes not only water areas that require

marine protected areas creation, but also water areas where seasonal protecting/limiting measures for certain types of activities are necessary.

U.S./ National Oceanographic and Atmospheric Administration (NOAA):

- NOAA's National Marine Fisheries Service (NMFS) partners with Alaska Native Organizations (ANOs) to co-produce knowledge for environmental analyses. NMFS works closely with ANOs to ensure TK is included throughout the description of the baseline conditions and in the impacts analysis for each proposed project. It is important for projects to avoid impacting natural resources of particular value to ANOs, such as by avoiding acoustic impacts to marine mammals and seasonal or temporary concentrations of marine mammals and their prey.
- Invasive species: NOAA partners with Alaskan communities to monitor marine invasive species. For example, NMFS hosts community BioBlitz events, during which community members and scientists work together to identify and collect samples of local invasive species. NOAA also helped integrate community-based invasive species monitoring into the curriculum for Bering Sea Days, an annual week-long marine science education program developed by the Aleut Community of St. Paul Island Tribal Government and St. Paul School.

U.S. Department of Interior (DOI):

- DOI's Bureau of Ocean Energy Management (BOEM) Alaska Outer Continental Shelf Regional Office (AKOCSR) is committed to the co-production of knowledge and TK.* BOEM AKOCSR initiated the first cooperative agreement the Bureau has ever had with Alaska Native Tribes to document environmental anomalies by local citizen scientists with a special emphasis on Cook Inlet and the North Slope. BOEM also entered into a cooperative agreement with the Department of Wildlife Management of the North Slope Borough (the local government with jurisdiction over the North Slope region of Alaska, of which ~80% of the population is Iñupiat) to develop processes and methodologies and collect co-production of knowledge and TK as related to ocean sciences (near shore ecology, wave dynamics and storm surges). Both cooperative agreements are multi-year and are ongoing.

*Kendall, J.K. et al. 2017. Use of Traditional Knowledge by the United States Bureau of Ocean Energy Management to Support Resource Management, in *Czech Polar Reports* 7(2):151-163, ASSW 2017.

- DOI's U.S Fish and Wildlife Service (FWS): During the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska, Federal and state agencies recognized the vast TK of the Native community who could provide detailed information on conditions in the years prior to the spill. The Native community had knowledge of the historic population sizes and ranges of many

of the species injured by the spill as well as observations concerning the diet, behavior, and interrelationships of injured species. Optimal use of scientific data and TK while increasing the involvement of communities in oil spill restoration enhanced the success of the restoration effort.

- The FWS used both western scientific data and TK to justify listing the polar bear (*Ursus maritimus*) as a threatened species under the Endangered Species Act. Ecological knowledge provided by Chukotka, Inuit, and other indigenous coastal residents about polar bear habitat, density estimates and population numbers provided valuable data used in making the decision. The final listing rule stated that both traditional and contemporary indigenous knowledge recognized climate-related changes occurring in the Arctic, and these changes are negatively impacting polar bears.
- The FWS, as well as the State of Alaska Department of Fish and Game Subsistence Division, collect and use TK for research and monitoring fish populations under the Federal Subsistence Management Program. The FWS collects and catalogues TK observations through interviews with local resident experts on the ecology, harvest, and use of salmon and non-salmon fish species. This work also produces drainage basin (or watershed)-wide portraits of climate and environmental change, emphasizing those that are related to subsistence fisheries. Use of TK also contributes to local capacity building by utilizing a framework of community involvement in research.
- The U.S. FWS utilizes TK in management decisions for the international Porcupine Caribou herd. Data from observations of local users and elders about the caribou herd and ecosystems changes are provided to biologists and regulatory decision maker. The Arctic Borderlands Ecological Knowledge Co-op (ABEKC) brings together and uses both local and scientific knowledge to monitor and assess ecosystems changes in an area that covers the range of the Porcupine Caribou herd and adjacent coastal and marine areas in the Yukon, Northwest Territories and Alaska. While no management decisions or advocacy positions are taken, the role of the Borderlands Co-op is to develop and share information about ecosystems for decision makers to use. The Borderlands Co-op gathers TK annually from interviews conducted within the four communities of Arctic Village, Kaktovik, Fort Yukon and Venetie.
- The FWS Alaska Maritime National Wildlife Refuge partners with Alaska tribes at summer youth culture camps in Sand Point, Unalaska, and St. Paul Island. While elders teach traditional skills, including hunting, fishing, and game processing, refuge staff work alongside the elders to teach science lessons. For example, campers may learn to mend and use nets for fishing in the morning and spend the afternoon with refuge staff building underwater remotely-operated vehicles to view and learn about the marine environment of the region.

