Mr Chairman and distinguished guests,

Science builds the basis for the political response to environmental problems.

I am therefore very happy to have been invited to this conference that brings together researchers and policy-makers on Arctic issues from different countries. International cooperation is crucial.

In 2004 I had the opportunity to go by air across the Greenland Ice Sheet.

It made a great impression on me. I saw the melting ponds in the middle of the Greenland Ice Cap.

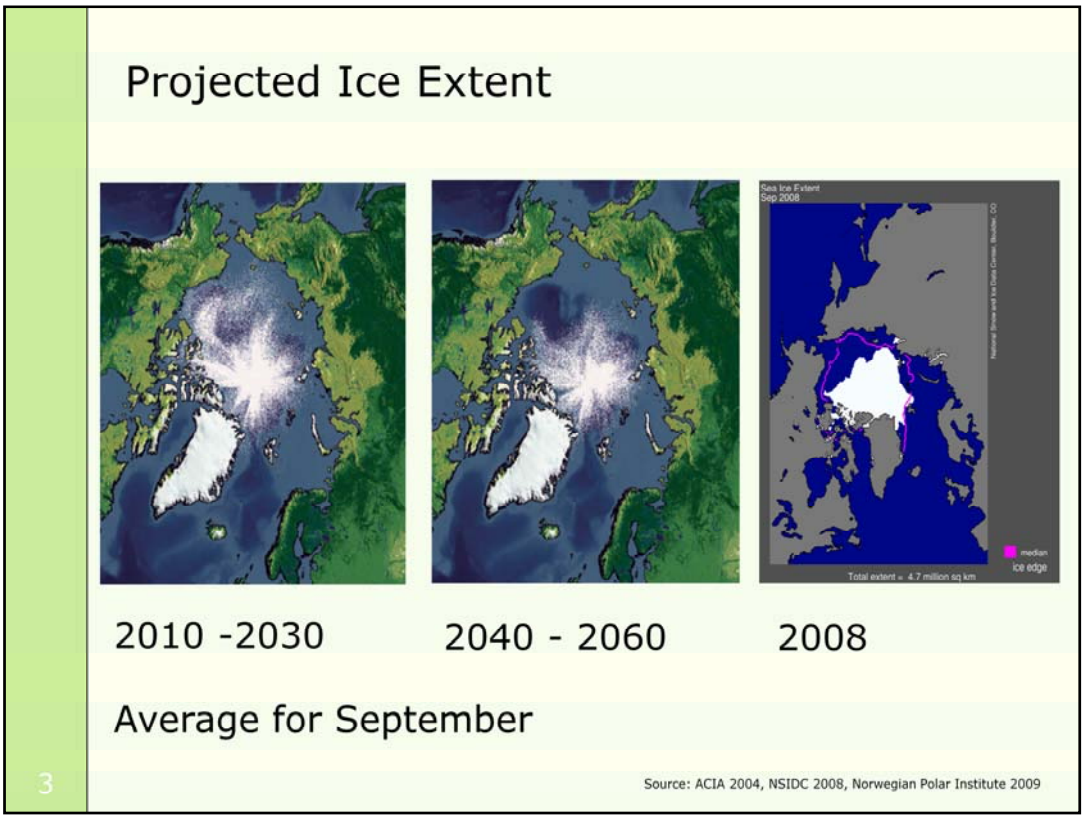
Knowing that the ice sheet at some places is more than 3000 meters thick, made me realize the power of climate change.

The reason why I went to Nuuk, was the presentation of the Arctic Council Impact Assessment on Climate Change.

The visit was very useful and I learnt a lot about melting of the Greenland Ice Sheet and its consequences.

However, the really dramatic changes have happened after my visit in 2004.

With a melt down of the Greenland Ice Sheet, the sea level is expected to rise 6-7 meters



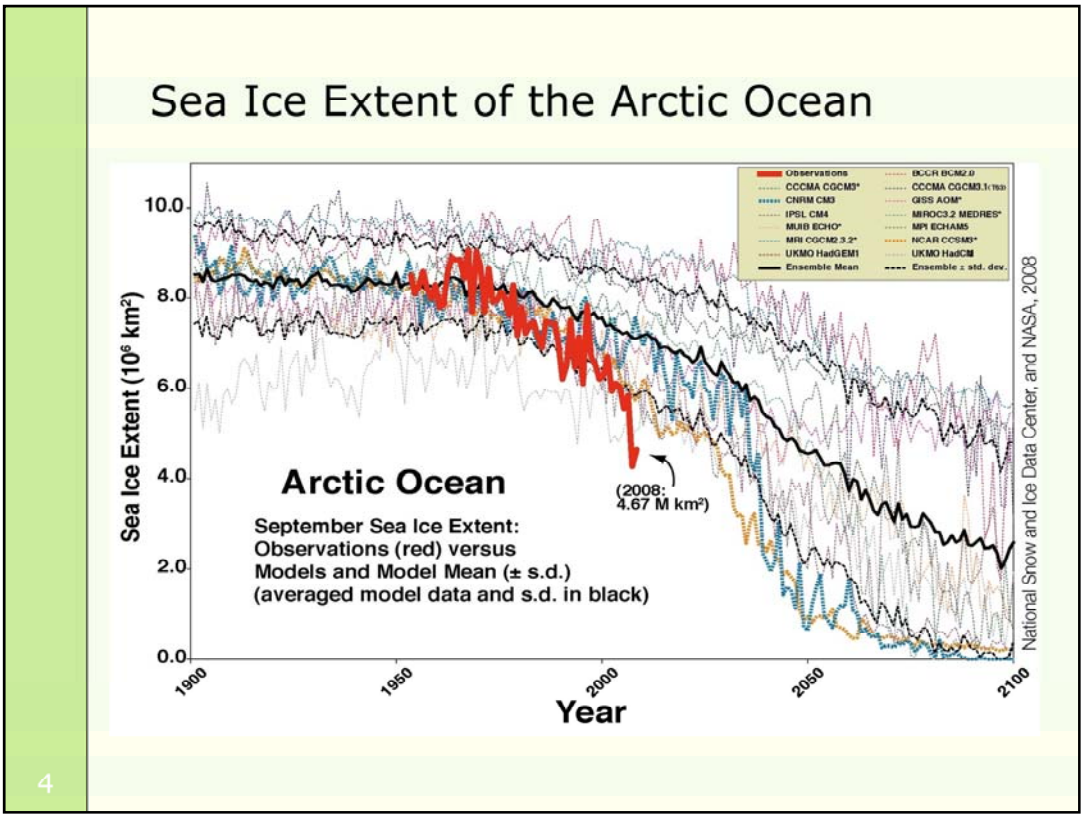
The ACIA-report was an eye-opener in 2004.

