ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

Nordic Council of Ministers

Vestland fylkeskommune

NORDIC MARINE THINK TANK

NMTT Forum Bergen
30th of November 2023

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

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NORDIC MARINE THINK TANK

Nordic Climate Change Forum for Fisheries & Aquaculture

Setting the Scene: Offshore wind outlook

Overview of offshore wind technology and the political ambitions for offshore wind in the EU -and Norway

Finn Gunnar Nielsen

Professor Emeritus University of Bergen

Bergen Offshore Wind Center

Nordic Marine Think Tank and ICES Joint Workshop
Second Nordic Climate Change Forum for Fisheries and Aquaculture:
Dealing with Maritime Space and User Conflicts in a New Era of Offshore Wind
Bergen 30 November 2023

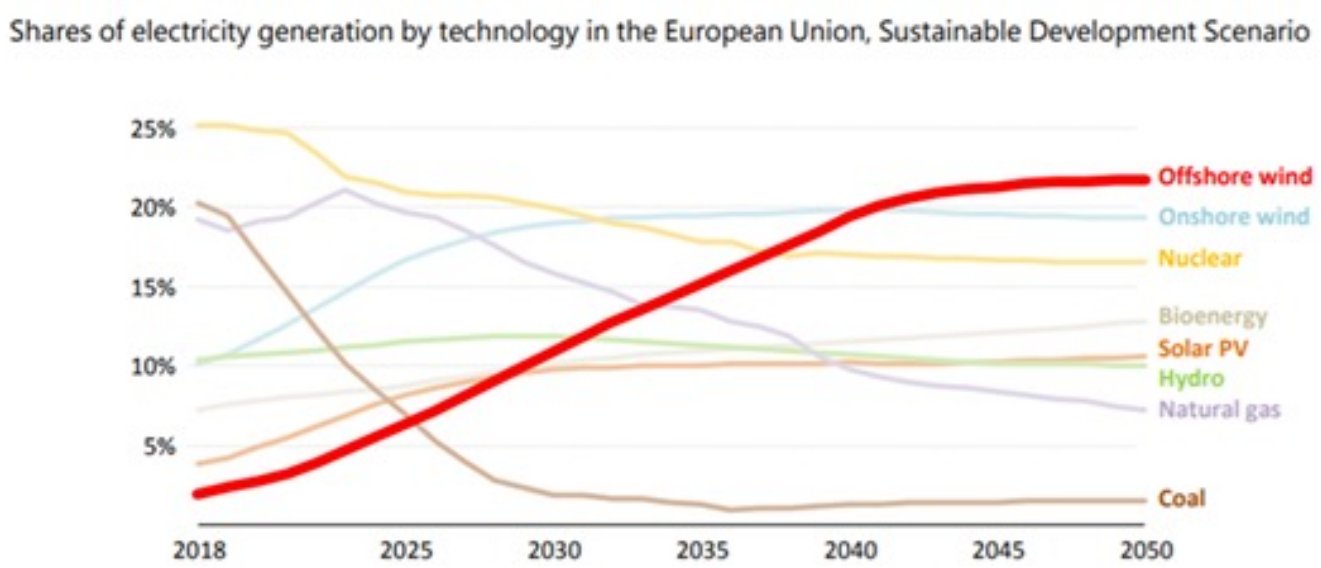
Overview of offshore wind technology and the political ambitions for offshore wind in the EU -and Norway

Finn Gunnar Nielsen
Professor Emeritus Geophysical Institute
Bergen Offshore Wind Centre (BOW)
https://www.uib.no/en/bow

UNIVERSITETET I BERGEN

“The Times They Are A-Changin"

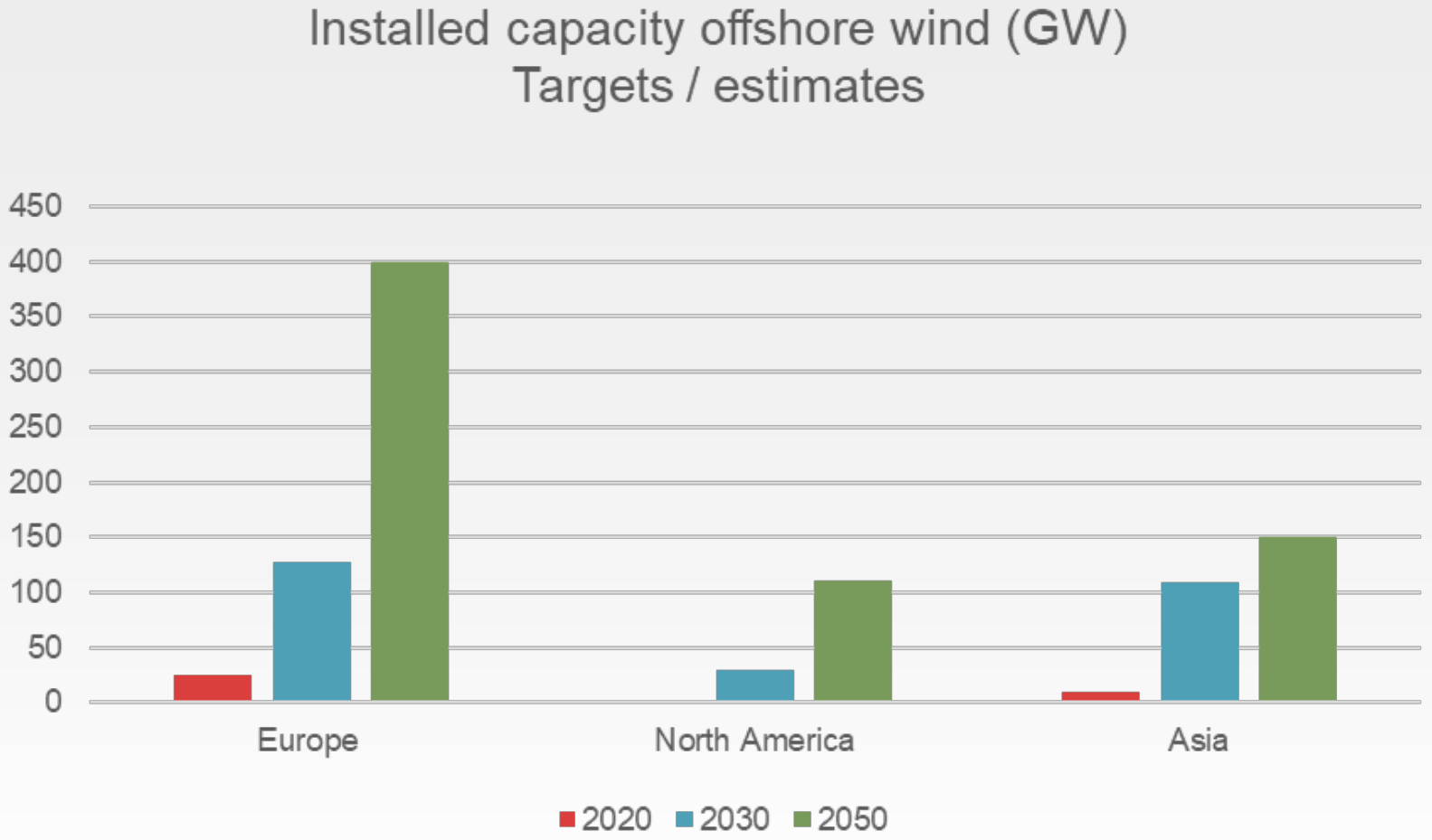
- EU’s Green Deal
- Europe 2050: 400 GW +
- Norway 2040: 30 GW
- Energy security
- Price of energy
- EU, October 2022:



Source: IEA 2019

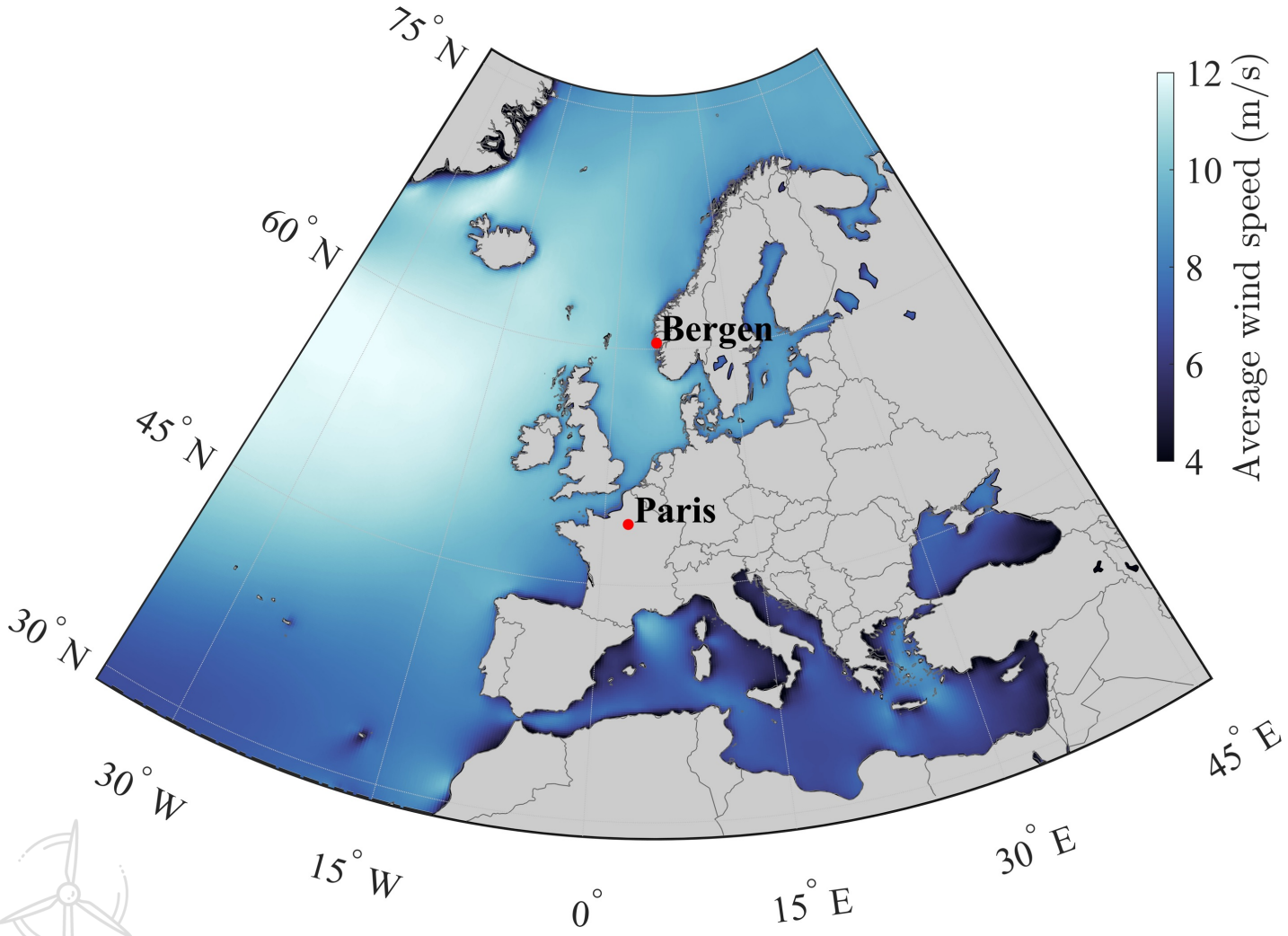
… **fast-tracking of the simplification of permitting procedures** to accelerate the rollout of renewables and related grids

International ambitions

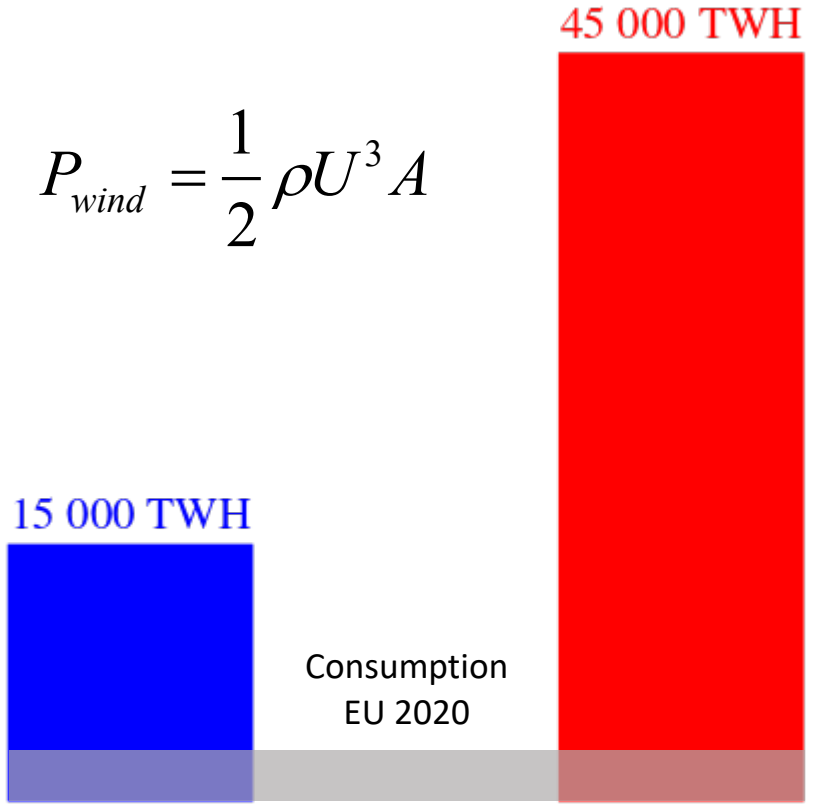


Source (partly): GWEC Global Offshore Wind report 2021

Offshore wind potential in Europe



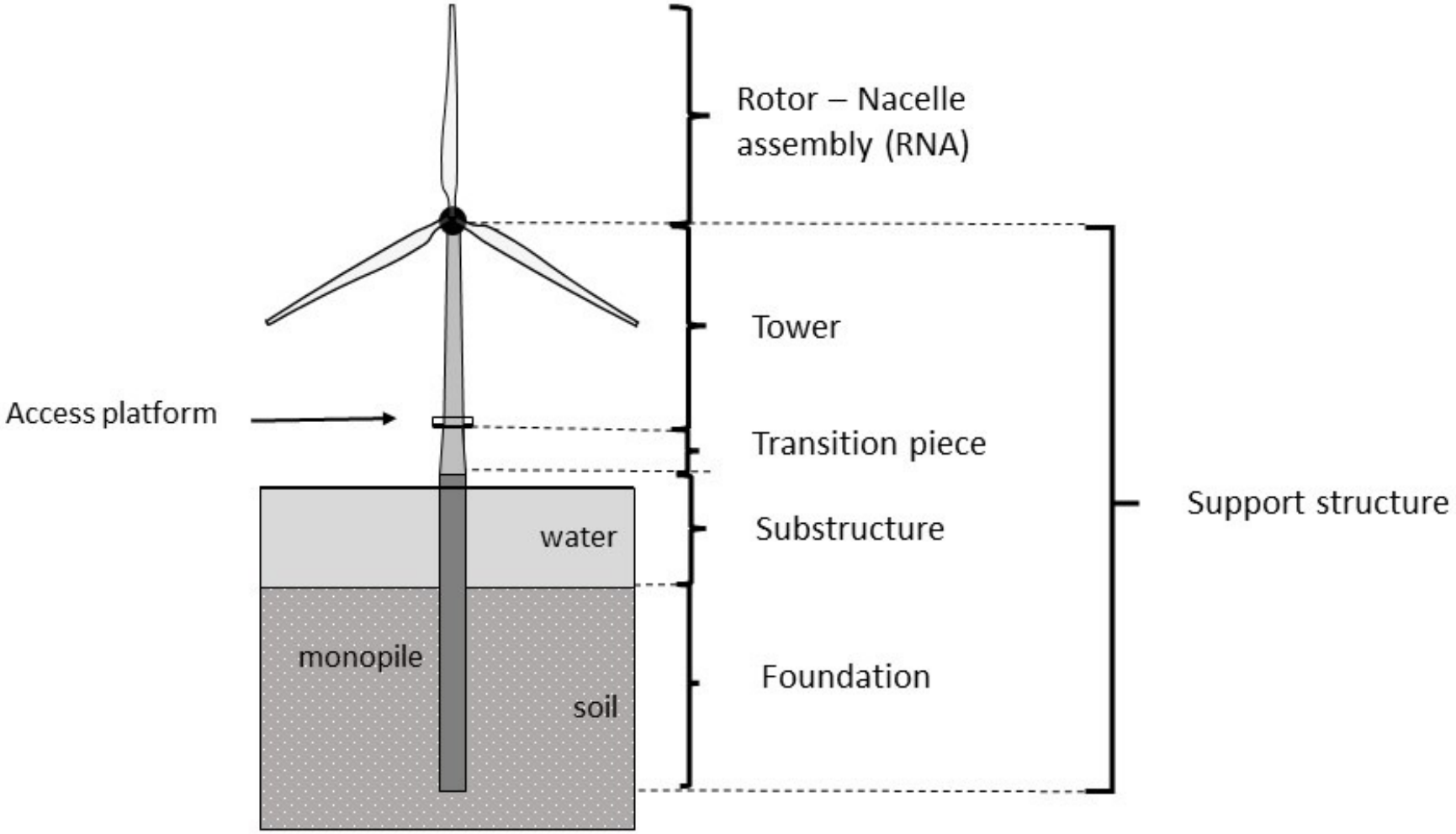
$$P_{wind} = \frac{1}{2}\rho U^3 A$$



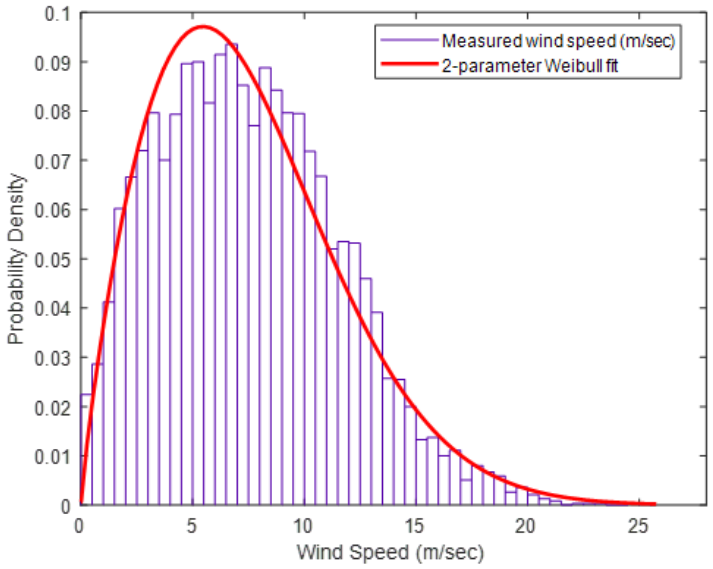
Source: ERA5 and IEA 2019

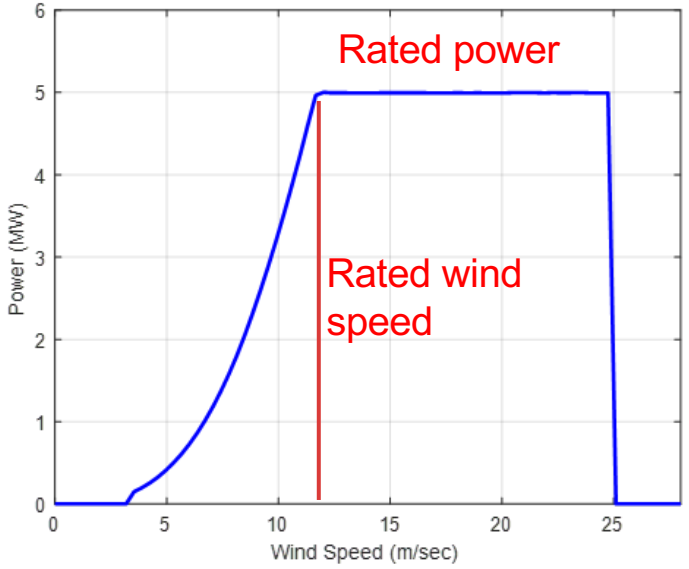
Design: Etienne Cheynet, UiB

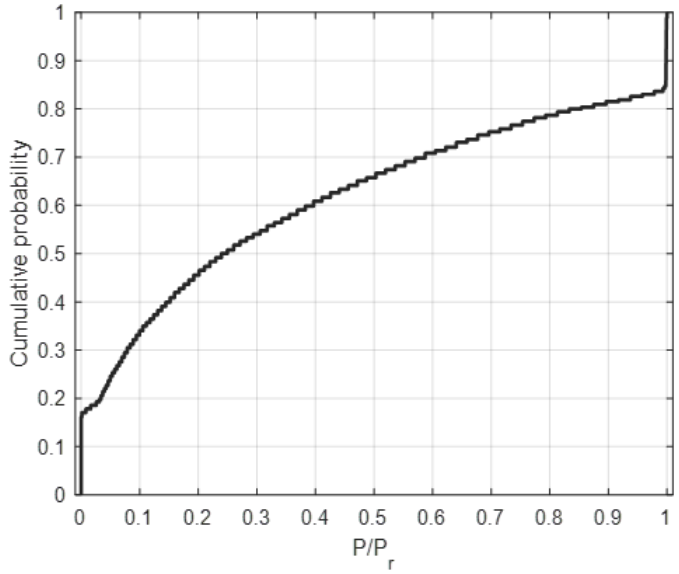
Components of an offshore wind turbine



From wind to power

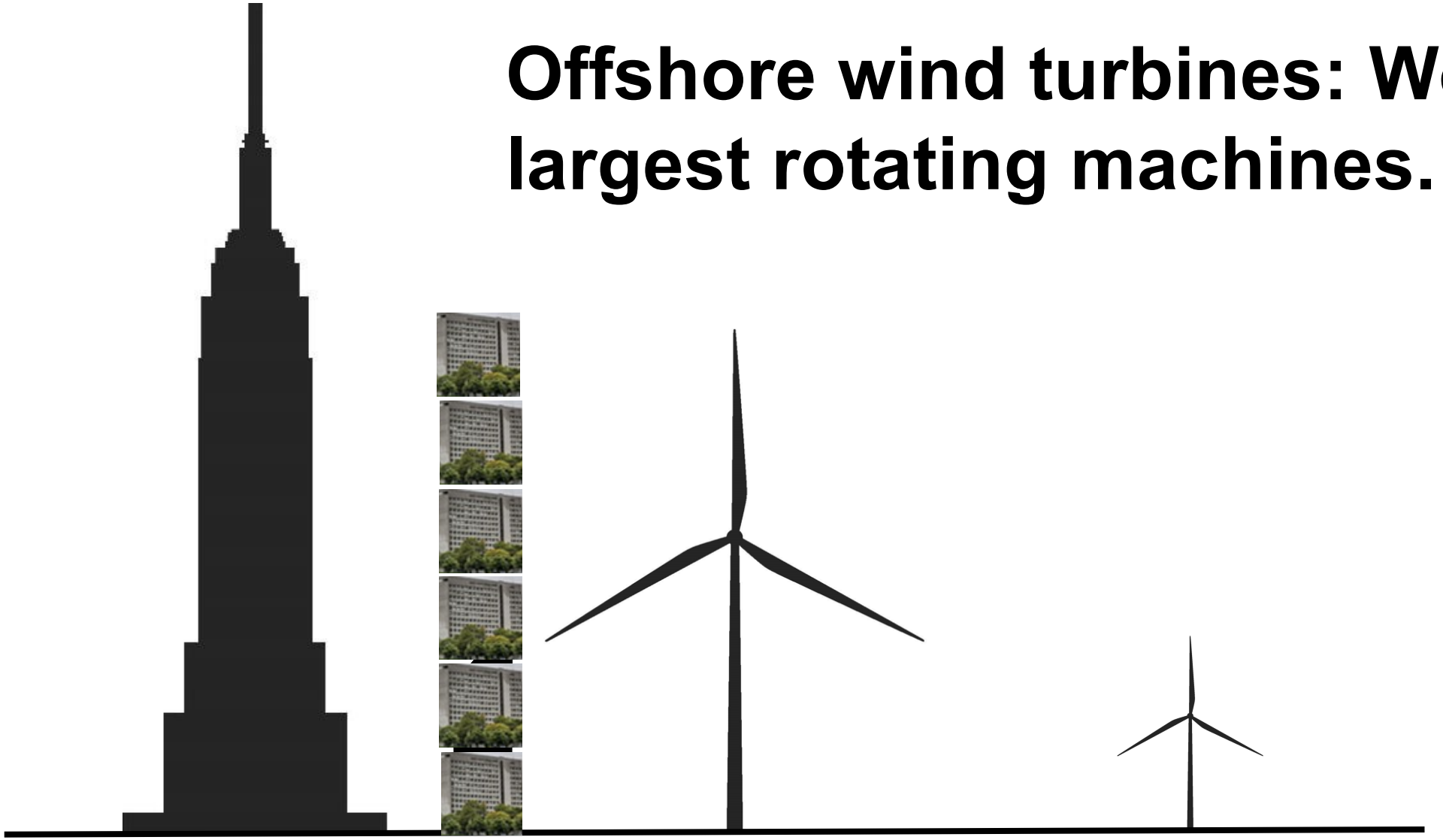






Wind statistics * Power curve = Power statistics

Offshore wind turbines: World's largest rotating machines.



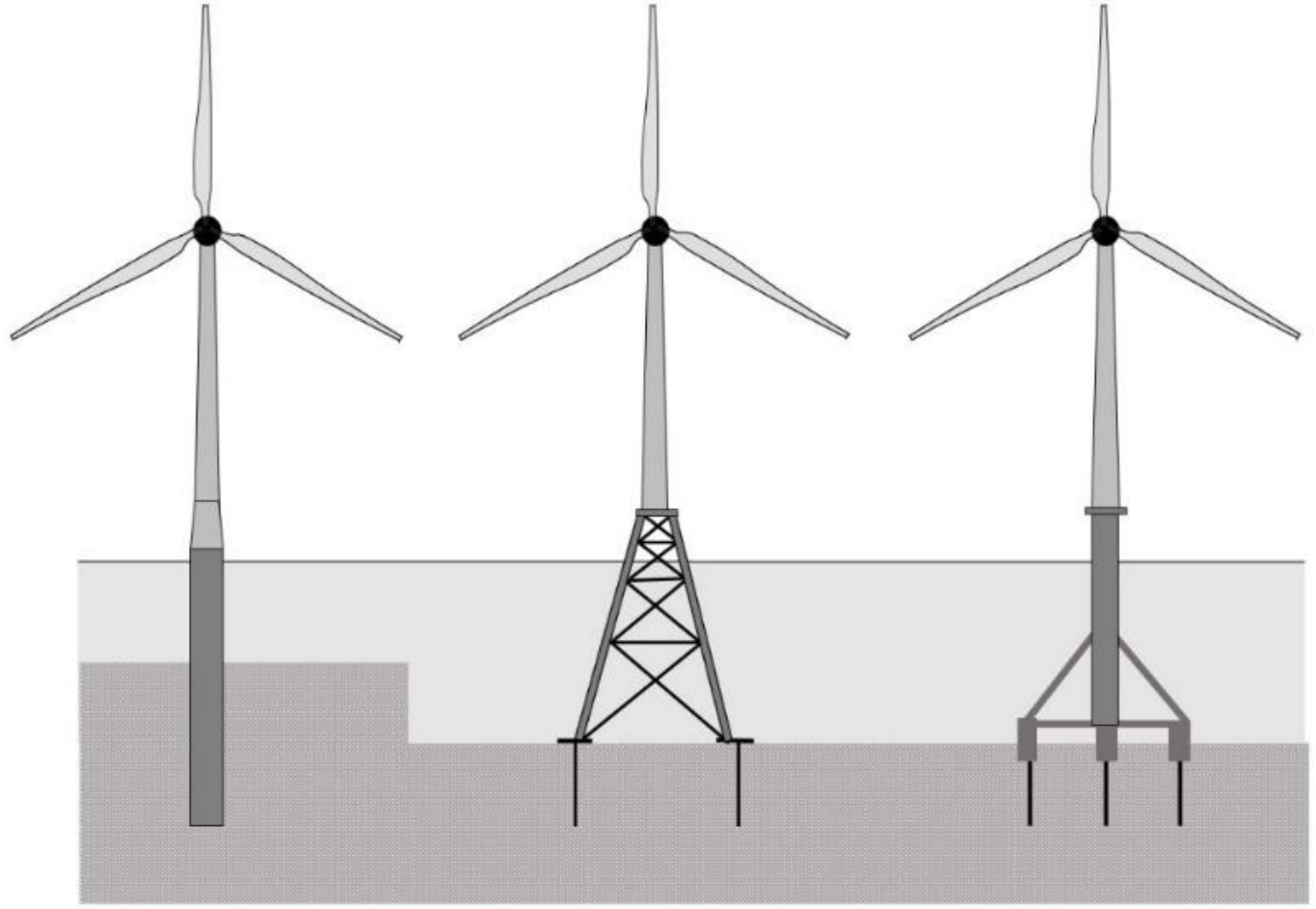
Empire State Building
443 m

6 * Bergen City Hall
117 m

State of art turbine
15 MW – 270 m
Rotor: 240 m

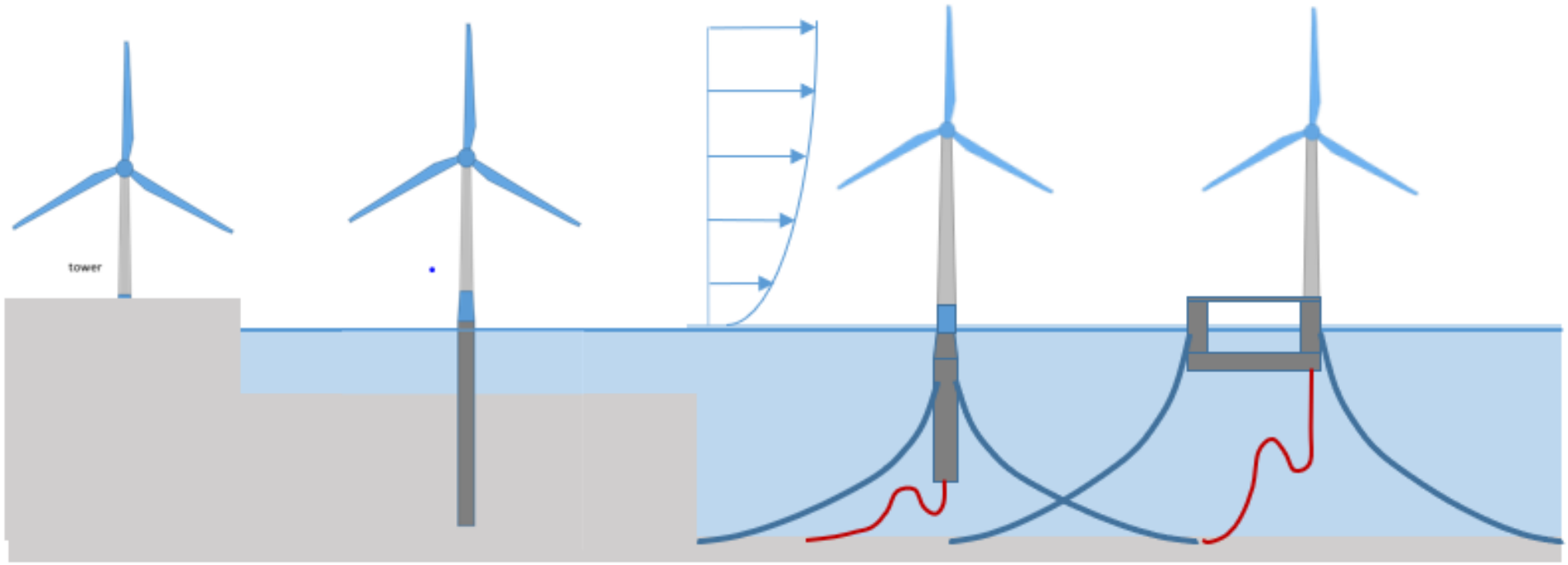
World's first full scale floating turbine, 2009
2.3 MW – 107 m
Rotor: 82 m

Bottom fixed concepts



Monopile Jacket Tripod

Deep water – Floaters



< 60m

> 100m

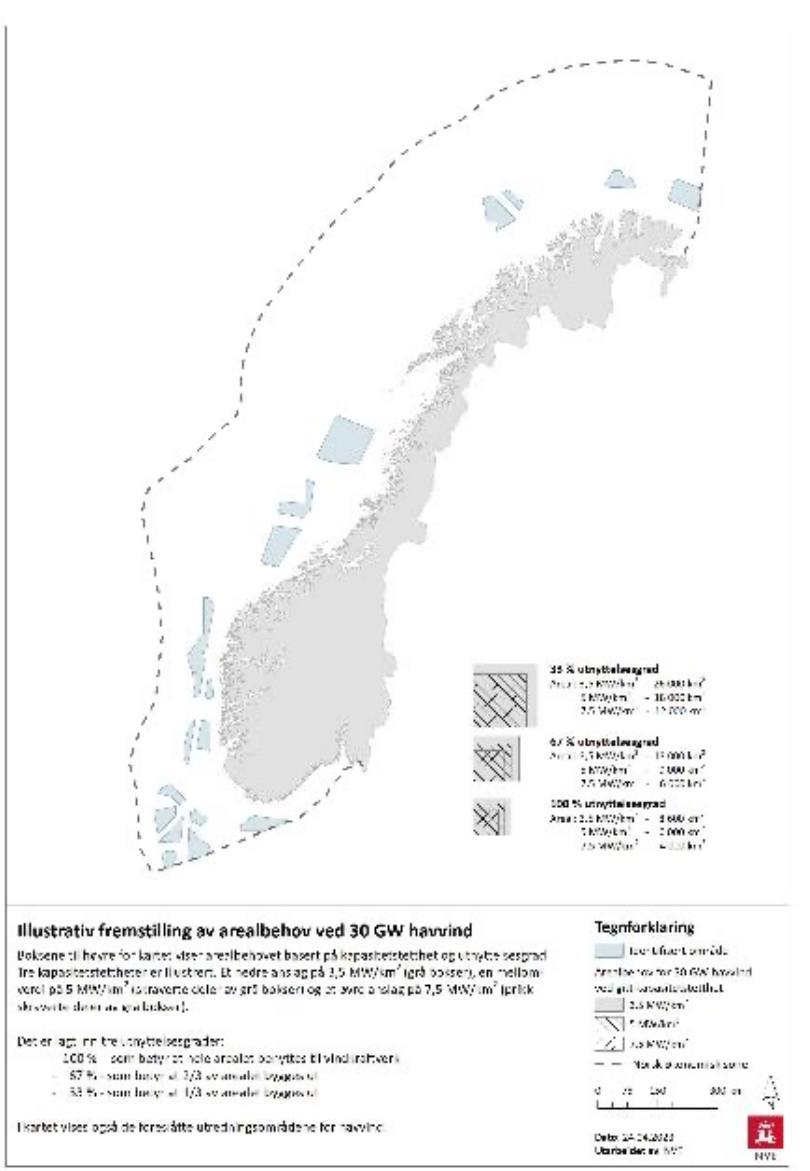
No. of mooring lines: 3 – 4

Length: (1 – 8) * WD

2023: New areas for offshore wind farms, Norway

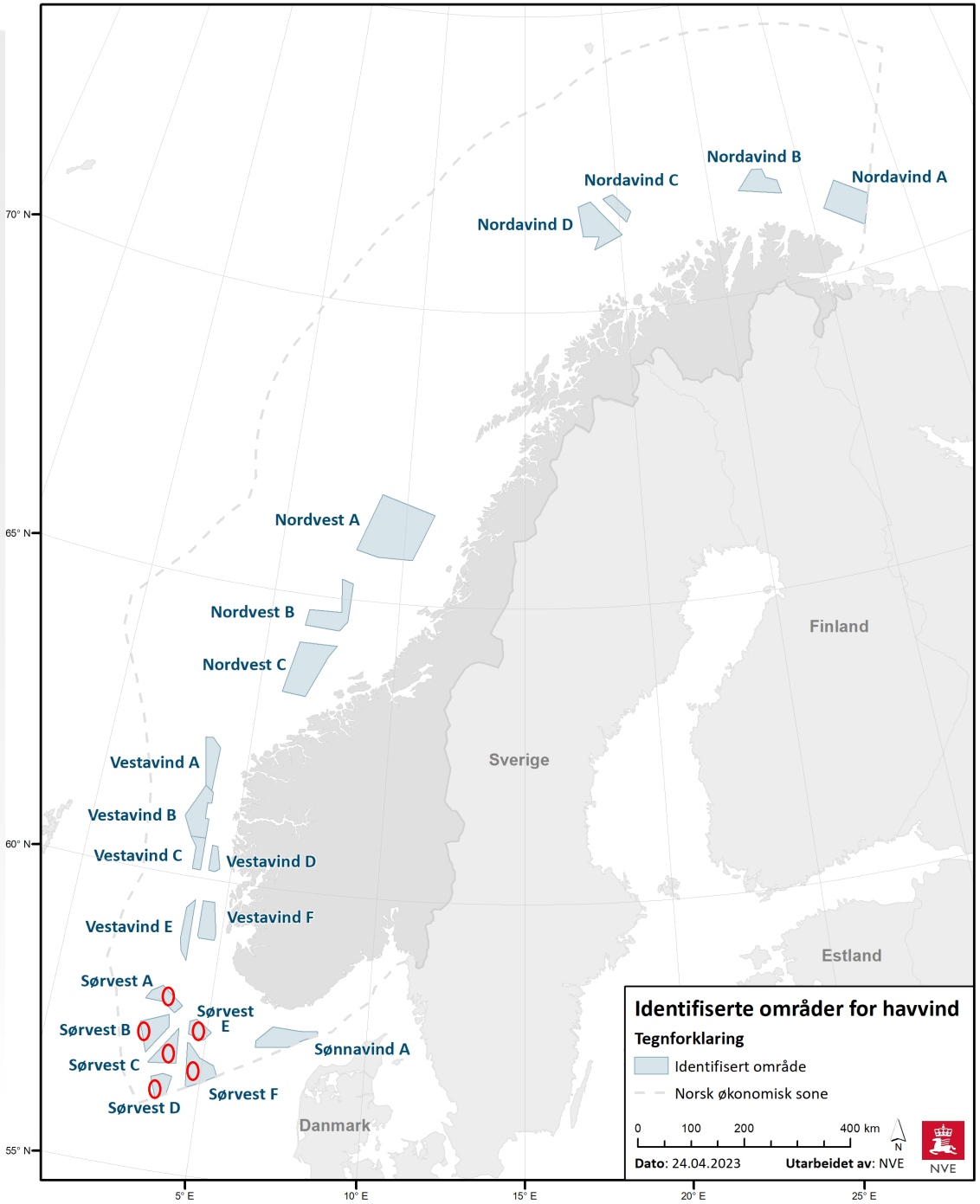
- 20 areas
- Large total area:
  - 54 000 km^2
  - O(10) larger than needed for 30 GW
  - Deep waters
  - Further from shore

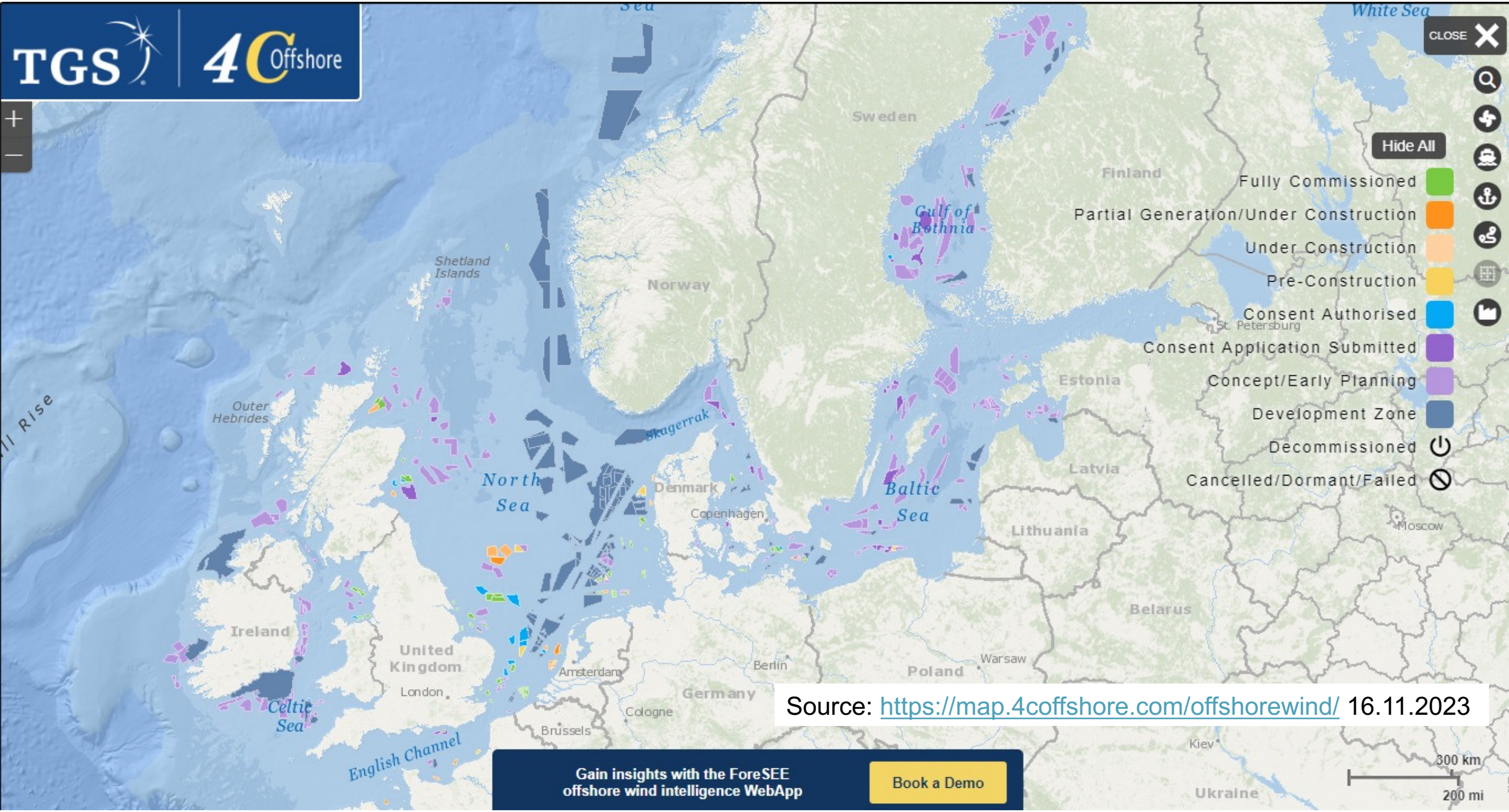
- Details: https://veiledere.nve.no/havvind/identifisering-av-utredningsomrader-for-havvind/



Deep waters!