Sweden

- Wetlands. In Sweden wetlands have been drained for more than 200 years which have reduced the total wetland area with 2-3 million hectares. Therefor there is a great need of restoring them to revitalize them for climate mitigation and adaptation, for biodiversity, for water balance etc. During the last decade peatforming wetlands -mires has been restored in several protected areas by plugging ditches. During 2018 Sweden has allocated 69 million SEK to restore wetlands in Sweden. Thereby safeguarding biodiversity in areas being drained for agricultural and forestry purposes. Wetlands is not only an important part of the landscapes green infrastructure but are also acting as water reservoirs and are contributing to climate mitigation and adaptation, serving as buffer zones during flooding. Local communities and stakeholders can apply for funding and have done so. A plan for protecting the peatforming wetlands was established 1984 and since then a number of such wetlands (mires) has been protected on a yearly basis.
- Ecosystem services. Since 2014 the Swedish EPA have worked to make the value of ecosystem services more visible to assist decisionmakers at all levels to take these values into account in their decision-making. A survey among the target group for the communication measures has shown a considerable awareness raising.
- Nature protection. The 21 Swedish counties work to protect biodiversity by establishing nature reserves. The land owners are compensated for the loss of their land or the restrictions in the use of the land. During 2016-2018 an area of 178 square kilometers has been protected distributed among 523 bigger and smaller reserves. The cost for this work of protection has been 72 million SEK. The biggest areas are protected in Northern Sweden securing arctic fauna and flora. One example is Svanträskmyran in Västerbotten County, 1473 ha with mire, home to a large diversity of flowers and birds.
- Sweden has meet the target for SDG 14.5 with 13.6 percent of Swedish territorial water and EEZ is protected as MPAs. There is though still work to be done to establish an ecologically representative, well connected and effectively managed network of MPAs in Swedish waters. The Swedish Agency for Marine and Water Management (SwAM) therefor in June 2016 presented the National Action plan for marine protected areas in Sweden to reach such a network. Also in order to secure the management of the network SwAM delivered to the Government in May 2018, an assignment on the identification of further measures aimed at reaching conservation objectives in MPAs focusing on fisheries and also investigated the impact of bottom trawling primarily in MPAs and within the trawl boundary. SwAM was also asked to recommend measures to support coastal fisheries.
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3. Pollution prevention

Canada

- Marine litter and plastics are addressed in numerous international fora (e.g. G7, G20, OECD, and various bodies under the United Nations). Canada has adopted a number of commitments in this area including the G7 Action Plan to Combat Marine Litter, G20 Action Plan on Marine Litter, United Nations Sustainable Development Goals, and Clean Seas Campaign.
- A comprehensive and global approach is required to address this issue, and Canada is taking global leadership in the fight against marine litter and plastic waste. Canada has made oceans health and addressing plastic pollution a priority under its 2018 G7 Presidency. Canada is working with its G7 partners to reduce plastic waste and prevent its release into the environment. Work is underway to advance a G7 commitment to take action on plastics throughout their lifecycle and reduce marine litter through a G7 Plastics Charter.
- The Northern Contaminants Program (NCP) is a multidisciplinary initiative, funded by the Government of Canada, addressing health, science, and communications issues related to contaminants in Canada's Arctic. Understanding contaminants pathways and processes in the Arctic, as well as the effects that contaminants may have on wildlife means that research based on an interdisciplinary approach, including natural and social sciences, as well as community-based monitoring and traditional and Indigenous Knowledge, is essential. The NCP engages northern communities and scientists in researching and monitoring of long-range contaminants in the Canadian Arctic that are transported through atmospheric and oceanic processes from other parts of the world, and remain in the Arctic environment and build up in the food chain (POPs, mercury, and now microplastics). The NCP works closely with the Arctic Monitoring and Assessment Programme (AMAP) and other Arctic nations on collaborative research and monitoring activities and on the preparation of scientific assessments. One of the key aspects of the NCP is the effective involvement of local peoples and stakeholders and the incorporation of Indigenous knowledge in the research process. The NCP requires that all funded project be carried out in partnership with Northerners. Scientists are encouraged to work with community leaders, Elders, hunters and others to incorporate Indigenous knowledge into the design and conduct of the study.