Since 2004, observations and new scientific findings indicate that the warming process in the Arctic Ocean is progressing much faster than the models have predicted.

In 2004 the Arctic Climate Impact Assessment predicted the changes in polar ice extent up to 2060 (at lowest level in September)

The 2007 sea ice extent was comparable to the ACIA-predictions for 2050.

In the summer of 2008, there was slightly more ice, but still very little compared to model predictions.



These curves illustrate the same development with regard to sea ice.

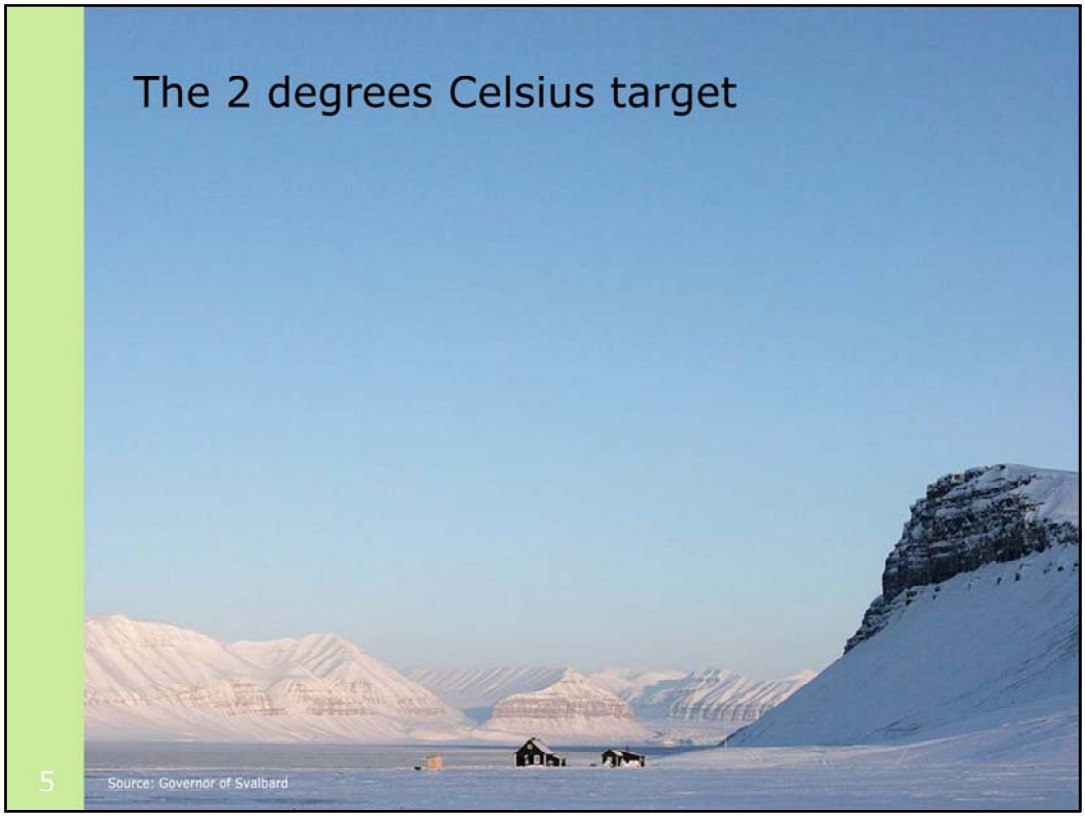
The scattered curves in the background are various model predictions. The thick black curve is the mean of these models. The red curve is the actual summer sea ice extent.

As you can see, the ice extent has dropped much faster than predicted by even the most pessimistic models. The scientists still don't fully understand the collapse of the polar sea ice we have seen since 2006.

Rapid loss of sea ice is likely to speed up the warming of the Arctic as well as the globe.