- :Bottom fixed (?)





Source: https://map.4coffshore.com/offshorewind/ 16.11.2023

19 Sept. 2022: The Netherlands:

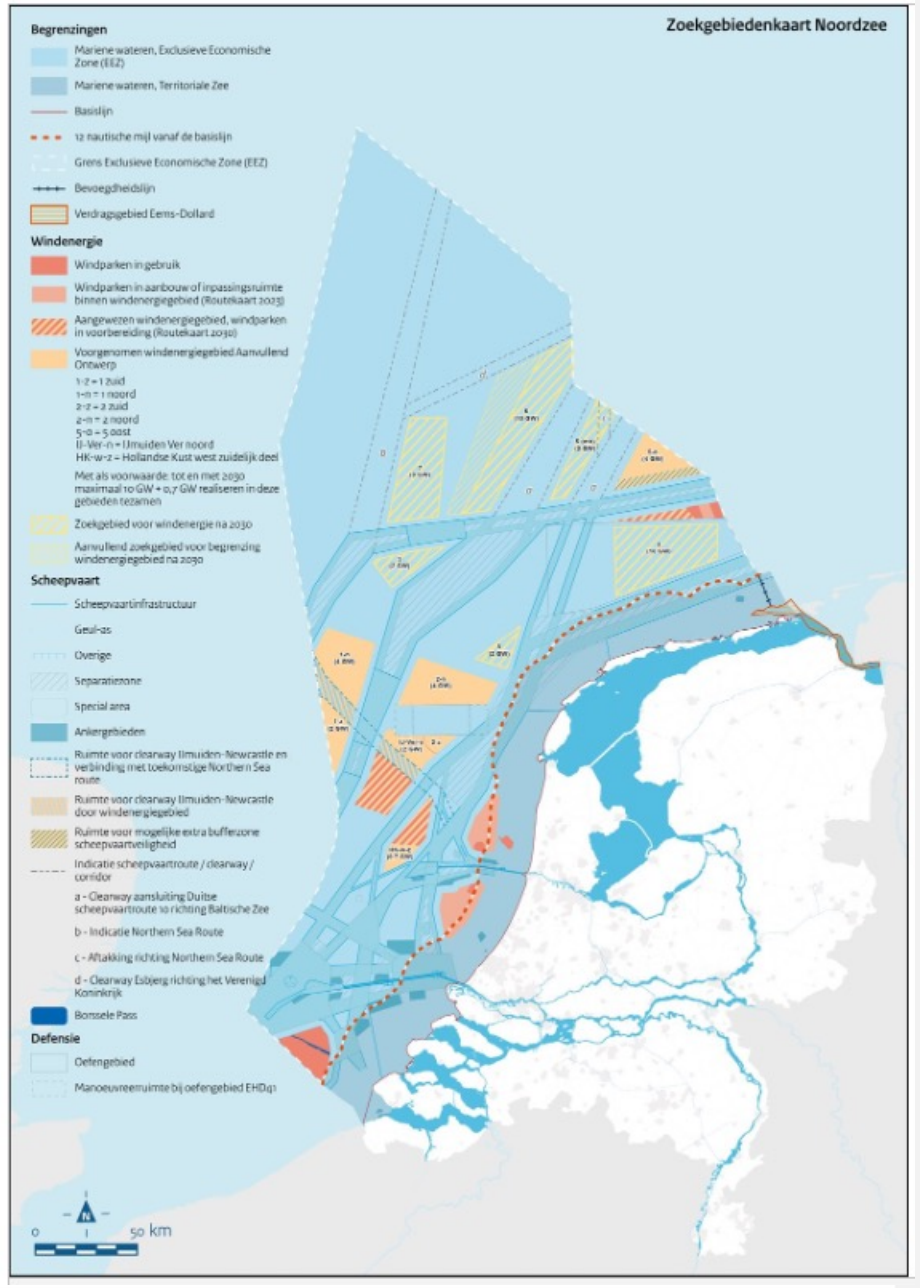
From 38 – 72 GW in 2050

EEZ : 154 000km^2 (?)

Installed (June 2022): 2.5 GW

Aim 2030: 21.5 GW (75% of power system)

Aim 2050: 72.0 GW

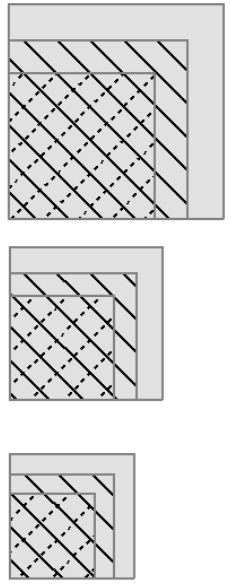


Source: [Wind op zee na 2030 - Wind op zee]
https://renewablesnow.com/news/netherlands-to-strive-for-70-gw-of-offshore-wind-by-2050-798340/

Key terms

- Needed wind farm area, A (km^2)
- Utilization, K_u
- Capacity density, I (MW/ km^2)
- Installed power, P (MW)

$$A = \frac{P}{IK_u}$$



33 % utnyttelsesgrad
Areal: 3,5 MW/km² - 26 000 km²
5 MW/km² - 18 000 km²
7,5 MW/km² - 12 000 km²

67 % utnyttelsesgrad
Areal: 3,5 MW/km² - 13 000 km²
5 MW/km² - 9 000 km²
7,5 MW/km² - 6 000 km²

100 % utnyttelsesgrad
Areal: 3,5 MW/km² - 8 600 km²
5 MW/km² - 6 000 km²
7,5 MW/km² - 4 000 km²

$P = 30\,000\,MW$

$I = 5\,MW / km^2$

$K_u = 1$

Example

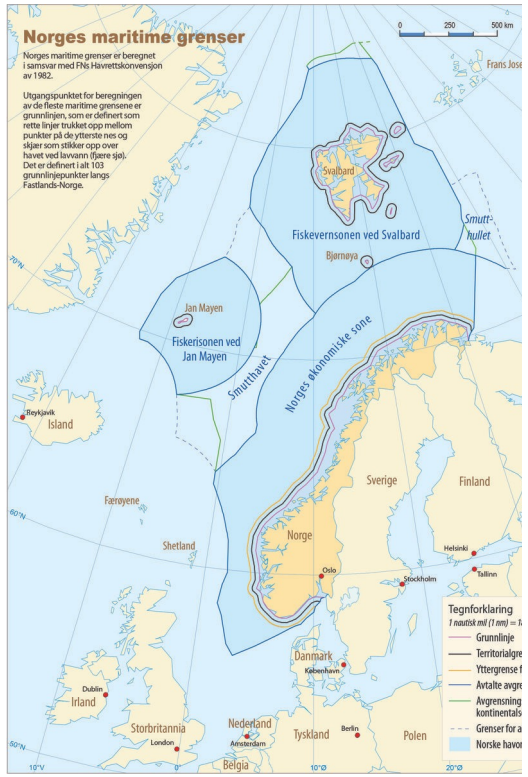
- 10 MW turbines, D = 178.3 m, U_r = 11.4 m/s, C_{Pr} = 0.44
- 1200 GW wind farm,
- Distance between turbines: L/D = 8
- Area needed: 244 km^2
- Capacity density: 4.92 MW / km^2 (Installed)
- C_c = 0.45: 4730 GWh/y, 2.21 MW / km^2 ocean area (Produced)

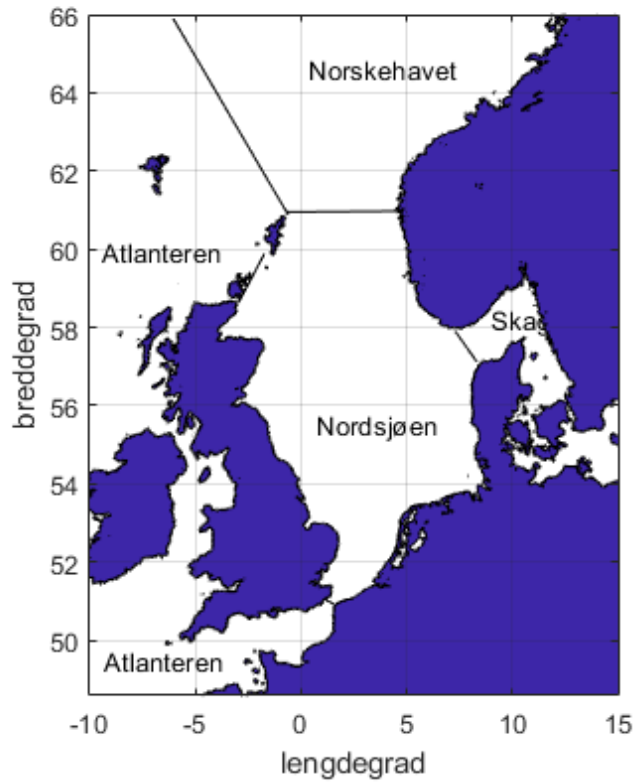
Areas

Norwegian Exclusive Economic zone (EEZ): 787 640 km²
North Sea: 575 000 km²

Ambitions:
Installed power, Europa: 400 GW (2050)
Energy: Approx. 1750 TWh/y

Norway: 30 GW (2040)



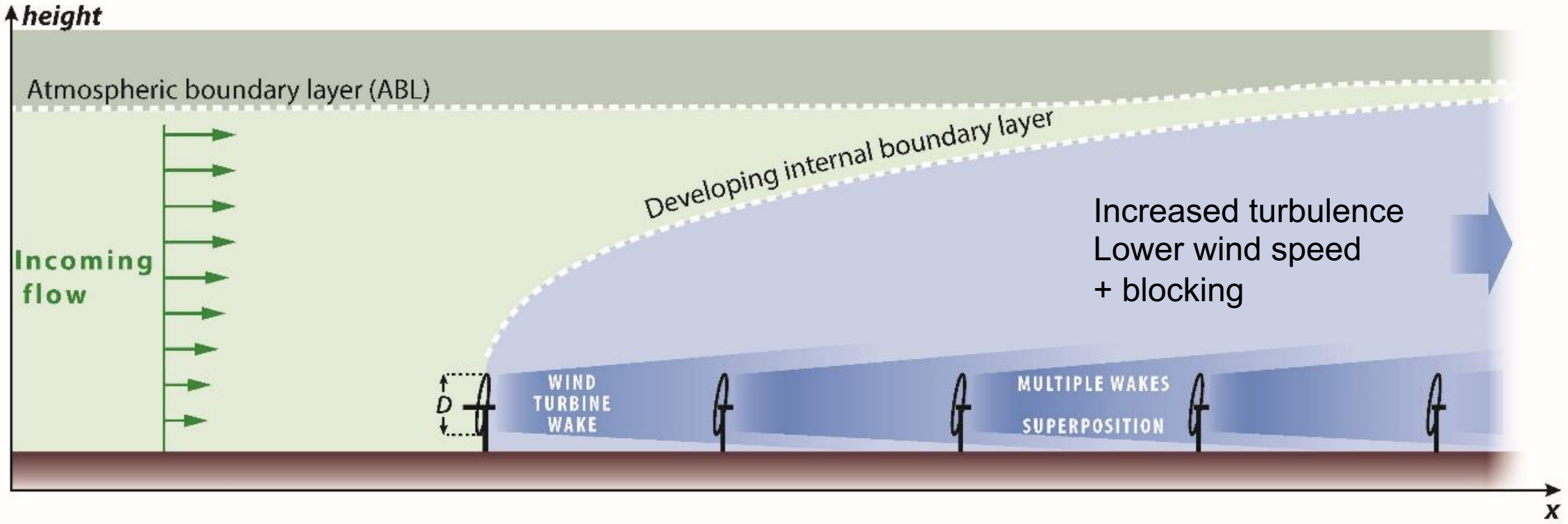


Area needed Europe (6 MW/km²): 67 000 km²

Area needed Norway (6 MW/km²): 5 000 km²

Kilder: SNL, Knut Barthel
SNL, Kartverket

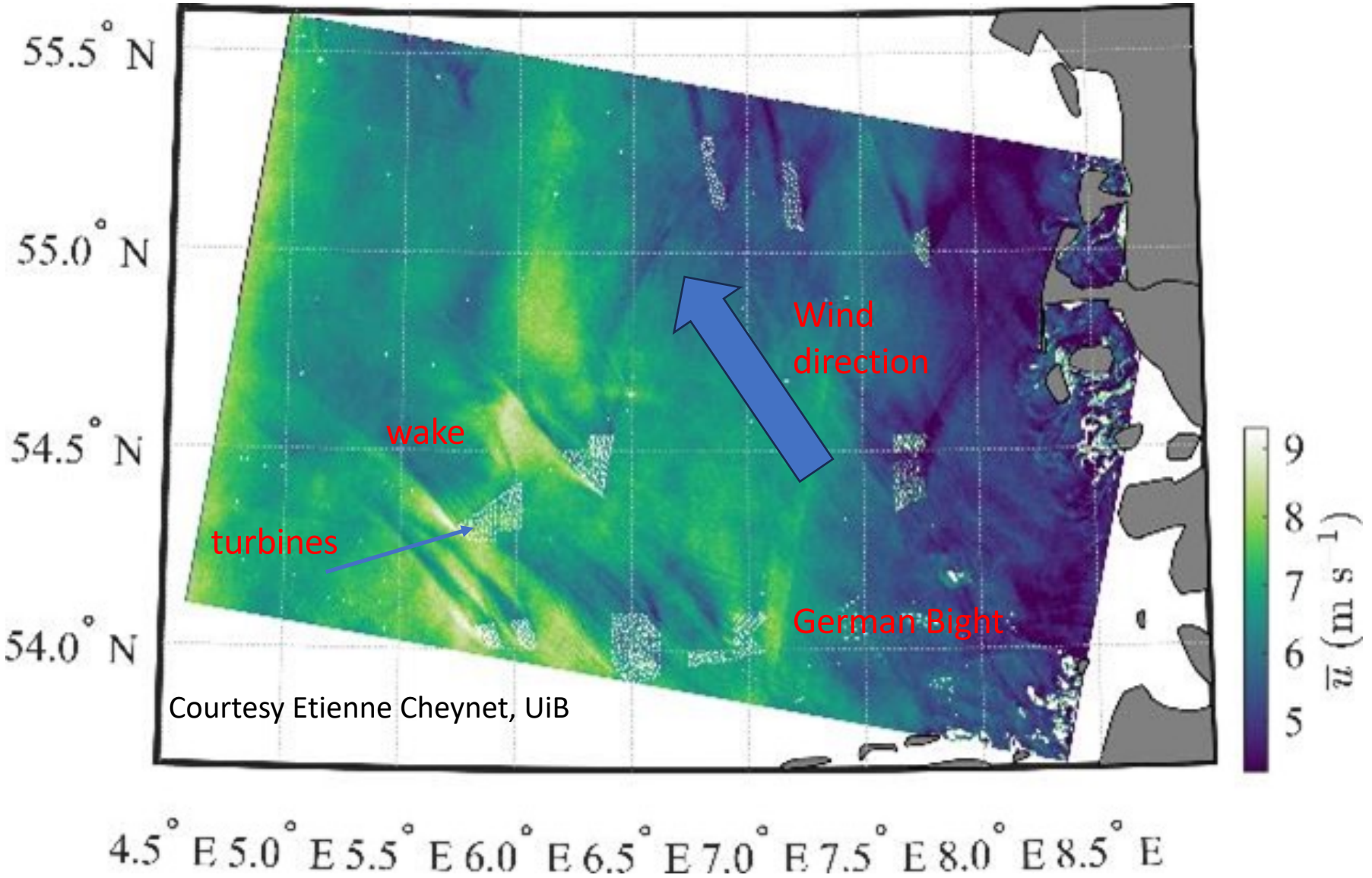
Wind turbine wakes and wind farm wakes



Picture adapted from Stevens, R. J., & Meneveau, C. (2017). Flow structure and turbulence in wind farms. *Annual review of fluid mechanics*, *49*, 311-339

Courtesy: Etienne Cheynet, UiB

Wind farm wakes



Courtesy Etienne Cheynet, UiB

Summary

- Offshore wind energy is a key element in EU's Green Deal
- Planned upscaling from 30 GW to 400 GW installed capacity in Europe by 2050
- The size of wind turbines and wind farms have increased rapidly
- Ocean areas needed depends upon several factors, among them wake effects.
- Both fixed and floating wind turbines are needed.
- Coexistence / common use of areas is an important issue

Being a trusted facilitator: Positioning fisheries, biodiversity and offshore wind debates in the Northeast coast of USA

Kanae Tokunaga
Gulf of Marine Research Institute

Being a trusted facilitator: Positioning fisheries, biodiversity and offshore wind debates in the Northeast coast of USA

Second Nordic Climate Change Forum for Fisheries and Aquaculture:
Dealing with Maritime Space and User Conflicts in a New Era of Offshore Wind
November 30, 2023

Kanae Tokunaga

Hannah MacDonald, Laura Taylor Singer

Gulf of Maine Research Institute
Science. Education. Community.

Gulf of Maine Research Institute

Why GMRI to lead in this space?

- Multi-disciplinary expertise on marine and fisheries research
- Access to the best available science
- Expertise in convening on challenges the fishing industry faces
- Objective, non-partisan, independent
- Trusted relationships

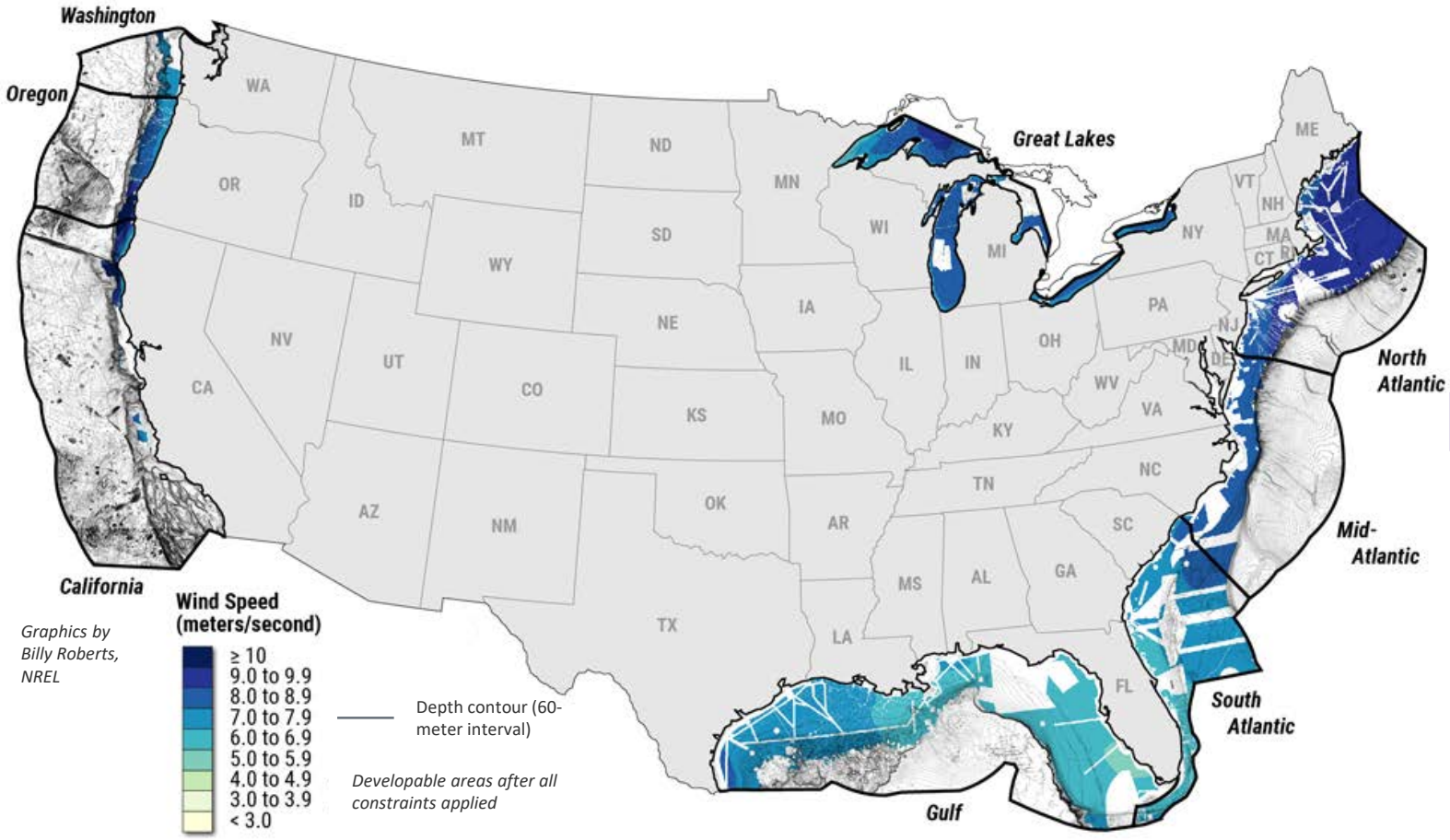
Locally Focused

Independent and Objective

Inclusive and Collaborative

Offshore wind energy potential

Gulf of Maine Research Institute



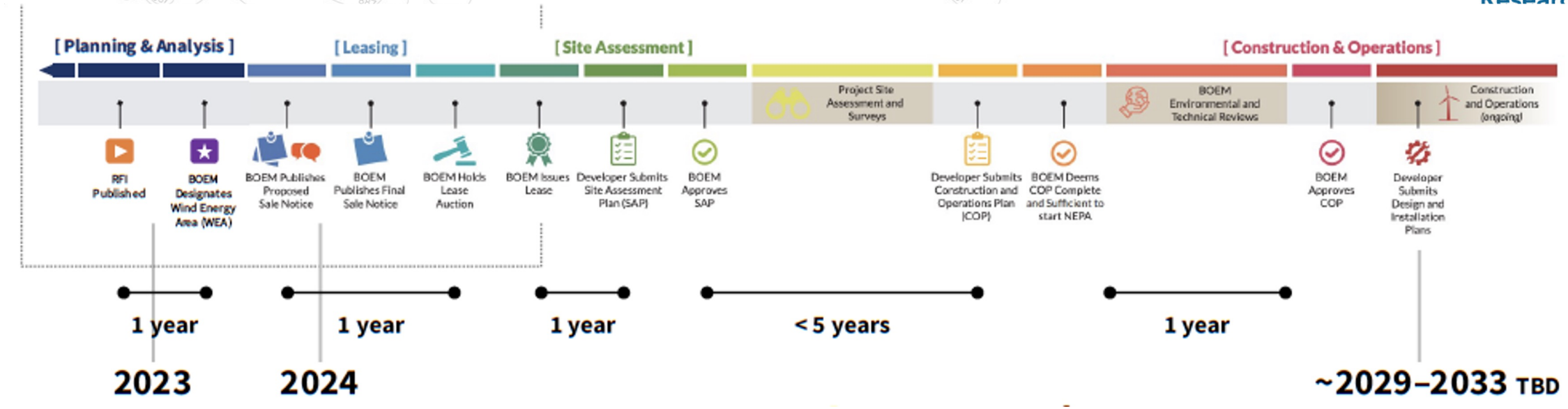
Region	Fixed-Bottom (GW)	Floating (GW)	Fixed-Bottom (%)	Floating (%)
California	4	88	4	96
Great Lakes	160	415	28	72
Gulf	696	867	45	55
Mid-Atlantic	157	166	49	51
North Atlantic	264	442	37	63
Oregon	2	150	1	99
South Atlantic	188	586	24	76
Washington	5	59	8	92
CONUS Total	**1,476**	**2,773**	35	65

*values are rounded to closest integer

Note: DOD-defined wind exclusion areas constitute an area equivalent to an additional 428 GW of California OSW wind energy potential.

Lopez et al. 2022 https://www.nrel.gov/docs/fy22osti/83650.pdf

Influence of Timeline on GMRI's Work



Now - end of 2024: ***Will*** offshore wind happen in the Gulf of Maine?

- Focus on sharing best available information and building capacity for stakeholder engagement

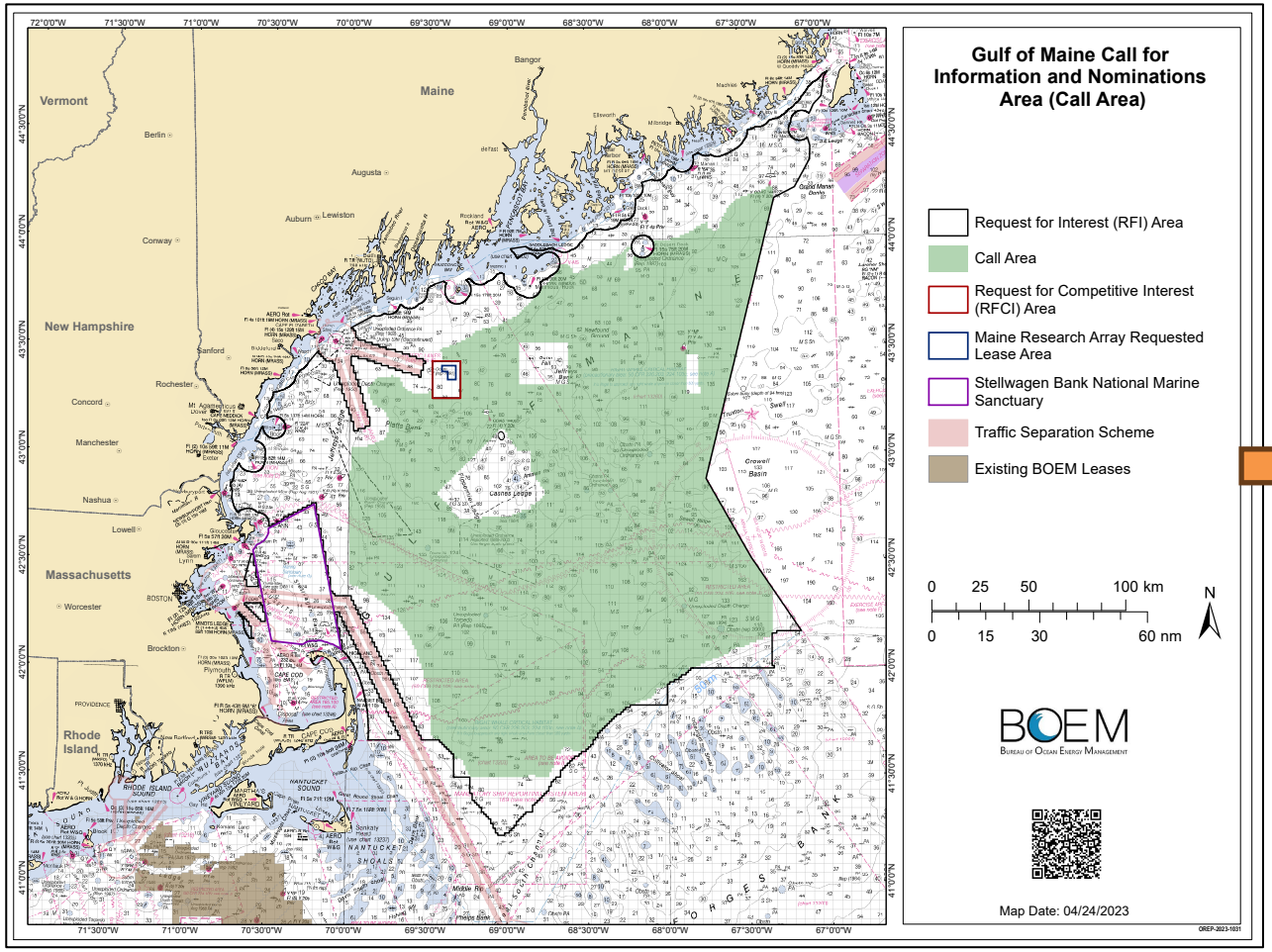
2024 - beyond: ***How*** will offshore wind be developed responsibly in the Gulf of Maine?

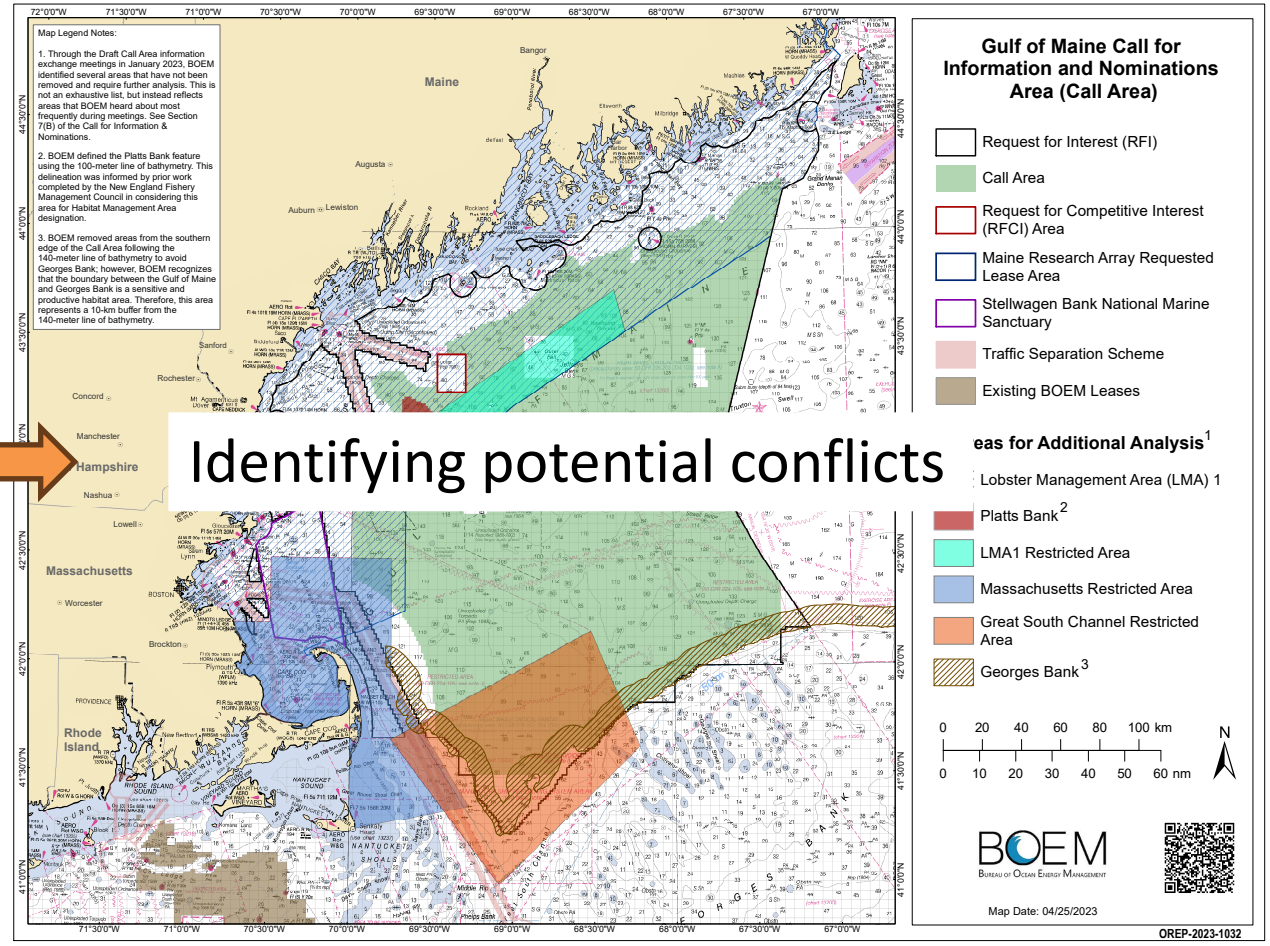
- New opportunities

Supporting fast-paced and dynamic process

Gulf of Maine Research Institute

April 2023



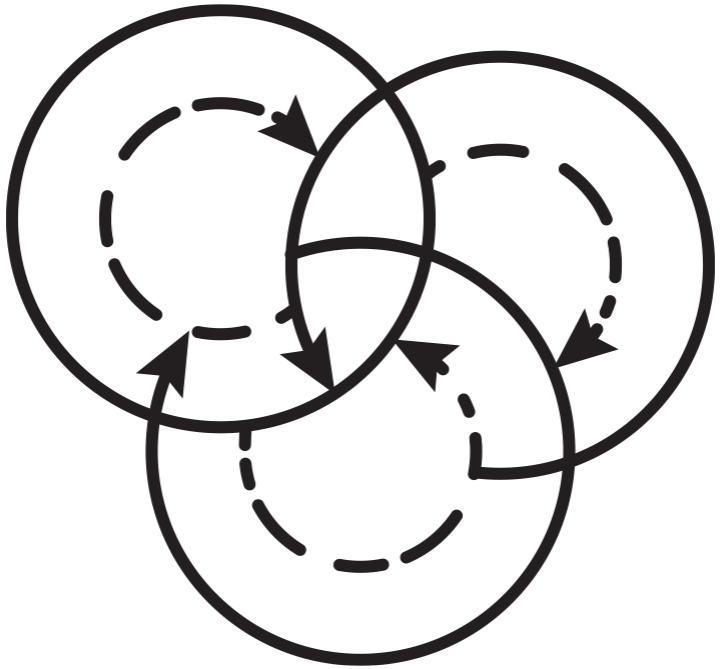


Identifying potential conflicts

Approach

Gulf of Maine Research Institute

Scientific Research



Convening

Knowledge Sharing

Scientific Research x Convening x Knowledge Sharing

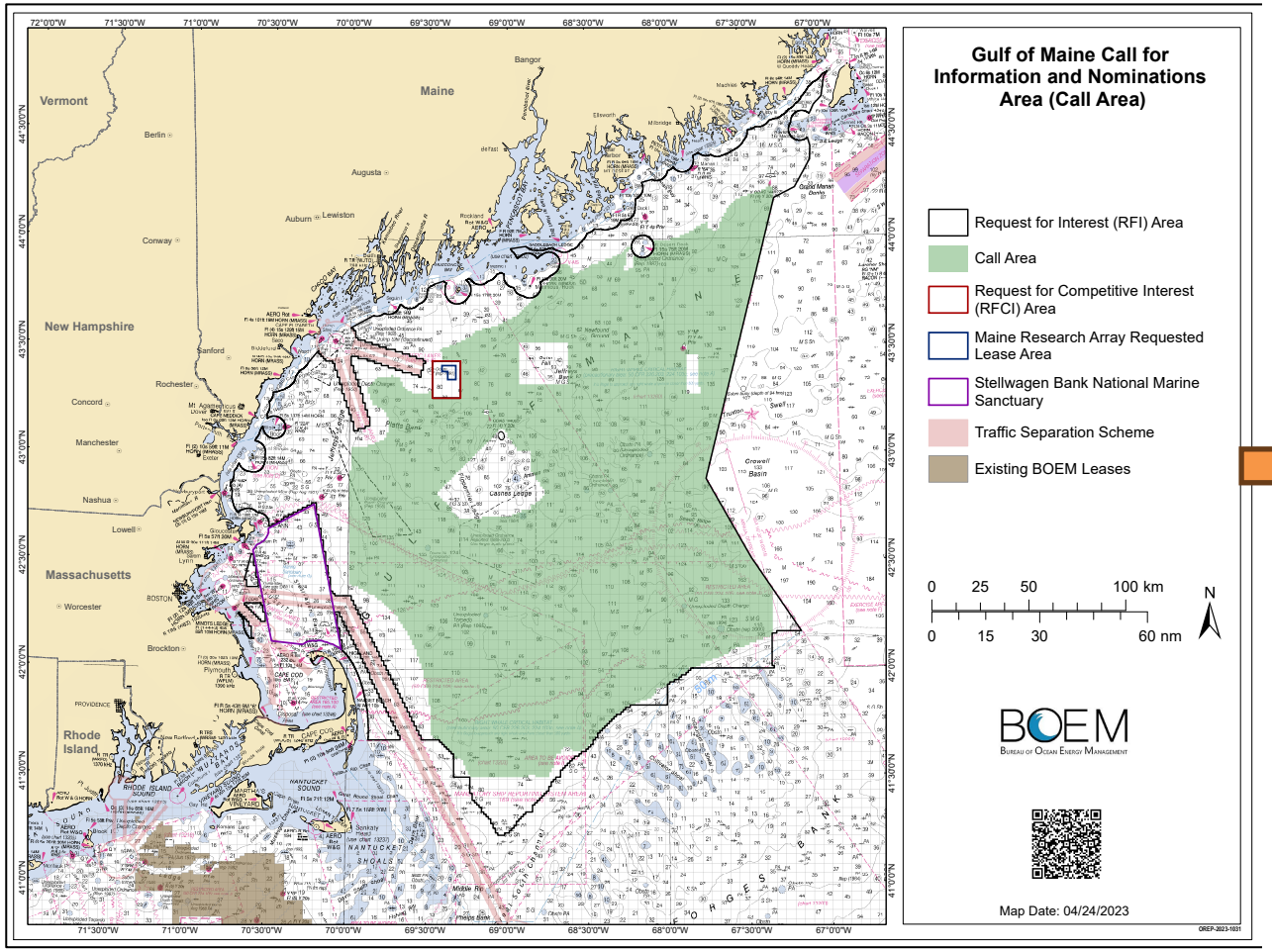
Gulf of Maine Research Institute

- Aligning efforts with BOEM process
- Supporting fishing communities engage with the process
  - 1:1 engagement with fishing community members
  - Convening port meetings
  - Providing resources (e.g., logistical support) for public comment

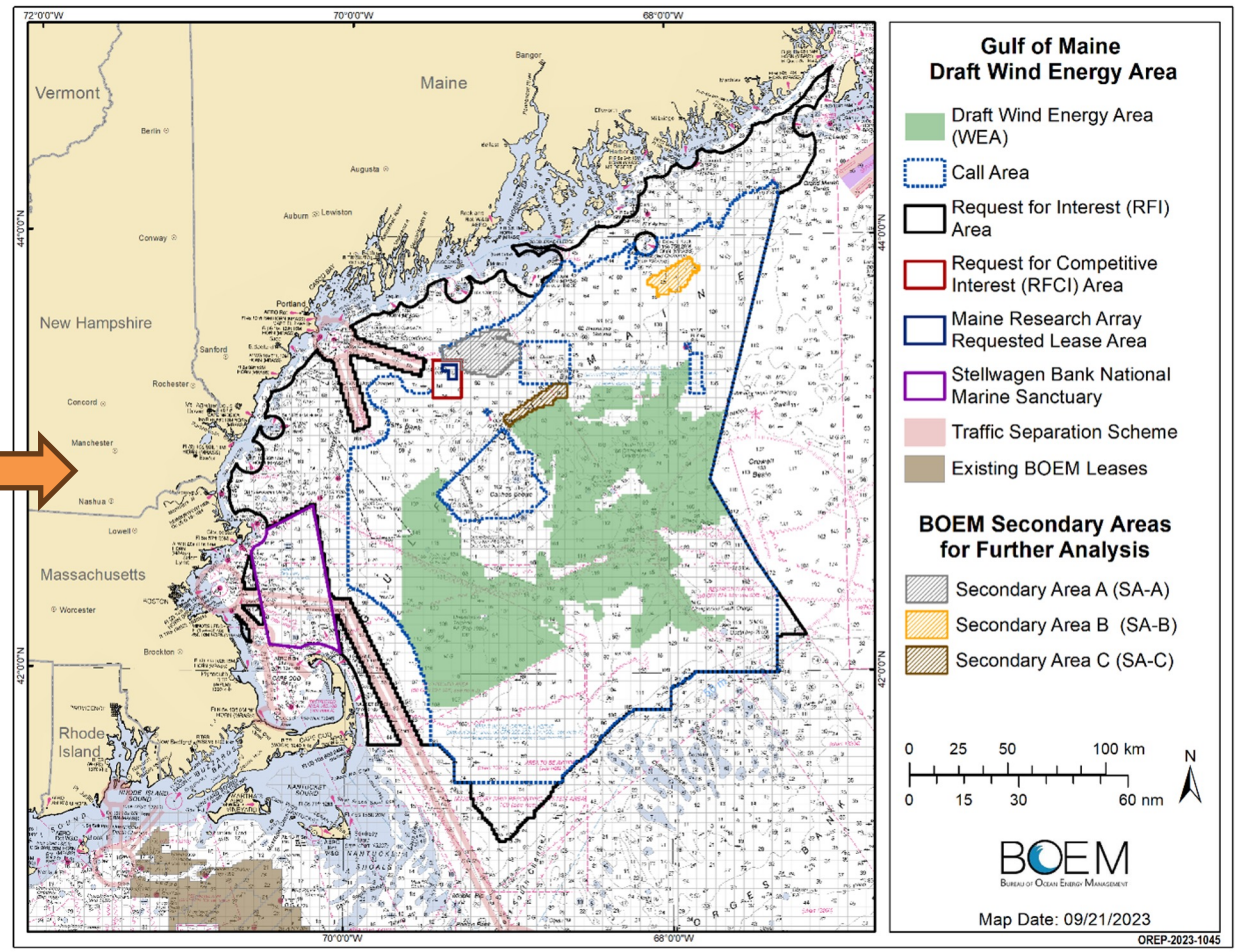
Supporting fast-paced and dynamic process

