

Havvind – offshore wind power in Norway

A strategic environmental
assessment

presented by
Cecilie Kvamme, IMR



INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET



► The Institute of Marine Research (IMR)

- National advisory research institute
- More than 700 employees
- Main office in Bergen
- Six research vessels
- Research and advice for marine ecosystems and aquaculture



HAVFORSKNINGSINSTITUTTET
INSTITUTE OF MARINE RESEARCH

► A national institute



Bergen: IMR headquarters



Holmfjord in
the Porsanger fjord



TROMSØ DEPARTMENT



MATRE RESEARCH STATION



AUSTEVOLL RESEARCH STATION



FLØDEVIGEN RESEARCH STATION

Office Trondheim

Office Oslo



Parisvatnet in Øygarden

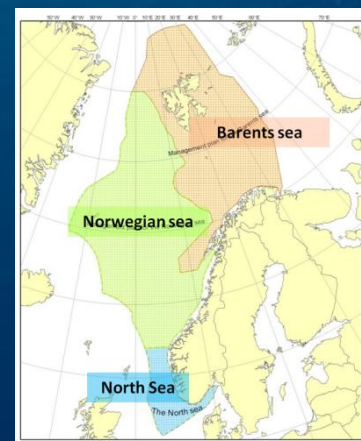


Guddalselva in Kvinnherad



IMR, SMP and offshore wind

- National management plans for marine ecosystems – IMR central role
 - Barents Sea – Lofoten – 2006, 2011
 - “Integrated Management of the Marine Environment of the Barents Sea and the Sea Areas off the Lofoten Islands”
 - Norwegian Sea - 2009
 - North Sea & Skagerrak - 2013



The Norwegian
management plan regions

What is the management plan?

From the Barents Sea – Lofoten management plan

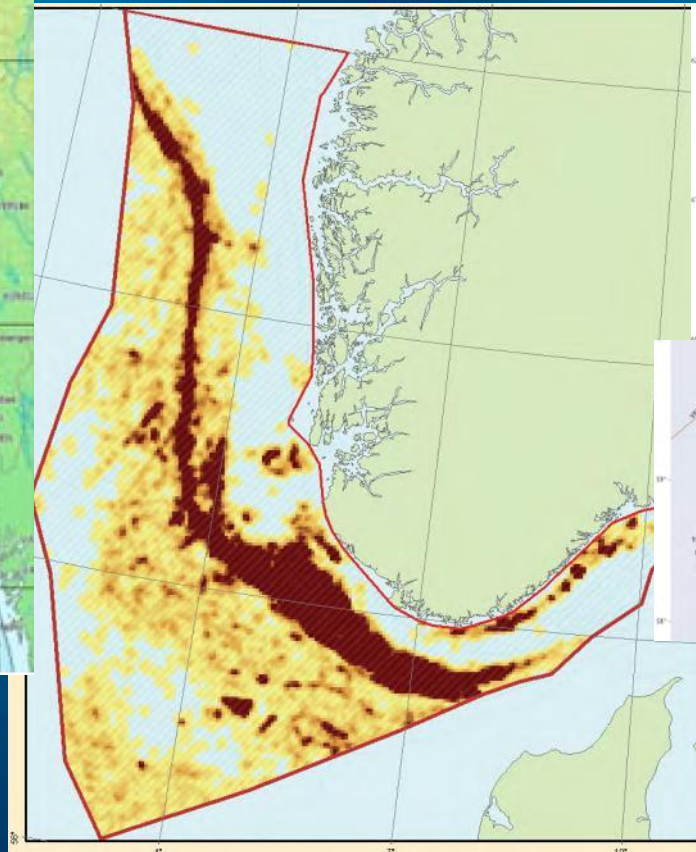
- The management plan sets the
 - overall framework for both existing and new activities in these waters
 - facilitates the co-existence of different industries, particularly the fisheries industry, maritime transport and petroleum industry
- The aim of the plan is to establish a holistic and ecosystem-based management of the activities in the Barents Sea – Lofoten area.
 - This means that all activities in the area should be managed within a single context and that the total environmental pressure from activities should not threaten the structure, functioning and productivity of the ecosystems



The North Sea

Fisheries activity 2011
(vessels > 21 m)

Petroleum extraction mapped 2011 (gas and oil fields)



Ship traffic 2011



IMR and offshore wind

- Projects
 - CoExist – Øivind Bergh
 - MERMAID - Innovative Multi-purpose offshore platforms: planning, design and operation – Øivind Bergh
 - PartiSEApate – Geir Ottersen
- IMR consultative body
 - License applications – offshore wind farms
 - Strategic environmental assessment
 - Spring 2013 – **Havvind – offshore wind power in Norway**
 - Published by the Norwegian Water Resources and Energy Directorate