Finland

- The city of Rovaniemi is one of the trailblazer municipalities participating in the Circwaste circular economy project of the Ministry of the Environment. This comprises the Arctic Circle Circular Economy Park project based on industrial symbioses for companies and operators in the circular economy and environmental business, and a project concerning a

sludge incineration plant. The circular economy is also included in land use and urban planning e.g. as part of the development of the university campus, as a commercial perspective relating to the service network survey, in the development of wooden city, and as an integral element of building for tourism. In 2018, Rovaniemi was awarded an official recognition of excellence in the contest that was concerned with the most interesting circular economy actions taken by municipalities. The city of Rovaniemi made a zoning plan for a campus area, which stipulates that all new buildings and additions must as a rule be made of wood. The dominant mode of mobility is walking, and in car parking due account is given to electric cars and bicycles and shared vehicles.

- In Kemi-Tornio industrial area industrial symbioses are developed where solutions are sought to utilise side-streams from industrial processes.
- In the Lapland University of Applied Sciences there is a project on biowaste as raw material.
- Finland's national nutrition recommendations and new information about the consumption of fish from the Baltic Sea are examples of the work done to reduce health hazards caused by pollution and enhance people's awareness of these issues. Nutrition recommendations are based on reliable and comprehensive information on the state of the environment to enable the assessment of risks and exposure. This is highly important also for many indigenous peoples in the Arctic.
- Risk management and minimising environmental damages are a key element in terms of the safety of maritime transport and Arctic expertise in preventing and combating environmental damages. In Finland, measures related to preparedness and combating environmental damages include comprehensive training and purchasing and introducing new equipment. There is strong expertise in these matters in both the public and private sector. The Finnish Environment Institute, Meritaito Ltd specialised in maritime engineering and their partners develop, compare and evaluate the effectiveness and environmental effects of different oil spill response methods in cold climate. They have designed a new smart buoy system that will deliver real-time data on oil in water. The goal is to provide a new and quick monitoring tool to be used in Arctic areas
- The SMEAR measurement station network is a system that measures diverse aspects of the transportation of pollutants and state of the environment.

Iceland

- Iceland has a programme to combat marine litter, both at the source and on coasts and the sea. Marine litter on coasts is cleaned and classified and analyzed in line with guidelines of the OSPAR Convention, in order to gain information on its sources. Support has been given

to the “Blue Army”, an NGO that has collected litter from coasts and the seabed, by volunteers and divers. This has not only resulted in cleaning up the areas involved, but helped increase awareness of the problem of marine litter and its scale. The Icelandic government has made a voluntary agreement with the Federation of Trade and Services to reduce the use of plastic in packaging et. al.

- A voluntary agreement has been in place since 2005 between the Icelandic Recycling Fund (Úrvinnslusjóður) and the Federation of Icelandic fishing Vessel Owners and Fish Processing Plants (SFS) on collection and recycling of fishing nets, based on a provision in legislation for industry to make such an agreement with IRF to insure collection and recycling of fishing nets. Today the recovery of fishing net is estimated to be 85%, most of it goes to recycling, both net and wires. Ropes are more difficult to recycle.
- Since 1989 Iceland has a deposit system on a national scale for a wide range of drinking containers. The deposit is on all ready-to-drink beverages, wine and liquor in bottles and cans made of plastic, aluminum and glass. The recycling rate today for drinking containers in Iceland is around 85%. The rate has dropped in the last few years due to the fact that many tourists are unfamiliar with the system.