Gulf of Maine Research Institute

April 2023



September 2023



Scientific Research x Convening x Knowledge Sharing

Gulf of Maine Research Institute

Nov 2023 ~ Now: Public Comment for Draft Wind Energy Area

- 15 port meetings, attended by 163 coastal community members

Achievements

- Emerging consensus around a few locations to exclude, need for passage and potential passage
- Public comments drafted and submitted by participants
- Summaries submitted as public comment

Lessons learned

- Time for participants to freely express themselves at the beginning of the meeting
- Local social dynamics to inform the convening approach

Scientific Research x Convening x Knowledge Sharing

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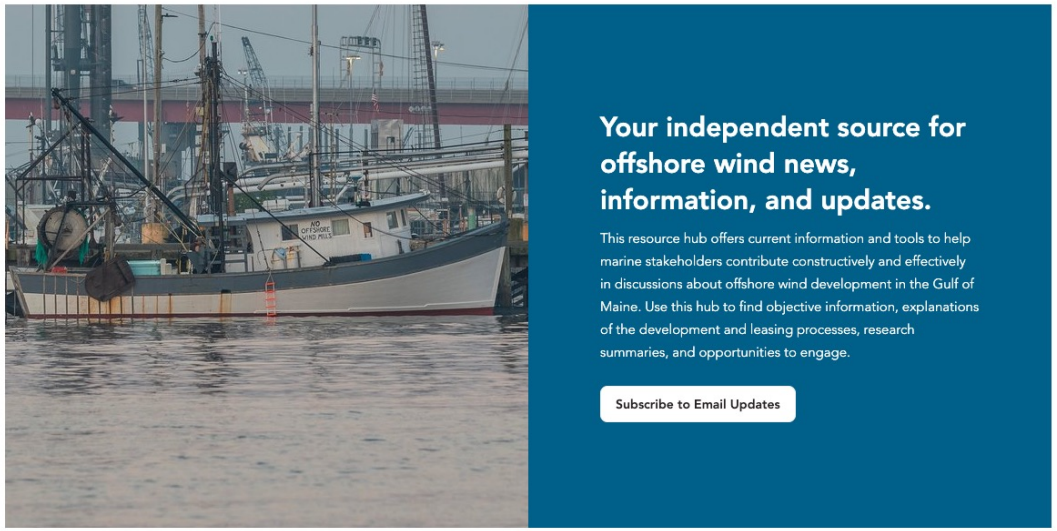
PROJECT

Offshore Wind Resource Hub



https://www.gmri.org/projects/offshore-wind-resource-hub/

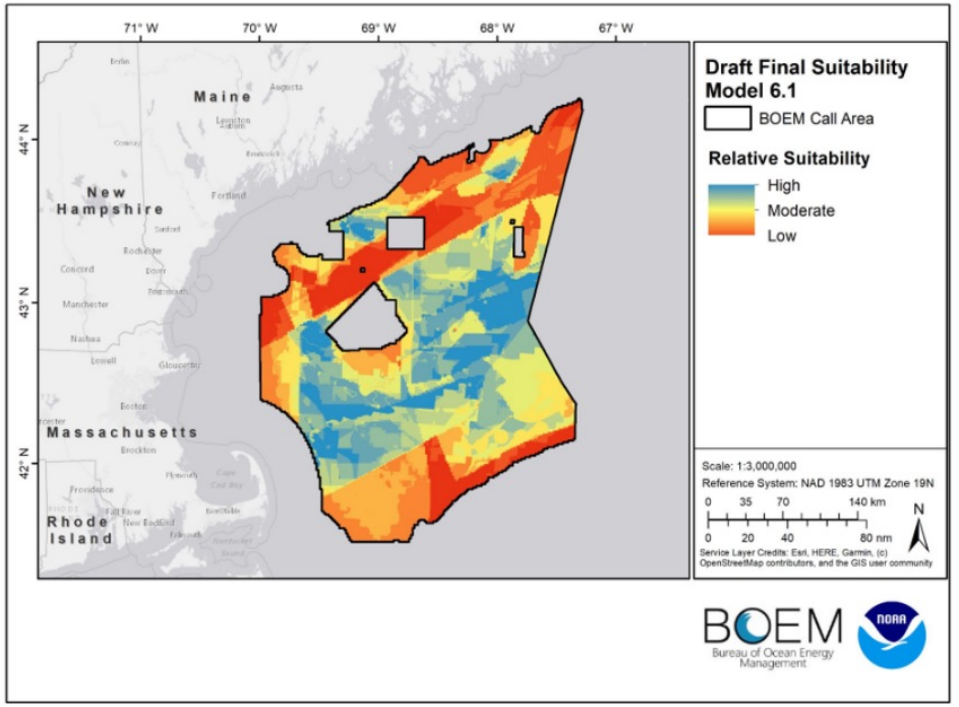


Figure 2 . Final suitability modeling results for the Call Area. Orange/red color indicates areas of lowest suitability (highest conflict) for offshore wind energy development. Green/blue color indicates areas of highest suitability for offshore wind energy development. Source: BOEM.

What goes into the Suitability Model?

The NCCOS Suitability Model is complex. To understand its function, it is important to understand what goes into the model and what the model is asked to do.

Data is acquired from many sources including - but not limited to - NOAA Fisheries, Northeast Ocean Data Portal, US Coast Guard, NCCOS, BOEM, state agencies, and the National Weather Service. 98 data layers were selected and then characterized into categories (submodels) that get calculated for suitability individually, and then cumulatively, to identify the most suitable areas for offshore wind development.

What is a submodel?

Scientific Research x Convening x Knowledge Sharing

Gulf of Maine Research Institute

Socioeconomic research workshop (January 2024)

Objective 1: Build an Understanding of Existing Research, Gaps, and Needs

- What socioeconomic research and assessment models exist in the Northeast, nation, and abroad? What were the key findings? Is there baseline information to include in future projects? What methods can be replicated?
- What case studies can provide examples in socioeconomic impact research? How do changes in fishing activity impact local employment and wages in economic sectors?

Objective 2: Streamline and Advance Economic Research on OSW

- What ongoing research can serve as a baseline for socioeconomic studies for the Gulf of Maine?
- What ongoing research efforts in the Northeast would benefit from cross-regional and interdisciplinary collaboration?

Objective 3: Create a Community of Practice

- How can successful methods and socioeconomic modeling approaches be replicated in the Gulf of Maine to provide the information needed by the fishing communities?

Scientific Research x Convening x Knowledge Sharing

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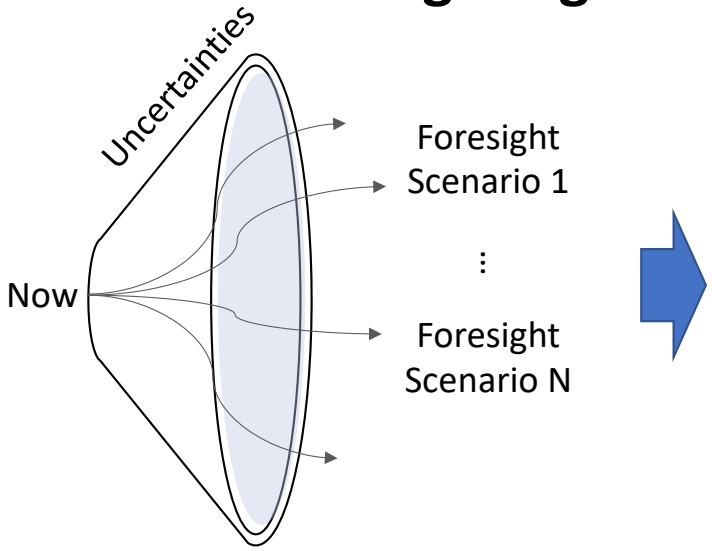
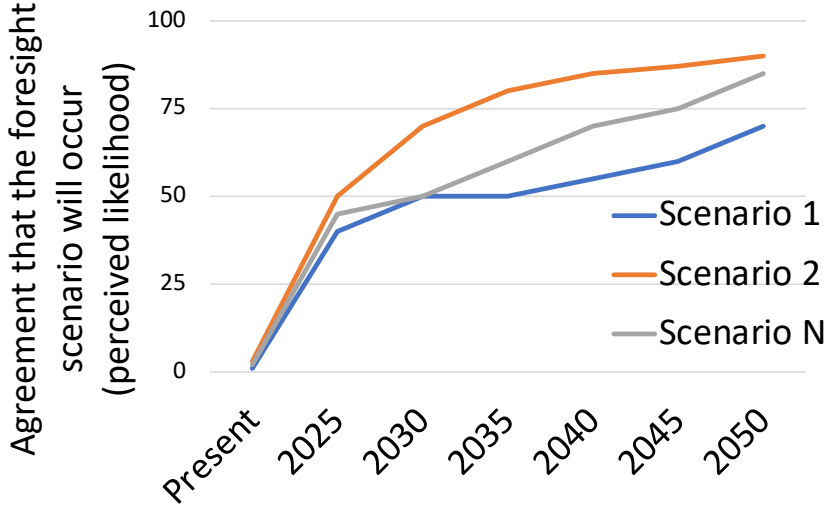
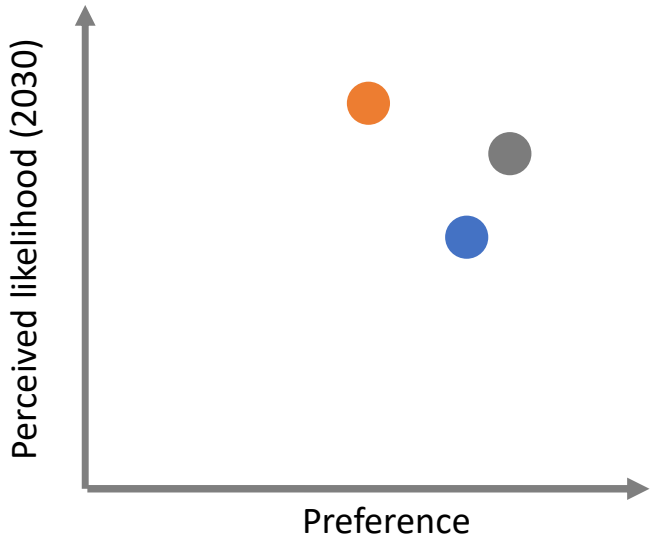
Quantitative "foresighting"



Example foresight scenario metrics

Foresight Scenarios	Implications	Preference	Perceived Likelihood (by 20XX)	Perceived Likelihood (by 20YY)
Co-location	Insurance challenge	★★★	XX%	YY%
…	…	…	…	…





Our Perspective

Gulf of Maine Research Institute

To realize opportunities of offshore wind development, the decision-making process must **recognize and respond** to the Gulf of Maine's cultural, ecological, and economic significance of coastal communities.

For offshore wind to be a **true solution** for the region, there must be **science-informed decision-making** and **effective stakeholder engagement.**

A process that includes stakeholders representing their interests **early and often,** grounded in the **best available science**, can help the region address the greatest long-term threat to our marine economy: climate change.

Thanks!

Kanae Tokunaga (ktokunaga@gmri.org)

Offshore wind in a Social-Ecological-Technical and Ethical system: Preparing for an ethical dialogue in a Nordic context

Rita Vasconcellos L. d'Oliveira Bouman,
SINTEF Ocean & FME NorthWind, Norwegian Research Center on Wind Energy

Offshore wind in a Social-Ecological-Technical and Ethical system

Preparing for an ethical dialogue in a Nordic context

Dr. Rita Vasconcellos d'Oliveira Bouman
SINTEF Ocean, Department of Climate and Sustainability

Teknologi for et bedre samfunn

Contents

1. Setting the Scene…
    1. Ethics
    2. Offshore Wind & Energy Transitions
2. Offshore Wind in SET Context
3. Keys to Dialogue : Normative Aspects
4. Conclusions

Introduction

Ethics perspective

Setting the Scene… What is Ethics?

Characteristics:

- What is right and wrong?
- Contextual

Object: Human Behaviour

"Morals are informed by ethics."

"Ethics is the science of morals."

Object: **MORALS and VALUES**

Characteristics:

- Reflective
- Interrogative
- (quasi) Universal

Introduction

Energy Transition

Setting the Scene… Energy Transitions

Green Transitions

Systemic changes in societies due to environmental crisis; mostly related to climate change and environmental degradation

Energy Transitions

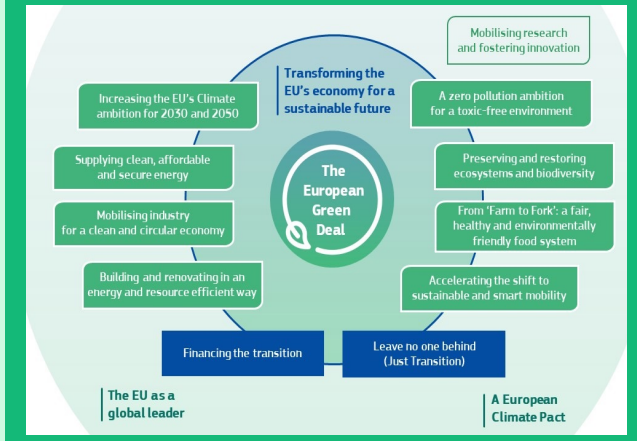
Shift in the global energy systems of production and consumption from fossil based-energy to renewable (green) sources

Setting the Scene… European Energy Transitions

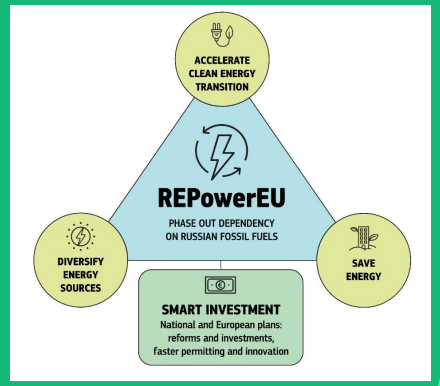
United Nations

EEA- European Economic Area

European Green Deal



RePower EU



Norway

Climate Action Plan for 2021–2030

2030 Agenda for Sustainable Development

Principle of 'Leave no one behind'

Teknologi for et bedre samfunn

SINTEF

Offshore Wind

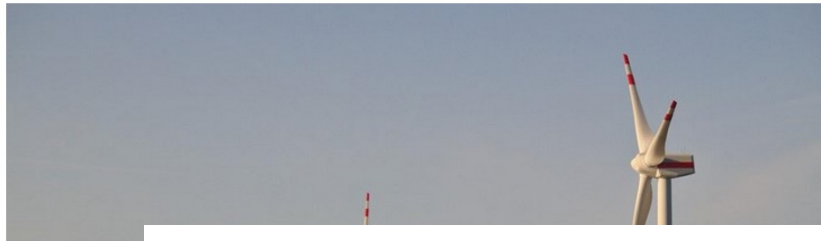
Current Situation

Offshore Wind: The saviour of the Energy Transition?

- Foreseeable fast and intense growth of offshore wind in short period
  - Meeting European energy production targets
  - Reaching climate goals
- Positive institutional landscape for implementation
  - Political & business support: countries (e.g., Belgium; Portugal or Spain)
  - New areas and projects all over Europe (and world)

NEWS ANNOUNCEMENT | 19 January 2023 | Directorate-General for Energy

Member States agree new ambition for expanding offshore renewable energy



US Approves Dominion Energy's 2.6 GW Coastal Virginia Offshore Wind Project

PLANNING & PERMITTING

October 31, 2023, by Adnan Memija

Share this article

The US Department of Interior (DOI) has approved the construction and operations plan (COP) for Dominion Energy's 2.6 GW Coastal Virginia Offshore

The Portuguese offshore wind market is expected to primarily consist of floating wind projects (source:

Portugal's offshore wind auction attracts 50 potential participants

17 Nov 2023 by David Foxwell

50 different entities have expressed interest in participating in the first offshore wind auction in Portugal

Offshore Wind: The saviour of the Energy Transition?

- Norwegian institutional landscape for implementation
  - Until recently… Political & business support
  - New areas open and projects

BUT

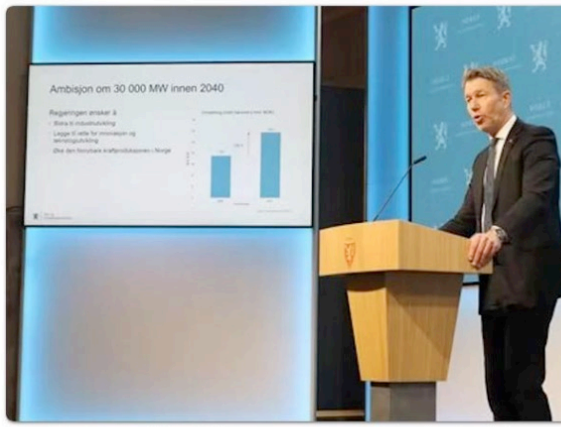
  - Growing fears of impactful delays or indefinite postponement..
- Growing social awareness and contestation
  - Potential spreading effect

RENEWABLE ENERGY

Norway sets target for Phase 1 offshore wind tend

The Norwegian government is seeking dialogue with the offshore wind sector and others to guide two offshore wind areas.

Dec. 7, 2022



Minister of Petroleum and Energy Terje Aasland presented the framework for allocating the areas phase of Sørlige Nordsjø II during a Dec. 6 press conference in Oslo.

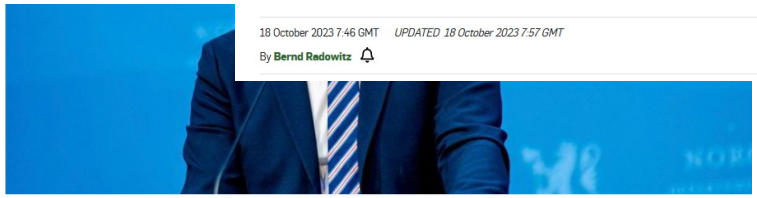
Norwegian oil and energy minister Terje Aasland. Photo: Per Ole Hagen/Redferns

Norway postpones floating wind tender indefinitely over EU rules talks

Nordic country also waters down pre-qualification criteria for bottom-fixed ar lined up for CfD auction

18 October 2023 7:46 GMT *UPDATED 18 October 2023 7:57 GMT*

By **Bernd Radowitz**



Norway's Oil & Energy Minister Terje Aasland. Photo: NTB/SCANPIX

European majors join race in Norway's first offshore wind tender

BP and Equinor throw names in hat for Norway's offshore wind auction after impairments in US projects

15 November 2023 14:37 GMT *UPDATED 15 November 2023 14:37 GMT*

By **Davide Ghilotti** and **Andrew Lee** in **London**

SET systems

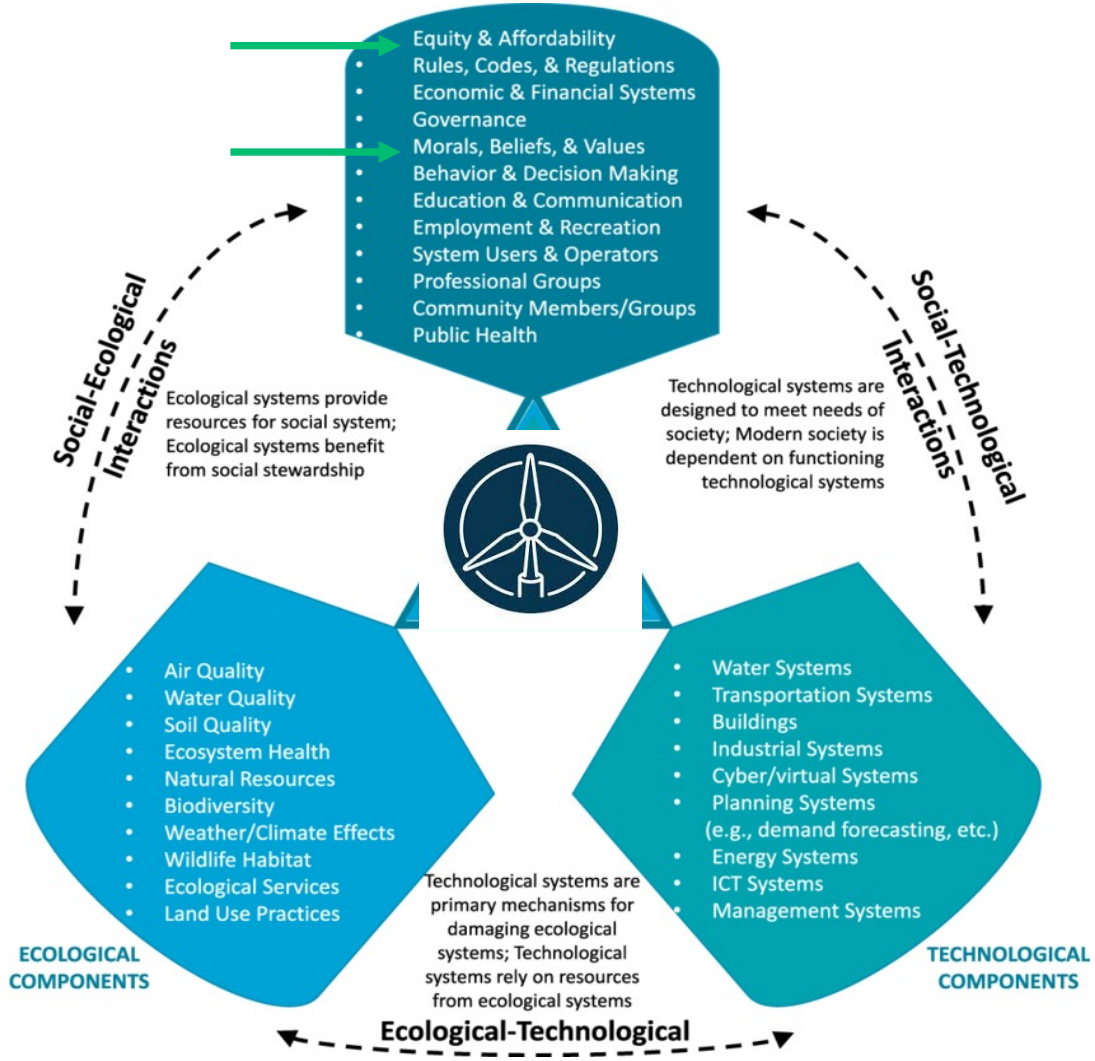
Offshore Wind in a SET framework

Chester et al. (2023)

Approach to understanding and formulating systems which are complex, adaptive and evolving by identifying the social, environmental and technological components and their interactions

Offshore Wind in a SET framework

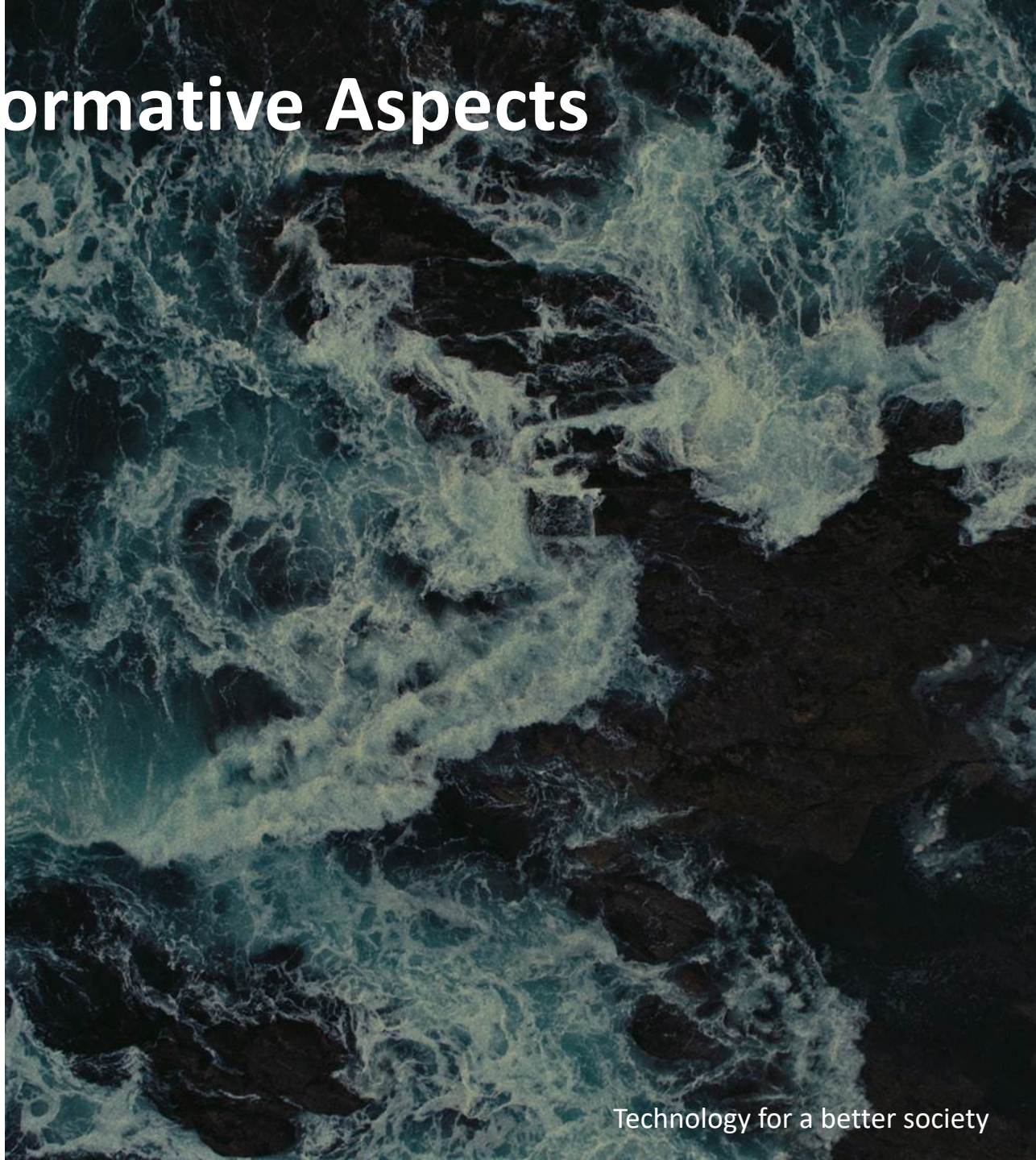
- Map factors for offshore wind
  - Ecological & environmental
  - Technological
  - Social & **Ethical**
- Identify the interconnections & linkages
  - Nature of the connections
  - How they influence each other
  - Polarity



Adapted from Markholf et al. (2018)

Preparing the Dialogue

Keys to Dialogue: Normative Aspects



Necessary to understand:

- What are the most relevant **ethical principles** and **values** embedded in (Norwegian) offshore wind debate?
- What are the (**competing)** normative **frameworks**?

Keys to Dialogue: Normative Aspects

PAPER • OPEN ACCESS

Whispers in the Wind: Ethical dimensions of social conflict in offshore wind

R Vasconcellos Oliveira[1,2]

Published under licence by IOP Publishing Ltd

Journal of Physics: Conference Series, Volume 2626, EERA DeepWind conference 2023 18/01/2023 - 20/01/2023 Trondheim, Norway

Citation R Vasconcellos Oliveira 2023 *J. Phys.: Conf. Ser.* **2626** 012070

DOI 10.1088/1742-6596/2626/1/012070

- Key Values
  - Justice
  - Nature
- Normative principles
  - *Great (er) Good*
  - Right to fruition
  - 'No harm', 'No Interference'

Social Controversies: Normative Aspects

Axiological examination

Justice

Intersectionality

Main Findings:

- Equitable distribution of benefits
- Recipients of the benefits (Which agents?)
- Compensations (How?)
  - Fair representation
  - Actual agency
  - Lack of good process guidelines
  - Future Generation's representation
    - Acknowledgement of misrepresentation and underrepresentation

(Energy) **Justice** (McCauley et al., 2013)

- Distributive
- Procedural
- Recognitition

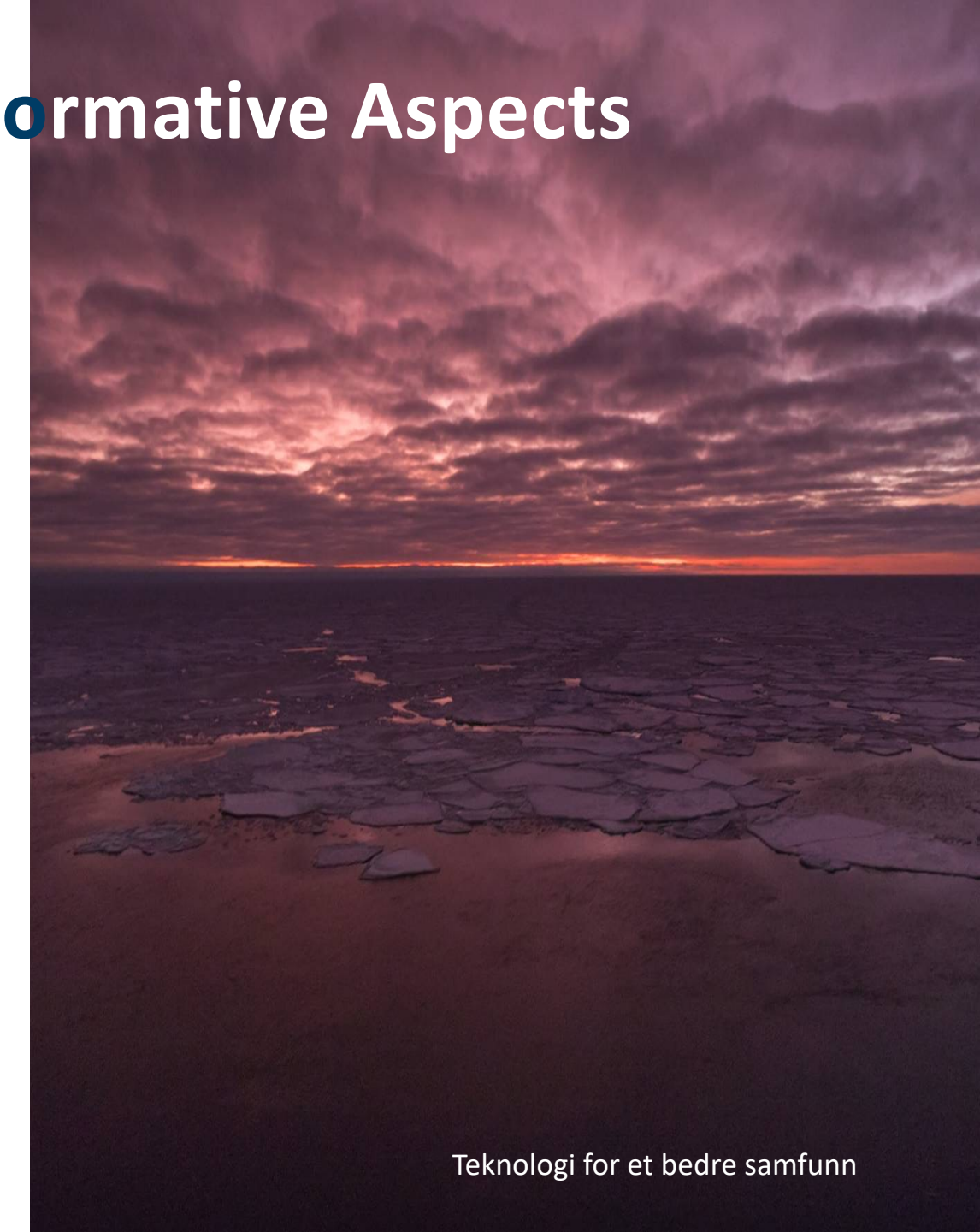
Social Controversies: Normative Aspects

Axiological examination

Nature

Main Findings:

- With (moral) Value
  - Non-human welfare
- Without (moral) Value
- Raking of relevance (climate vs biodiversity)
- Source of resources
  - Human wellbeing



Social Controversies: Normative Aspects

Principle examination

Main Findings:

- *Good* Technology
  - Increase amount of good (benefits – burdens)
  - (Increase or decrease) Human wellbeing
- *Right* Technology
  - Our duties towards nature- potential effect on environment
  - Rights (freedom, fruition…)

To reflect…

Social dynamics on offshore wind has strong normative roots

Face heads on clashing concepts of nature and justice

Positive (economic, social, environmental…) impacts do not concede moral acceptability

Identify an address conveniently the agents and their normative stance

Need to reflect on (human, animal & environmental) wellbeing

(Un)definition of procedural guidelines

Integrate temporal and dynamic dimensions

Addressing normative issues earlier in the process is key to successful design and implementation of offshore wind projects

Teknologi for et bedre samfunn

Dr. Rita Vasconcellos d'Oliveira Bouman

SINTEF Ocean, Department of Climate and Sustainability

rita.Bouman@sintef.no

Experiences and Expectations of Offshore Co-existence with Fisheries and other Maritime Sectors

Experiences from offshore wind and marine spatial planning in Sweden

Per Olsson

Unit director
Marine spatial planning Havs- och vattenmyndigheten Sweden

Proposal for amended Swedish Maritime Spatial Plans

NMTT

30 November, Bergen

Havs och Vatten myndigheten

Per Olsson

Per.olsson@havocvatten.se

Swedish Agency for Marine and Water Management (SwAM)

Havs och Vatten myndigheten

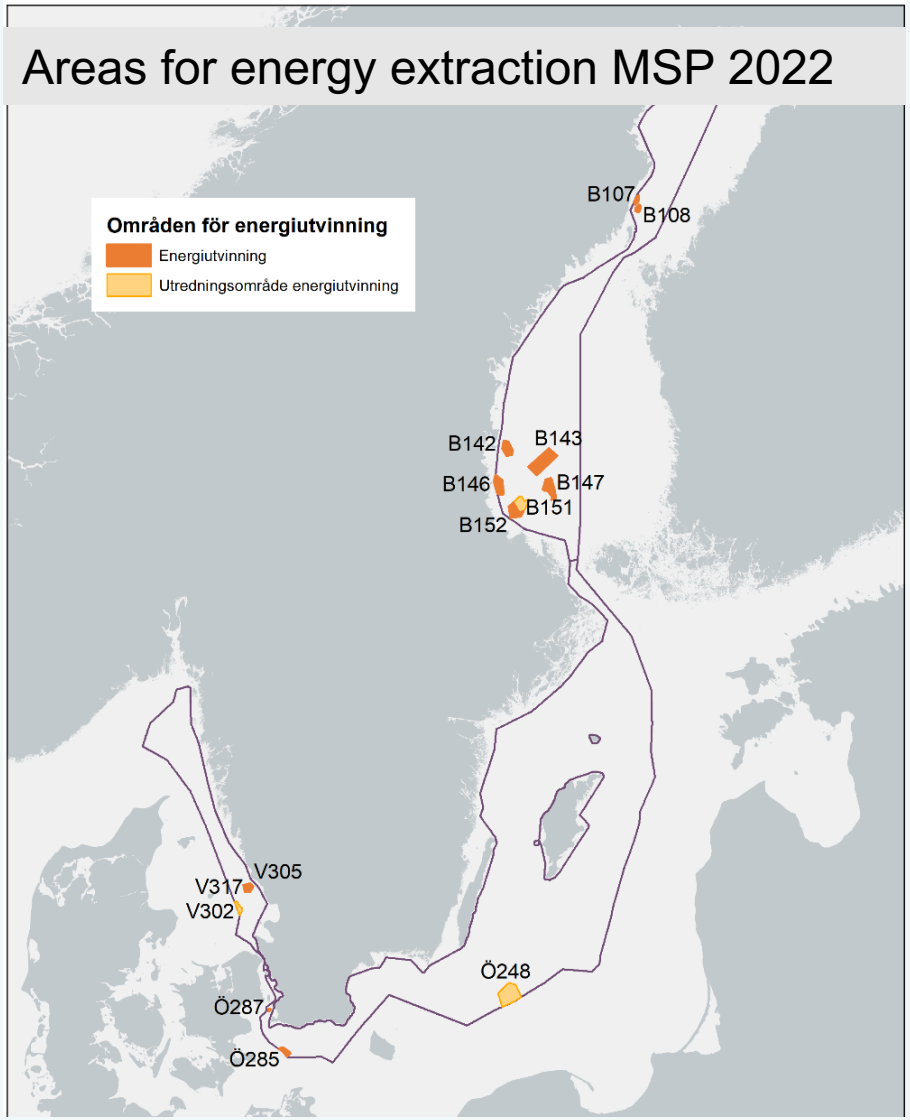
- Government agency, placed under the Ministry of Climate and Enterprise
- Responsible for the national management of Sweden's marine and freshwater environments, including fisheries management
- Approx. 350 + employees in 6 departments
- Headquarters in Gothenburg and Fisheries Inspection Offices in Gothenburg, Simrishamn and Karlskrona
- Commissioned to establish Sweden's marine spatial planning, MSP
- Preparation for MSP and implementation since the start of the agency in 2011 - Delivered plan proposals for government decision in December 2019.

www.havochvatten.se

Government assignment on new areas for energy extraction in the maritime spatial plans

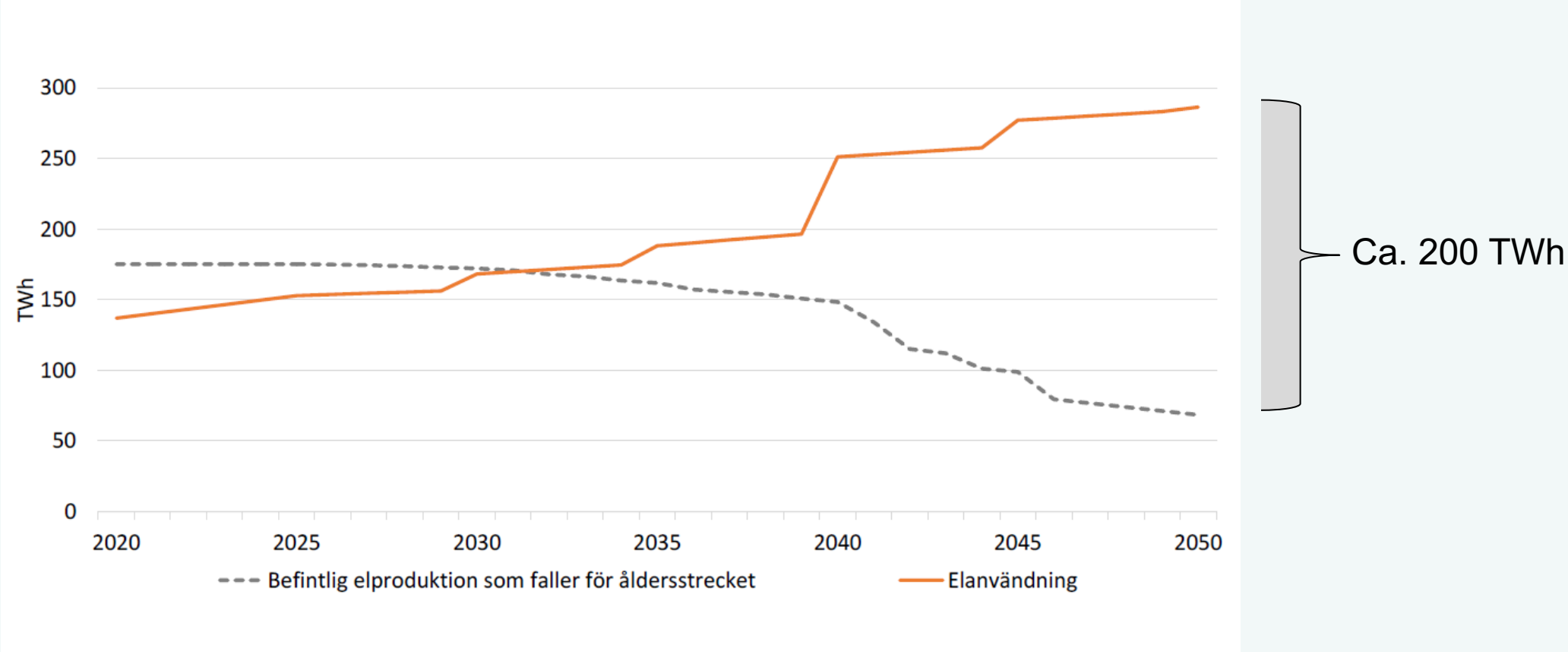
Havs och Vatten myndigheten

- February 2022 – Decision on Sweden's first maritime spatial plans.
- Designated areas in adopted marine spatial plans corresponding to approximately 60 TWh of annual production. Estimated to provide 20-30 TWh of annual production.
- Increased electricity production is required to achieve the climate and energy targets and to enable extensive electrification
- The maritime spatial plans need to be updated to allow for an additional 90 TWh.