It could also trigger other processes, such as release of methane from melting permafrost and more rapid sea level rise from melting of the Greenland Ice Sheet.

So let's hope the slight growth in minimum extent, from 2007 to 2008, is a sign that this dramatic loss of sea ice will slow down.



To avoid dangerous climate change, including vicious cycles related to the Arctic climate system, it is imperative to limit global warming to 2 degrees Celsius above pre industrial levels.

I am old enough to have taken part in the discussions about whether the ”2 degrees Celsius target” is sufficient enough. We are not certain that this target is sufficient to avoid the Greenland Ice Sheet from melting.

The ”2 degrees Celsius target” will require at least:

- A peak in global greenhouse gases emissions by 2015
- Reductions in global emissions by 50-85% by 2050.

Achieving the ”2 degrees Celsius target” is very ambitious.

Together with the EU, Norway links the ”2 degrees Celsius target” to the negotiations for the climate conference in Copenhagen later this year.

On the front page of this magazine is says: ”We are all waiting for Obama”.

Today is the day when President Barack Obama is taking office. The new president faces a lot of expectations, not at least in the field of environment. We choose to be optimistic, what Obama has done so far is promising.

Obama was quick in appointing his environment administration, which is promising.

We hope the new US government will play a key role on the way to Copenhagen.

In the climate policy towards Copenhagen, Norway has four priority areas;

-Deforestation in the tropics

-Carbon capture and storage technology

-Shipping

-Impacts of a warming in the polar regions.

One priority area for Norway in the climate negotiations, is **deforestation and forest degradation**.

Emissions from deforestation in developing countries contribute to about 20 per cent of global greenhouse gas emissions.

To take early action, Norway is prepared to spend up to 3 million NOK a year (600 million dollars) to reduce emissions from deforestation in developing countries until these emissions are regulated in a post 2012 regime.

Measures to reduce deforestation will be essential to achieve the target of limiting the temperature rise to 2 degrees Celsius.

As a big exporter of oil and gas Norway has a responsibility to contribute to develop technology that makes us able to use fossil energy without huge emission of CO2.

Carbon capture and safe storage in industry and power generation has the potential of reducing emissions substantially.

It offers the potential to reduce CO_2 emissions by 85 to 95% from coal and gas fired power plants and safely store it underground.

Introduction of this technology at a global scale is therefore of great importance.

Shipping is another priority area for Norway in the climate negotiations.

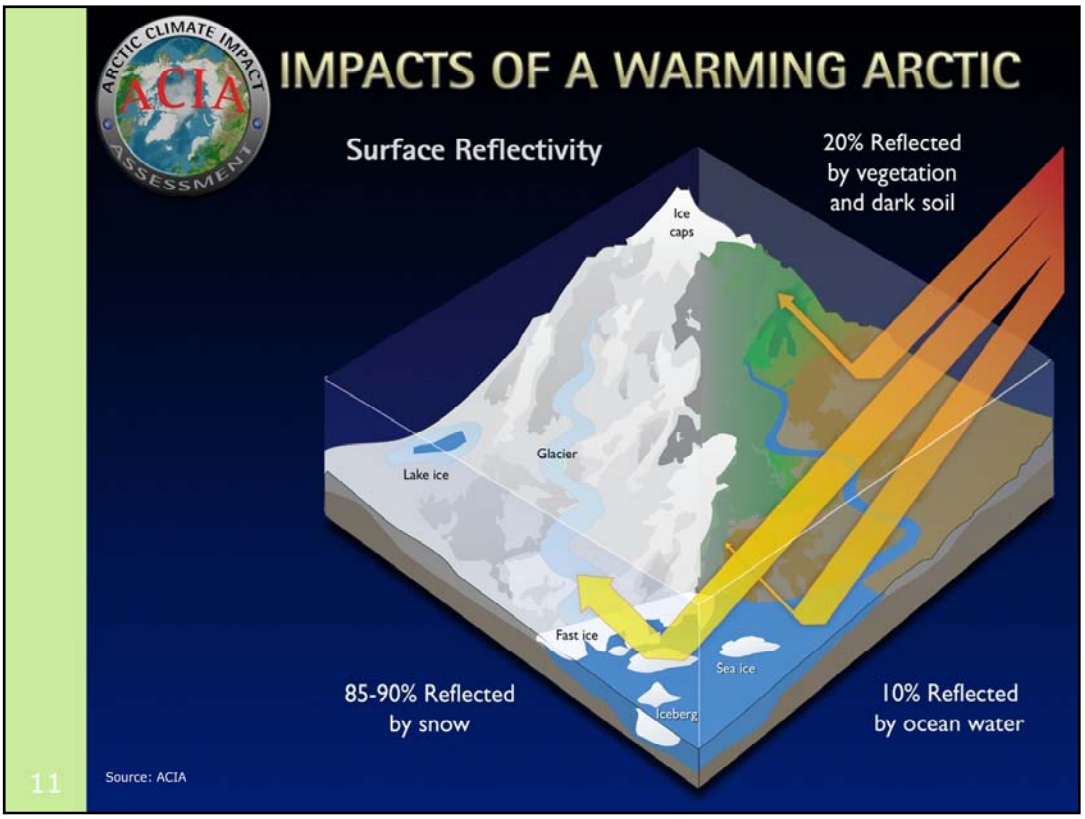
As the fifth largest shipping nation, Norway has a strong focus on cutting emissions from international shipping.