Norway

- Combatting marine litter and micro plastics is high priority for the norwegian government. In 2014, Norway brought this issue to the global agenda in the United Nations Environment Assembly. In December last year, the countries of the world agreed on a zero vision for discharge of litter and micro plastics to the oceans.
- The Norwegian Environment Agency has identified key sources of marine litter and micro plastics in Norway. The largest sources is consumer products and waste from fisheries and aquaculture. The Agency has done a similar assessment for sources of micro plastics. This will be used to get robust national measures in place.
- The National Environment Agency is now working on a producer responsibility scheme for plastic products used by the aquaculture and fisheries. This means that producers and importers of fishing nets have to take care of them when they are discarded. It might also include a responsibility for design and clean-up of litter. Nine Norwegian harbours are part of "Fishing for Litter". This is a project where litter collected at sea can be returned for free. We are now considering a similar system nation-wide. The Norwegian Government also support efforts to improve waste facilities in harbours, and extensive beach clean-up efforts.
- Norway also have a system that ensures a high return rate of plastic bottles, through an environmental tax on bottles and drinking cans. Bottles and cans get a lower tax depending

on the return percentage. This gives the industry a good reason to establish return systems for bottles.

- In Norway, the municipalities are responsible for control and enforcement of legal requirements relating to local air quality. A number of measures have been implemented to improve local air quality. Examples of such measures include restrictions on the use of studded tires, speed reductions, road maintenance and the replacement of old, polluting stoves. Other examples are low emissions zones and time and environmentally differentiated road tolls. Traffic-reducing measures implemented to reduce greenhouse gas emissions, will also reduce local pollution levels.
- The Norwegian Government has had a led role in efforts to reduce long-range air pollution and use of hazardous chemicals through international agreements and EU directives. These include the Convention on Long-range Transboundary Air Pollution, the Minamata Convention, EU directive on emissions to air from large combustion plants, and the EU directive on national emission ceilings for certain pollutants. The work of the Arctic Council and AMAP has contributet substantially in this regard.

U.S. Environmental Protection Agency (EPA):

- National Pollutant Discharge Elimination System (NPDES) General Permits for Arctic Oil and Gas Exploration: EPA's Region 10 considered and applied TK to improve decision-making when developing permits under the Clean Water Act. Before developing the draft National Pollutant Discharge Elimination System (NPDES) general permit for exploration discharges in the Beaufort and Chukchi Seas of Alaska, EPA reached out to the Alaskan Native Villages of Point Lay, Barrow, Nuiqsut and Kaktovik after becoming aware of their interest in discussing TK. At the request of tribal governments on the North Slope, and with their explicit permission, EPA incorporated, where appropriate, Inupiat and local understanding of the Chukchi and Beaufort Seas into EPA's decision-making. Tribal members from the villages provided observations and comments about nearshore physical and biological habitats, marine resources, and subsistence use areas, and also shared their concerns about the potential effects of oil and gas related discharges to subsistence use areas. Region 10 evaluated and incorporated the communities' concerns, observations and TK information in developing the permits. After incorporation of the TK, the permit conditions included additional environmental monitoring requirements during four phases of drilling, limits on discharges during bowhead hunting activities in the Beaufort Sea, and other restrictions related to chemical use and discharge under certain ice conditions and water depths. Also, in response to tribal concerns about whale deflection (causing the whales to move away from their regular path and further away from hunters

and/or their regular feeding areas), EPA included a provision in the general permits to require monitoring for possible deflection of marine mammals during periods of discharge.