Havs och Vatten myndigheten

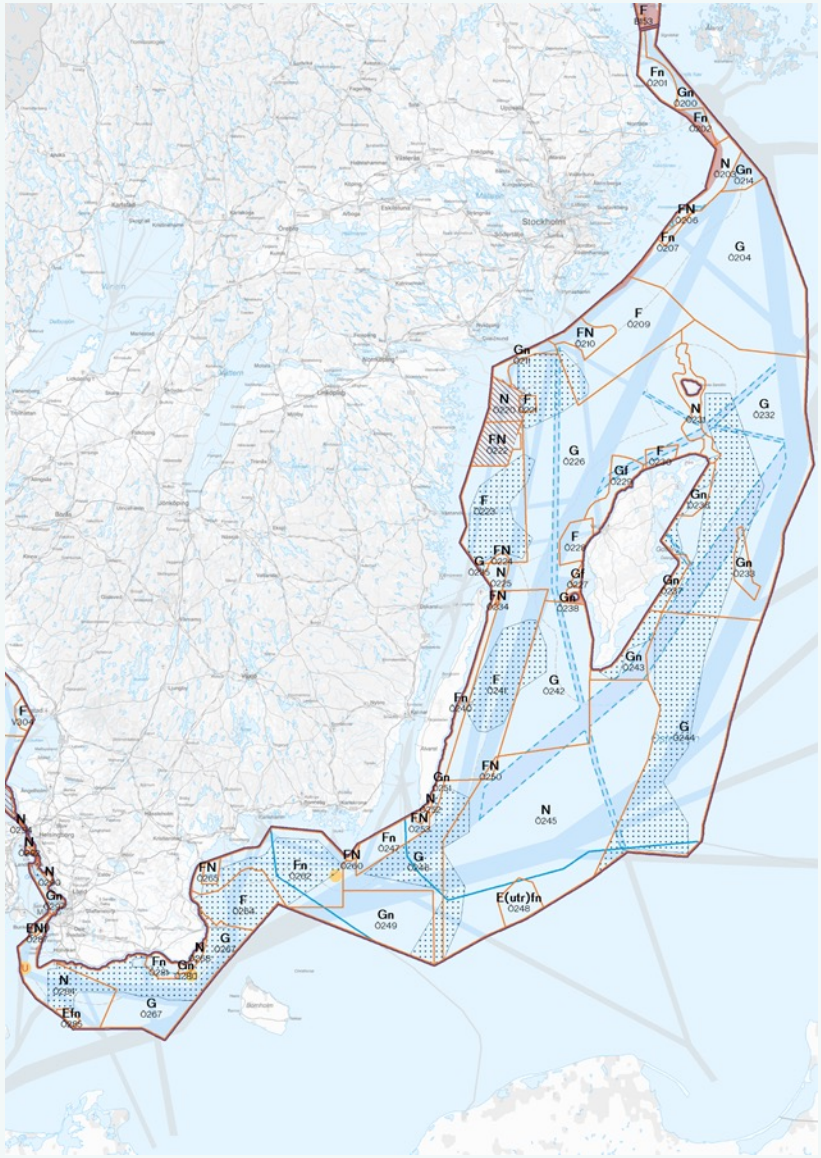
By 2050, new electricity production equivalent to approx. 200 TWh



Step 1 of the assignment – basis for new or changed areas for energy extraction

Havs och Vatten myndigheten

- Coordination by the Swedish Energy Agency
- The Energy Agency reported to the government in March 2023
- 9 authorities participated
- Describes the possibilities for coexistence between wind power and other interests
- 53 areas are proposed. No areas without conflicts of interest



Decided MSP 2022

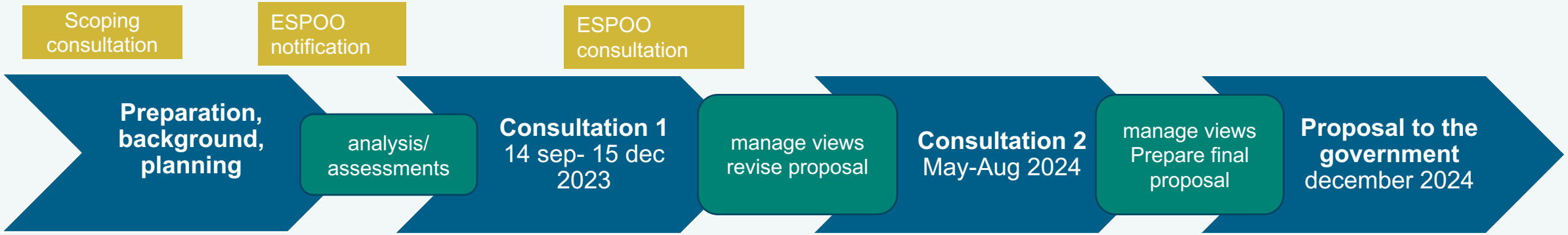
Stage 2 of the assignment – proposals for amended maritime spatial plans

Havs och Vatten myndigheten

- SwAM will develop proposals for amended marine spatial plans with new areas for energy extraction in the sea
- The result of step 1 is an important basis
- The proposals must be presented to the Government as soon as possible or no later than 31 December 2024
- The work is based on the Marine Spatial Planning Ordinance (2015:400)

Overall time schedule

Havs och Vatten myndigheten



1. Proposal
2. Impact assessment

1. Proposal
2. Impact assessment
3. Compilation consultation 1

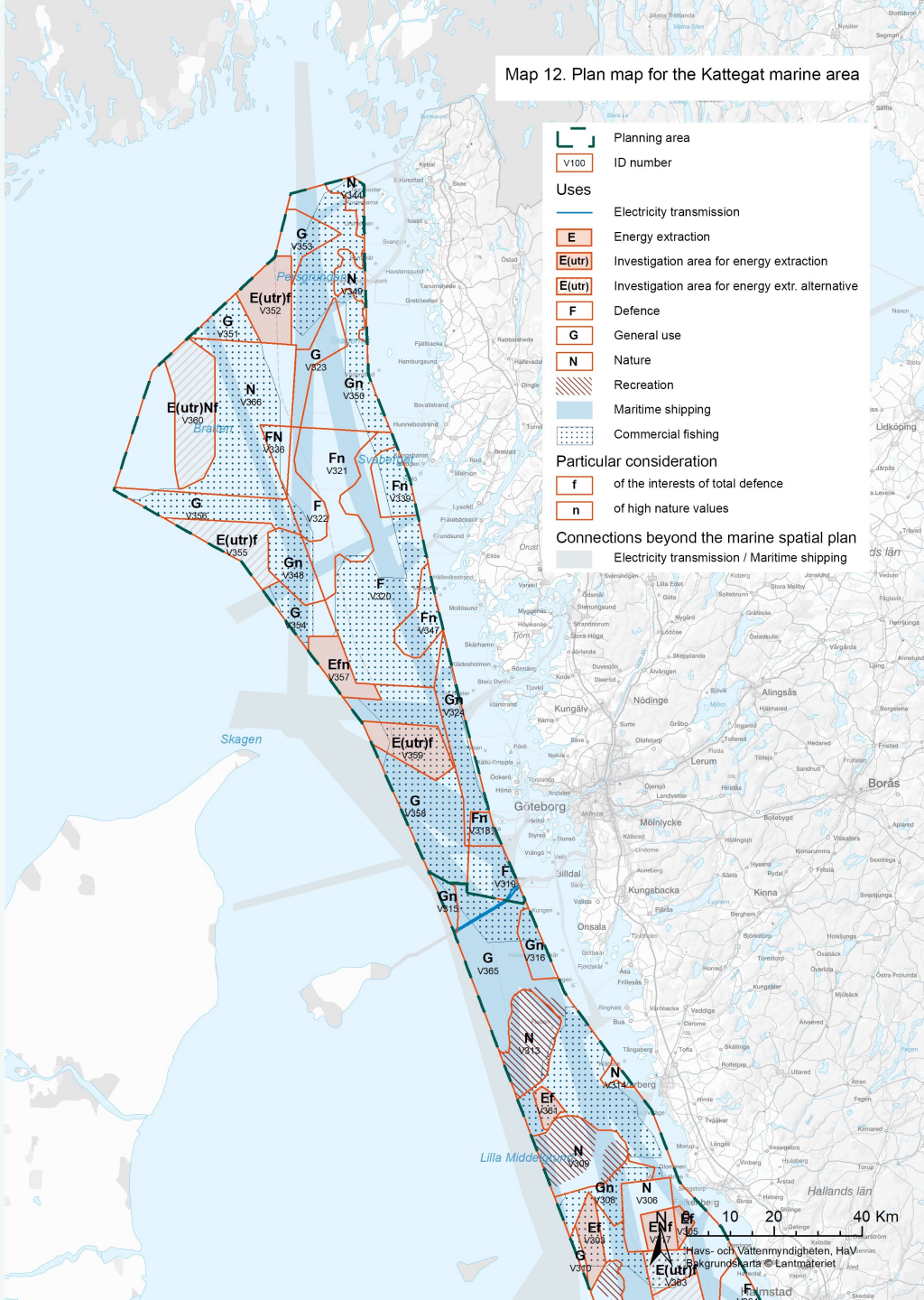
1. Final propsal
2. Impact assessment
3. Compilation consultation 1 & 2
4. Concluding remarks
5. Other background

Havs och Vatten myndigheten

Proposal for amended Swedish MSP

- Focus on Energy extraction, but also some adjustments for areas with particular consideration for high natural values and use Nature
- Plan proposal in seven parts:

1. Mission, Application, Process
2. Overall guidance, vision and goals
3. Gulf of Bothnia
4. Baltic Sea
5. Skagerrak / Kattegat
6. Meaning and consequences
7. Planning conditions



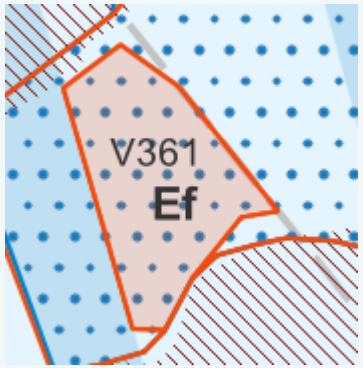
Proposals and alternatives for energy extraction

Havs och Vatten myndigheten

A. Areas of proposal

(24 areas, 101 TWh / 25 GW)

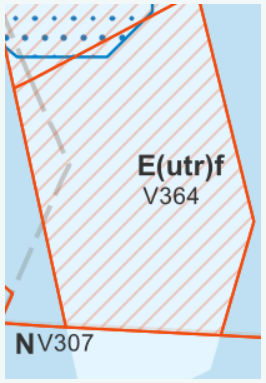
- Proposed areas for energy extraction ex:



B. Alternative areas

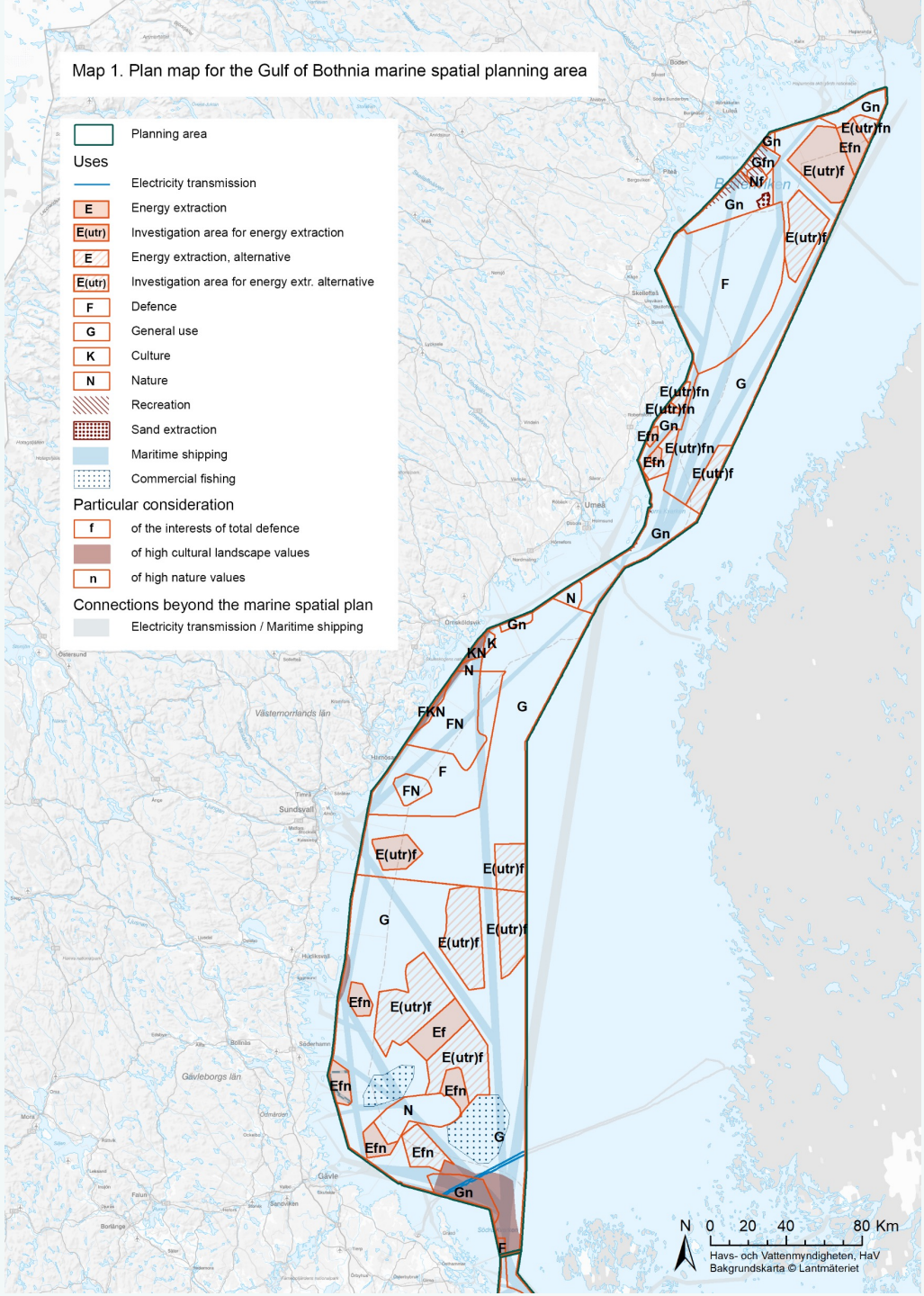
(33 areas, 279 TWh / 70 GW)

- to replace or supplement proposals for areas with energy extraction ex:



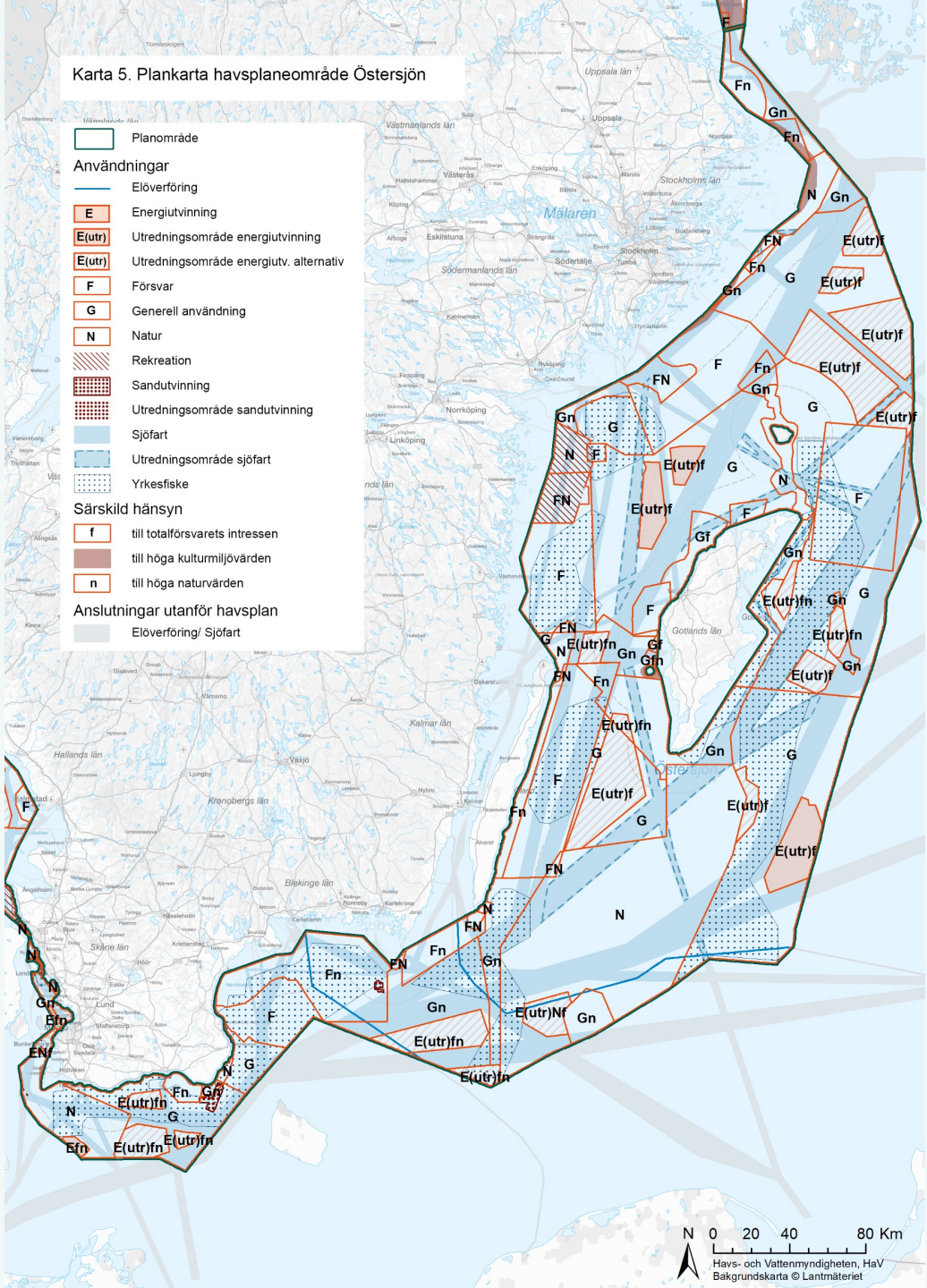
Gulf of Bothnia

- Good conditions for energy extraction and other activities
- UNESCO World Heritage, small scale fisheries and high nature values
- Ice-formation and winter navigation – need for more knowledge
- 11 proposed energy areas and 11 alternatives
  - In general – less conflicts of interest
  - More proposed energy areas in the territorial sea than other marine planning areas
  - Large parts available for bottom fixed foundations
  - Good conditions for grid connection (after 2033)



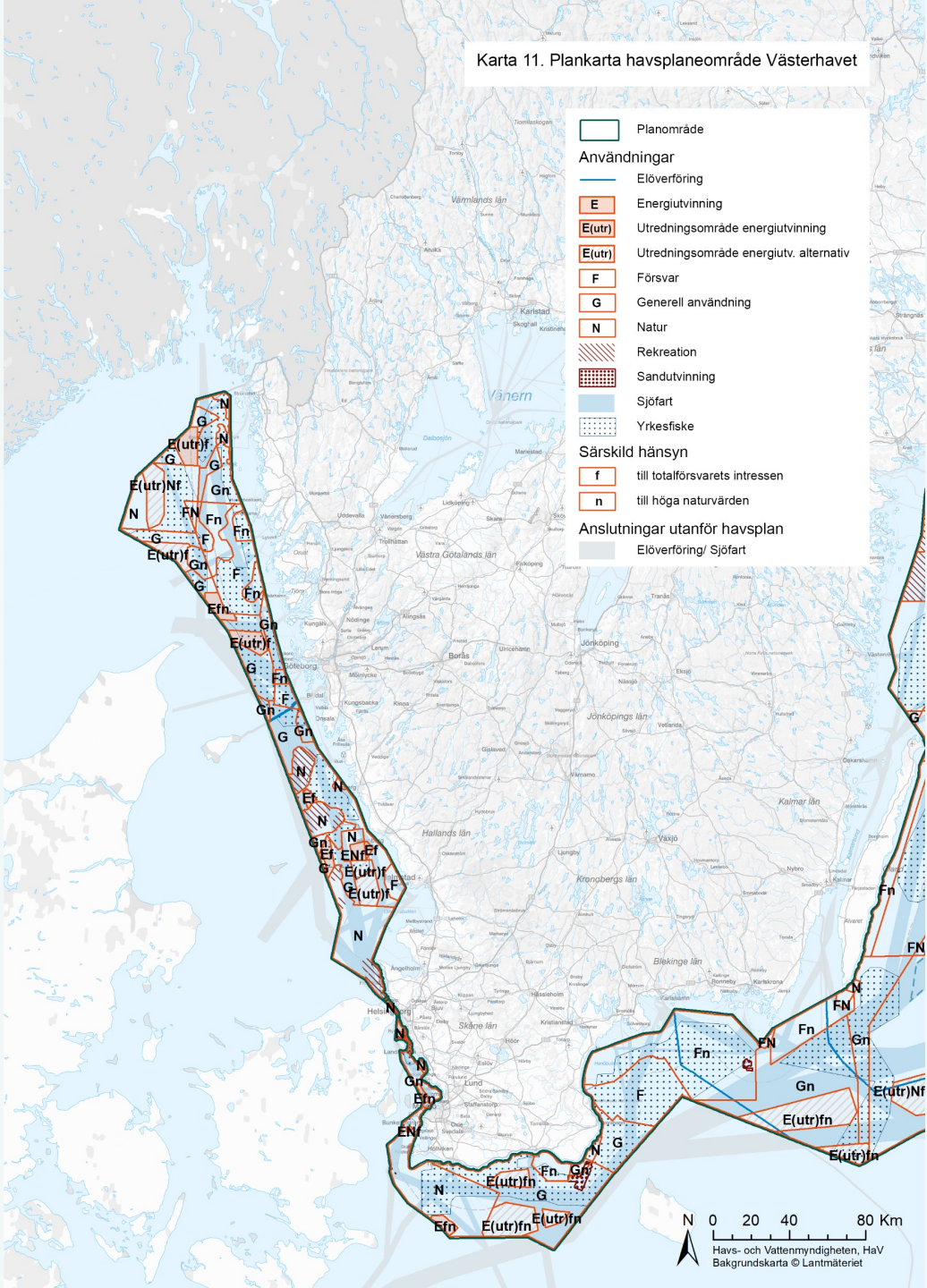
Baltic Sea

- Extensive national defence interests
- Shipping and fishing
- High nature values (eg. birds and harbour porpoise) and recreational values
- Big electricity demand, uncertainties grid connection
- 6 proposed energy areas and 18 alternatives
  - Some areas with few but intractable conflicts
  - Major uncertainties surrounding the military interests of total defence
  - Natura 2000



Skagerrak and Kattegat

- High nature values, recreation and tourism
- Extensive commercial fishing, large share of the area
- Important area for energy extraction
- 7 proposed energy areas (including 3 existing permits) and 4 alternatives
  - Swedish Armed Forces in general more positive
  - Permits for OW issued in some areas
  - Difficulties or challenges in coexistence with commercial fishing in some areas



Havs och Vatten myndigheten

Impact assessment

Havs och Vatten myndigheten

Assessment aspects

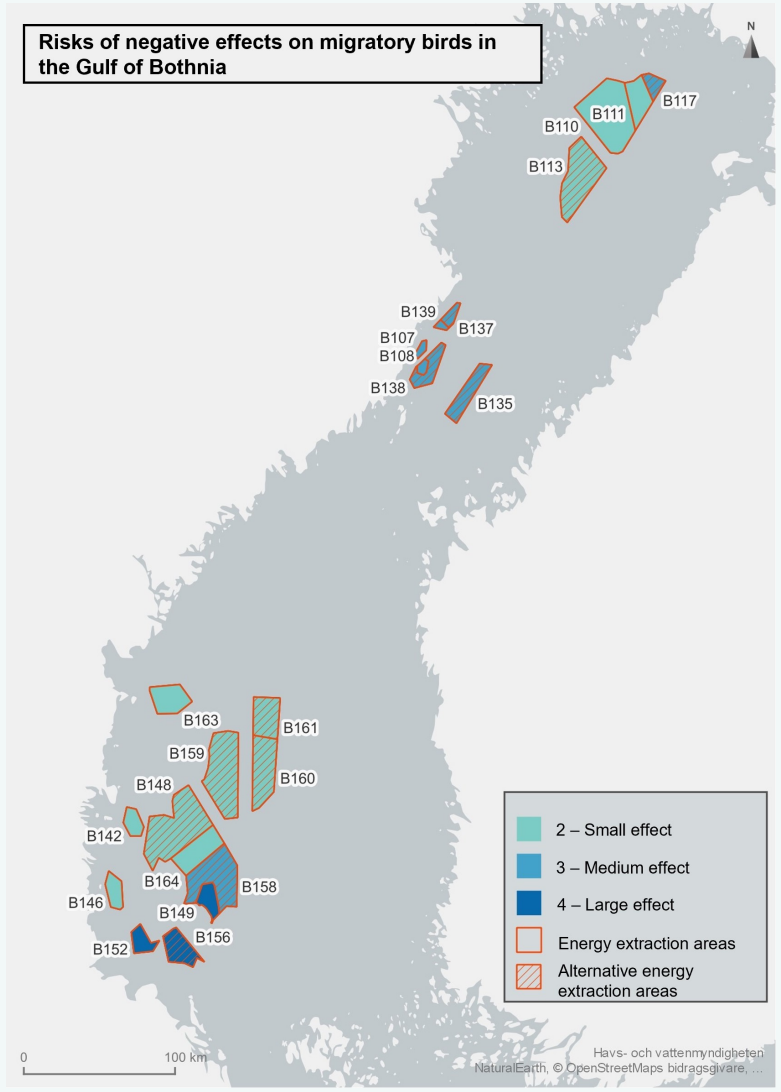
Environmental aspects	Economical aspects	Social aspects
• Birds • Marine mammals • Benthic environments • Fish and spawning • Water and air • Climate	• Commersial fishing • Energy extraction • Shipping	• Population and health • Cultural environment • Outdoors and recreation

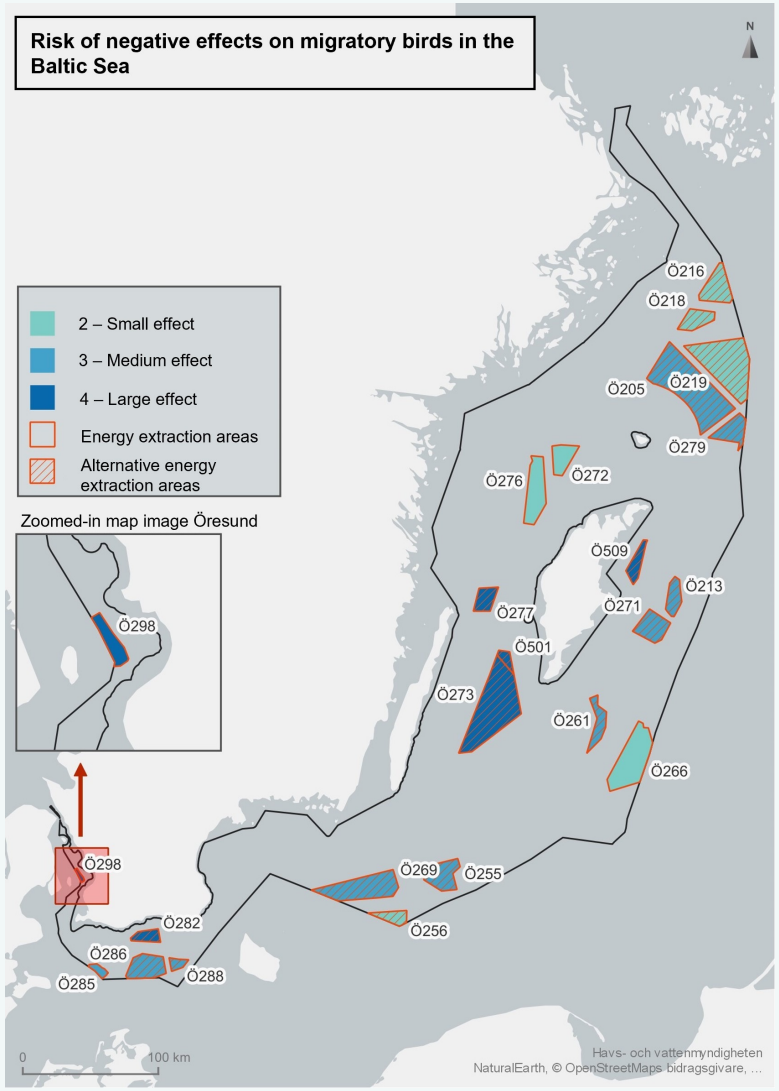
Birds

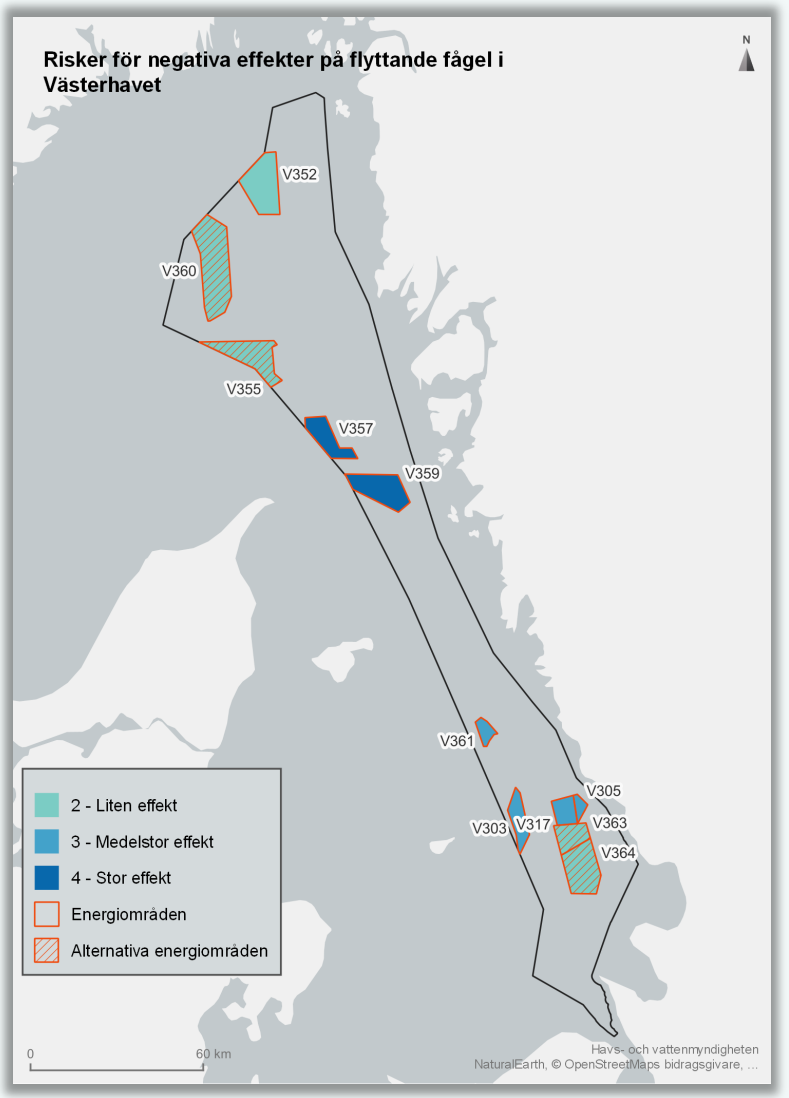
» Risk areas

- Migratory bird routes, bottlenecks
- Coherent areas along the coast
- Displacement from foraging areas

Havs och Vatten myndigheten







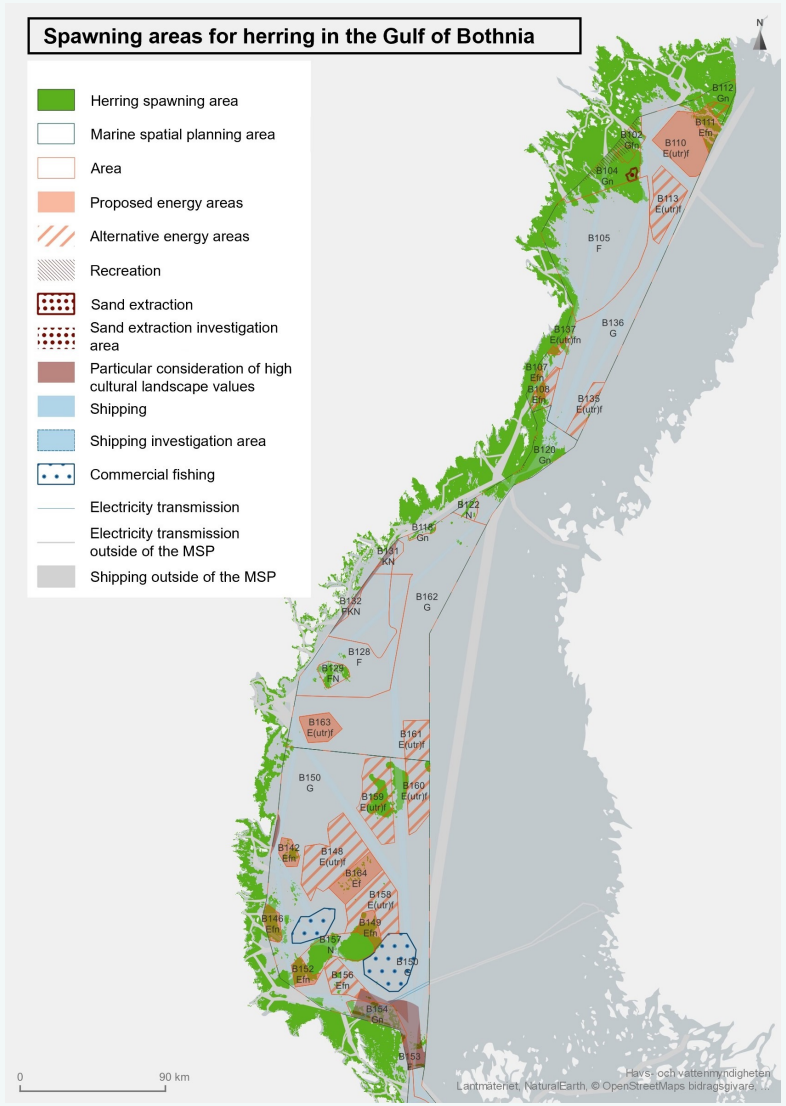
Havs och Vatten myndigheten

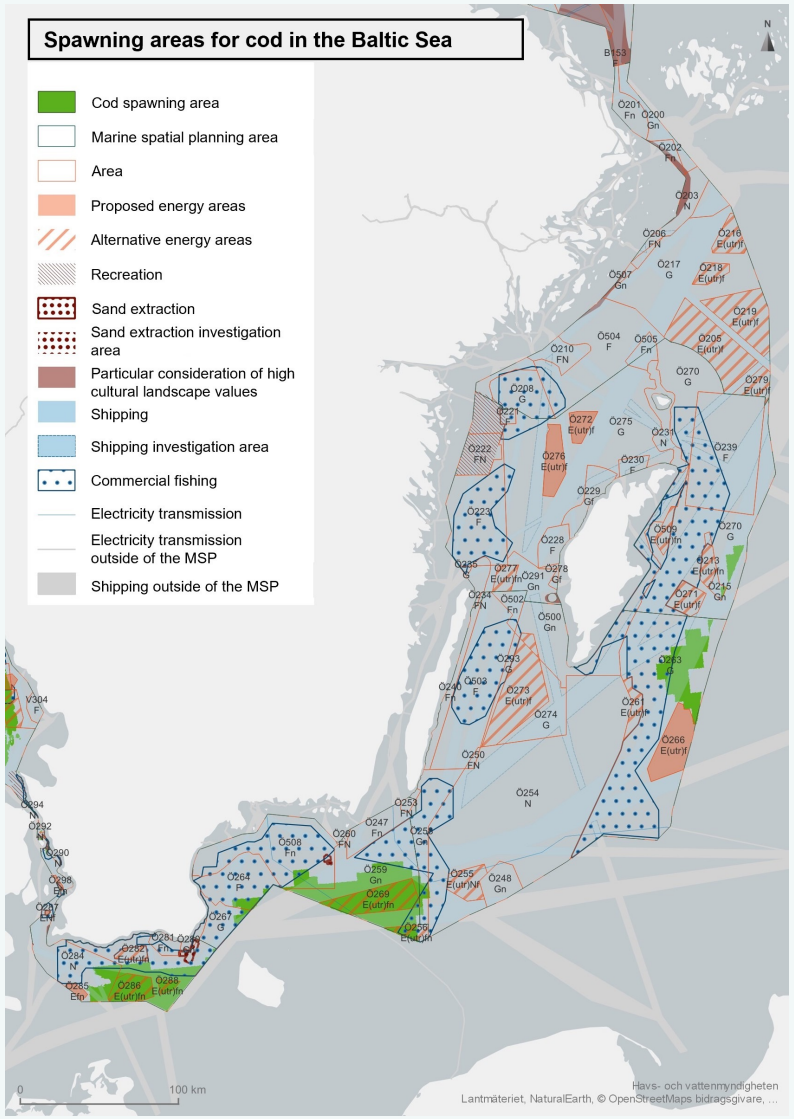
Marine mammals

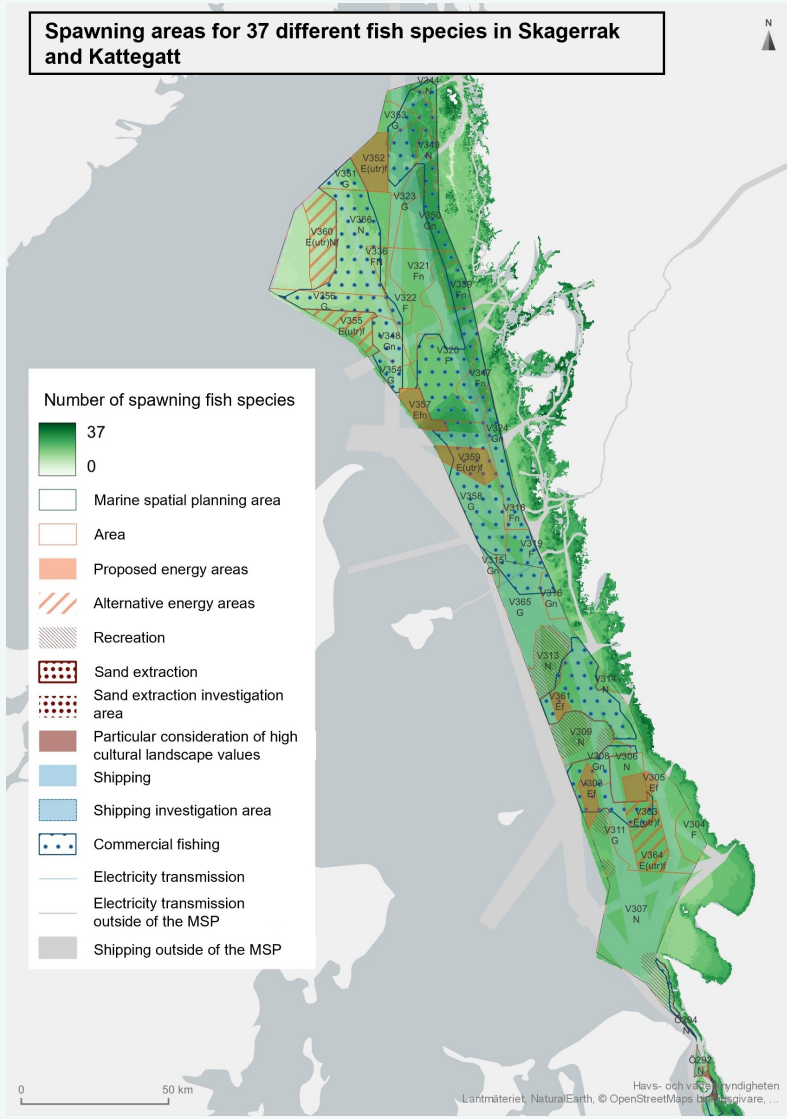
- Disturbance in connection with the installation of offshore wind power.
- Greater risk within the Baltic harbor porpoise's distribution area in the south-eastern and central Baltic Sea, given the population's acutely threatened status.
- Negative impacts should in most cases be minimized to acceptable levels by means of noise reduction measures and by avoiding disturbance during sensitive reproduction periods.
- The long-term effects during the operational phase are insufficiently studied → caution in the pace of establishment and avoidance of a large number of wind power projects in important habitats.