Emissions from international shipping must be regulated under the next climate protocol.

A last, but not least priority area for Norway in the climate negotiations, is a special focus on monitoring **the Arctic** and the consequences related to ice.

The effects of global warming are strongest and most visible in the Arctic. The IPCC tells us that the Arctic is warming at almost twice the global level.

Norway will therefore use the Arctic as a showcase to build awareness about the impacts of climate change, at a regional as well as a global level.

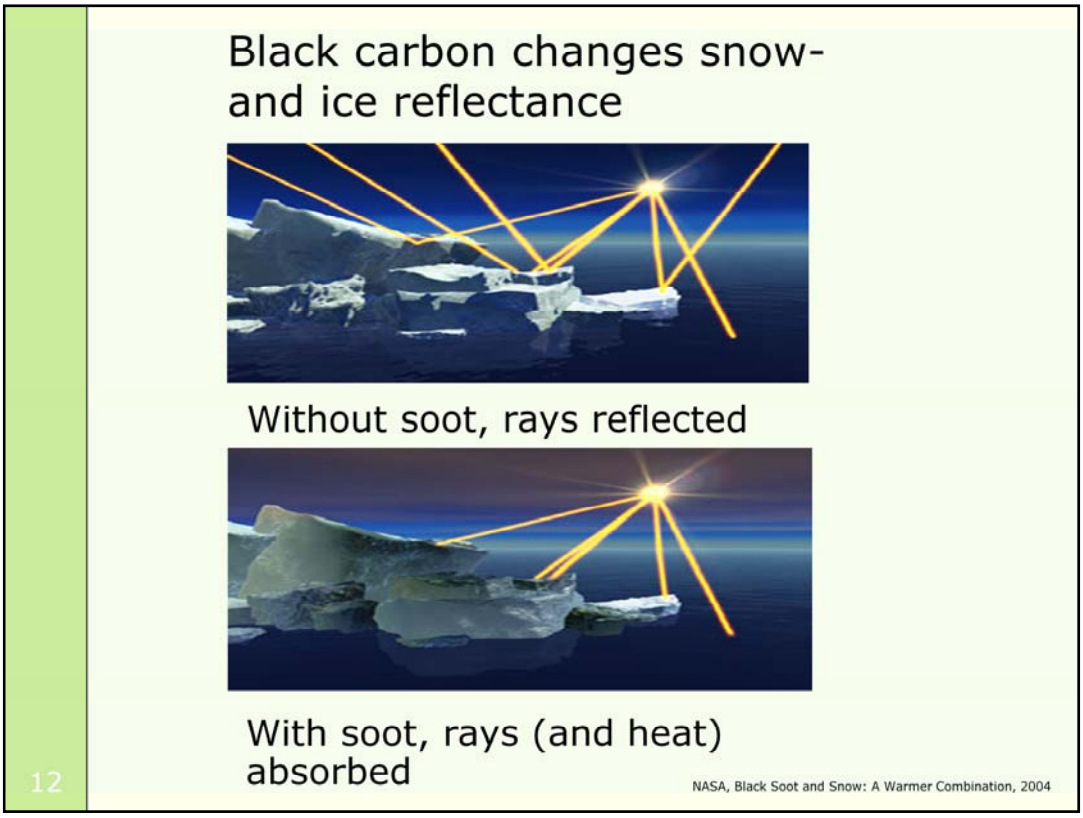


Albedo is the amount of sun energy which is reflected from a surface. The reflection from snow and ice is much higher than for open sea and for vegetation and soil.

This means that melting of snow and ice makes sea and land absorb more energy from the sun. This warms the land and sea of the Arctic, increasing the melting of ice and snow further.

And so it goes in a vicious cycle. This ”ice-albedo feedback” is an important reason why the Arctic warms much faster than the rest of the globe. This mechanism also contributes to increased global warming.

By amplifying the warming of the Arctic, this effect could also trigger irreversible melting of ice-sheets, such as on Greenland, and initiate other vicious cycles, such as the melting of permafrost and releases of methane.



New research indicate that black carbon, methane and other short-lived gases, have had nearly the same warming effect on the Arctic, as CO2 in the past century.

In a shorter time perspective of 1-2 decades, these pollutants may have a greater temperature impact on the Arctic than reductions in CO2 and other long lived gases.

Reducing these short lived pollutants may therefore be important to avoid a too rapid Arctic warming in the near term.

This should be done in addition to reducing CO2-emissions.

Thawing permafrost will change Arctic ecosystems on a large scale, and create problems for physical infrastructure. This is already happening many places in the Arctic.

Thawing permafrost will release methane to the atmosphere and accelerate global warming.

On a large scale, permafrost thawing changes ecosystems – for example, changing forest to wetland.

It has been estimated that 900 gigatons of carbon is stored in permafrost worldwide.

This large store would more than double the amount of carbon in the atmosphere today if released.

Temperatures in permafrost areas like Siberia, has increased 3 degrees C in 40 years.

Both thawing of permafrost and releases of methane are known to increase. Methane is a very strong climate driver.

Releases of methane from permafrost is another vicious cycle with potentially devating concequences for global climate change.

The ecosystems in the oceans will also be effected by climate change, and probably more than we thought a few years ago.

