

# Samarbeidsforum for havvind

## Arbeidsgruppe 3 – Infrastruktur og utvikling av nett til havs



Møte 8, 25. januar 2024, Nydalen

**Statnett**

 **Norsk Industri**

 **Fornybar Norge**



**ZERO** 

# Agenda 25. januar 2024

Fra 08:30	Kaffe og småsnacks
09:00 – 09:10	Velkommen – <i>Håkon Borgen, leder av arbeidsgruppen</i>
09:10 – 09:50	Bærekraft - Sustainability <ul style="list-style-type: none"><li>• Offshore Coalition for Energy and Nature (OCEaN) - <i>Dení Aguilar Bellamy (by Teams), Coordinator – Offshore Energy and Nature RGI (30 min incl Q&amp;A)</i><ul style="list-style-type: none"><li>- Topics will include Nature Inclusive Design (NID), auctioning, mitigation measures, measuring net positive impacts, maritime spatial planning</li></ul></li><li>• Refleksjoner rundt bordet</li></ul>
09:50 – 10:10	Forvaltningsregimet for fornybar energiproduksjon til havs - <i>Sigrun Kavli Mindeberg, NVE</i>
10:10 – 10:15	Status fra ekspertgruppen om teknologi for nettilknytning av flytende havvind – <i>Hans Petter Rebo, Norsk Industri</i>
10:15 – 10:30	<i>Pause - mat er tilgjengelig, og det åpnes for bespisning i møtet frem til 11:30</i>
10:30 – 11:05	Kunnskapsgrunnlag for kommende utlysning <ul style="list-style-type: none"><li>• Nettutredning Sørvest F - <i>Amund Ljønes, Statnett Utvikling Hav</i></li></ul>
11:05 – 11:30	Europeisk Offshoreplan 2024 – <i>Erika Stadler, Statnett Langsiktig kraftsystemutvikling</i>
11:30 – 11:35	Forberedelse åpent møte
11:35 – 11:45	Pause
<hr/>	
11:45 – 12:00	<b>Åpent informasjonsmøte – (<a href="#">Link til møtet</a>)</b> <ul style="list-style-type: none"><li>• Orientering fra arbeidsgruppen om hovedtemaene i møtet</li></ul>
<hr/>	
12:00	Kaffe i <i>Ladepunktet</i> (1. etg.) for de som har anledning

# Velkommen

*Håkon Borgen, leder av arbeidsgruppen*

# Hva har skjedd siden sist?

- Frist for søknad om prekvalifisering til Sørilige Nordsjø II var 15. november 2023
- Statnett har inngått utredningsavtaler (Memorandum of Understanding) med fem europeiske søsterselskaper som en del av oppdraget med å vurdere potensielle hybride nettløsninger for havvindproduksjon i område Sørvest F i Nordsjøen
- NVE publiserte første leveranse i oppdraget om å gi innspill til OED om forvaltningsregime for havvind 15. desember – *tema i dag*
- EFTAs overvåkningsorgan, ESA, godkjente 19. desember eventuell statsstøtte til et havvindprosjekt i Sørilige Nordsjø II
- Kraftløftet, LO og NHOs tiltaksplan for økt kraft- og nettilgang i Norge mot 2030, ble lansert 5. januar
- 23. januar publiserte ENTSO-E, som er offshore planansvarlig etter TEN-E 2022, Offshore Network Development Plan 2024 (ONDP) – *tema i dag*
- I regi av arbeidsgruppe 3, Infrastruktur og utvikling av nett til havs, inviterte Fornybar Norge, Offshore Norge og Statnett til et fysisk samhandlingsmøte om samordnet nettløsning 24. januar for konsortier som er aktuelle for Utsira Nord
- Ove Flataker fra RME har måttet trekke seg fra arbeidsgruppe 3. Vi takker Ove for meget godt samarbeid og verdifulle bidrag til arbeidsgruppen