Fish and Spawning

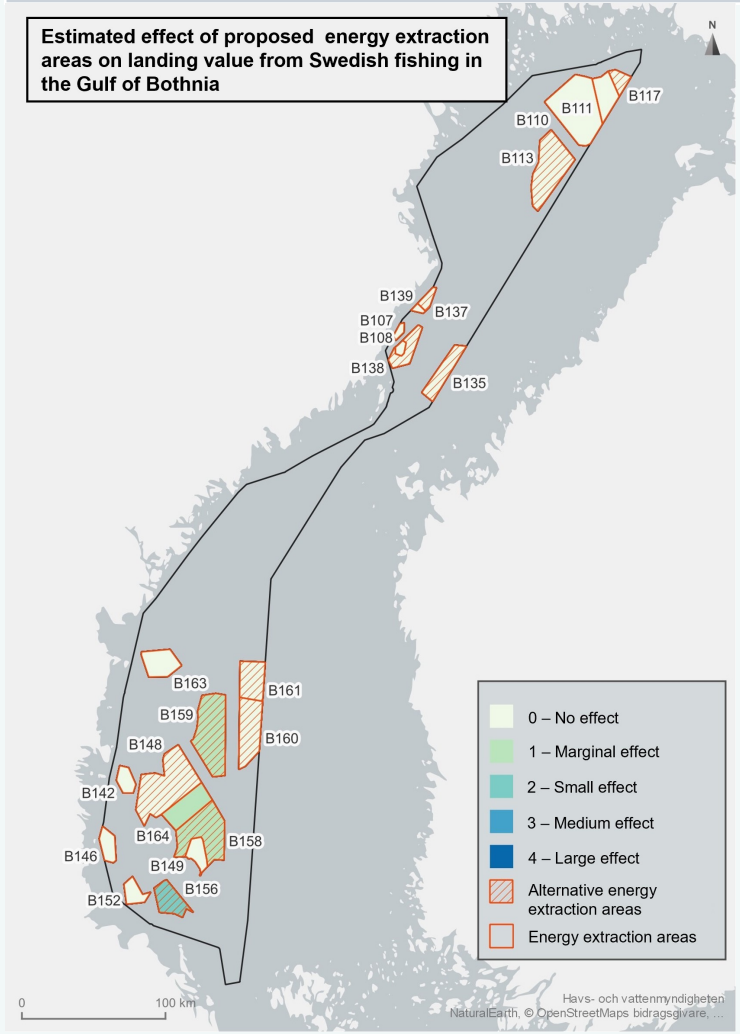
- Offshore wind power does not pose a threat to fish species or fish populations
- Assessment of local effects is necessary, incl. impact on spawning and juvenile phases

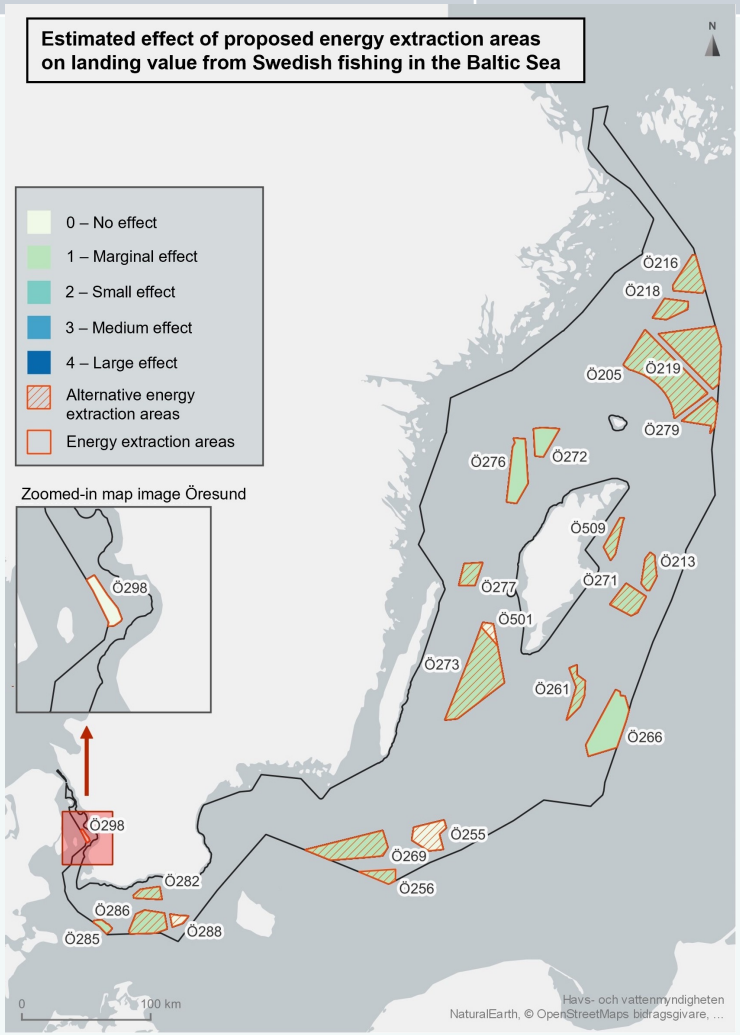


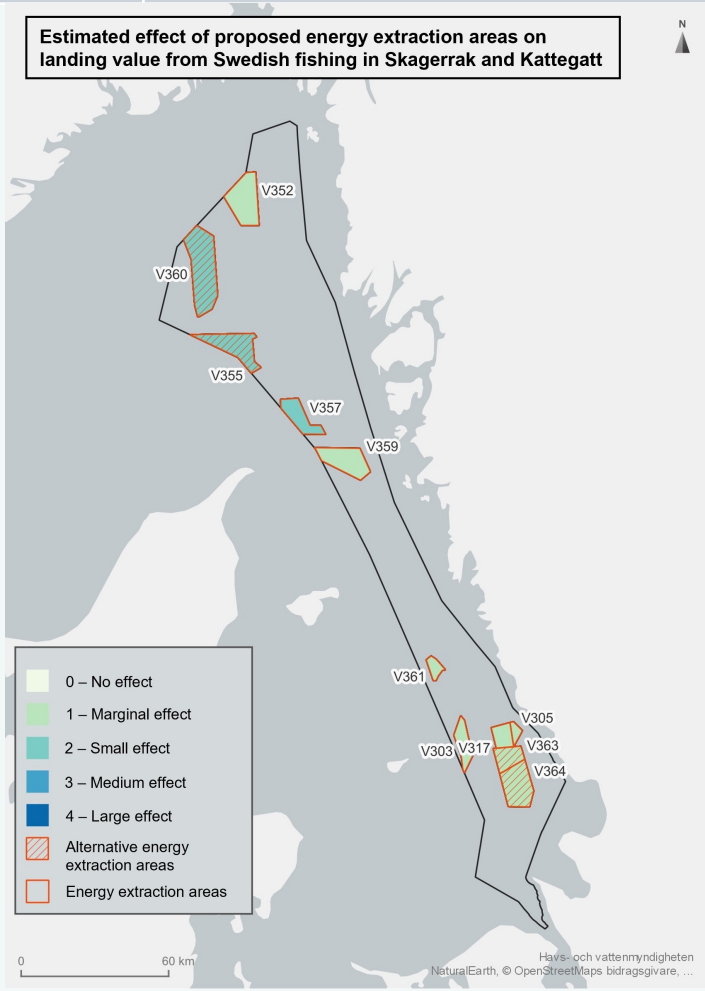




Commersial fishing	Bothnian bay	Baltic Sea	Skagerrak/Kattegat
Areas of proposal	143 tkr (0,02%)	1 195 tkr (0,2%)	6 377 tkr (1,0%)
Proposals and alternatives	1 020 tkr (0,16%)	7 984 tkr (1,2%)	14 002 tkr (2,2%)
Most affected fisheries % - procentandel av det årliga landningsvärde för det svenska fisket	Migratory trawls for pelagic species	Migratory trawls for pelagic species	Demersal trawling for shrimp, Norway lobster or fish







Thank you!

Havs
och Vatten
myndigheten

The Norwegian cross-Directorate marine spatial planning experience

Kari Grundvig

Directorate of Fisheries, Norway

The Norwegian Cross-Directorate marine spatial planning experience

Kari Grundvig
Senior Advisor

DIRECTORATE OF FISHERIES

Bergen, Nov 30th 2023

Main objective

The Directorate of Fisheries' shall promote profitable economic activity through sustainable and user-oriented management of marine resources and marine environment.

Areas of operation

- Management of marine resources
- Aquaculture management
- Coastal Zone Management


Our vision:
Marine life – our common responsibility
DIRECTORATE OF FISHERIES

Norway

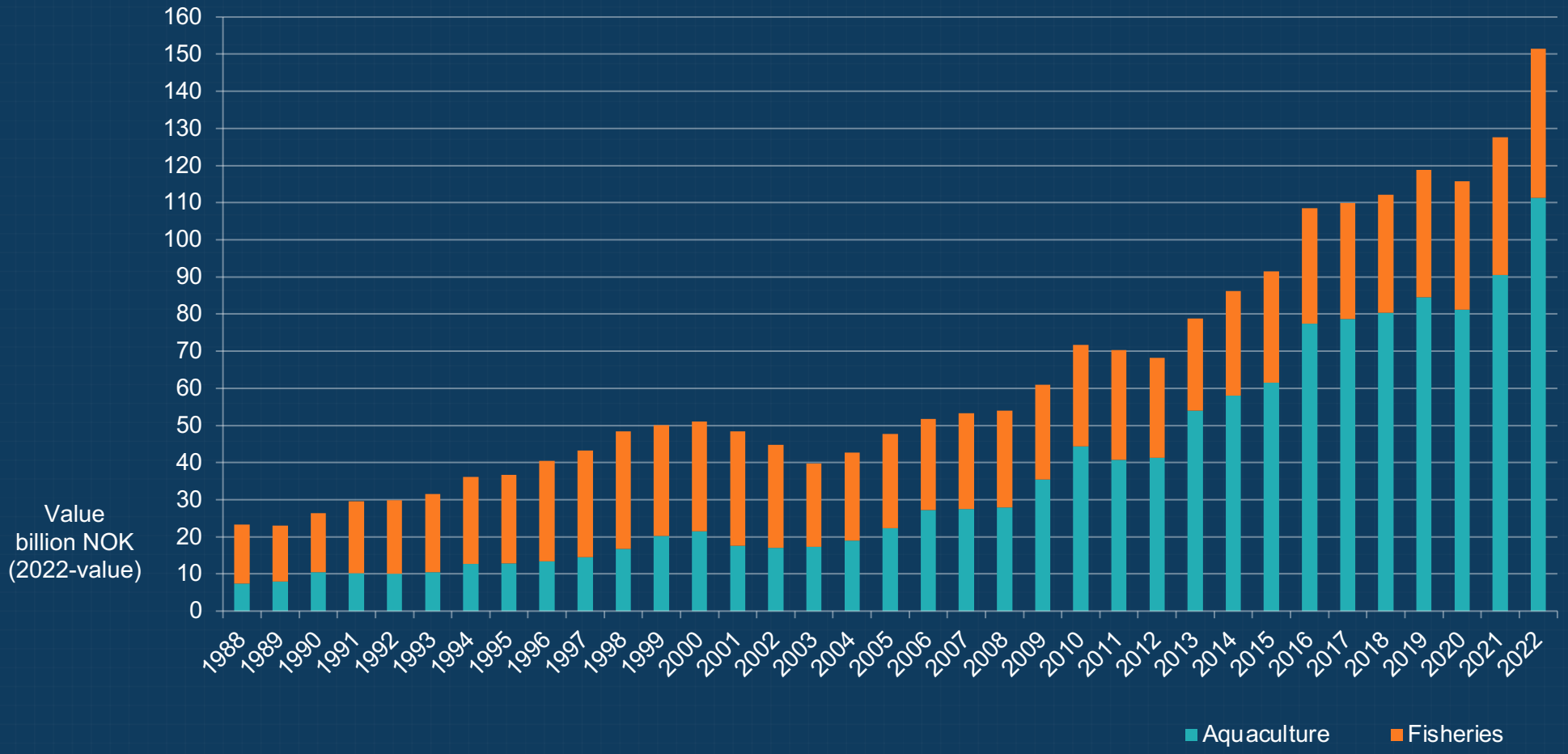
- Population: 5.3 million
- Mainland: 323 787 sq.km
- Spitsbergen: 61 022 sq.km
- Jan Mayen: 377 sq.km
- Mainland coastline: 28 953 km
- Total coastline (including islands): 100 915 km
- Mainland EEZ: 968 700 sq.km
- Spitsbergen FPZ: 804 000 sq.km
- Jan Mayen FZ: 296 600 sq.km

Norwegian economic zone

STATENS KARTVERK

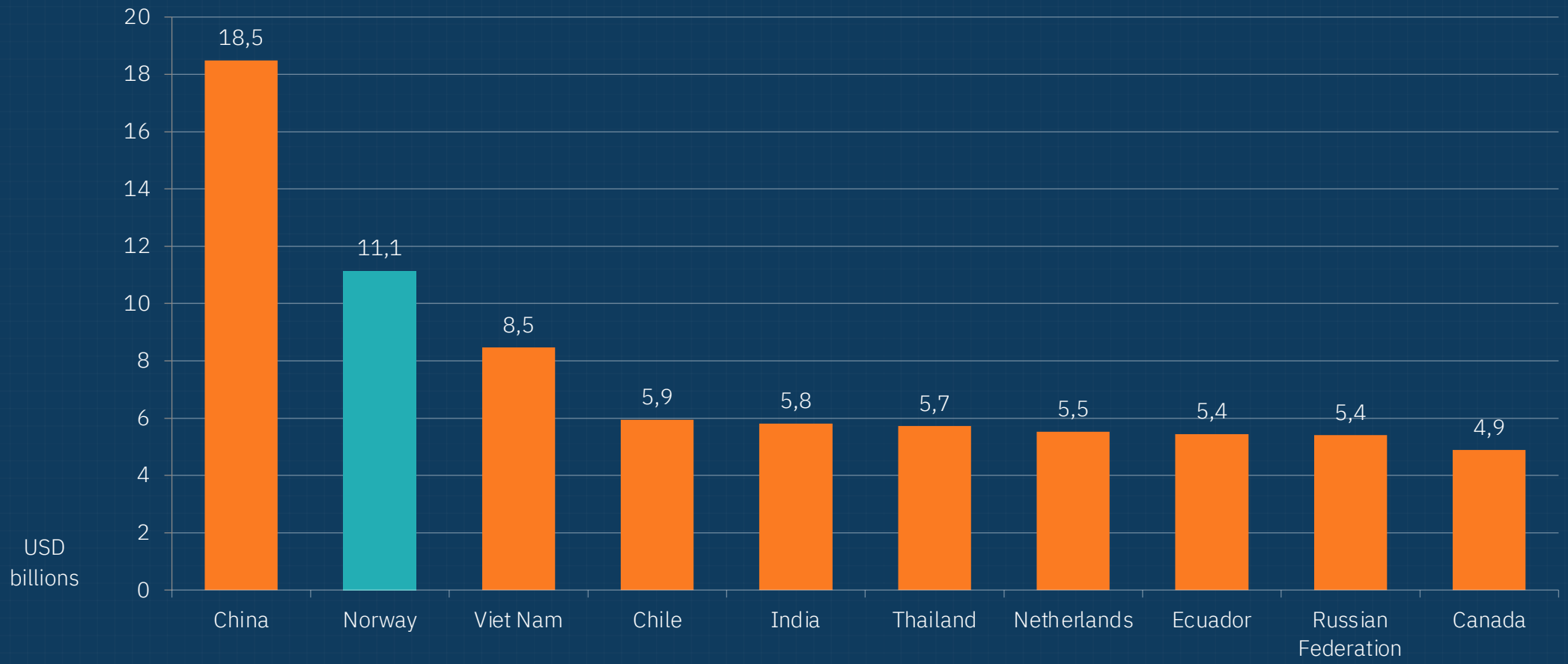
Norwegian seafood export

1988 – 2022



Source: Norwegian Seafood Council,
Statistics Norway

The leading export nations of seafood
2020

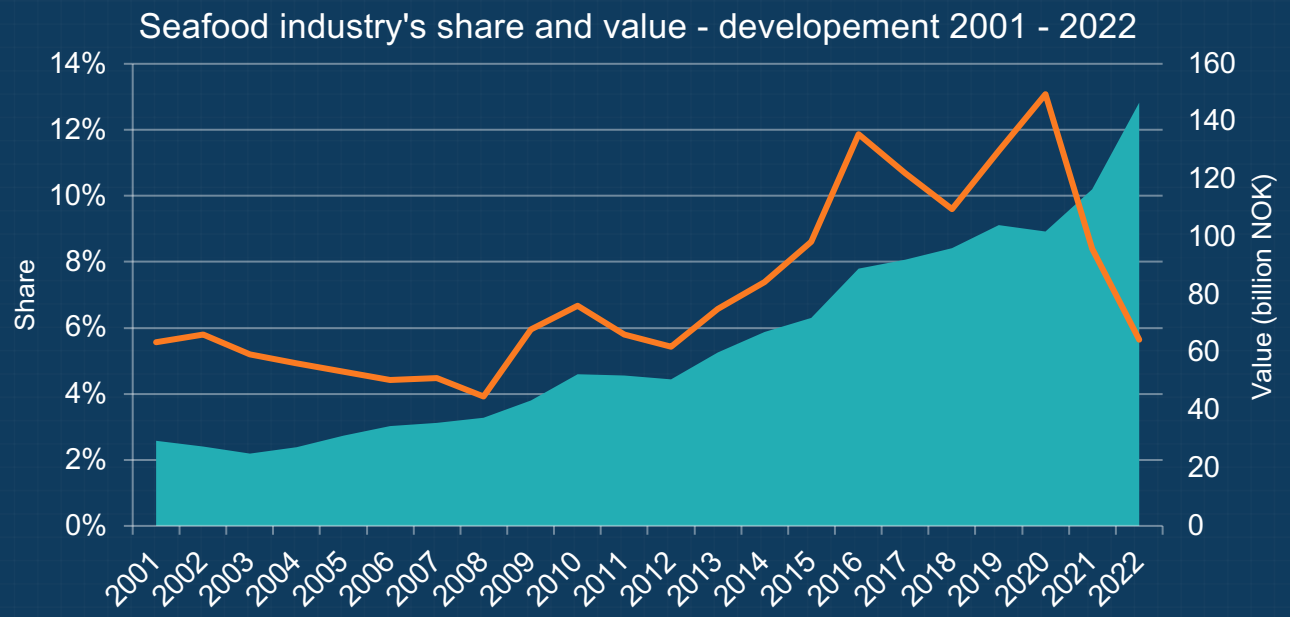


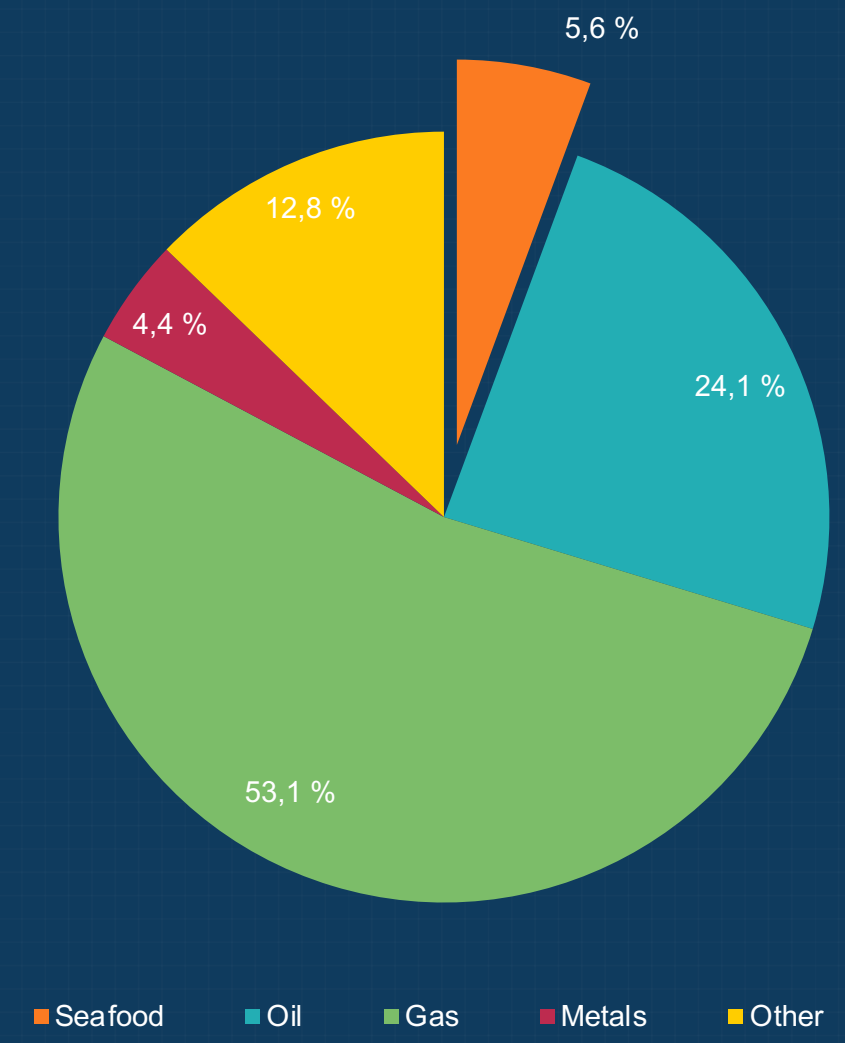
Source: FAO

The seafood industry's share of total Norwegian exports

2022

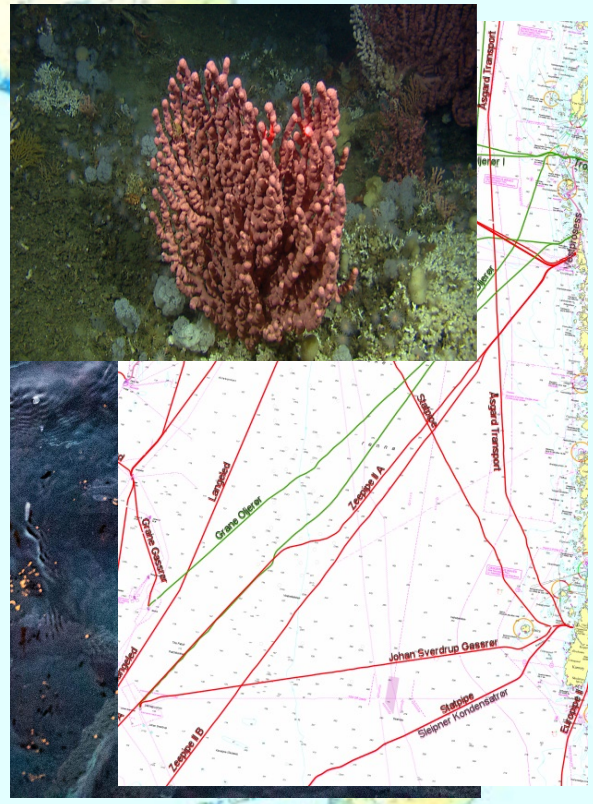
Value





Source: Statistics Norway

Co-existence: Many interests



Oil and Gas

Offshore Wind

Fish Farming (Open Ocean)

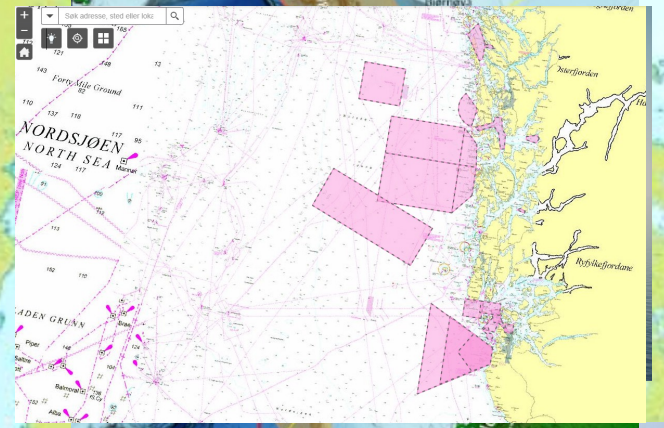
Offshore Mineral exploitation

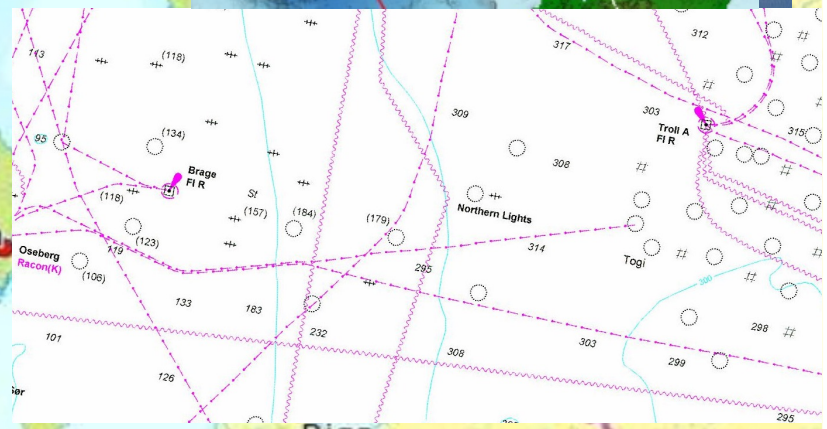
CCS

Cables and Pipelines

Military Areas

Environmental Protected Areas





Norge

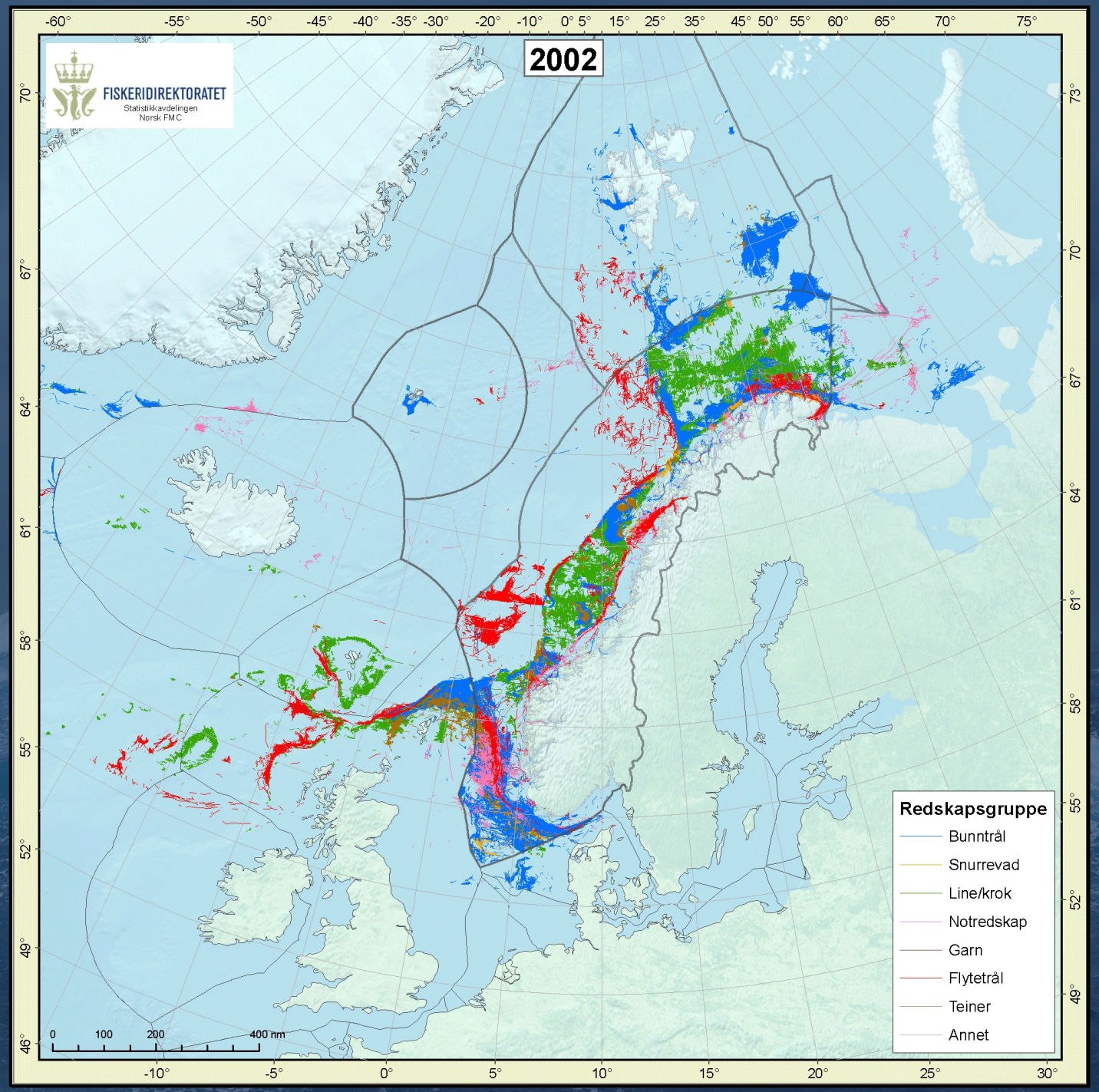
Sverige

Oslo

Stockholm

Riga

200 km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FISKERIDIREKTORATET
Statistikkavdelingen
Norsk FMC
Redskapsgruppe
Bunntrål
Snurrevad
Line/krok
Notredskap
Garn
Flytetrål
Teiner
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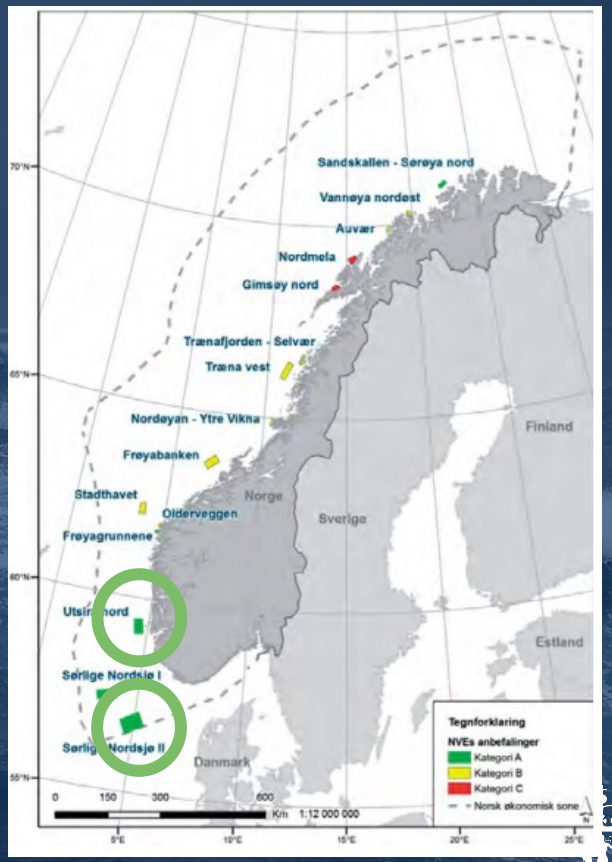
0 100 200 400 nm

Cross-directional group for identifying new offshore wind areas

Task: Find areas for accomodating a total of 30 GW by 2040

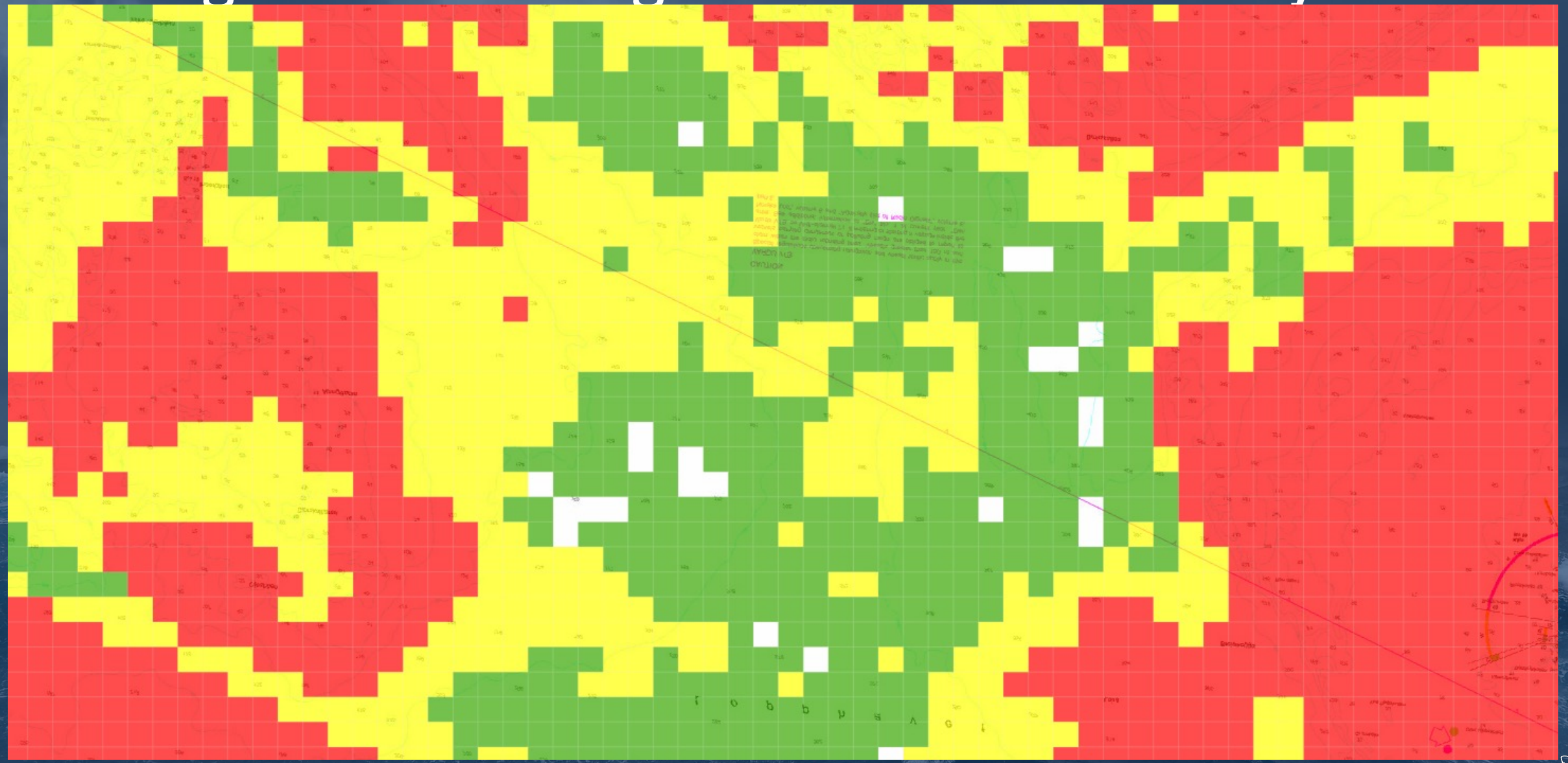
- Assess the areas from SIA 2012
- Assess options for higher capacity utilisation in already opened areas
- Identify new areas

Suggestions for areas submitted on 25.april 2023

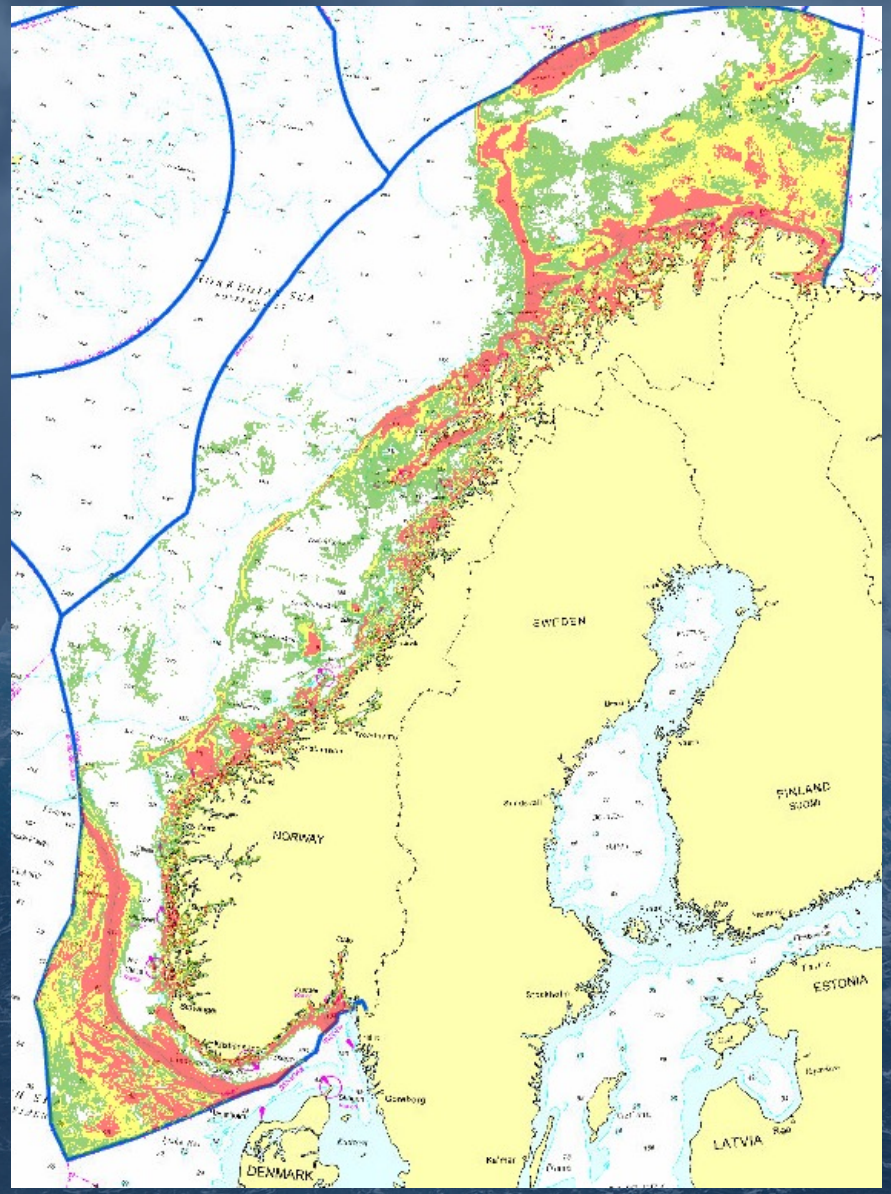


The Fisheries directorate developed new maps for visualising fisheries

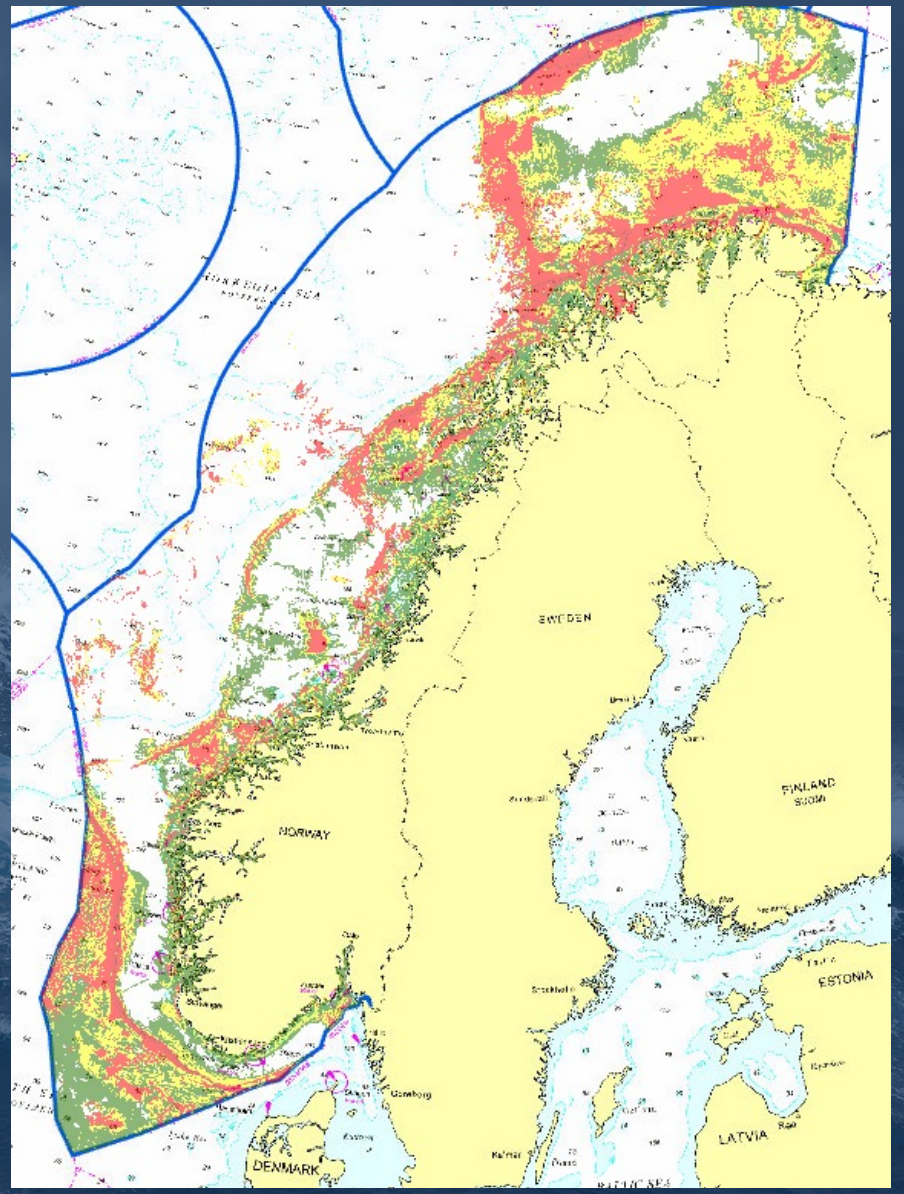
Linking vessel tracking data with other activity data