Havvind – Offshore wind power in Norway – a SEA

- Offshore renewable energy production in Norway is governed by the **Offshore Energy Act**.
- Under this act, the construction of offshore wind power and other renewable energy production units/facilities at sea can only take place after the Norwegian Government has **opened specific geographical zones for licence applications**.
- The opening of zones **requires** that a **strategic environmental assessment** (SEA) is carried out.
- The work with the SEA has been carried out by the **Norwegian Water Resources and Energy Directorate** (NVE) and was presented to the Ministry of Oil and Energy (OED) on January 4, **2013**.
 - Norwegian Directorate of Nature Management, The Norwegian Directorate for Fisheries, The Norwegian Coastal Administration, and the Norwegian Petroleum Directorate
- The Ministry will decide which zones are to be opened for licence applications.



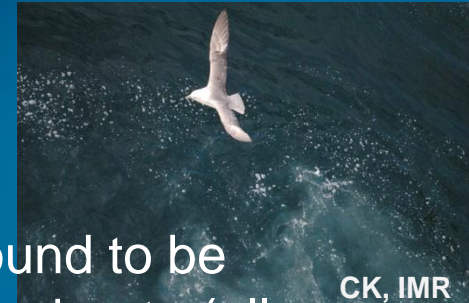
- The SEA is carried out on an **overall level**, and is **not a substitute for project-specific impact assessments**.
- Goal: provide best possible basis for deciding which zones should be **opened** for licence applications.
 - 15 zones
 - Bottom-fixed installations, floating turbines
 - Capacity from 4600–12600 MW, with an estimated normal production of 19–50 TWh
 - Capacity factor of turbines is estimated to be in the range of 36–50%.
 - In total, the areas considered cover a total area of 9000 km², approximately 1% of the Norwegian Exclusive Economic Zone
 - Technical challenges : Deep waters, excessive wave heights, and non-homogeneous seabed conditions
 - Wind resources more favourable than in other European zones
 - Norwegian industries offshore and subsea construction,



Environmental impacts

- Birds

- Impacts on seabirds and migrating birds are found to be small (most southern and northern areas) to moderate (all other)
 - Distance from established bird colonies
 - Bird densities



- Fish

- Impacts small or even non-detectable
 - Exceptions Stadthavet, Frøyabanken and Sørilige Nordsjø II - blue ling, haddock and sandeel
 - Reduced by not allowing construction work during spawning-periods



- **Marine mammals**

- Killer whales – sensitive to sound
 - Behavioural impact – 8 km around construction site
 - Northern sites
 - Avoid noise-generating construction when presence expected



- **Benthic organisms**

- Impacts depend on size and form of wind turbine foundations
- Found to be small to moderate
- However, bottom often poorly mapped
 - Closer studies needed in later project-specific assessments

- **Environmental risk**

- Measured as the potential for a given type of accident to occur, and the severity of the pollution potential of said accident
 - Utsira Nord, Stadthavet highest – but considered low in all zones



Impact on business and public interests

- **Petroleum interests**

- Highest petroleum resource potential in south
- The Norwegian Petroleum Directorate: “coexistence of wind power and petroleum installations possible within all zones”



- **Shipping**

- Established shipping lanes and leads
- Some conflicts with existing leads
- Co-existence may require alterations of existing leads and rearranging of beacons/lighthouses



- **Fisheries** - Norwegian Directorate for Fisheries

- Co-existence between wind farms and fishery activities not possible within a zone
- Recommends 7 of 15 areas not opened for licence applications



- **Landscape**

- Visual impact
- Not considered to be unacceptable in any of the 15 zones



- **Outdoor recreation and tourism**

- Visual intrusion – not considered unacceptable
- Leisure yachting and fishing activities
- Tourism – from potential negative impact (3) → slightly positive (1)



- **Historical monuments and cultural heritage sites**

- No direct impact, but possible visual impact (3)

- **Other interests**

- Areas used for military practice purpose (2)
- Meteorological and aviation radars - wind turbines should not be sited closer than 5 and 10 km, respectively – no zones
- Pipelines on the seabed (1), subsea power cables - none



Category A

Technically and economically feasible

Relatively few negative impacts

Grid connection possible before 2025

Category B

Challenges - either technical aspects or conflict of interests/negative impacts

Might be resolved in the future (technology development, grid measures and/or mitigation measures)

Can be opened: technology matures, or existing use of the areas changes

Category C

Greater challenges

Conflicts of interest not easily resolved

Foreseen negative impacts considered acceptable

Zones should not be opened at the expense of zones in the two other categories



Thank you!