# Offshore Coalition for Energy and Nature (OCEaN)

*Dení Aguilar Bellamy (by Teams), Coordinator – Offshore Energy and Nature RGI*

# Offshore Coalition for Energy and Nature

*Aligning nature protection with offshore wind energy*



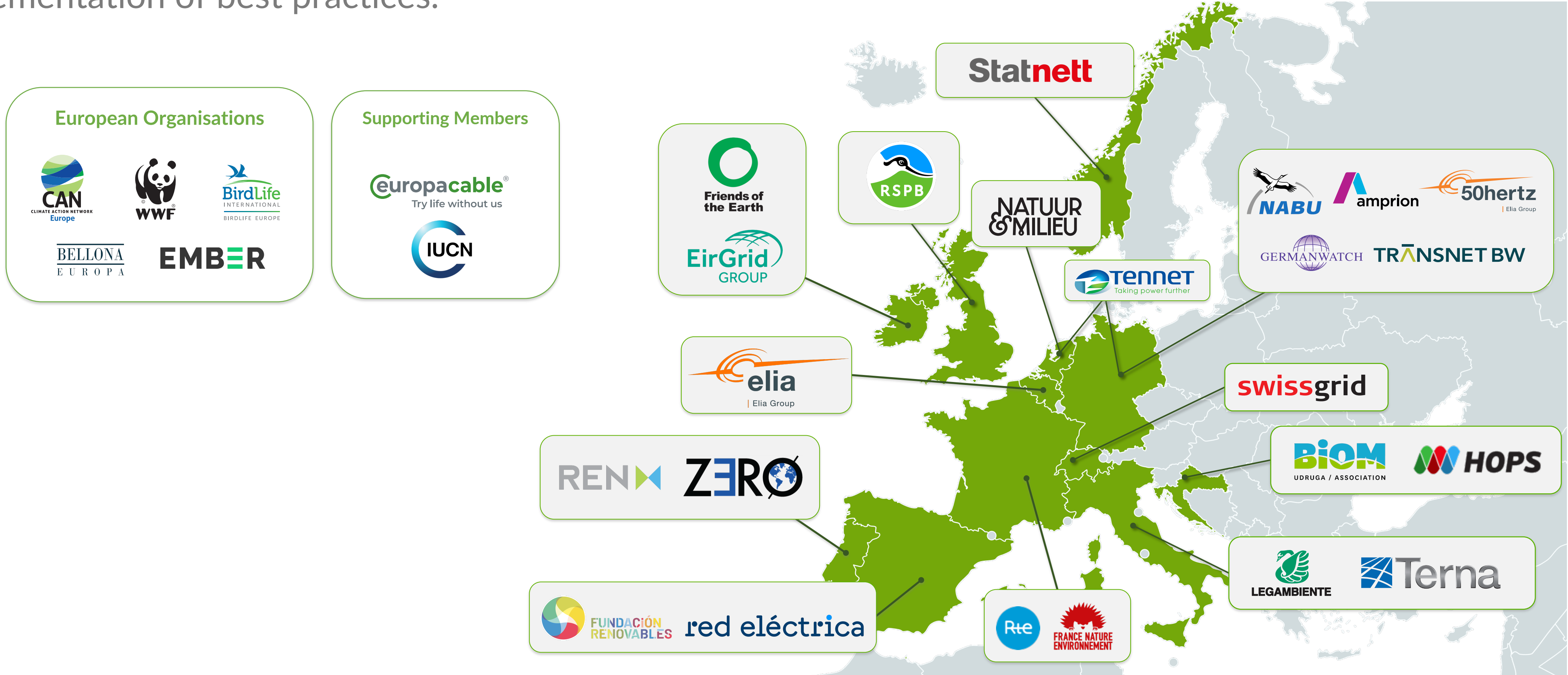
**Dení Aguilar Bellamy**  
**January 2024**