- Alaska Native Tribal Health Consortium (ANTHC) Local Environmental Observer (LEO) Network: The LEO project supports indigenous communities in Alaska to amplify and educate a vast network of agency and organizational entities across geographic regions on local priorities. Traditional and local knowledge perspectives bring an inherent observational evaluation to the forefront, rapidly identifying subtle changes in the environment based on a rich sense of place. The LEO App increases the capacity of indigenous communities to contribute timely observations of environmental change in the field through maps and photos, which are time stamped, geo-coded, and tagged by topic. These observations have created a database which today has over 2,000 posts contributed by over 2,500 members in 603 communities in Alaska and around the globe. Paired with satellite imagery, LEO has become a powerful tool in assessing long-range impacts such as wildfires and algal blooms that can affect food and water resources. The LEO Network is developing partnerships to further assess the implications of observed changes through a One Health lens. One Health participants include technical experts from state/territorial and federal agencies, academic institutions, and U.S. and Canadian tribal organizations on topics related to human, wildlife and ecological health. All of the meetings are recorded and available at the LEO Network website at: <https://www.leonetnetwork.org/en/leo/hubpage/ALASKA?show=one-health-group>.
- EPA also has improved the decision-making process as it relates to site assessment, characterization, and cleanup activities, to ensure the Agency is considering TK when tribes willingly provide this information to EPA. The consideration of TK offers a way of bridging gaps in perspective and understanding, especially when used in conjunction with knowledge derived from the scientific method.

Sweden

- Sound management of chemicals and waste
 - An example of ongoing holistic considerations is the strategic approach to international chemicals management - SAICM - and its “beyond 2020” process. It offers a unique opportunity to strengthen sound management of chemicals and waste in the long term and promote a sustainable development. Sweden is dedicated to set an ambitious new framework for chemicals and waste beyond 2020 which has the vision and potential to reduce the risk from hazardous chemicals and wastes. Sweden therefore recently launched a high ambition alliance in New York this summer (in July), with the aim to promote an ambitious deal on chemicals and waste.

- Swedish action plan for a toxic-free everyday environment: Extra resources have been invested since 2010 in a national action plan for a non-toxic everyday life. The action plan focuses specifically on reducing the exposure of children and young people to hazardous chemicals in our everyday environment. By protecting children, we also protect adults. The investment is an important step towards achieving our environmental quality goal of a non-toxic environment. The government's initiative has led to that our responsible agencies have been able to carry out a broad initiative on measures nationally, within the EU and globally. It has among other things included identifying and implementing measures to phase out and limit the most dangerous chemicals, strengthening the EU common legislation on hazardous substances and, in some cases, to develop national legislation when EU legislation does not provide adequate protection. The Swedish government has decided that the action plan will to continue till 2020.
- National Substitution Center: A national substitution center was established in 2017 with the ambition to intensify the work among companies and in public procurement to substitute hazardous substances with safer alternatives and thereby contribute to the development of sustainable chemical products, articles and non-chemical methods and techniques. The substitution center will serve as a support to SMEs as well as for larger companies, seeking information on alternatives to hazardous substances including identifying new technical solutions where longer-term research and development is required. Counseling, education and communication will be core parts of the activities.
- Platform for Sustainable Textiles and Fashion: The Swedish government has assigned the University of Borås to establish a Platform for Sustainable Textiles and Fashion. The Platform shall provide possibilities for further cooperation and collaboration with the aim to take further action to reach sustainability in the entire lifecycle of textiles. The platform should contribute to non-toxic and resource efficient material cycles.
- Action on Polychlorinated biphenyls (PCB): The use of PCB in open applications was banned in Sweden in 1973. In 1978 all new use of PCB was banned. The Swedish PCB ordinance took effect 2007 and was revised in 2010. According to the ordinance fluids containing more than 2 ppm PCB are considered to be PCB-products, which is lower than the limit value under current EU-legislation. PCB contaminated equipment has to be decontaminated immediately.
- To prevent illegal transport of waste a co-operation group on enforcement of transboundary shipment of waste has been established to actively prevent the illegal transport of hazardous waste. The group involves multiple regulators and law enforcement authorities and has developed an inspection plan and identified areas needing improvements.
- A deposit scheme for PET bottles was introduced already in the early 1990's, we have a ban and a fee on littering and we also have a regulation for minimizing the use of plastic

bags. Every year around 600 million PET bottles are sold in Sweden and we recycle between 73-92%.