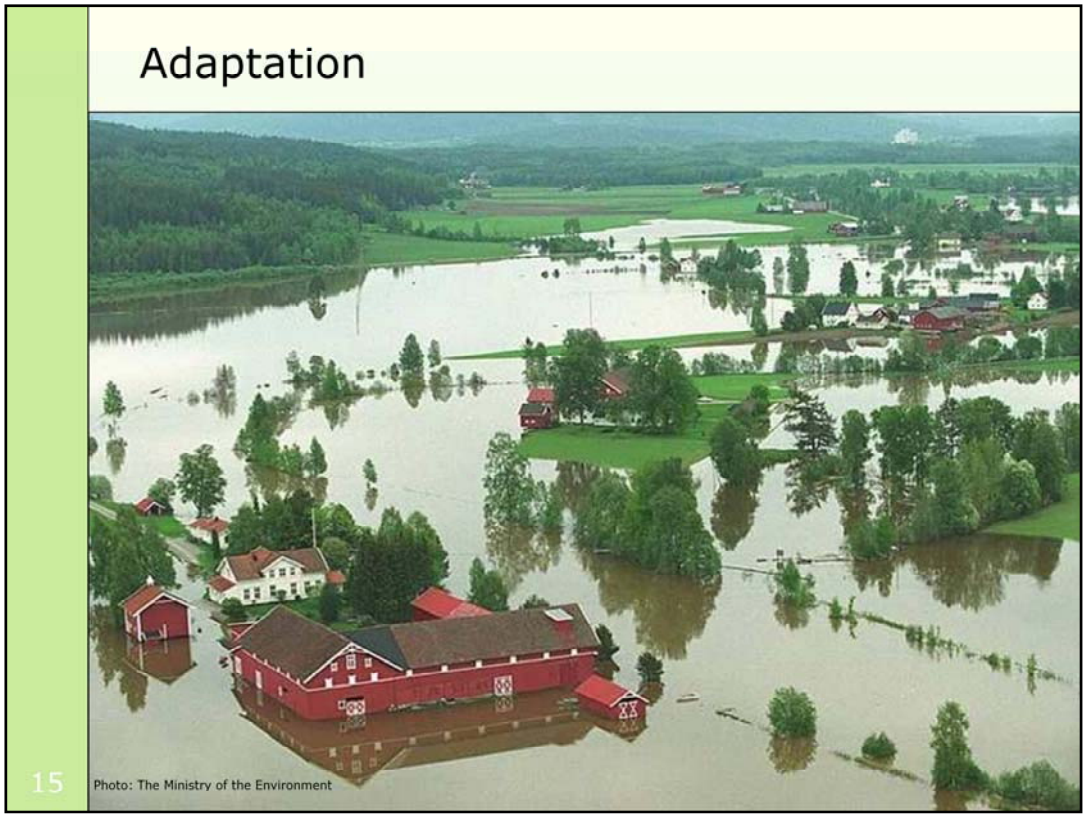
Approximately one third of the CO2 we release to the atmosphere, is absorbed by the sea. This is slowing down global warming.

CO2 becomes acid when solved in water. This means that the sea also becomes more acid.

This is bad news for all creatures which have an outer shell made of calcium-carbonate, which dissolves more easily the more acid the water becomes.

Effects of acidification are likely to occur first in oceans in the Arctic, since cold water absorbs more CO2. Effects are expected at all levels of the Arctic marine food chain, especially to plankton, fish eggs, coral reefs and herring.

Scientists tell us that before 2025, acidification will have adverse effects on the marine food chain.



Even if humanity stopped all emissions of greenhouse gases overnight - global warming would continue for several decades, due to the warming effect of what has already been released.

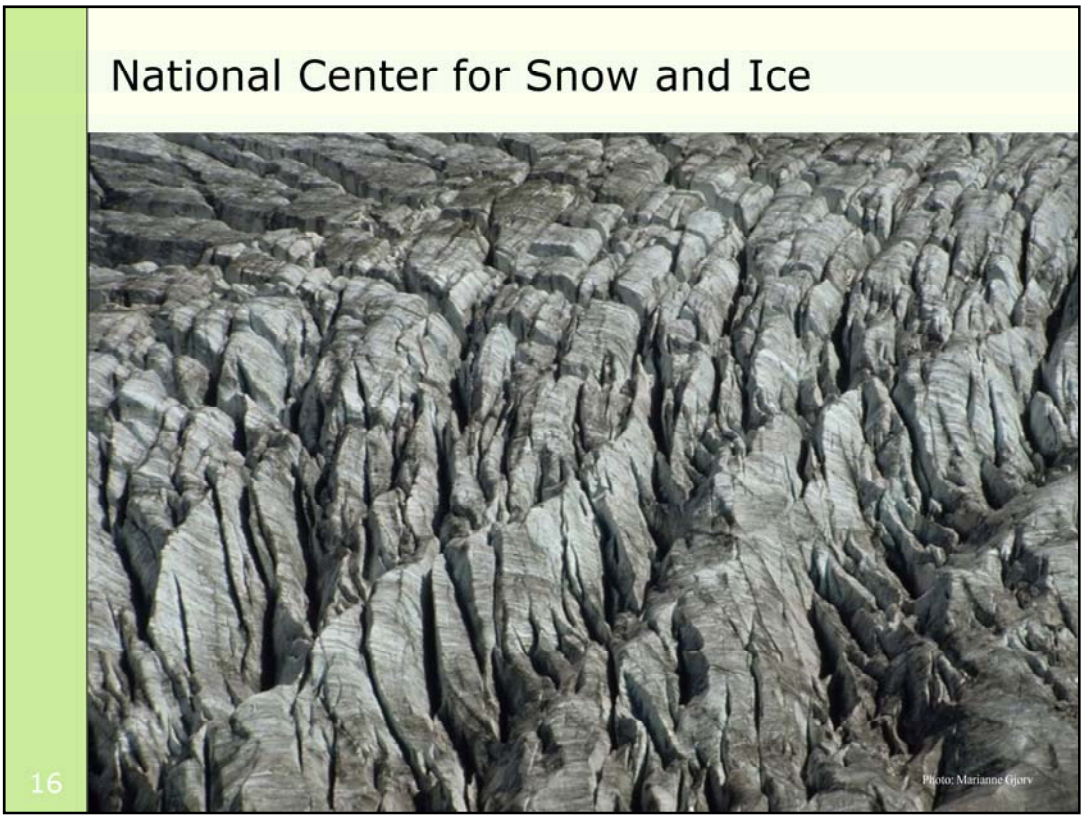
Adaption to climate change is therefore necessary, even if we succeed in reducing our emissions.