# Agenda

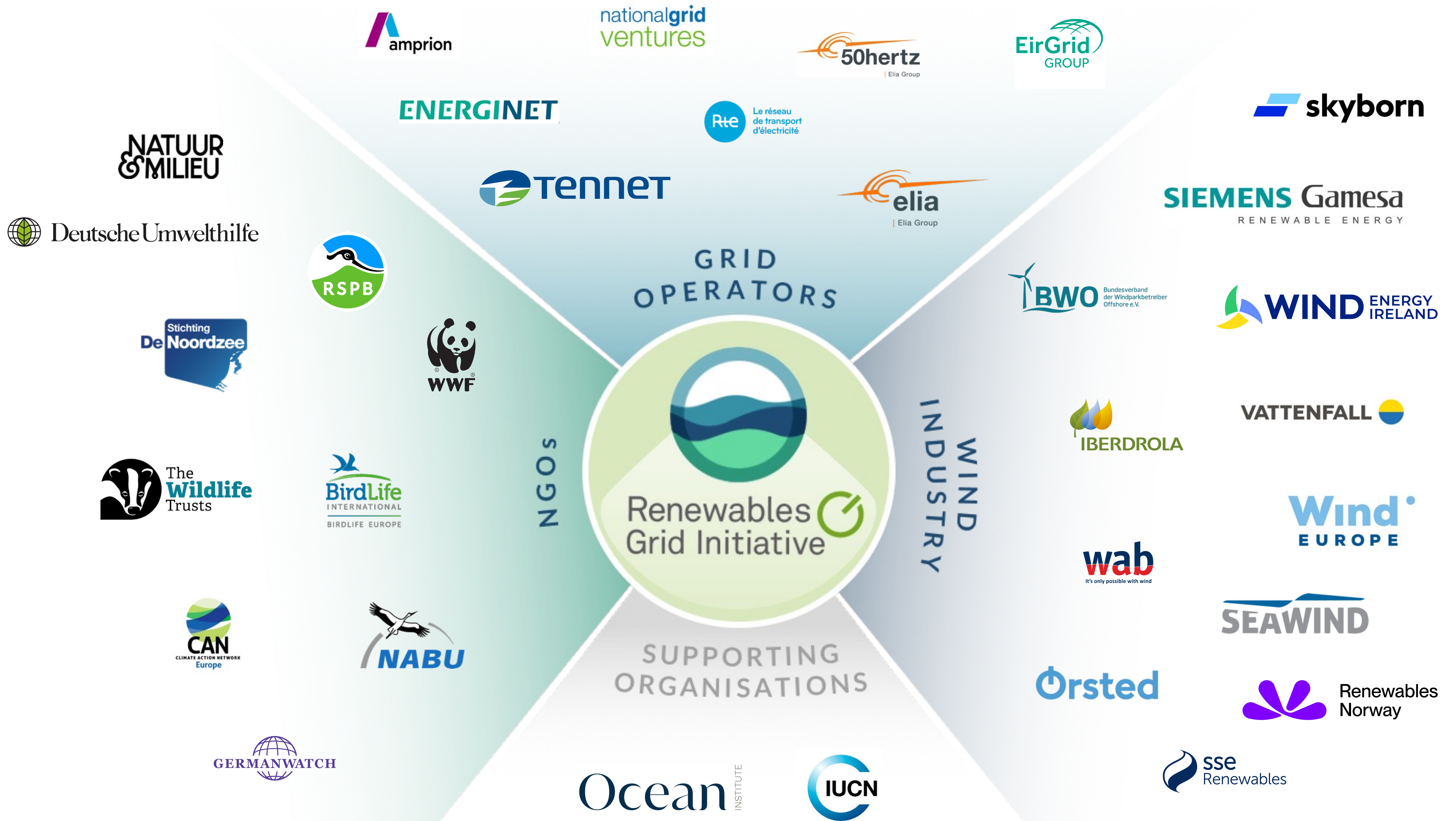
- Introduction to RGI and OCEaN.
- OCEaN activities related to the sustainability of offshore wind and grid infrastructure:
  - Auctioning\*
  - Mitigation measures\*
  - Nature Inclusive Design (NID)\*
  - Methodologies to measure net positive impacts of the infrastructure on biodiversity (*if times allows*)
  - Maritime Spatial Planning (*if times allows*)

# Renewables Grid Initiative (RGI)

RGI is a unique **collaboration of NGOs and TSOs** from across Europe engaging in an 'energy transition ecosystem-of-actors'. We foster knowledge exchange, discussions on the grid infrastructure needs, and the implementation of best practices.