Amount of «fishing operations»

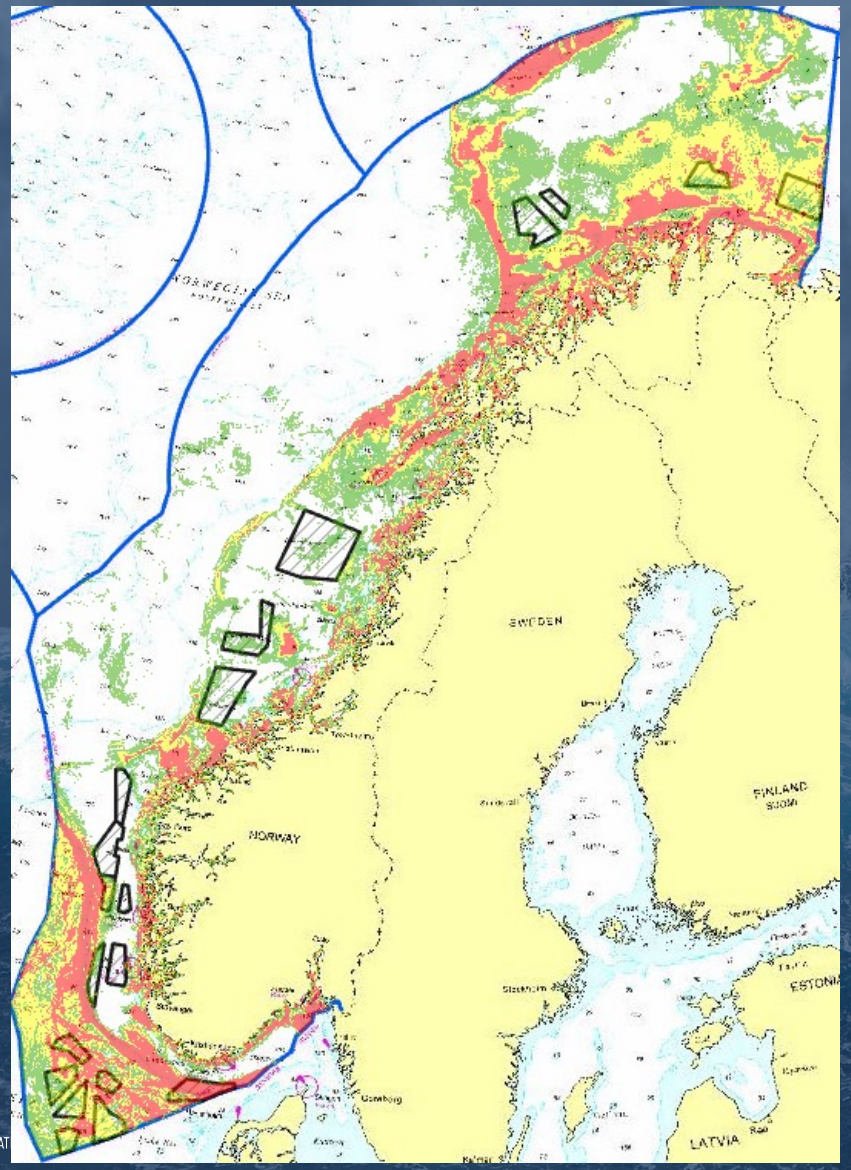


Amount of catches

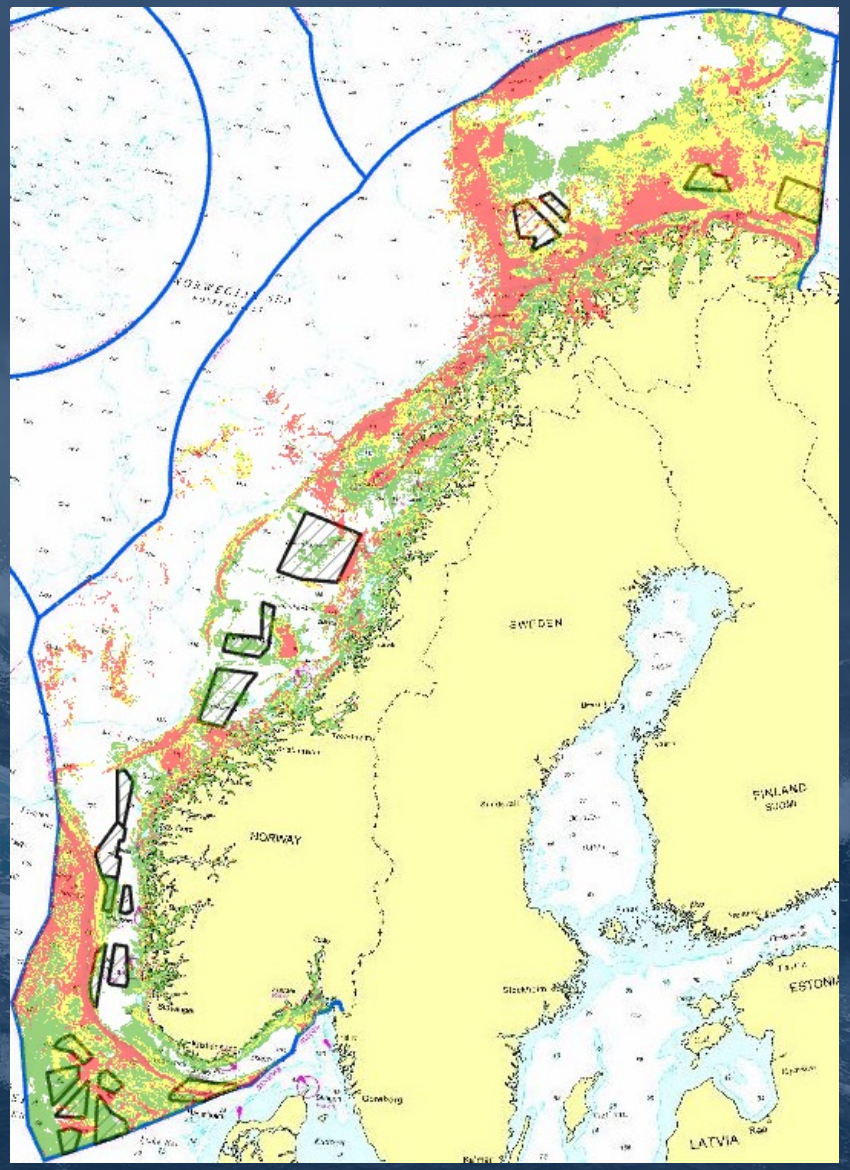


The result - fisheries

Number of Fishing operations

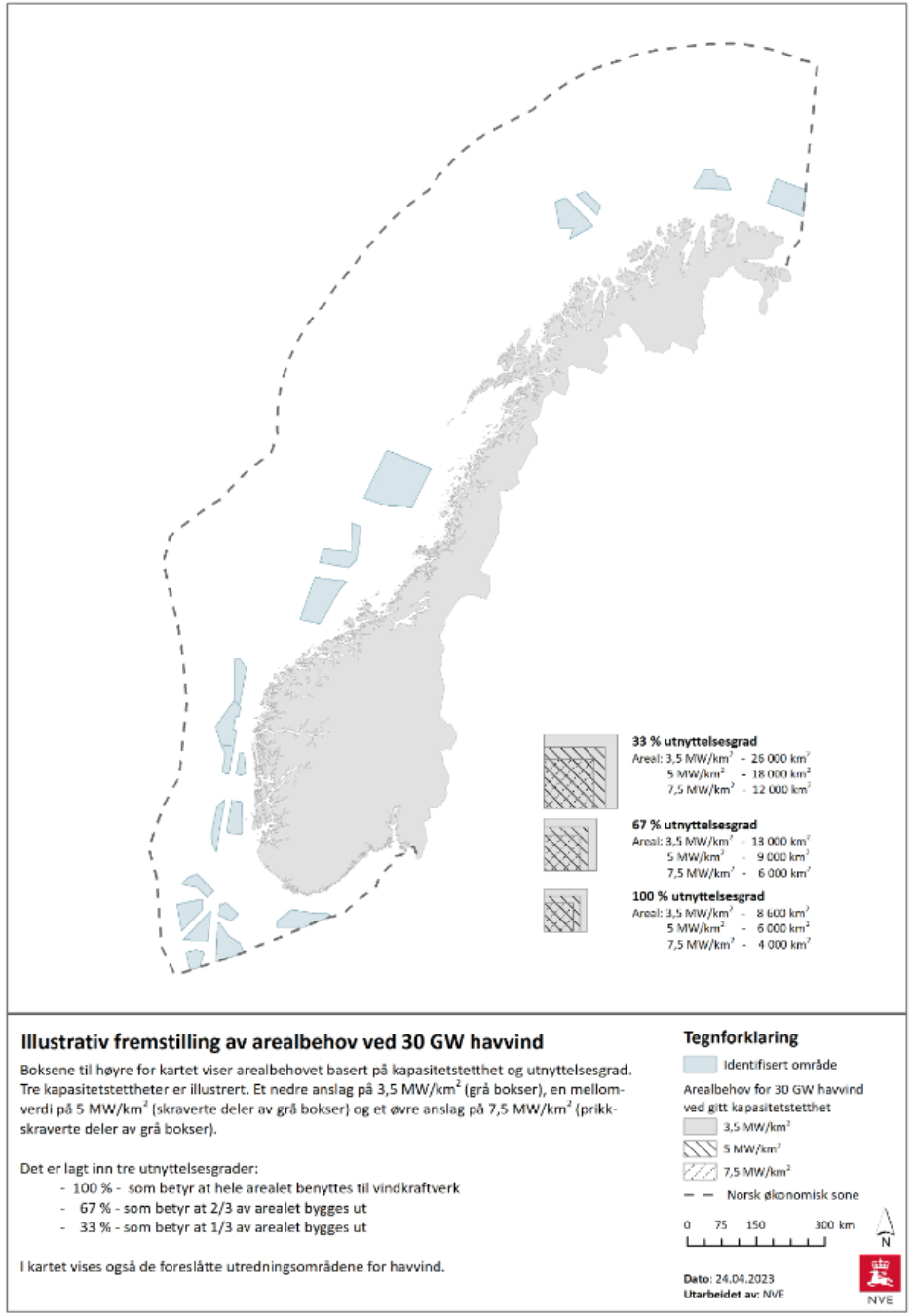


Amount of Catch



The identified areas are much larger than required for 30 GW offshore wind

- Ca 54 000 km² found
- Needed: 4000 – 8600 km²

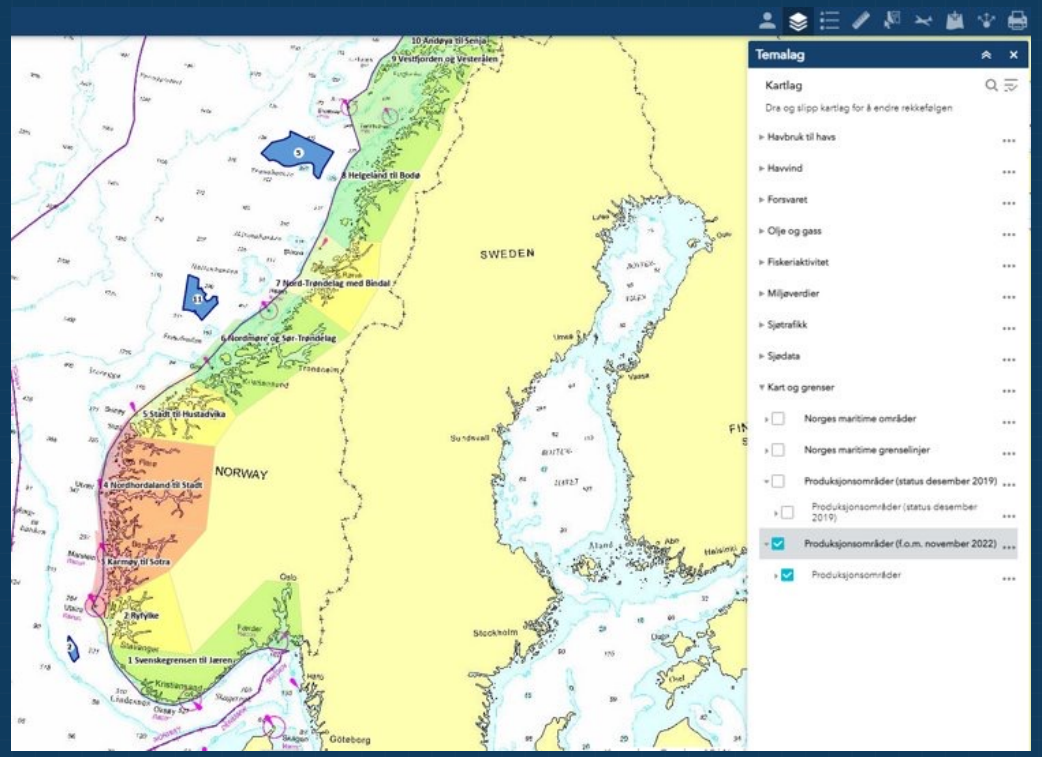


Illustrativ fremstilling av arealbehov ved 30 GW havvind.

Strategic Impact Assessment (SIA)

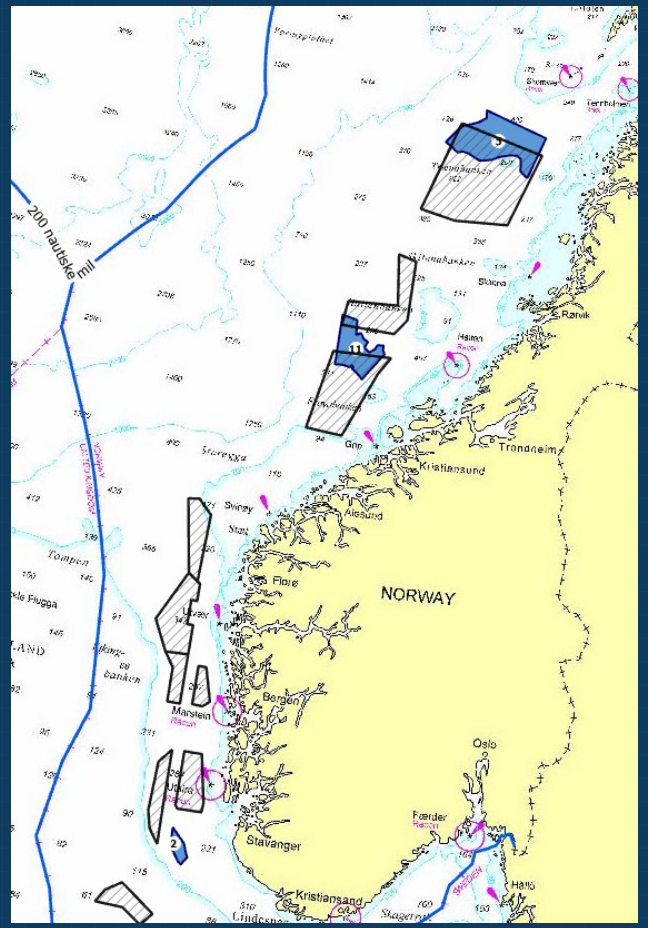
- NVE Norwegian Energy Regulatory Authority
- 3 + 17 areas
  - Initial 3: Sørvest F, Vestavind B and Vestavind F to be assessed for possible applications in 2025
  - The remaining 17 to be assessed for possible later opening.
    - Please note that the Fisheries Directorate advised against one of these (Sønnavind A)
- About 20 technical reports in total
  - Fisheries Directorate is giving advise on four:
    - Fisheries
    - Open Ocean Aquaculture
    - Water column biodiversity
    - Seabed (Benthic) diversity
- How much weight will be placed on these four technical reports in comparison with the other 16?

Open Ocean Aquaculture



- Open Ocean Aquaculture is aquaculture outside the production areas for salmon and trout.
- Outside the Norwegian baseline (outside all islands and reefs)
- The government has decided to carry out an impact assessment in “Norskerenna sør”, “Frøyabanken nord” and “Trænabanken” for open ocean aquaculture.

SIA report: Impacts of offshore wind on Open Ocean Aquaculture



- Two areas are partially overlapping:
  - Frøyabanken Nord
  - Trænabanken

Exposed concepts

- 5 concepts received development licenses
- Smart Fish Farm is a concept for open ocean aquaculture.


Illustration: Mariculture AS

- Thank you for your attention

Panel Debate

Mia Høgi
Pelagisk Forening

Niels Herman Oxholm Johansen
Danmarks Fiskeriforening Producent Organisasjon

Lísa Anne Libungan
Fisheries Iceland

Christopher Harman
Norwegian Offshore Wind Cluster

Antonio Aguera Garcia
Institute of Marine Research

Lunch Break – 55 minutes

Special Guest Performance: “Anthropogenic underwater sound and zooplankton”

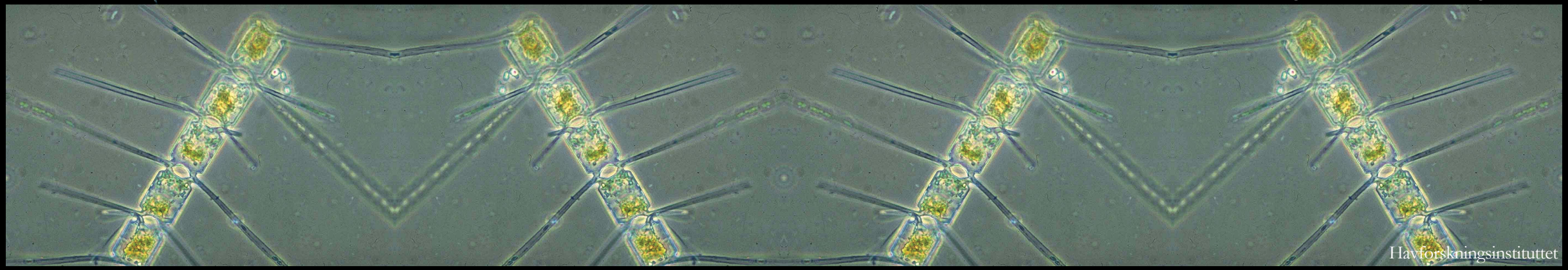
Emilie Hernes Vereide

PhD candidate, University of Oslo/Institute of Marine Research, Bergen

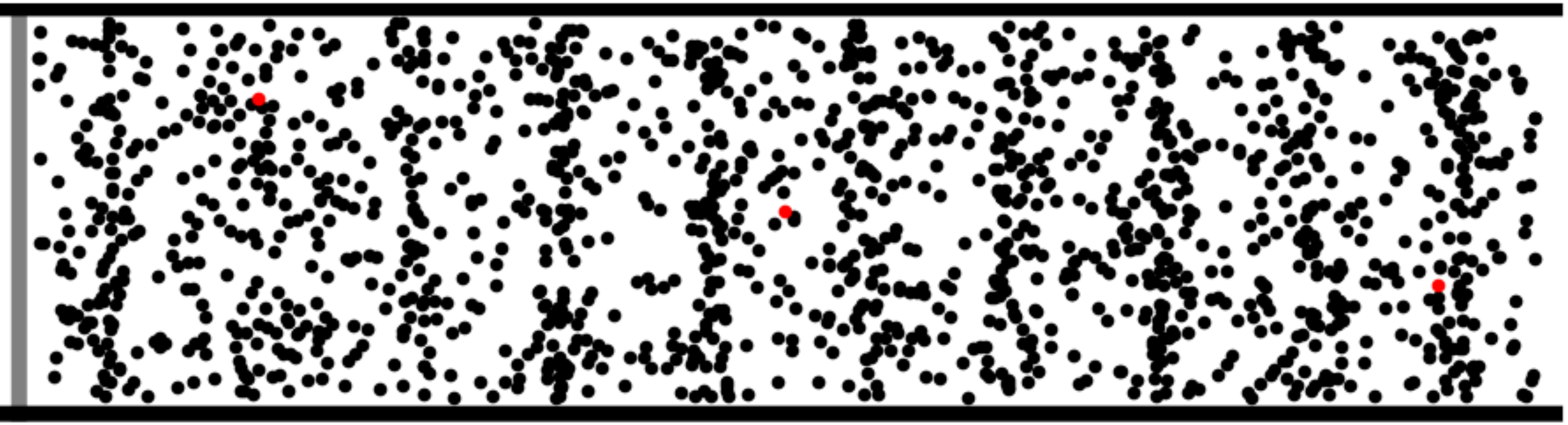
Jonathan Borba // Unsplash

Erling Svensen // Havforskningsinstituttet
Nikolay Kovalenko // Unsplash

Erling Svensen // Havforskningsinstituttet



Havforskningsinstituttet



Ecosystem Monitoring of Offshore Wind and Marine Spatial Planning

Mapping effects and consequences of the establishment of offshore wind for the Norwegian fishing industry: Insights from Hywind Tampen

Anne Christine Utne Palm

Institute of Marine Research, Bergen

Knowledge acquisition for coexistence between the fisheries and offshore wind industry

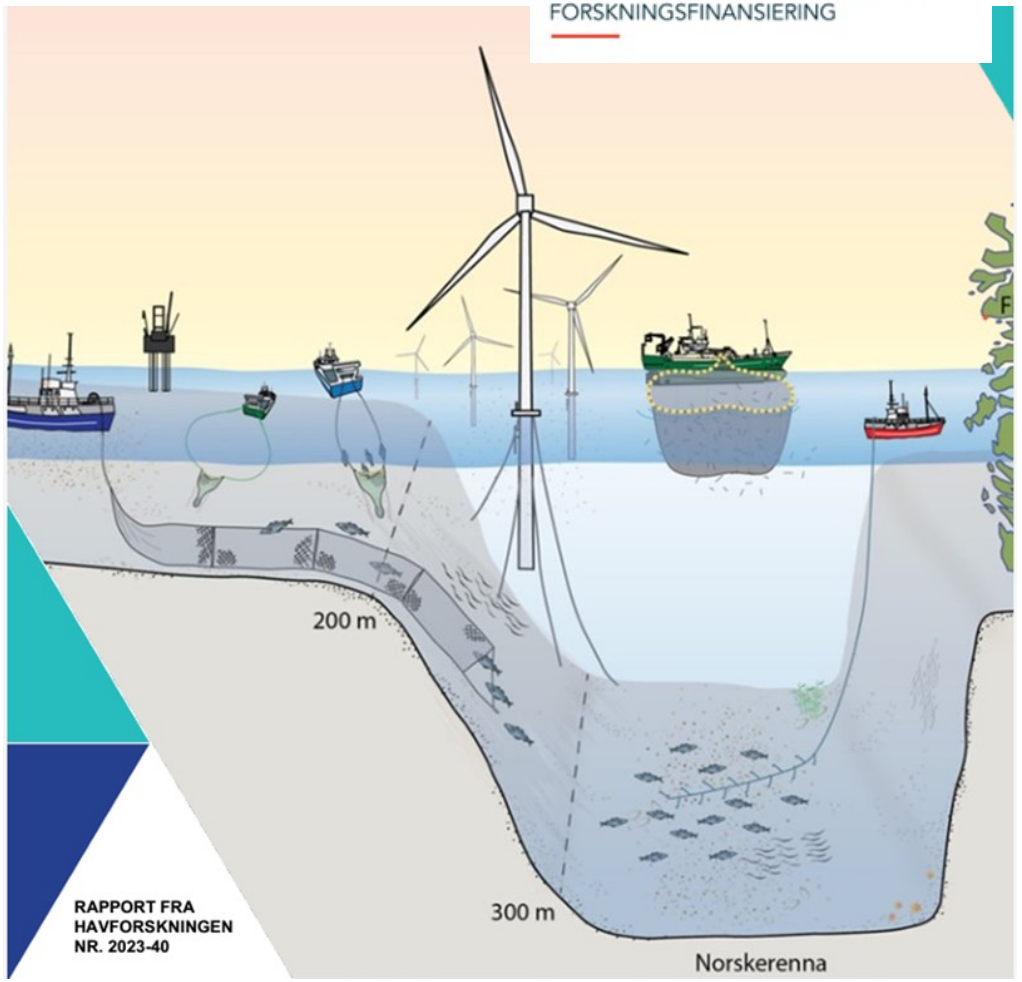
FISKERI- OG HAVBRUKSNÆRINGENS FORSKNINGSFINANSIERING

Aim: Unveil existing knowledge and experiences of effects and consequences of offshore wind industry for the Norwegian fisheries industry

1. **Compile existing knowledge** about the environmental effects and consequences of offshore wind

2. Obtain knowledge and experience from the Fishing Industry **– interview with fishers**

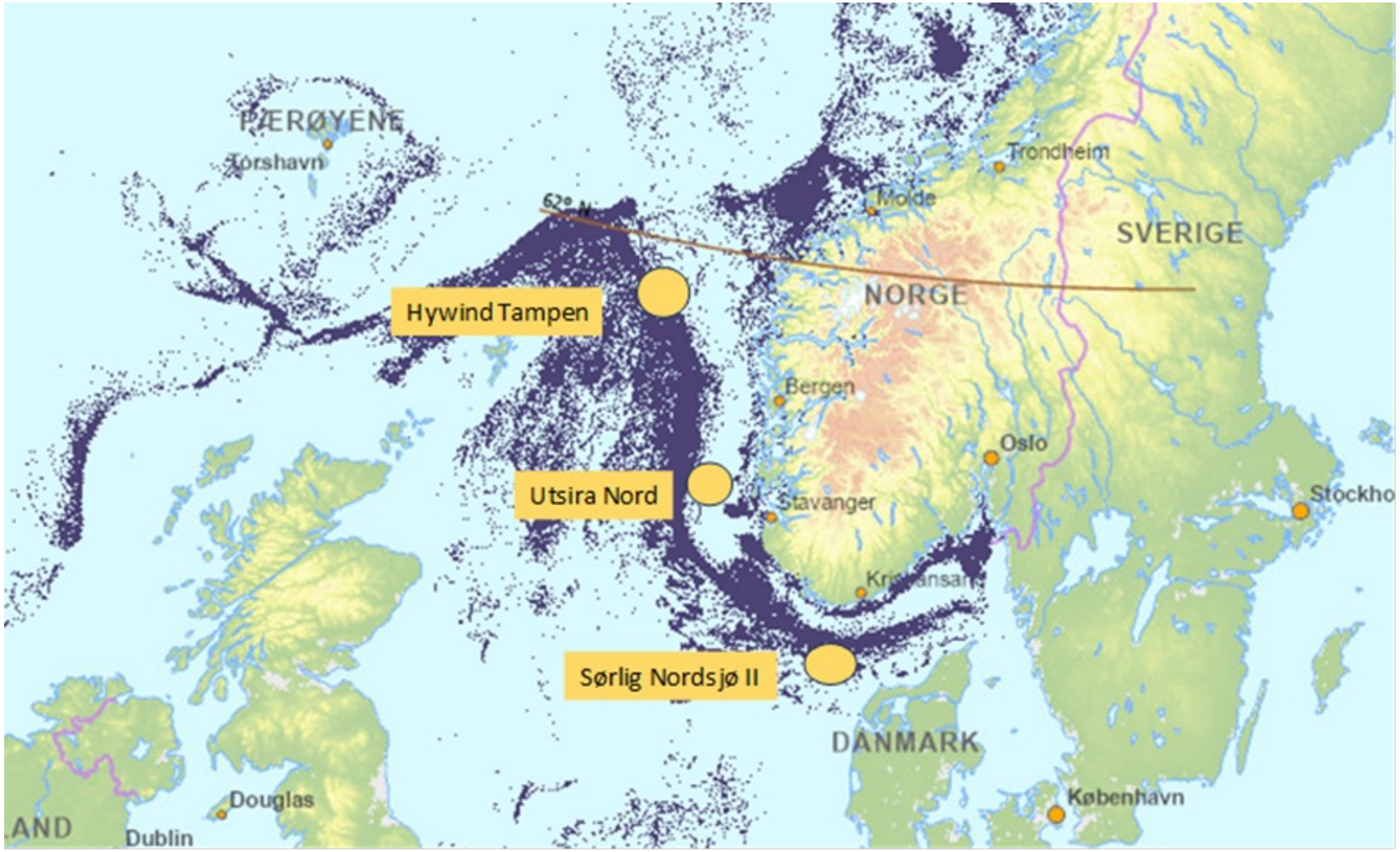
3. Investigate whether the establishment of offshore wind takes place in **close cooperation** with the fishing industry - as is the intention of the Parliament (Stortinget).



With focus on Hywind Tampen, Utsira Nord and Sørlig Nordsjø II

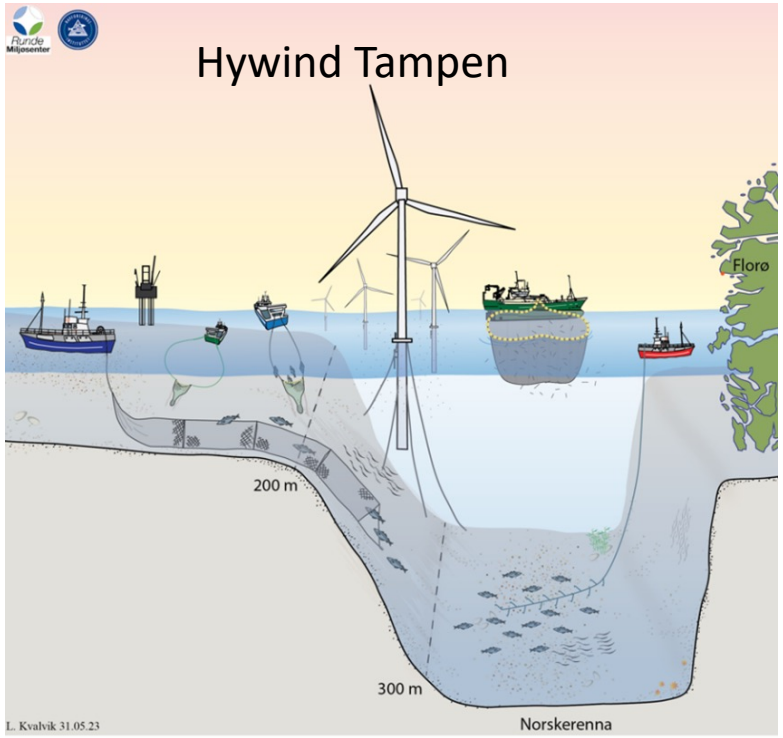
Collaboration between HI, the Directorate of Fisheries, SINTEF, Runde Miljøsenter and Bergen Ocean Wind center UiB

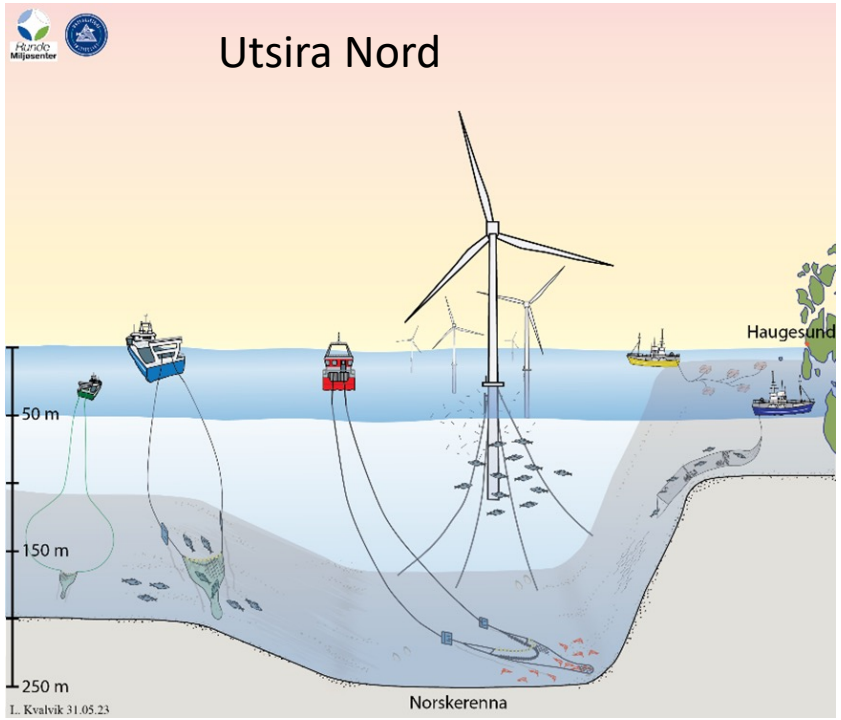
Location in relation to fishing activity

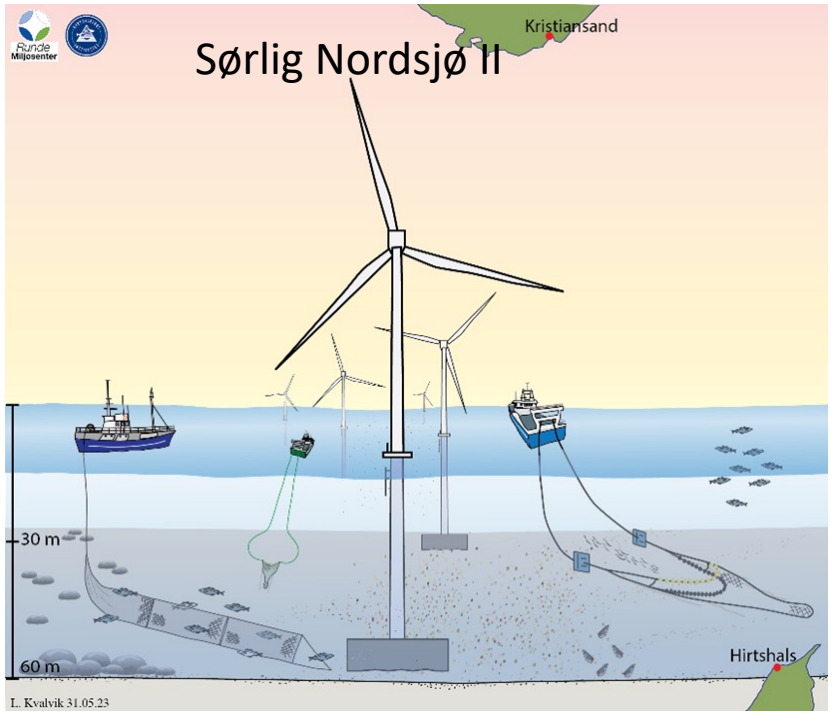


Map taken from the Directorate of Fisheries' map page.
Fishing boats >15 m in the period 2018-2022

The fishery







Fiskeri	Redskap	Målart	Område	Lengde (m)	Antal
Havfiske med garn	Garn	Sei	HYT, SN II	27 - 56	8
Havfiske med trål	Bunntrål	Sei	HYT	35 - 76	6
Reketrål	Bunntrål	Reker	UTS	15 - 36	2
Trålfiske etter tobis	Bunntrål	tobis	SN II	69 - 78	2
Pelagisk fiske	Trål og ringnot	Sild og makrell	HYT, SN II, UTS	67 -78	2
Havfiske med line	Line	Lange	HYT	39 - 58	2
Bunnfiske med snurrevad	Snurrevad	Torsk sei hyse og lysing	HYT, SN II	35 - 58	2
Total					24

HYT: Hywind Tampen, SN II: Sørlig Nordsjø II, UTS: Utsira Nord

The fishermen are worried about


Torskelarve *Gadus morhua*

Loss of area

- real area larger than the wind farm, important to listen to the fishermen!!

lack of alternative areas

- climate footprint and environmental cost by using alternative fishing areas

Effect of noise

- We lack studies on the effect of noise from offshore wind farms. We know that continuous low-frequency sound can have a negative effect on fish behaviour, growth and reproduction.

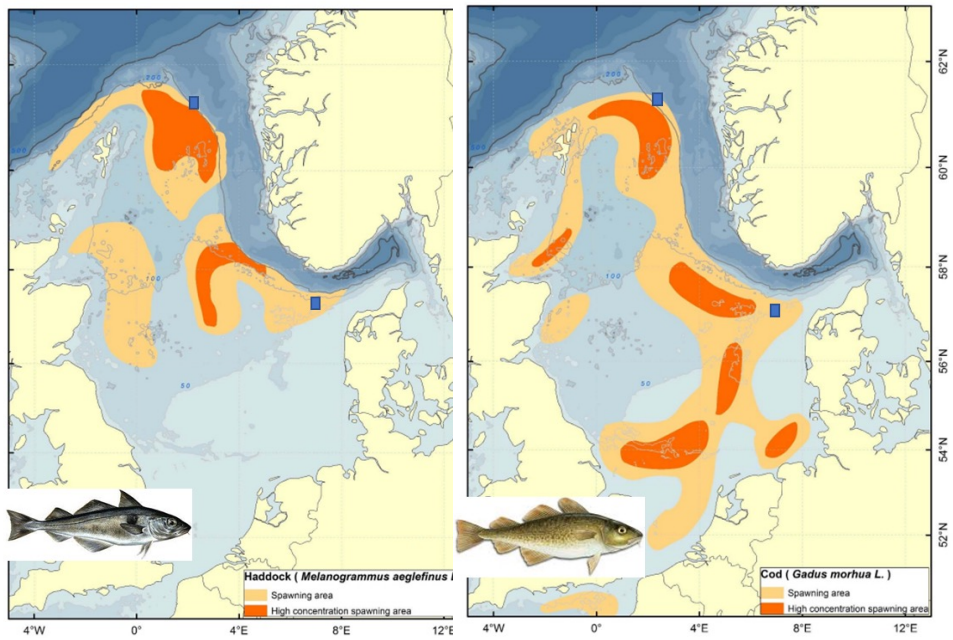
Effect on migration routes and spawning

- We lack fields observations from areas with offshore wind facilities.

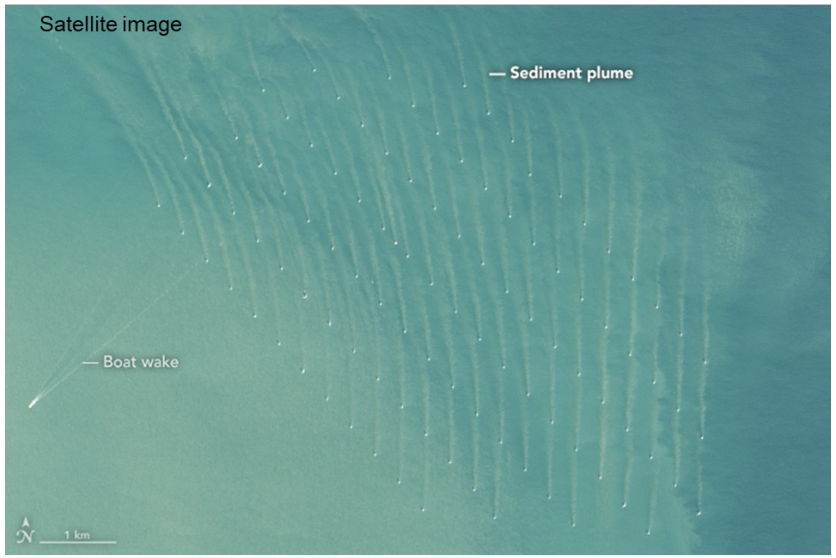
- Experimental studies suggest that cod larvae attracted to low-frequency sound and that haddock larvae change swimming direction when exposed to electromagnetism.

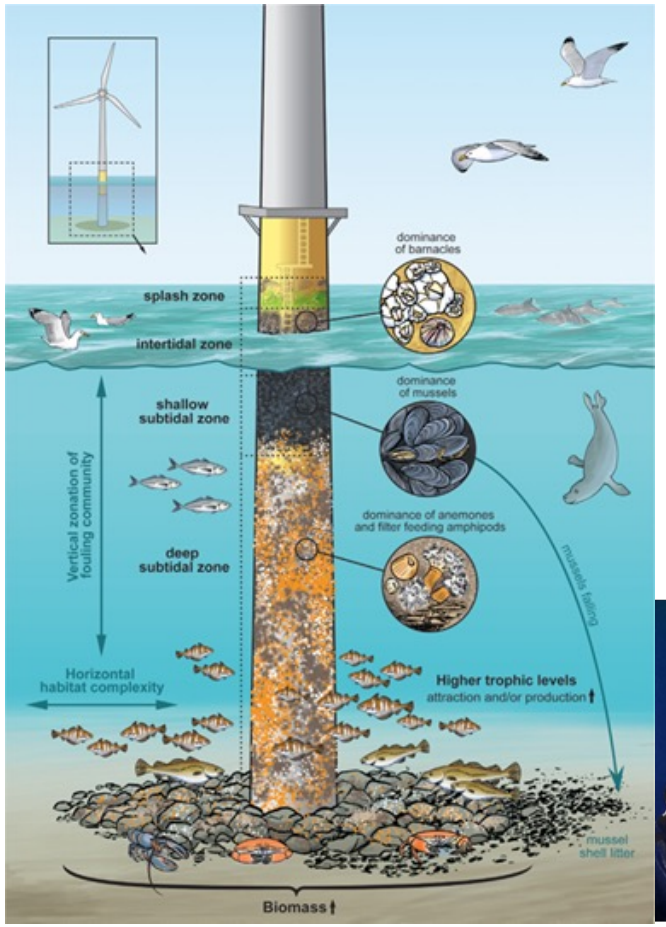
Lack of knowledge about the effect on the fishing resource - and the ecosystem

– by today, we are missing , no long-term studies looking at changes in fishing resource and the ecosystem before, during and after the development of offshore wind.