- In June 2017 the Swedish government appointed a commission of inquiry with the mission to increase the knowledge about the negative environmental effects of the plastic and also decided a government commission on measures against littering of plastic.
- Marine plastic pollution
 - Combatting marine plastic pollution is a high priority for the Swedish government. A Government inquiry has been set up and environment authorities have been commissioned to identify possible measures going beyond EU legislation.
 - In a comprehensive effort to reduce this pollution, the government is spending approx. 10 million Euro per year until 2020 to, inter alia, cover municipalities' costs for clean-up, promote innovations to combat microplastic pollution and reduce discarded fishing gear. Sweden has also introduced a national ban on microplastics in rinse-off cosmetic products. The Swedish Chemical Agency is furthermore supporting the European Chemicals Agency in its investigation on EU-wide restriction on microplastic in all kinds of products.
 - Sweden actively supports the expert group process set up by UNEA resolution 3/7 process to examine response options for combatting marine plastic litter and microplastics from all sources, noting the conclusions of the report prepared by UNEA resolution 2/11 and the potential benefits of a new, strengthened and more holistic architecture for combatting marine plastic pollution. Another important process that Sweden actively engage in is the Basel Convention on transboundary movements of hazardous wastes.
 - The Swedish government has commissioned the Swedish National Road and Transport Research Institute (VTI) to develop and disseminate knowledge about the release of microplastic from the transport system. VTI is to develop and disseminate knowledge about microplastic emissions from the entire transport system. VTI will also identify and evaluate potentially effective instruments and measures that can limit emissions.
- Air pollution
 - Sweden has a long tradition of reducing air pollutants and has the ambition of being a role model on air quality. We have come a long way, but still additional initiatives are needed at both national and local level if Sweden is to be able to attain the air quality-related environmental objectives and meet its international undertakings. Sweden also needs to continue to work actively in an international context to reduce global air pollution and thus the in-bound transport of air pollution from other countries to Sweden.
 - A cohesive strategy for a Swedish clean air policy. In June 2016 the Cross-Party Committee on Environmental Objectives presented a proposal for a cohesive strategy for a Swedish

clean air policy. The purpose of the strategy is to tighten up Sweden's work on clean air. The seven political parties on the Committee, equivalent to almost 90 per cent of the votes in the Swedish Parliament, are completely united behind the proposals for a Swedish clean air strategy.

- The Government has decided on two new intermediate targets with associated instruments and measures.
 - 1) Limited emissions from road traffic in urban areas where the proportion of journeys undertaken by cyclists or pedestrians or passenger journeys on public transport is to be at least 25 per cent by 2025.
 - 2) Meet the emission undertakings of the National Emission Ceilings Directive in which emissions of nitrogen oxides, Sulphur dioxide, volatile organic compounds, ammonia and particles, PM2.5 are to correspond to the indicative targets for 2025 as shown in the revised National Emission Ceilings Directive.
- Synergies with climate policy. There are clear synergies between climate policy and clean air policy. One example is the bonus-malus system for cars, a legislation that concerns all new light weight vehicles that are sold after 1 July 2018 which means that diesel and petroleum cars will experience a significant tax raise, a three to four times higher tax than prior to the implementation. The money that are collected from the tax return are invested in bonuses for low emissions vehicles. Other measures that have synergies between climate and air quality are: urban environmental agreements (municipalities can apply for grants to cover part of the investment costs for public transport infrastructure), requirements of renewable fuels at filling stations, electrical bus premium, charge at home grant and eco-bonus system for heavy transport
- Low emission zones in cities. From earliest 2020 municipalities may choose to introduce environmental zones to improve air quality in cities.