Alpine glaciers are water reservoirs for dry seasons.

At the global level approximately 2 billion people in Asia might be effected by melting of high laying glaciers in the Himalayas.

Climate change will effect agriculture production – most severe effects are expected in Africa, India and China.

There is a great need for adaptations strategies and action plans to meet these challenges.



A better understanding of the dynamic of the changes in the Arctic and their global impacts, are crucial for achieving the 2 degrees Celsius target.

The Norwegian Government has therefore decided to establish a Center for Snow and Ice with a basis here in Tromsø.

An Expert Conference on Snow and Ice will be arranged here in Tromsø in early June this year.

The polar bear is threatened due to climate change and reduced sea-ice extent.

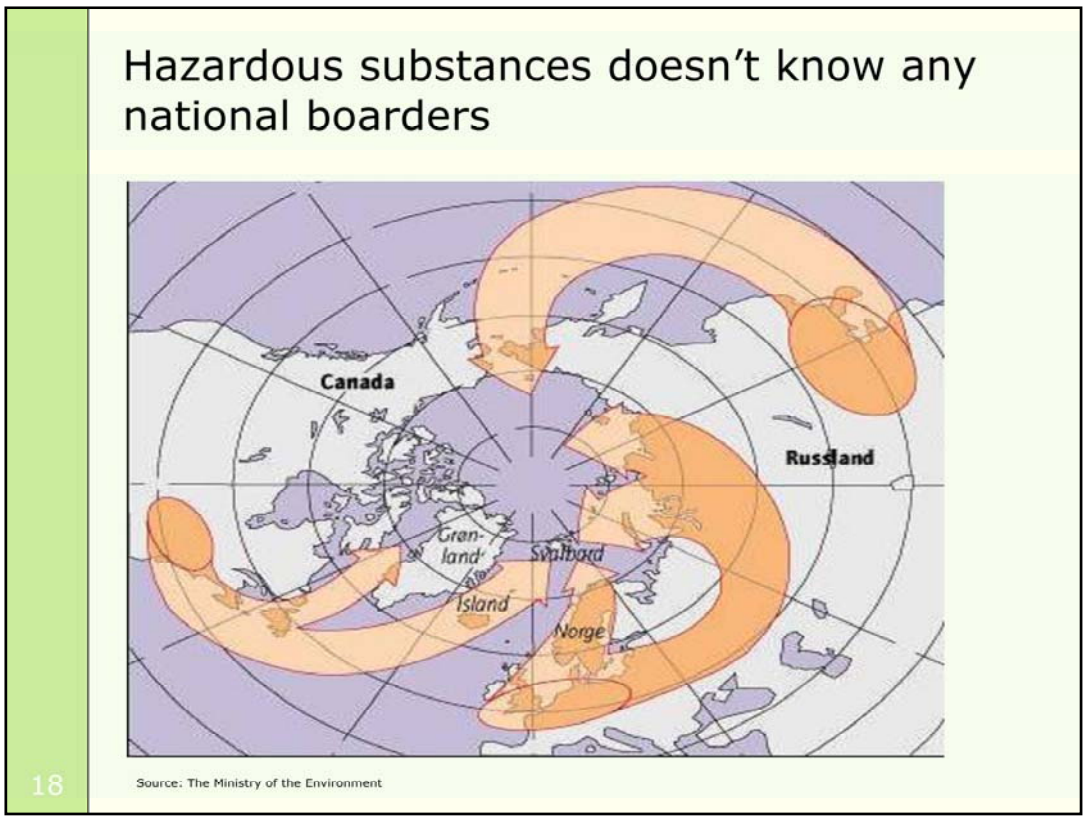
The negative effects of climate change on polar bear populations can be expected to be amplified by other negative impacts, in particular the effects of toxic chemicals such as PCBs.

Norway has invited the Parties to the Convention* to a meeting under the ”1973 Polar Bear Agreement”.