- Studies have shown that offshore wind farms can **affect the ecosystem locally**, but it is still unclear how large the area of influence is and **whether local effects lead to effects at the ecosystem or population level** -> Size of development
- It is also known that the effects are **species dependent**, and it is likely that some species benefit while others are negatively affected.





Unwanted species

New species

Changes in habitat

Few studies have looked at the effect of offshore wind farms on fisheries

Literature search: (Google Scholar, Cristin and Google)
Offshore wind" AND (fish* OR crustaceans*; last search: 06.02.2023

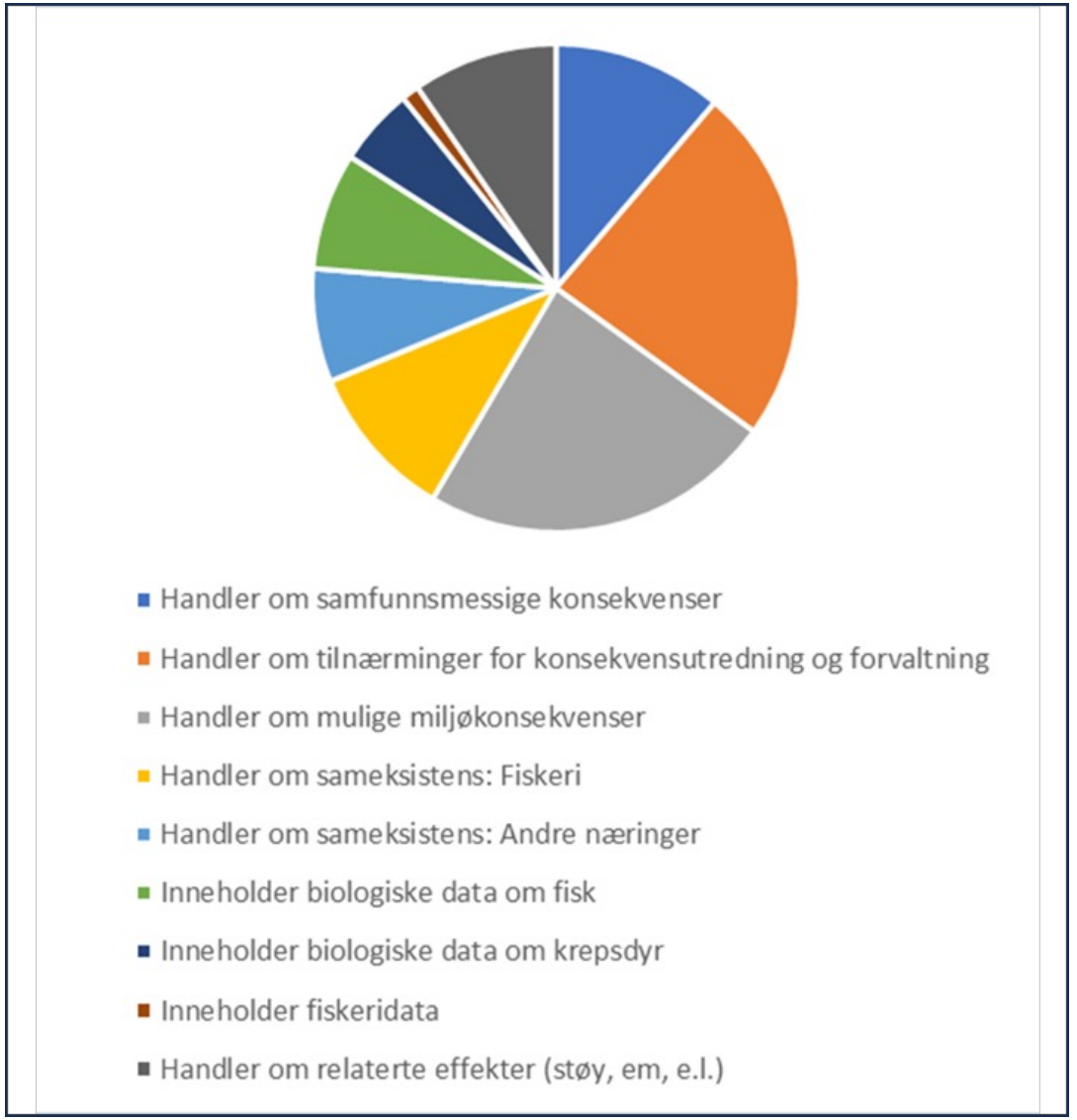
Possible effects of offshore wind facilities on the fishery resource, i.e. effect on fish and crustaceans - **279 studies** in total.

about **80% is about potential effects** and what one thinks needs to be done to get a sustainable development of offshore wind - these are **review articles - or modeling studies**.

Only **17%** of the studies included **biological data** (from experimental **fishing or fisheries** (42 studies)).

Only 5 studies have looked at the effect of offshore wind on fishing activity
- and of these 5, none have also included catch data.

Lack studies that have looked at both change in fishing activity and catch (CPUE)



Based on experience

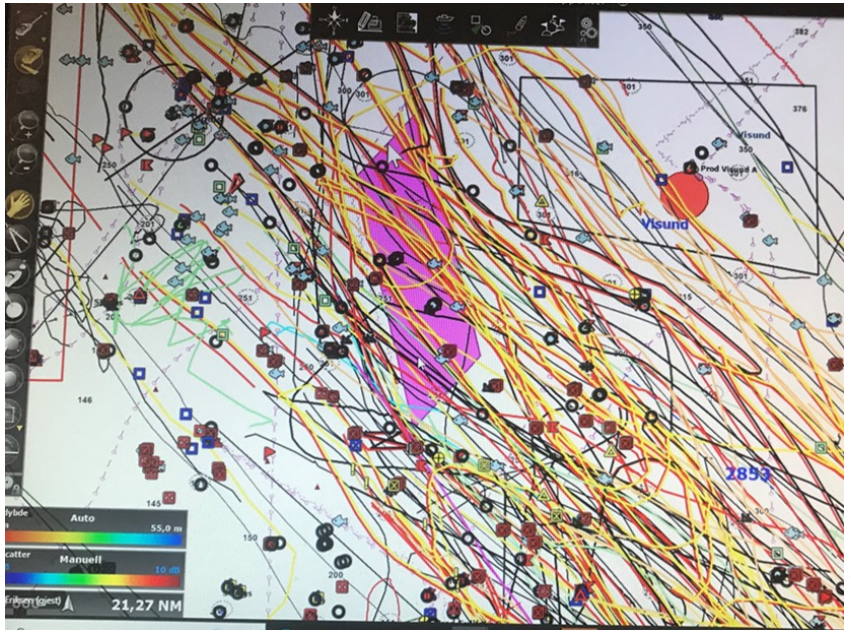
All the skippers are quite clear that they have not been properly listened to in the process so far.

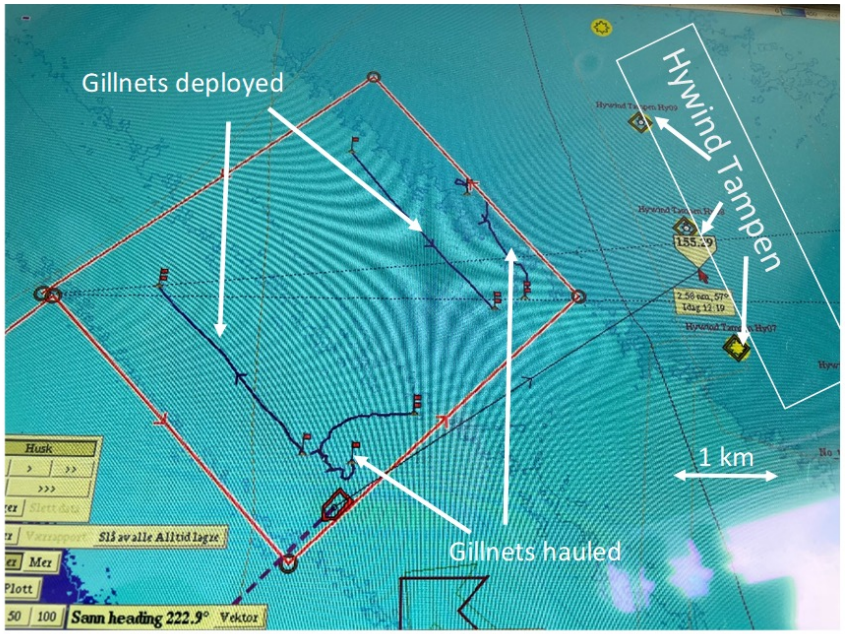
In their opinion, there is a "***lack of will and a lack of knowledge about the fisheries and the environment in which the fishermen work***".

Development of Hywind Tampen is an example of poor coexistence. Here, they did not listen to the fishermen or their organizations.

In connection with the development of Utsira Nord and Sørlig Nordsjø II - we expect that the fishermen's input will be taken into account.

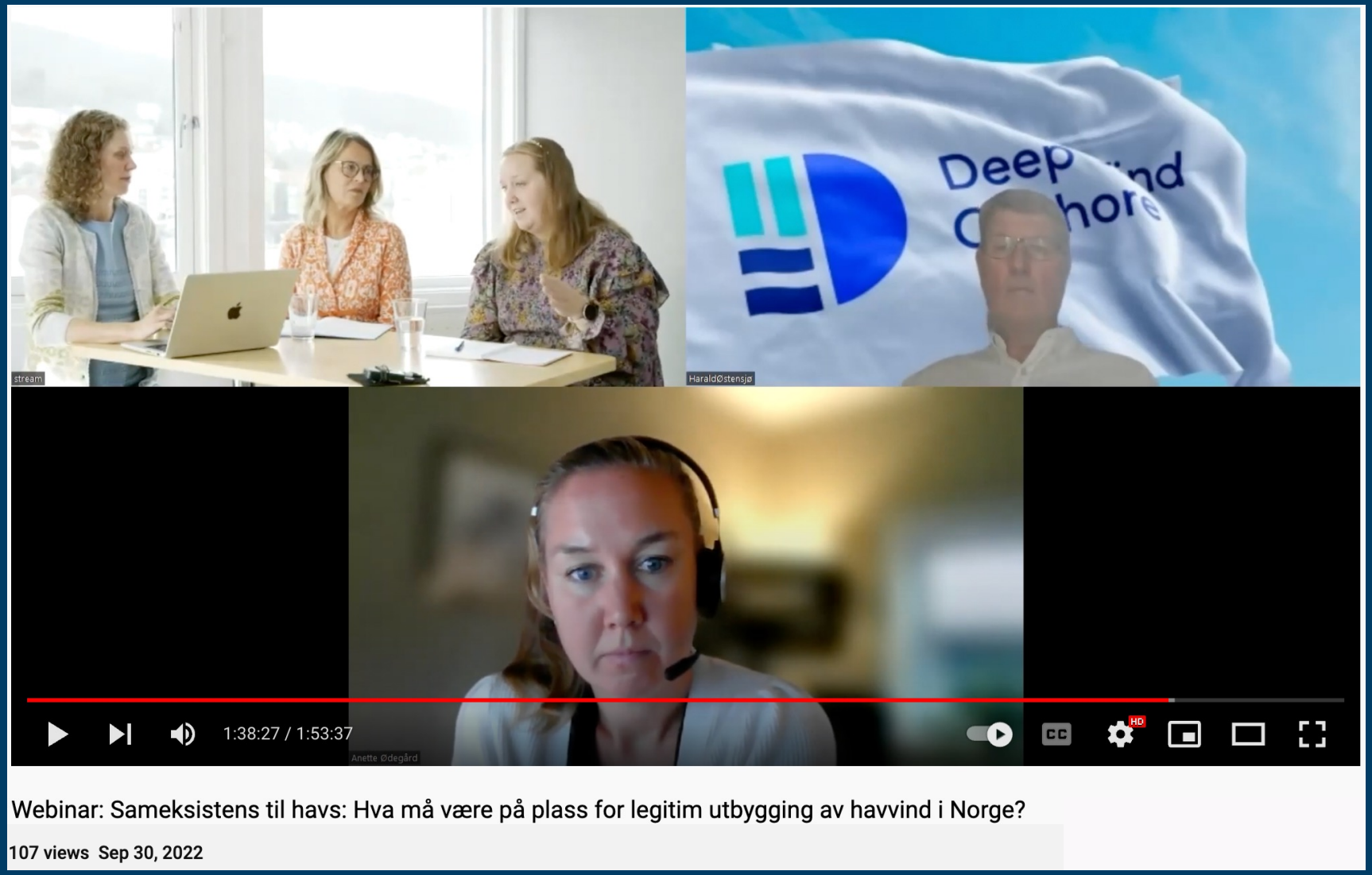
That not only **the fisheries organisations**, but also those who **fish in the relevant areas** are included in the planning process - of location and design of the park**.**

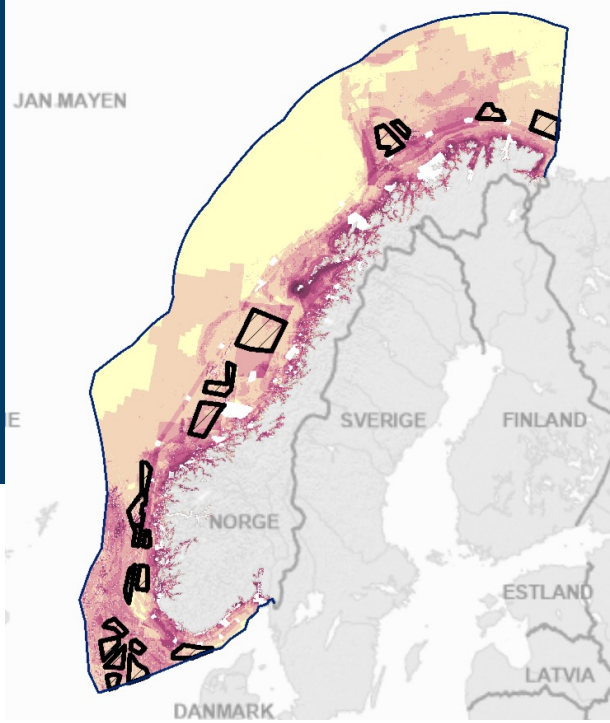




Prosject webinar Sept. 2022

Creating time & space around the table





Direktoratsgruppa med fagstøtte

NVE · Miljødirektoratet · FISKERIDIREKTORATET · OLJEDIREKTORATET · FORSVARSBYGG · KYSTVERKET

Nasjonal kommunikasjonsmyndighet · AVINOR · NINA Norsk institutt for naturforskning · Statnett · Luftfartstilsynet · Meteorologisk institutt · PETROLEUMSTILSYNET

April 25, 2023: First round of mapping new areas for offshore wind cites in Norway.

- **Wonderful example of cross-sectoral inclusiveness**
- Broad consensus among fishermen's organizations in Norway that this is a **credible** & **legitimate** start of a longer **process**…

On 29 March 2023, the Ministry of Petroleum and Energy announced a competition for project areas for offshore wind industry in Utsira Nord and Sørlig North Sea II

DET KONGELIGE
OLJE- OG ENERGIDEPARTEMENT

Vedlegg 4

Beskrivelse av kvalitative kriterier for Utsira Nord
og Sørlig Nordsjø II

Olje- og energidepartementet

Sustainability

1. Climate footprint
2. Coexistence
3. Waste (recycling)
4. Nature and environment

Tabell 1 Kriterier og vekting

Kriterium	Vekt
Kostnadsnivå 2030	30 pst.
Innovasjon og teknologiutvikling	20 pst.
Gjennomføringsevne	30 pst.
Bærekraft	10 pst.
Positive lokale ringvirkninger	10 pst.

Tabell 1 Kriterier og vekting

Kriterium	Vekt
Gjennomføringsevne	60 pst.
Bærekraft	20 pst.
Positive lokale ringvirkninger	20 pst.

2.4 Tildeling av prosjektområde

De tre søkerne som samlet sett får høyest poengsum i den kvalitative konkurransen vil tildeles hvert sitt prosjektområde. Søkeren med høyest poengsum vil få tildelt sitt foretrukne prosjektområde, søker med nest høyest poengsum vil få tildelt sitt foretrukne prosjektområde blant de gjenstående to prosjektområder og søker med den tredje høyeste poengsum vil få tildelt det siste prosjektområdet.

3. Kvalitative kriterier

Dette kapittelet redegjør for de kvalitative kriteriene, og hvilken dokumentasjon som må innleveres. Grunnet havdybden i Utsira Nord vurderer departementet at flytende havvind er mest aktuelt og har utformet kriteriene deretter.

3.1 Kostnadsnivå 2030

Kriteriet skal bidra til at prosjektområdene tildeles til de mest kostnadseffektive prosjektene. Dette vil bidra til å gjøre flytende havvind kommersielt og konkurransedyktig raskest mulig, og samtidig redusere statens kostnad gjennom å begrense nødvendig statsstøtte for å realisere prosjekt i Utsira Nord.

Under dette kriteriet vil søknadene vurderes basert på kostnadsanslag og energiproduksjon for et 500 MW flytende havvindprosjekt etablert på Utsira Nord i full drift i 2030.

Thank you for your attention!

Contributors

Institute of Marine Research:

Anne Christine Utne Palm, Karen de Jong

Maria Tenningen

Runde Environmental Centre: Nils Roar Hareide

SINTEF Ocean: Dorothy Jane Dankel

Fisheries Directory: Bård Aarbakke, Per Finne

Univ. of Bergen, Bergen Ocean Wind Centre: Finn Gunnar Nielsen

Referance-group

Norwegian Fishermen Association:

Jan Henrik Sandberg

Fiskebåt: Hanna Bauge, Gjert E. Dingsør

Seafood Norway (Sjømat Norge):

Arild Rød

Norwegian Industry (Norsk Industri):

Stål Heggelund

Special thanks to:

FHF

FISKERI- OG HAVBRUKSNÆRINGENS FORSKNINGSFINANSIERING

24 Fishing boat skippers

ICES Research Roadmap for Offshore Wind

Lisa Pfeiffer

ICES Expert in Residence

ICES Roadmap for Offshore Renewable Energy

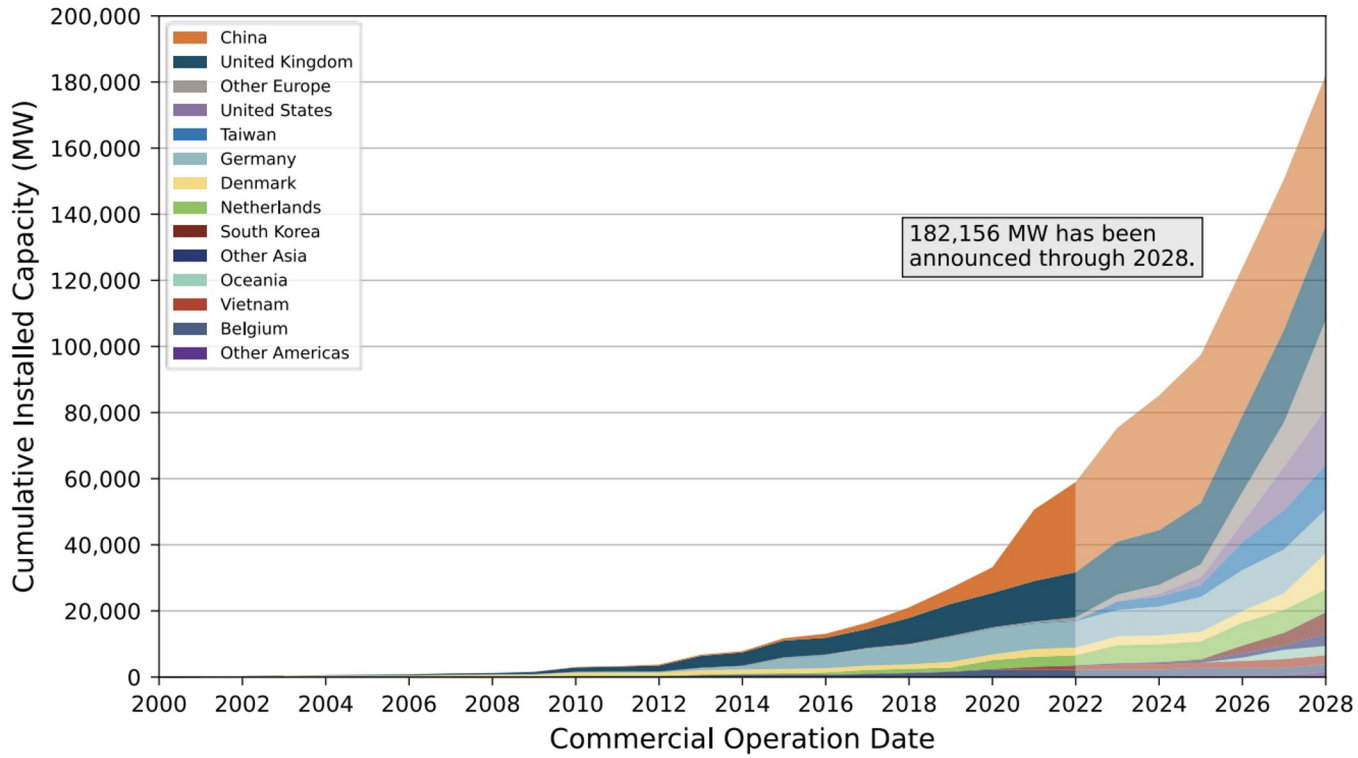
Lisa Pfeiffer
NOAA Fisheries
Secondment at ICES Secretariat
November 30, 2023

Offshore renewable energy growing at an unprecedented rate

Largest change in human use of the ocean–perhaps ever

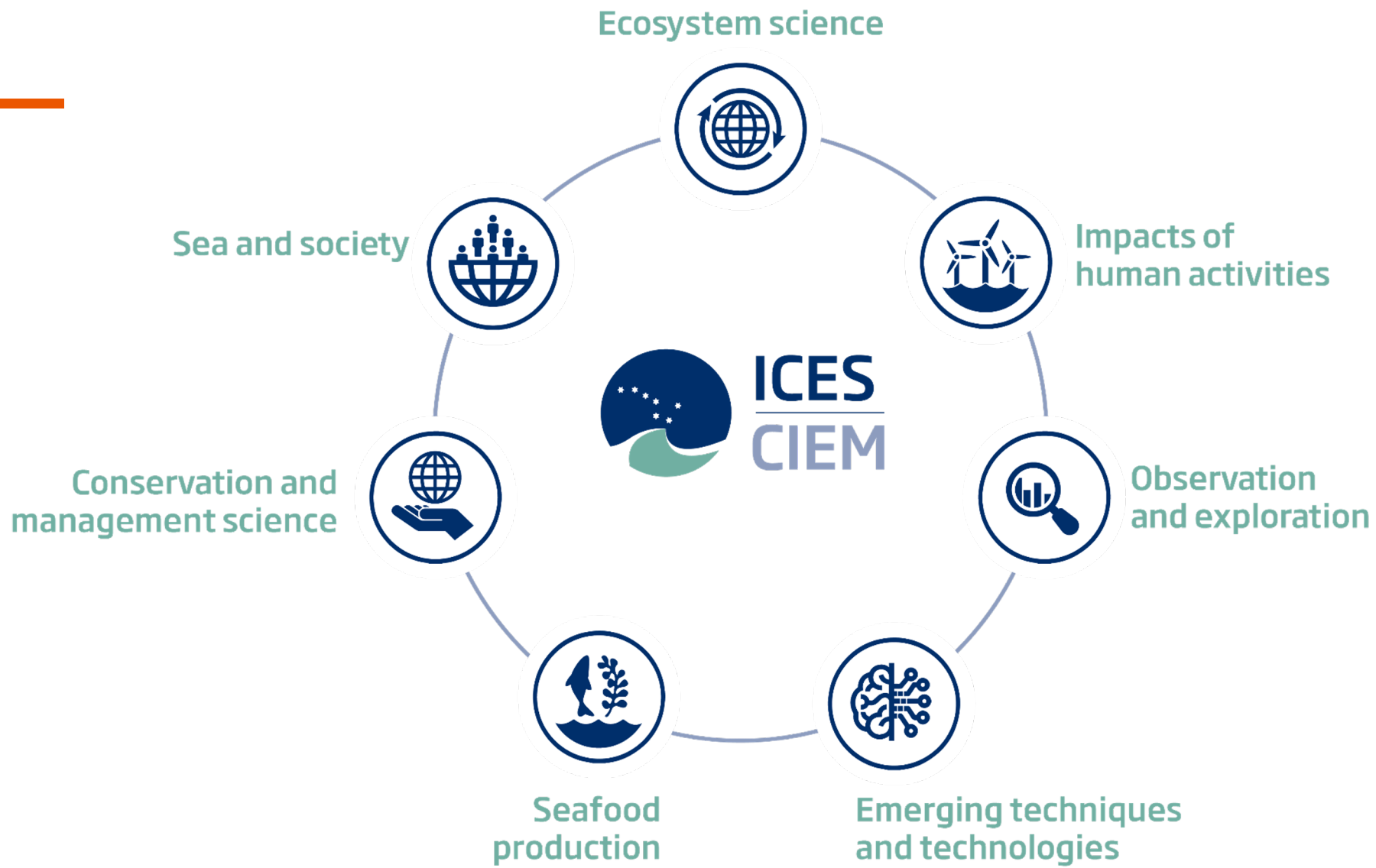
Climate change

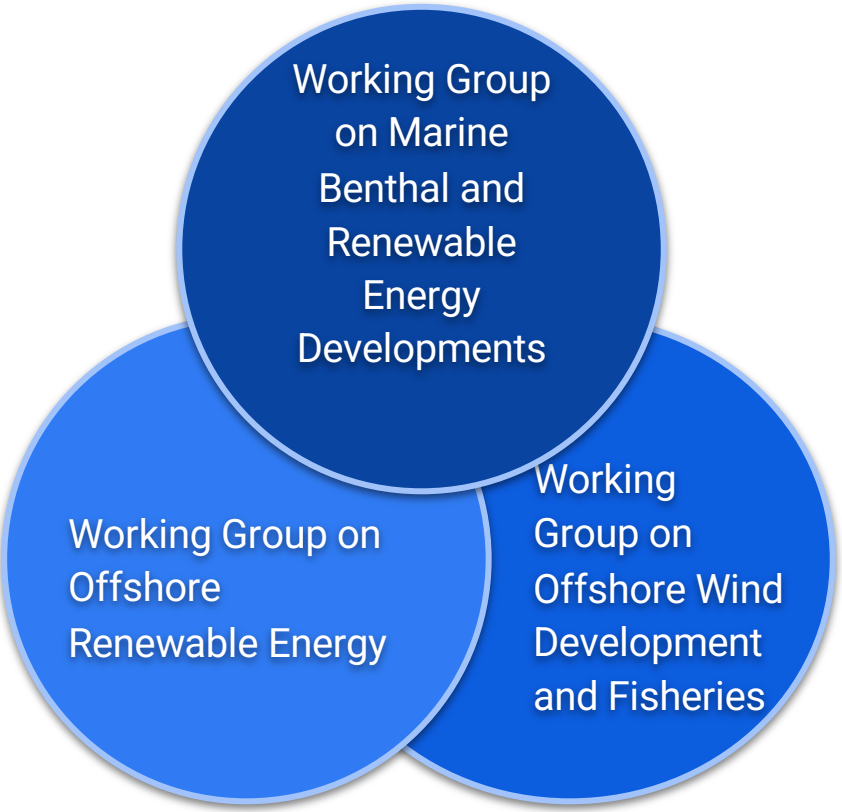
Energy security



Source: Offshore Wind Market Report: 2023 Edition. US Department of Energy.

The International Council for the Exploration of the Sea (ICES) is an intergovernmental marine science organization, meeting societal needs for impartial evidence on the state and sustainable use of our seas and oceans.


Ecosystem science
Impacts of human activities
Observation and exploration
Emerging techniques and technologies
Seafood production
Conservation and management science
Sea and society
ICES
CIEM



ICES Roadmap for Offshore Renewable Energy

Goals of ICES Efforts in Offshore Renewable Energy

1. To advance the ICES scientific capacity to support advice regarding the interactions among offshore renewable energy developments and marine ecosystems.

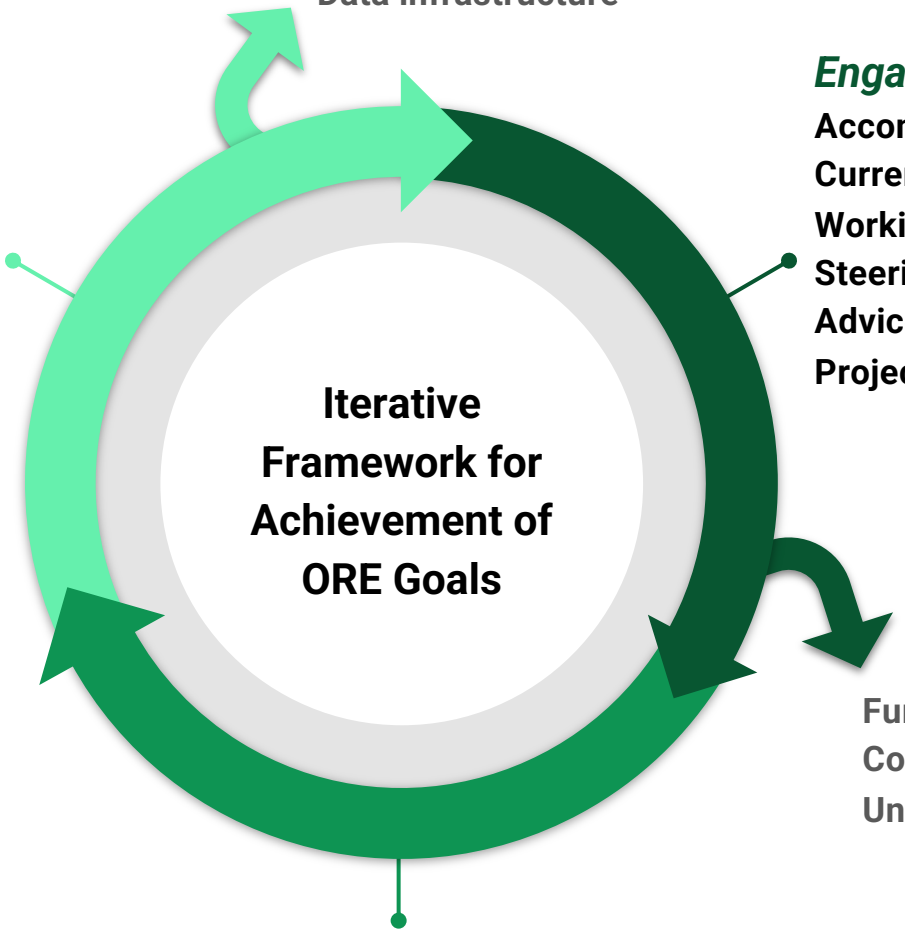
2. To facilitate an international effort to design data collection networks at the range of spatial and temporal scales needed to monitor, assess, and predict the impacts of offshore renewable energy development on marine ecosystems.

3. To advance development and application of models, coordinated process studies, and long-term observations supporting the analysis of impacts from offshore renewable energy development at regional and ecosystem scales and at subseasonal to decadal scales.

4. To develop frameworks that guide the use of best available information on the interactions of offshore renewable energy, ecosystem functions and structure, and ecosystem services and provisions.

Each year, ICES will work to define priority actions to meet the Science, Data, and Advice objectives, and make progress toward the goals.

DRAFT



Science products
Advice provision
Data infrastructure

Engage

Accomplishments in previous cycle
Current advice requests
Working Group activities
Steering Group priorities
Advice foresight
Projects

Funding opportunities
Collaborations
Understanding of policy drivers

Prioritize

Gap analysis
Assess capacity
Ensure activities match objectives
Strengths/Weaknesses/Opportunities/Threats

Build Capacity

Develop workshops
Engage relevance Working Groups
Craft Terms Of Reference
Determine data needs
Develop networks

2023-2024 Priorities

The outcomes of the engagement and prioritization process for 2023-2024 resulted in four priority issues:

1. Assess the trade-offs between ORE developments and other sectors, starting with fisheries and biodiversity; and address best practice guidelines for marine spatial planning.
2. The development and publication of guidelines and standards for monitoring and assessment in the ORE sector at the temporal and spatial scales needed to support ecosystem-based management.
3. The development of ecosystem-based management science and approaches to support the sustainable development of offshore renewable energy, in support of national government, regional, and industry needs.
4. Assess the impact of ORE developments on fishery and ecosystem observation surveys, fisheries management advice, and ICES recurrent advice, and develop solutions to meet the Objectives and advance the Goals identified in the Roadmap.

Next steps

1. Roadmap finalization; publication
2. WKWIND (February/March 2024)
    a. Will address Priority Area #1 (Trade-offs, building on prior ICES Advice products)
    b. Develop Terms of Reference for Priority Areas #2 (Guidelines for monitoring and assessment at regional scales) and #3 (Ecosystem approach to decision making)

State-of-the-art offshore monitoring technology

Kai Stoltz

GCE Ocean Technology


STATE-OF-THE-ART
TECHNOLOGY
GCE
Ocean
Technology

GCE Ocean Technology

PARTNERS

Industry

AkerSolutions, cdb, CGG, DNV, equinor, TechnipFMC, OneSubsea

R&D

NORCE, SINTEF

Development Contributors

Bergen Kommune, Vestland fylkeskommune, Øygarden

Higher Education Institutions

BI, Høgskulen på Vestlandet, NTNU Norwegian University of Science and Technology, Universitetet i Stavanger

MEMBERS

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Innovasjon Norge, Forskningsrådet, siva

Cluster Relations

Arena Pro Ocean Hyway Cluster, BLUE MARITIME CLUSTER, GCE NODE | AN INDUSTRY-DRIVEN CLUSTER FOR OCEAN TECHNOLOGIES, Kongsberg Innovasjon, maritime cleantech, NCE Media, Norwegian Centres of Expertise NCE Seafood Innovation Cluster, energy valley, hub for ocean

National Relations

AKSEL, Bunnsolid, BERGEN NÆRINGSRÅD, connect NORGE, FFU, LUMEN, maritime BERGEN, Norwegian Cognitive Center, Norwegian Energy Partners, NTNU OCEAN CLUB, OCEAN INNOVATION | NORWEGIAN CATAPULT CENTRE, SPE Bergen Section, SUT Society for Underwater Technology, UTC Underwater Technology Conference, UTF Underwater Technology Foundation, VNR VEST NÆRINGSRÅD

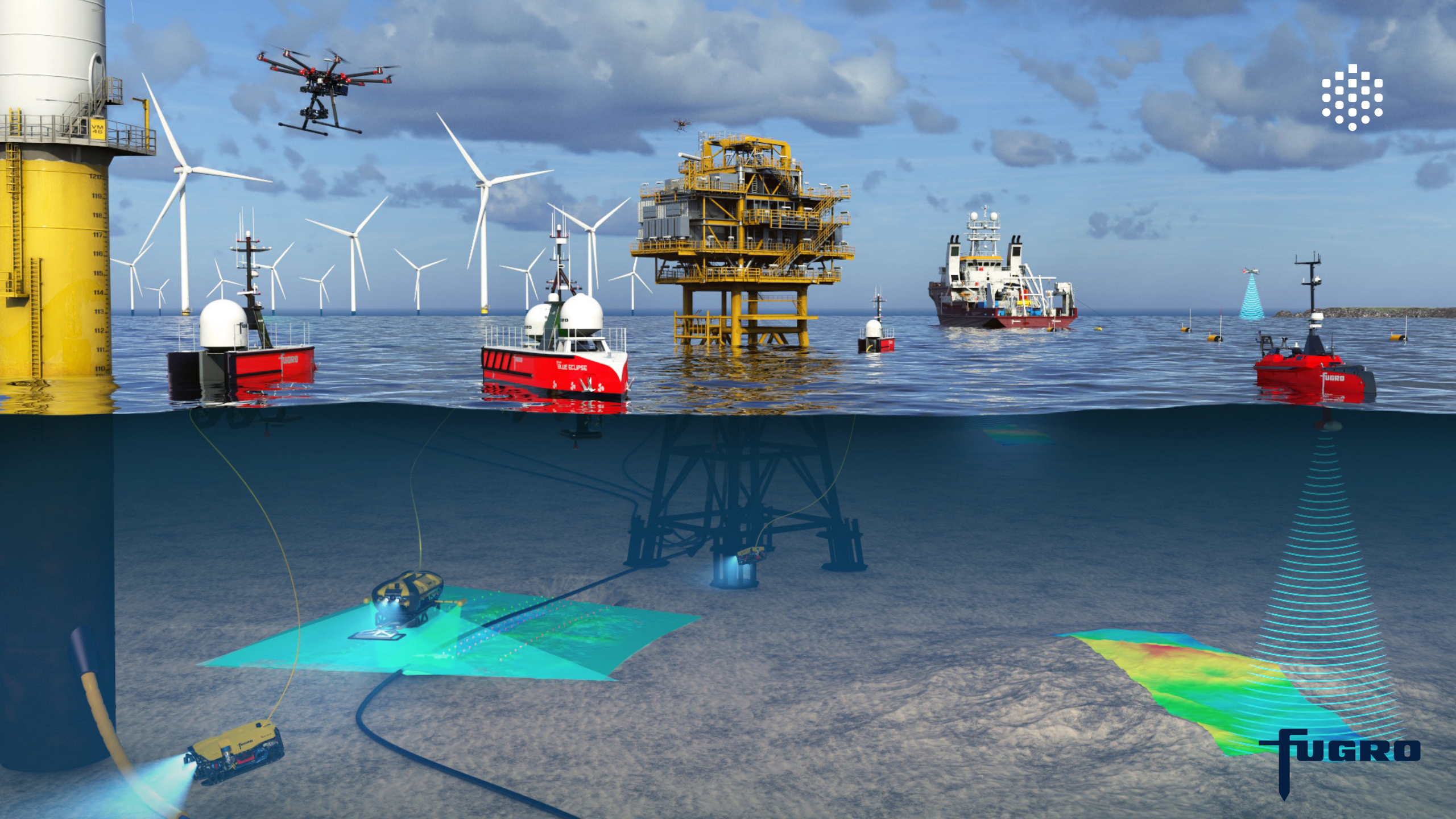
International Relations

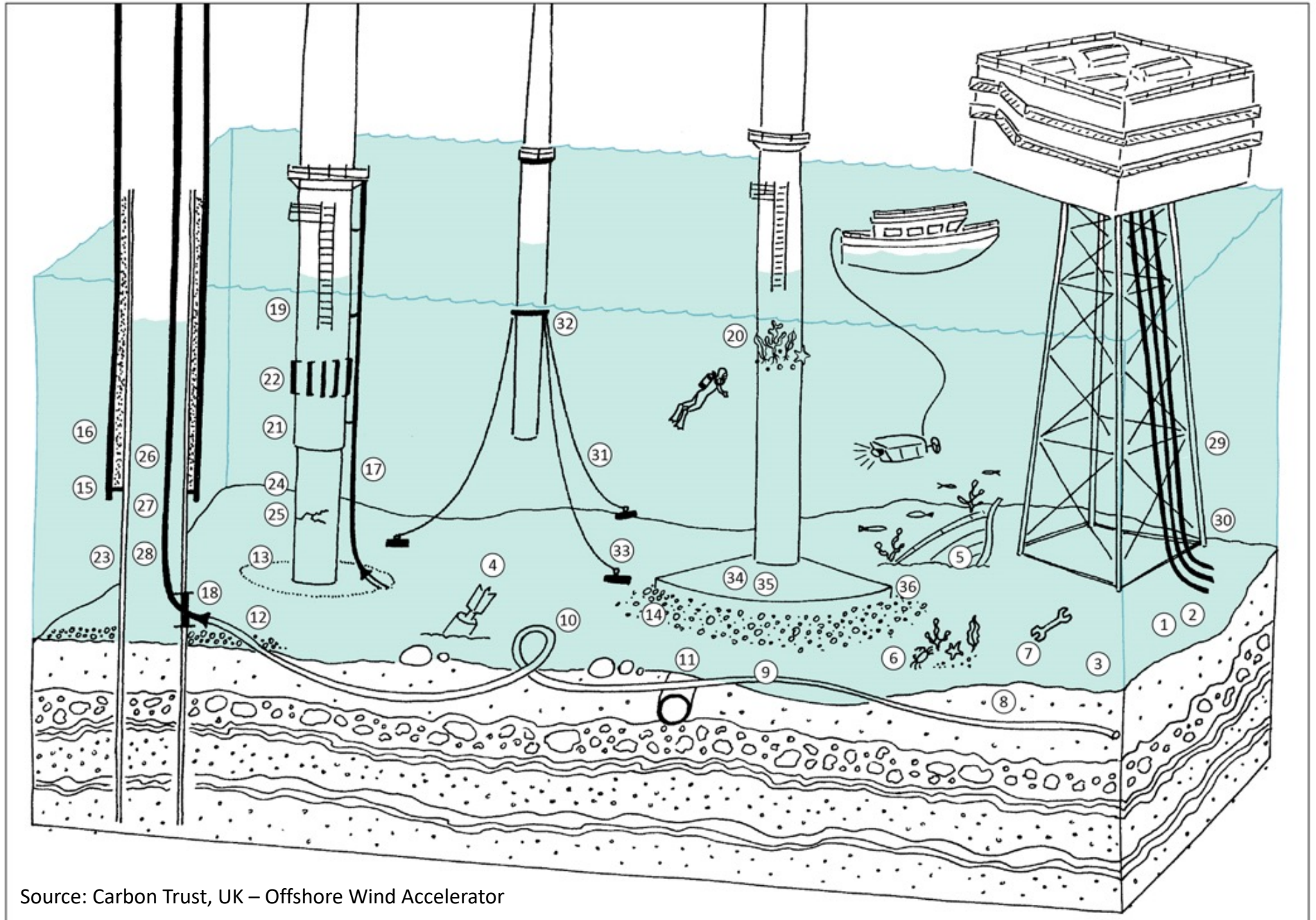
AHK Deutsch-Norwegische Handelskammer, BlueTech Cluster Alliance, CANADA'S OCEAN SUPERCLUSTER, EMEC THE EUROPEAN MARINE ENERGY CENTRE LTD ORKNEY, FIESP, HERIOT WATT UNIVERSITY, MARTIN TRUST CENTER FOR MIT ENTREPRENEURSHIP, Ocean Energy Europe, Organização Nacional da Indústria do Petróleo, Scottish Hydrogen & Fuel Cell Association, Governo do Rio de Janeiro Secretaria de Desenvolvimento Econômico, Energia, Indústria e Serviços, Subsea Energy Australia, Wind Europe