The meeting will be here in Tromsø, 17-19th of March, this year.

Hopefully, we will see the start of a closer circumpolar cooperation on management of polar bears.

* Parties to the Convention:
US, Canada, Denmark/Greenland, Russia and Norway



The Arctic may look like a pristine environment. However, human pollution influence the life in the Arctic today.

Pollutants from industry and agriculture and the use of chemicals in products, are entering the Arctic with winds and sea currents from the south.

The Arctic is a global sink for hazardous substances.

We monitor that the amount of hazardous substances in the food chain is increasing.

On Svalbard, we are monitoring levels of PCBs and other hazardous substances in air as well as in living organisms.

While levels of "old" chemicals like PCBs are slowly declining, several newer chemicals, such as brominated flame retardants, are increasing.

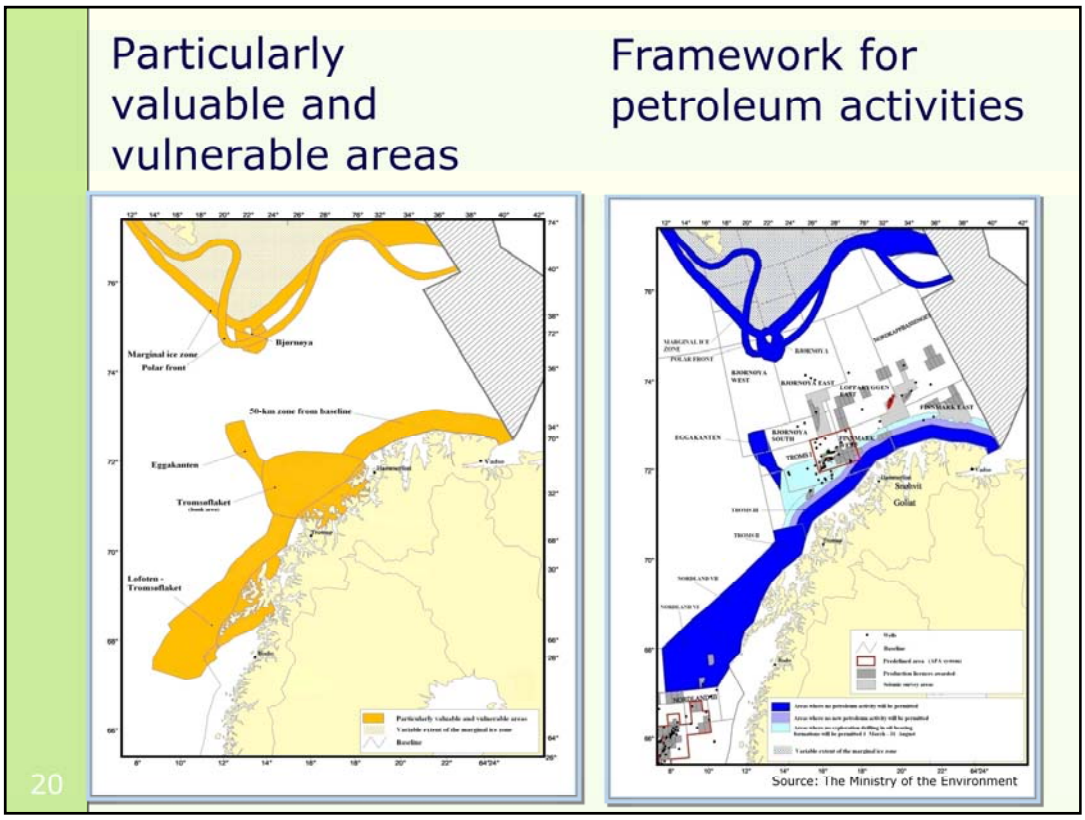
Toxic chemicals such as PCBs are accumulated effectively in the Arctic marine food chain.

The high levels of such substances in some predators, such as polar bears and polar gull is a cause of concern.

The picture shows a dead polar gull in the nest together with her small baby gulls.

Research shows that the concentration of PCBs is high in polar gulls.

Such toxic substances also represent a threat to human health and the ecosystems.



In 2006 the Norwegian Government presented an integrated management plan for the Barents Sea.

This plan is bases on an ecosystem approach.

Our aim is to consider the impacts from various activities and external factors together.

We must ensure that the overall impact is not threatening the structure and functioning of the marine ecosystems.

This includes fisheries, shipping and oil- and gas, as well as external factors such as climate change, long range pollution and acidification.

The Integrated Management Plan states that no petroleum activities will be initiated in or near the marginal ice zone and the polar front or in the Northern part of the Barents Sea.

It is a pleasure for us to notice that EU has chosen the same ecosystem based approach in their new Directive

The Arctic environment is already under increasing stress from climate change and toxic substances.

Impacts related to climate are likely to increase fast.

Management must of course minimize overall impacts of climate change and hazardous substances. But we must be very careful not to add new external factors that can put further pressure on the Arctic Environment.

Strict standards and precautionary approach to activities in sensitive areas should be applied.

The legal framework for protecting the Arctic Sea is very much the same as everywhere else.

The UN Convention on the Law of the Seas is our fundament.

Together with international agreements in the field of environment and climate change, this constitutes the legal framework for our management of the Arctic environment.

The Climate Change Convention and the Kyoto Protocol, stands at the center of our efforts to save the Arctic Environment and avoid dangerous feedbacks on the global climate.

Our will to commit over selves to deep cuts, and to act on these commitments, will determine the future of the Arctic.

Framework Convention on Climate Change –ratified by all Arctic states

Kyoto Protocol – not ratified by the US. This is Obama's biggest challenge in the field of environment.

This is the biggest challenge in the environmental field for the American president.

The management of the sensitive and vulnerable environment of the Arctic must be comprehensive and ecosystem based.

The Convention on Biological Diversity (CBD) covers conservation and sustainable use and benefit sharing from use of genetic resources (relevant for bio-prospecting)

The biodiversity convention recommends a ecosystem based approach to all management, and provides guidelines for the UN Convention on the law of the seas.

All Arctic states except from the US has ratified the CBD.

OSPAR –convention: Safeguard human health and conserve marine ecosystems in North-East Atlantic. Russia is a relevant member, but has not yet joined.

Espoo Convention: Requires the countries to assess environmental impacts at an early stage. Provides public opportunity to participate.

Ratified by all Arctic states except for US and Russia.

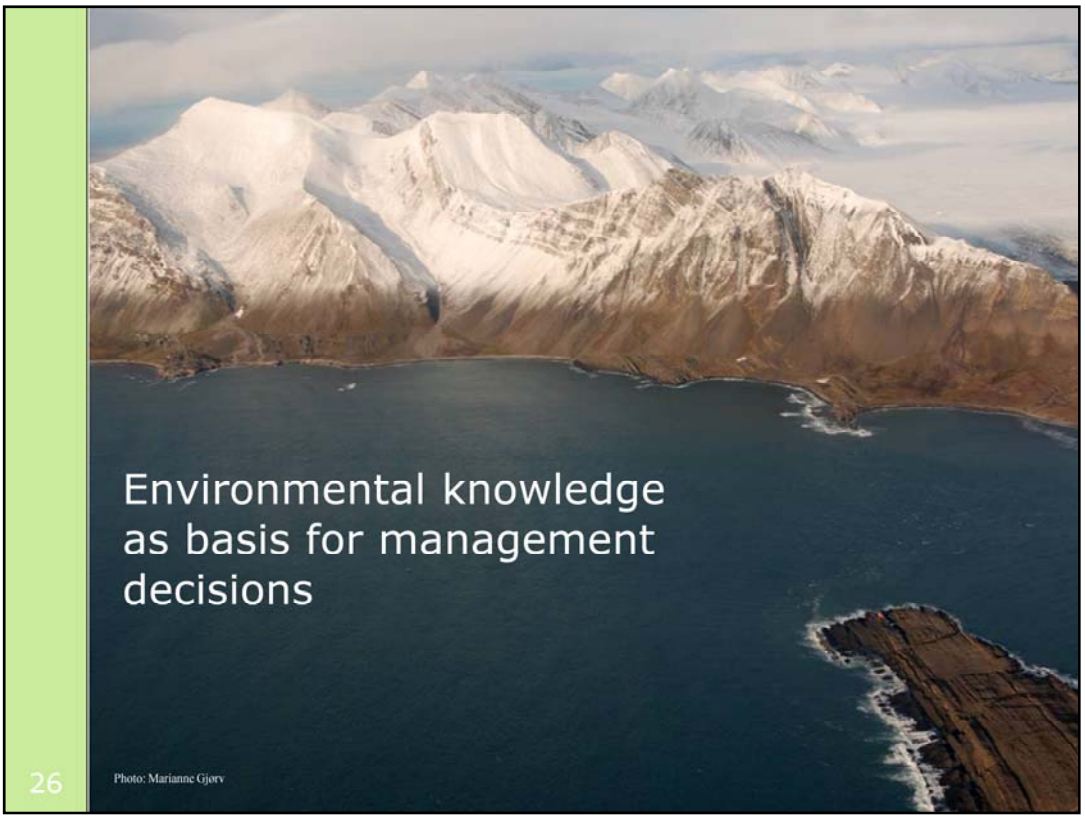
Let me underline: It is essential that all Arctic countries ratify existing environmental conventions and protocols relevant to the Arctic.

As I have mentioned, toxic substances are a threat to the pristine environment of the Arctic. The **Stockholm Convention** regulates **emissions** of the most toxic substances and those that are transported over long distances to protect human beings and the ecosystem.

The Stockholm Convention is not ratified by US and Russia.

Basel Convention – regulates **transboundary movement of hazardous waste** and their **disposal**. Important for the Arctic. All Arctic countries have ratified (incl. Russia), but not the US.

Ratifying relevant conventions and protocols is crucial but we also need to cooperate to further strengthen the existing legal framework and adjust it to meet the environmental challenges in the Arctic.



It is necessary that the Arctic states contribute with knowledge, monitoring and assessment of the environmental developments.

We must ensure that management decisions are based on updated knowledge.

The Arctic environment is changing fast and the time to study and improve the understanding of it is now.

Finally, I would like to convey the best regards from Minister of Environment and Development Erik Solheim.

Since he is the minister of both Environment and development, people ask whether he has time to care about the Arctic. He has indeed! He pays a lot of attention to Polar issues…

...and he is a great friend of the polar bears.

Thank you for the attention!