Statfjord A 1977

Photo by Norsk Oljemuseum/Troels Erstad

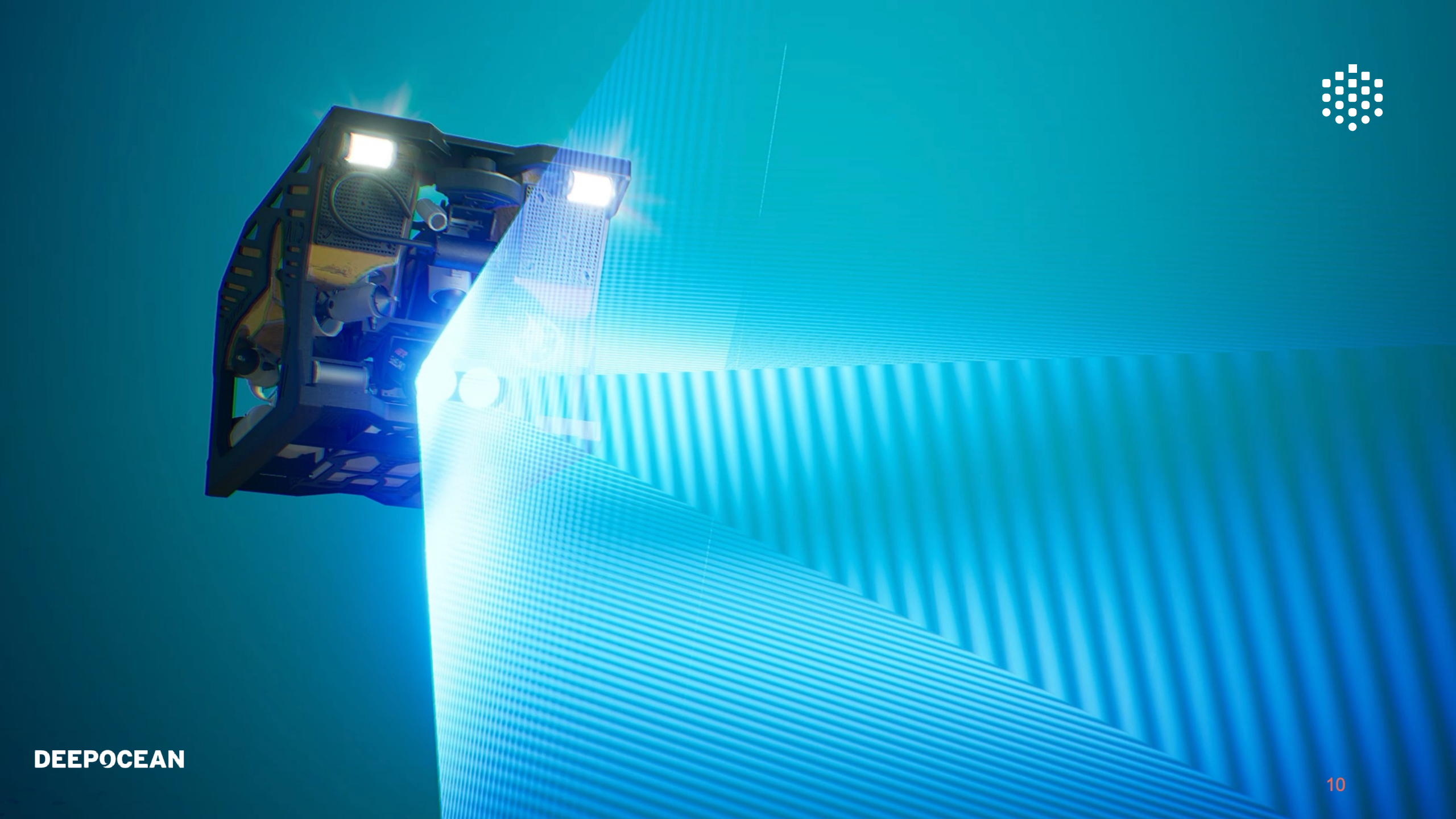
Photo by Vattenfall


FUGRO
BLUE ECLIPSE
FUGRO



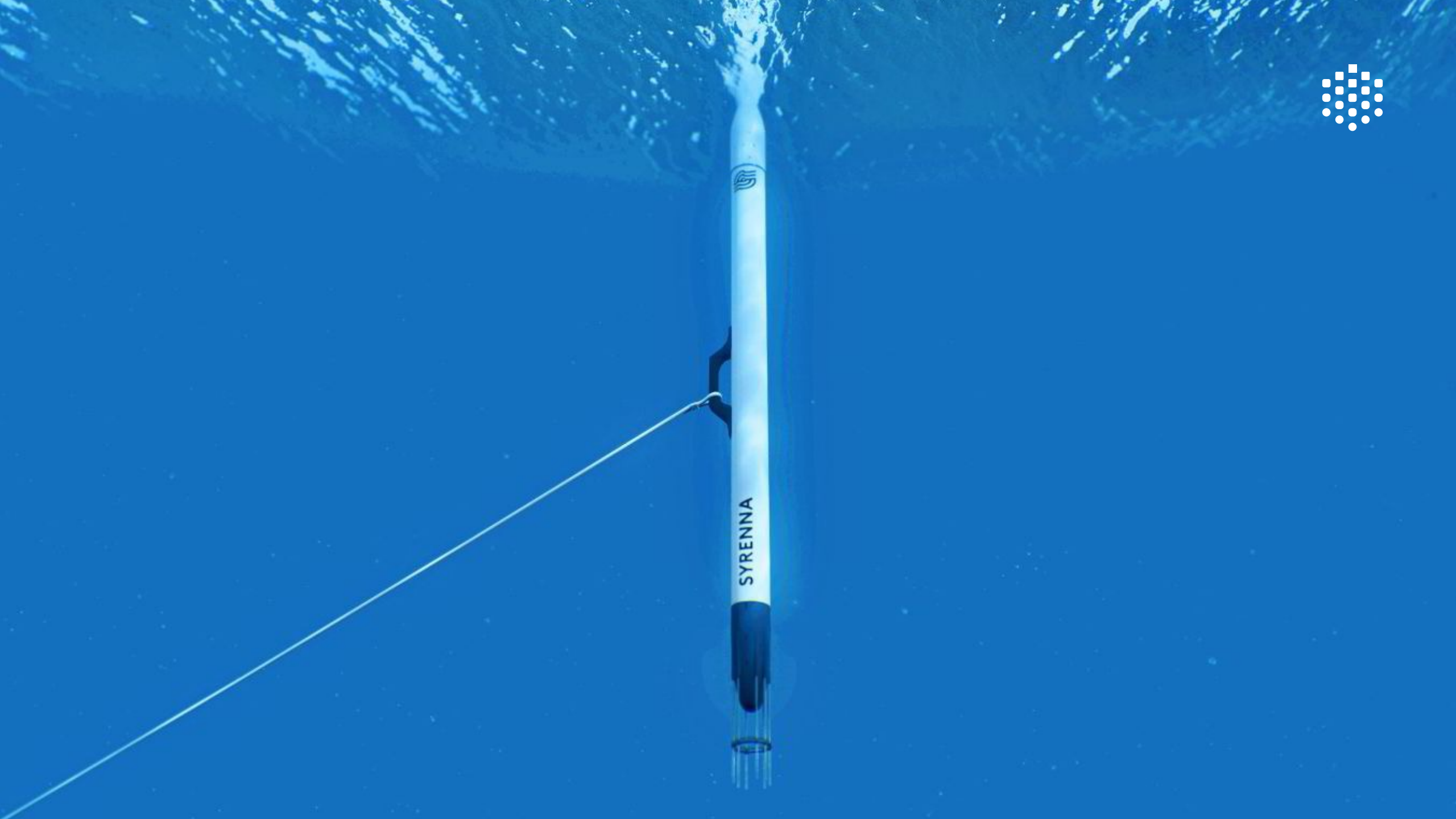
Source: Carbon Trust, UK – Offshore Wind Accelerator

1. Seabed morphology
2. Seabed mobility
3. Seabed bathymetry
4. Unexploded ordnance
5. Archeaology
6. Benthos, flaura and fauna
7. Debris and foreign objects
8. Buried cables
9. Free spans
10. Cable loops
11. Cable crossings
12. Cable protection
13. Scour
14. Scour protection
15. Grout seals
16. Grout integrity
17. J-tubes
18. J-tube seals
19. Ladders and boat fenders
20. Marine growth
21. Corrosion
22. Cathodic protection
23. Coatings
24. Welds
25. Cracks and flaws
26. Internal corrosion
27. pH
28. Oxygen levels
29. Flooded members
30. Pile sleeves
31. Tendons
32. Swivels
33. Anchor points
34. Concrete
35. Rebar corrosion
36. Earthing



DEEPOCEAN


REACH
SUBSEA


SYRENNA

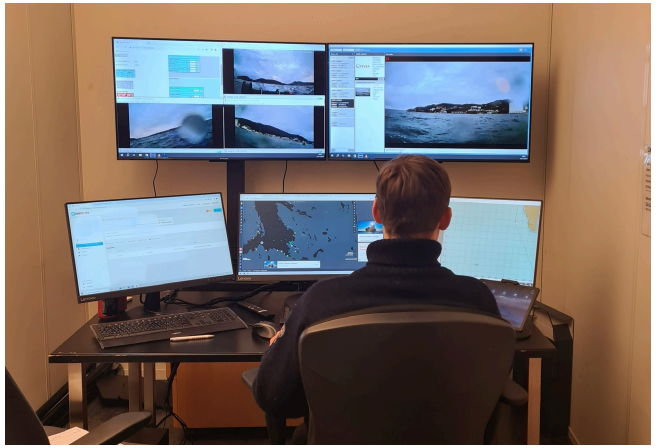
CTD Survey outside Bergen

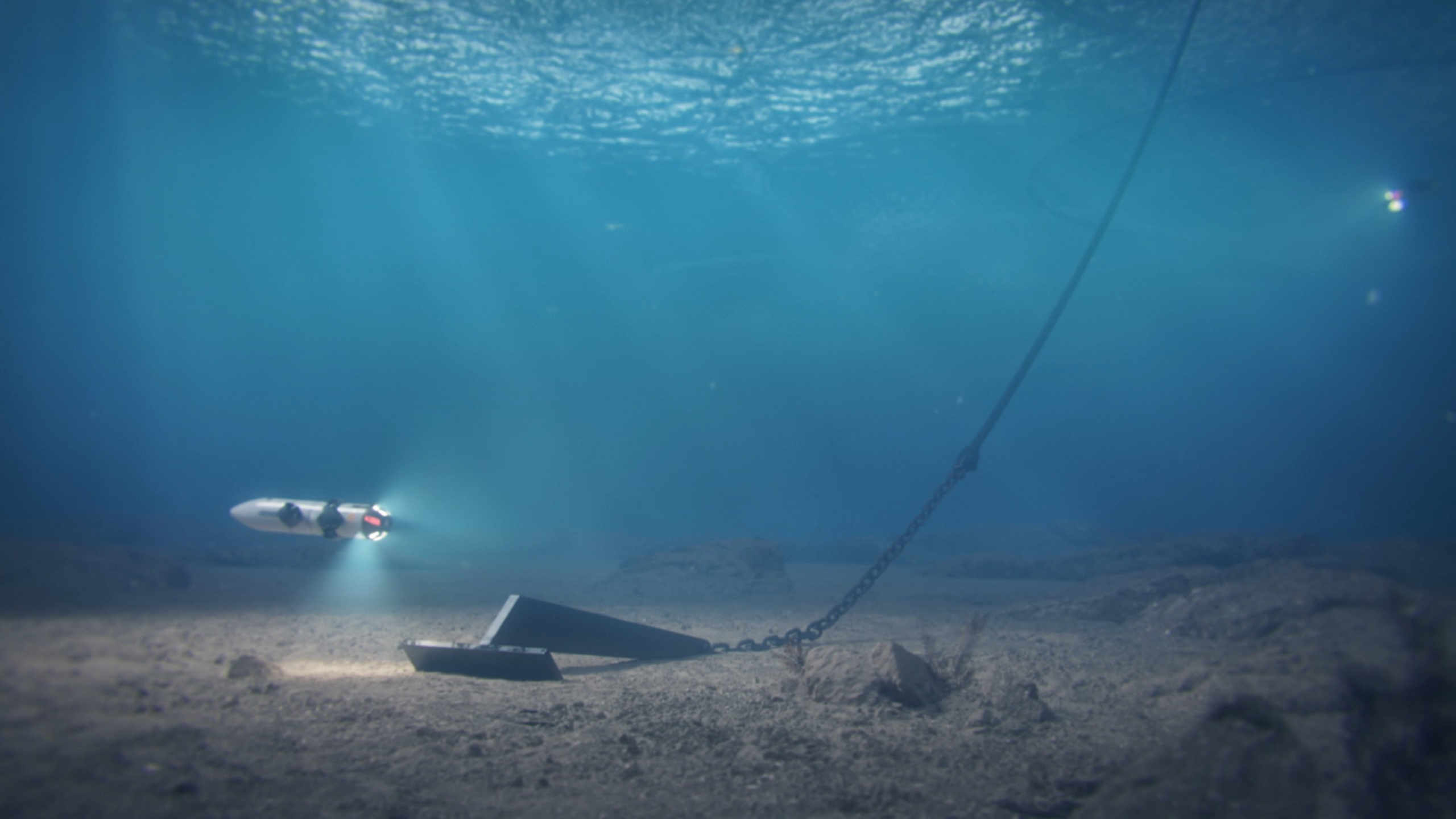
Published
November 23, 2023

Our latest activity in Bergen Byfjord involved Eirik conducting operations remotely from our Remote Operations Center (ROC).

Nordic USV has conducted several CTD surveys in Bergen Byfjord as part of the initial testing and verification of our operations.

NORDIC USV





World Class Ocean Technology
from Norway

Kai Stoltz

BDM

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+47 93016772

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Bringing Marine Spatial Planning processes into a Nordic context: What do we need to know?

Sigrid Eskeland Schütz,

Faculty of Law, University of Bergen

Bringing Marine Spatial Planning processes into a Nordic context: What do we need to know?

Prof. Sigrid Eskeland Schütz,

Faculty of law, University of Bergen

Prof. Sigrid Eskeland Schütz, Jur. fak. UIB og prof. Elise Johansen, WIKBORG REIN; “Faglig grunnlag for overordnede prinsipper for arealbruk til havs”, Bergen Open Research Archive: Faglig grunnlag for overordnede prinsipper for arealbruk til havs (uib.no)

It`s getting crowded…some places more than other:

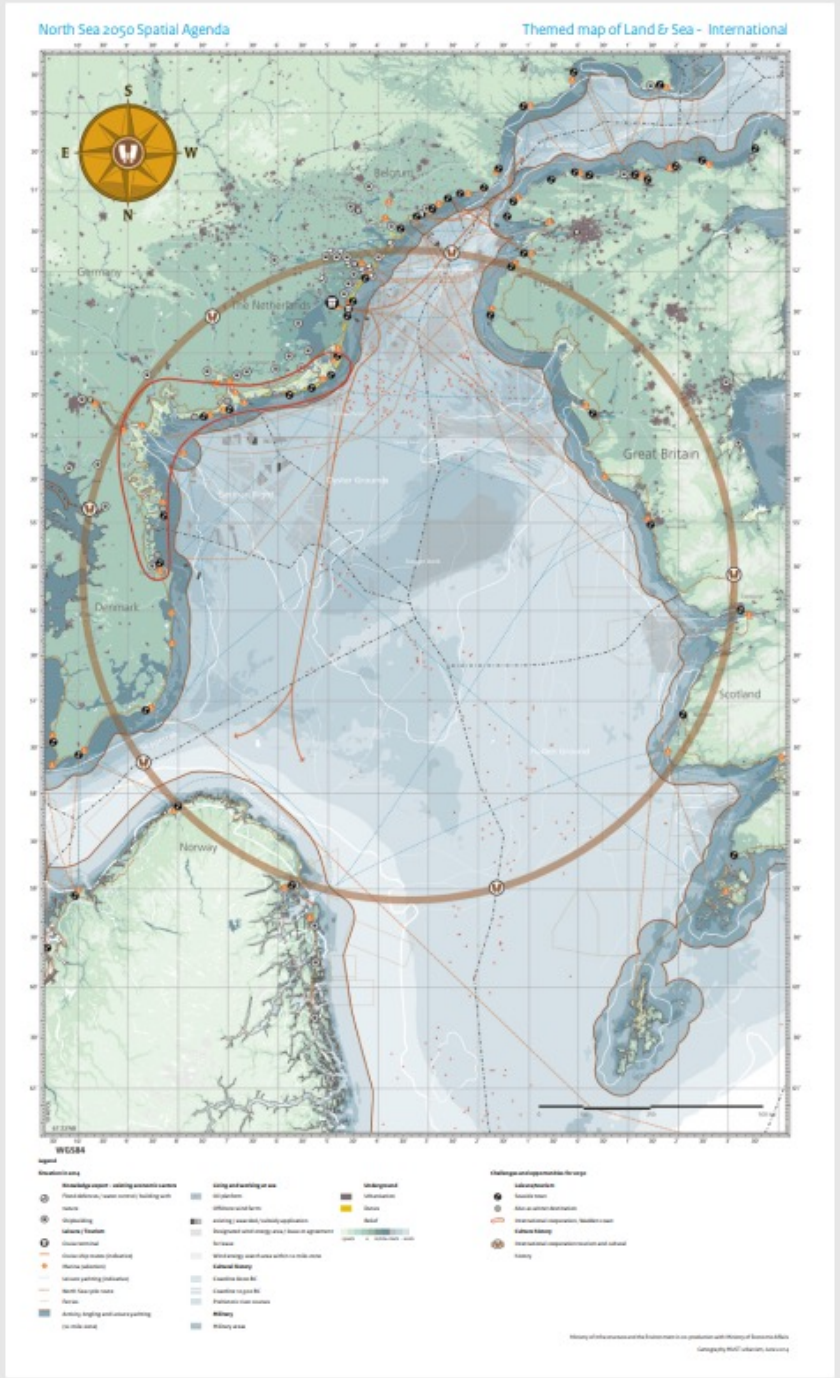
North Sea
Baltic Sea

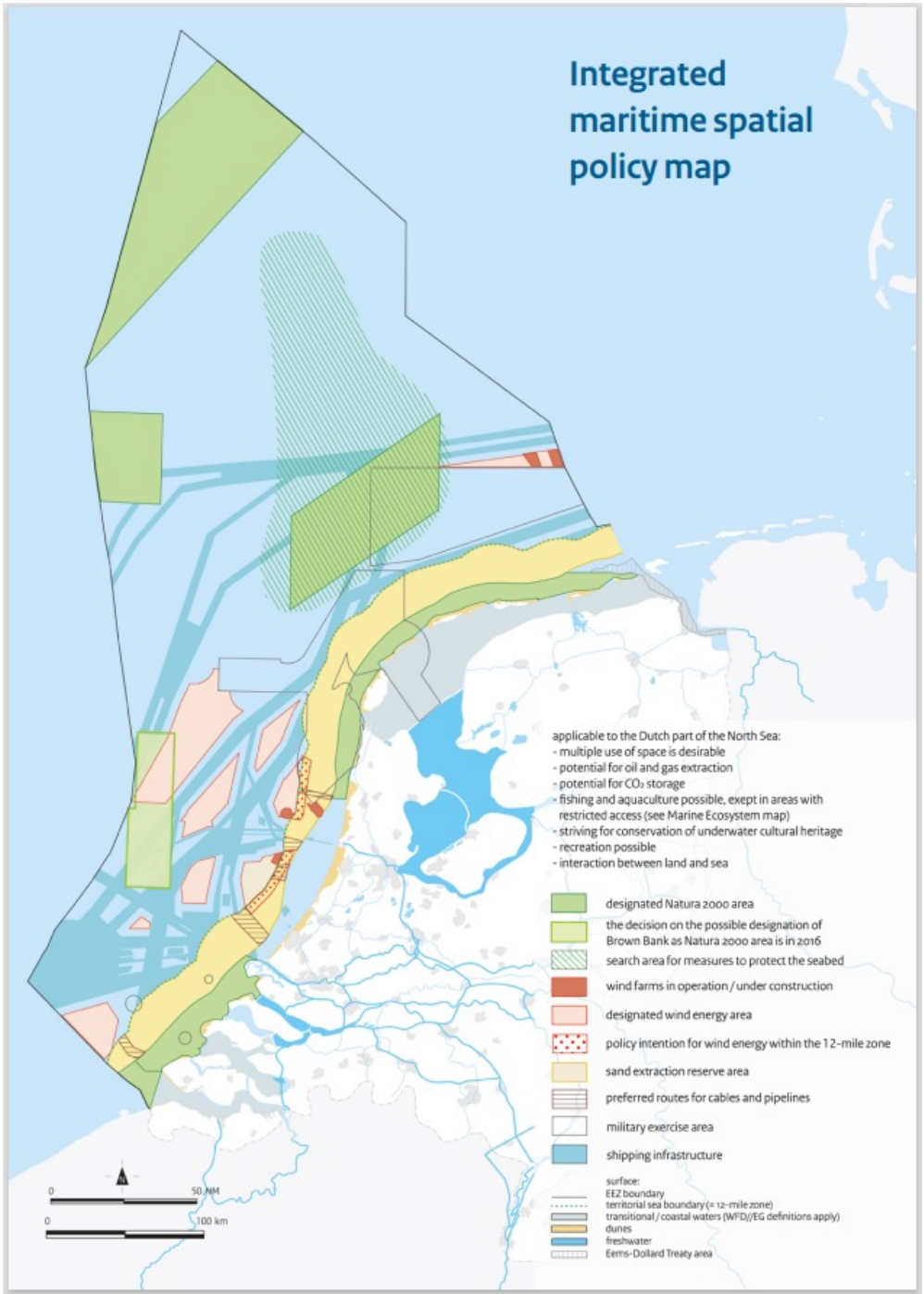
..we need room for more marine protected areas (30% by 30), renewables, infrastructure.. ..smart and coordinated: we need cooperation across marine borders

But do we talk the same regulatory language?

Policy Document on the North Sea 2016-2021 - including the Netherlands' Maritime Spatial Plan

Figure 6.1 **International North Sea**





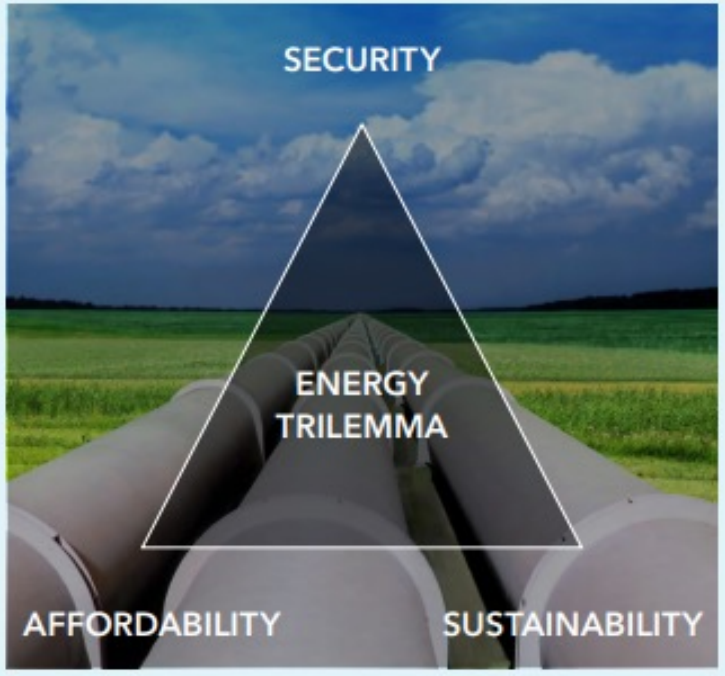
The Nordic countries in the same geopolitical boat, and EU politics:

Energy security moving to centre stage. Taxonomy. Green deal.

- DNV Energy Transition Outlook 2023, p7

Energy trilemma

The energy trilemma describes the attempt to balance energy security, equity (accessible and affordable), and environmental sustainability. Since the signing of the *Paris Agreement* and the rapid advance of renewable energy, the quest to reduce emissions has been in the spotlight. However, energy security is now moving to centre stage due to the shifting geopolitical landscape and escalating tensions in some regions where control over energy is being used as a means to achieve political ends.



https://www.witteveenbos.com/news/catalogue-launched-for-designing-nature-inclusive-offshore-wind-farms/

Witteveen + Bos

EN / NL

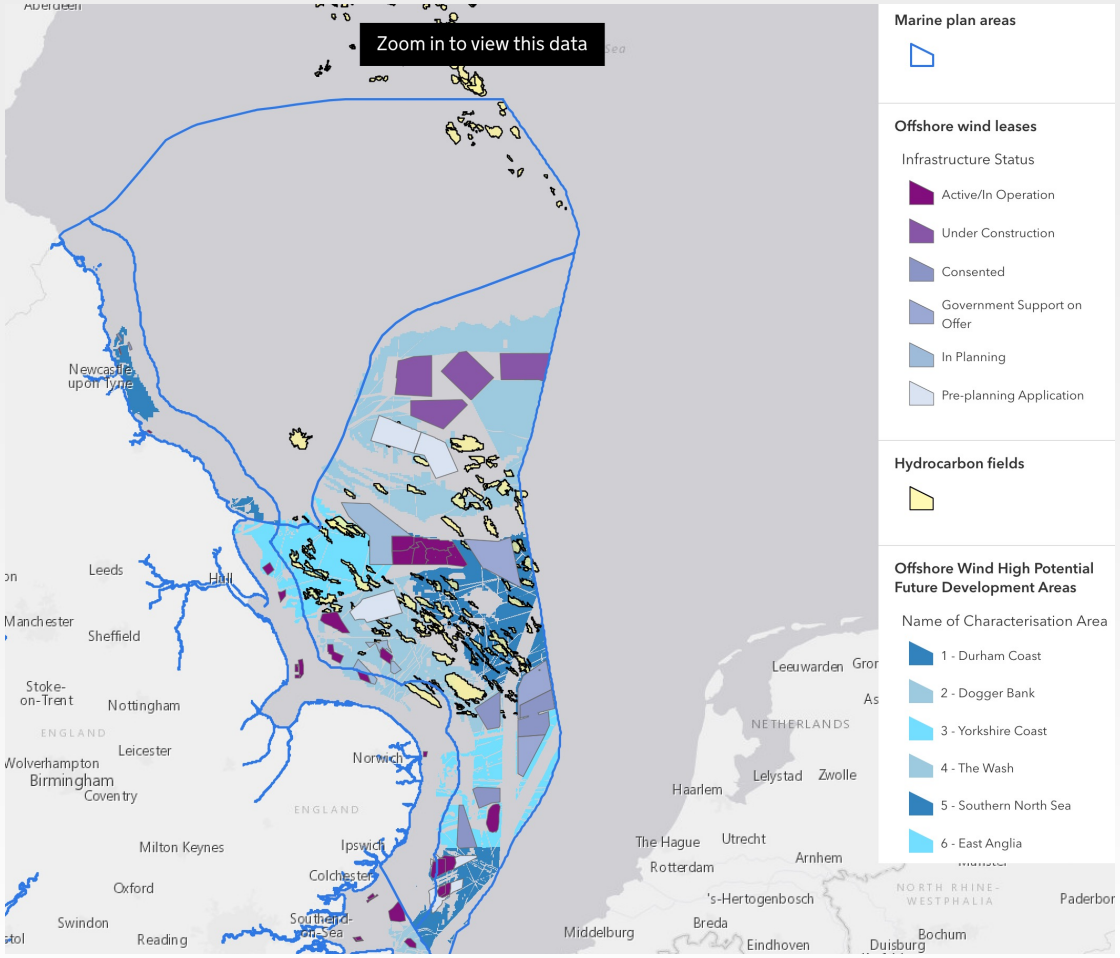
Areas of expertise | Projects | Challenges | News | About us | Career | Conta

EU/EEA-relevant:
Taxonomy:
-Nature restoration
-Nature-inclusive design
Green deal:
-Faster permission prosesses
-Renewable go-to areas

Home > News > Catalogue launched for designing nature inclusive offshore wind farms

Multi-use, marine industrial sites/energy islands

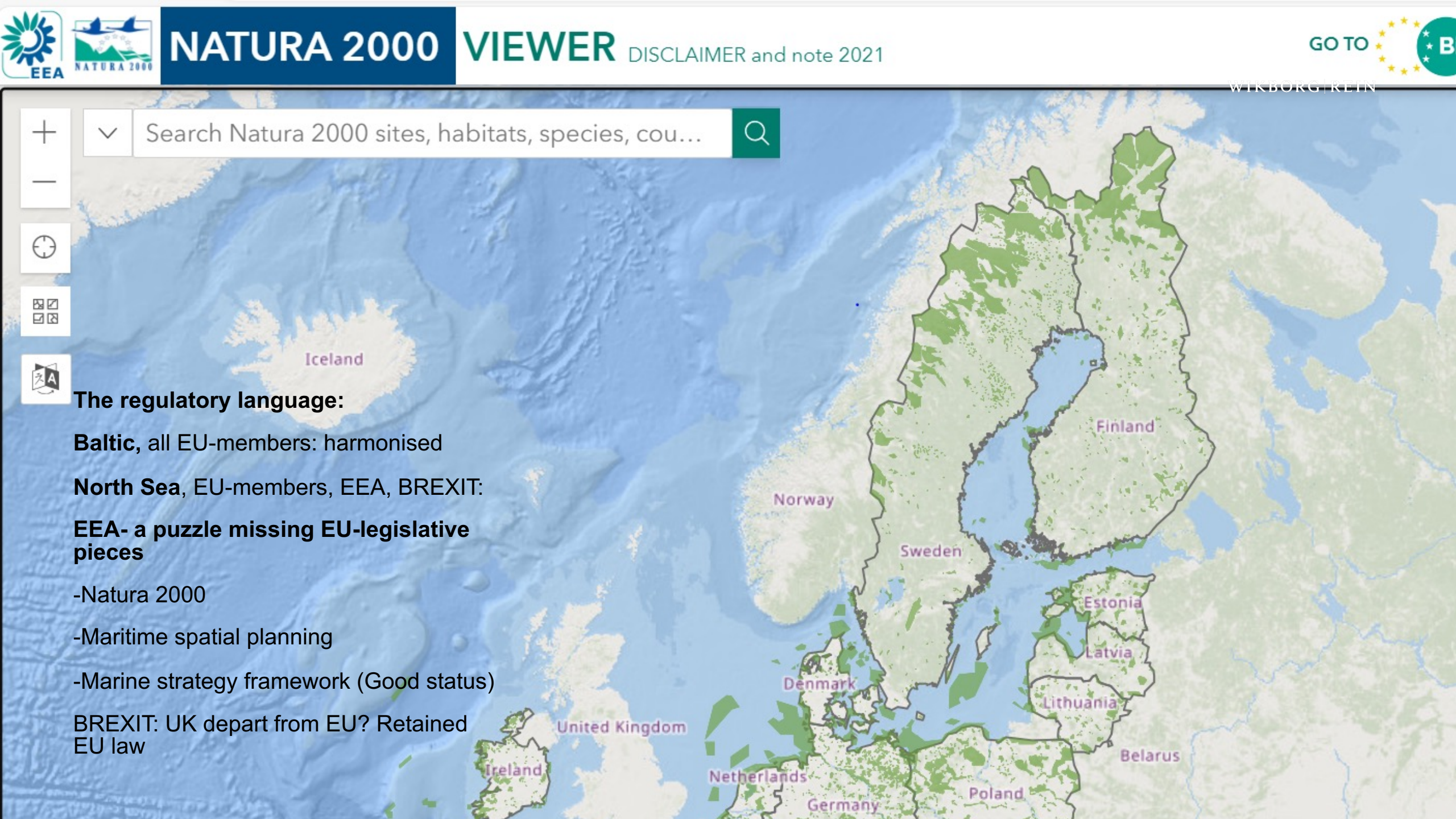
Lacroix, Denis & Pioch, Sylvain. (2011). The multi-use in wind farm projects: More conflicts or a win-win opportunity?. Aquatic Living Resources. 24. 10.1051/alr/2011135.



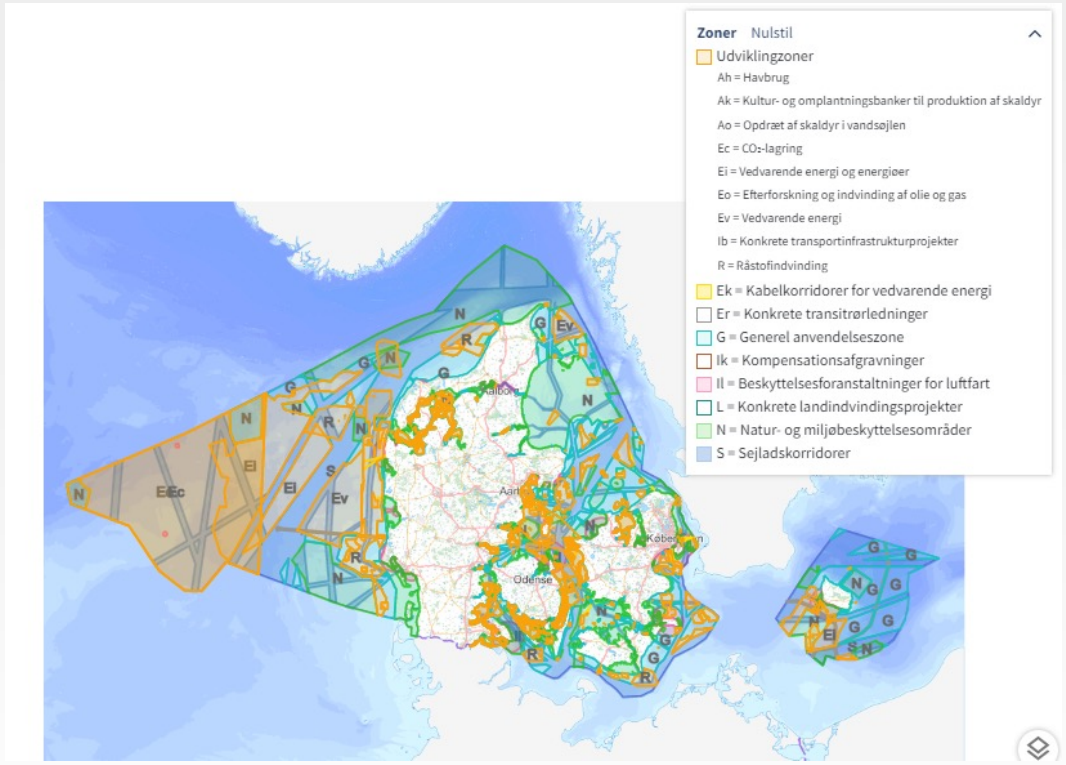
- Germany, England (south-east) marine plans: highlights multi-use, space-saving planning:
- Germany; «Economic uses should be sustainable and as space-sparing as possible».
- England; south-east coast; densly built out areas; co-excistence promoted, if possible.

This is what the world's first energy island may look like (stateofgreen.com)


DNV
TECHNOLOGY OUTLOOK
2030
Multipurpose offshore platforms

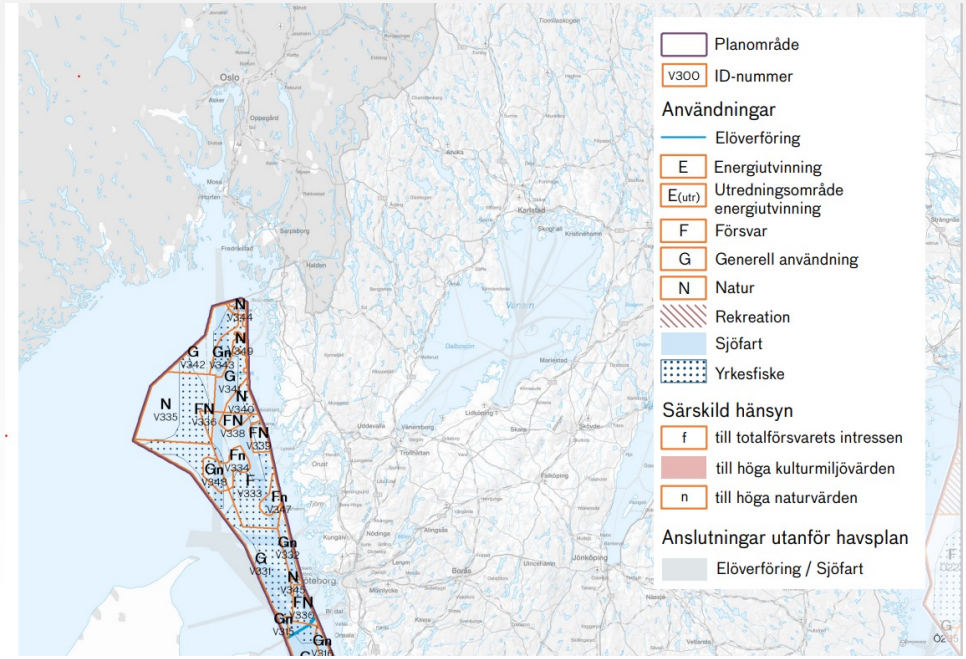

NATURA 2000 VIEWER
DISCLAIMER and note 2021
GO TO
WIKBORG | REIN
Search Natura 2000 sites, habitats, species, cou…
Iceland
Finland
Norway
Sweden
Estonia
Latvia
Lithuania
Belarus
Denmark
United Kingdom
Ireland
Netherlands
Germany
Poland
The regulatory language:
Baltic, all EU-members: harmonised
North Sea, EU-members, EEA, BREXIT:
EEA- a puzzle missing EU-legislative pieces
-Natura 2000
-Maritime spatial planning
-Marine strategy framework (Good status)
BREXIT: UK depart from EU? Retained EU law

And within EU; not full harmonisation in MSP, minimums-harmonisation: Denmark, Sweden



Denmark; Legally binding MSP`s, 10 years.
Maritime transport zones; free from permanent installations

Sweden; Policy plans (guidelines), 8 years:
No binding restricitons



- Regulatory innovation takes place in the Nordic countries in relation to marine management. The challenges are in many cases similar.

- National good governance and regulation an advantage in international trade; national regulatory differences could be a conscious policy choice. But where we aim for the same regulatory framework or solutions, we should cooperate to have common regulatory design/language:

A common regulatory language could promote, facilitate and simplify:

- Development of best regulatory and administrative practice in the Nordics
- Regulatory knowledge innovation and -transfer
- Transborder cooperation and planning

Sigrid.schytz@uib.no

Handling complexity, co-existence and collaboration using digital twins: Visual evidence and data driven decisions on dynamic data models

Eirik Solberg & Håvard Legreid, Digital Tvilling

Coffee Break – 20 minutes

Roundtable Discussion and Commitments from Nordic Leaders

Panel Debate

Geir Huse
Research Director
Institute of Marine Research

Hanne Wigum,
Leader Offshore Wind Concepts, Equinor

Rita V.L. d'Oliveira Bouman
SINTEF Ocean & FME NorthWind, Norwegian Research Center on Wind Energy

Sigrid Eskeland Schütz
Faculty of Law, University of Bergen

Meinhard Eliasen
Energy Consultant, Faroese Environment Agency

Closing remarks and next steps

Dorothy Dankel
NMTT Forum & SINTEF

Lisa Pfeiffer
ICES Expert in Residence

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

Nordic Council of Ministers

Vestland fylkeskommune

NORDIC MARINE THINK TANK

TAK

TACK

TAKK

Nordic Climate Change Forum for Fisheries & Aquaculture

QUJANAQ

KIITOS