# 2023 highlights of OCEaN

**How to integrate nature into offshore wind and grid infrastructure**

12:30 - 3:30 pm CEST  
Wednesday, 26 April 2023

Renewables Grid Initiative | ocean | Wind EUROPE | ANNUAL EVENT 2023 COPENHAGEN

**OCEaN Statement on Ecological Criteria in Offshore Wind Farm Auctions**

April 2023

ocean Offshore Coalition for Energy and Nature

November 2023  
Event at European Parliament

"The European offshore wind industry: a wake-up call"  
14 November 11.00-12.30

**Introducing Med OCEaN**

**Offshore Coalition for Energy and Nature - Mediterranean Sea**

September 2023

ocean Offshore Coalition for Energy and Nature  
MEDITERRANEAN SEA

**Reconciling Energy & Nature**  
OCEaN Events at the 2023 Wind Europe Annual Event

**presentations**

11:15 - 12:00 APR 25  
Artificial reefs to support biodiversity at Borssele Offshore Wind Farm  
Collaboration between Ørsted and The Rich North Sea  
Location: Stand E-D30

16:15 - 17:00 APR 25  
Importance of successful stakeholder engagement and a nature inclusive design in developing the future grid  
Eliia, 50Hertz, and Energinet present their experiences  
Location: Stand E-F70

11:15 - 12:00 APR 26  
Nature inclusive design in turbine foundations at Hollandse Kust Zuid  
Collaboration between Vattenfall and The Rich North Sea  
Location: Stand C2-B6

**workshop**

12:30 - 15:30 APR 26  
How to integrate nature into offshore wind and grid infrastructure – a spotlight on offshore auctioning  
This event is invitation only. We welcome a select amount of walk-ins on a first come, first serve basis.  
Location: Meeting Room 18+19, Level 1 (Exhibition area)

**Come visit OCEaN at stand C1-B9!**  
#OffshoreNature23

**OCEaN Statement on the upcoming EU Wind Power Package**

October 2023

ocean Offshore Coalition for Energy and Nature

Offshore Coalition for Energy and Nature  
NSEC ministerial meeting – 20 November 2023

**Theme 2: Energy & Ecology**  
NCO Ambassador: Antonella Battaglini, on behalf of OCEaN

**Med OCEaN Recommendations**

**Maritime Spatial Planning to enable nature-friendly offshore wind and grids**

November 2023

ocean Offshore Coalition for Energy and Nature  
MEDITERRANEAN SEA

**Workshop How to plan and deploy nature friendly offshore wind**

25 MAY 2023  
12:15 - 13:30 CET

REGISTER NOW

Brest Expo - Parc de Penfeld  
Brest, France

EMD | Renewables Grid Initiative | LPB

**ENERGY NATURE WEBINAR SERIES on NATURE INCLUSIVE DESIGN**

**Enhancing marine life around the subsea electricity grid in the Dutch North Sea**

with The Rich North Sea | TENNET | presented by ocean | Renewables Grid Initiative

26 January 2023  
15:00 - 16:30 CET

**ENERGY NATURE WEBINAR SERIES on NATURE INCLUSIVE DESIGN**

**Subsea Grids Supporting Marine Biodiversity**  
Improving Undersea Resiliency with Natural Materials

with red eléctrica | presented by ocean | Renewables Grid Initiative

26 October 2023  
10:00 - 11:30 CET

**Energy & Nature Database**

The OCEaN Energy & Nature Database is a public database promoting positive offshore measures. OCEaN defines the criteria used to select these measures, please refer to the Energy & Nature selection criteria. If you are aware of similar measures and want to share them with us, please contact Ines van den Berg (ines.vandenberg@renewables-grid.eu) and Ana Hilarovic (ana.hilarovic@renewables-grid.eu).

**Search:**

Results per page: 5

**Sea Basin:**

- Atlantic Ocean
- Baltic Sea
- Mediterranean Sea
- North Sea
- Other sea basins

**MUSEAS:** Multi-use in Seas project assessing offshore multi-use in Europe

**Seaweed cultivation in UK North Sea waters**

**Eco-friendly subsea cable in Canary Islands**

**Restoration of Posidonia oceanica meadows at the Gulf of Follonica**

**FLORA:** Floating radar for marine environmental data in Gran Canaria

**North Sea Farm 1:** Commercial scale seaweed farm located between offshore wind turbines in the Dutch North Sea

**ULTRAFIS:** Circular low trophic offshore aquaculture in wind farms and restoration of marine space in North and Baltic Seas

**Combining aquaculture and offshore wind in a multi-use platform within Kårehamn wind farm**

**MultiFrame project:** building synergies with offshore wind in Sweden

**Ecosour protection:** enhancing nature values in Borssele V - innovation pilot offshore wind farm

**Coastal Life:** Restoration of coastal habitat zones in Denmark

**MUSICA:** Multiple use of space for island clean autonomy on Chiosouss Island

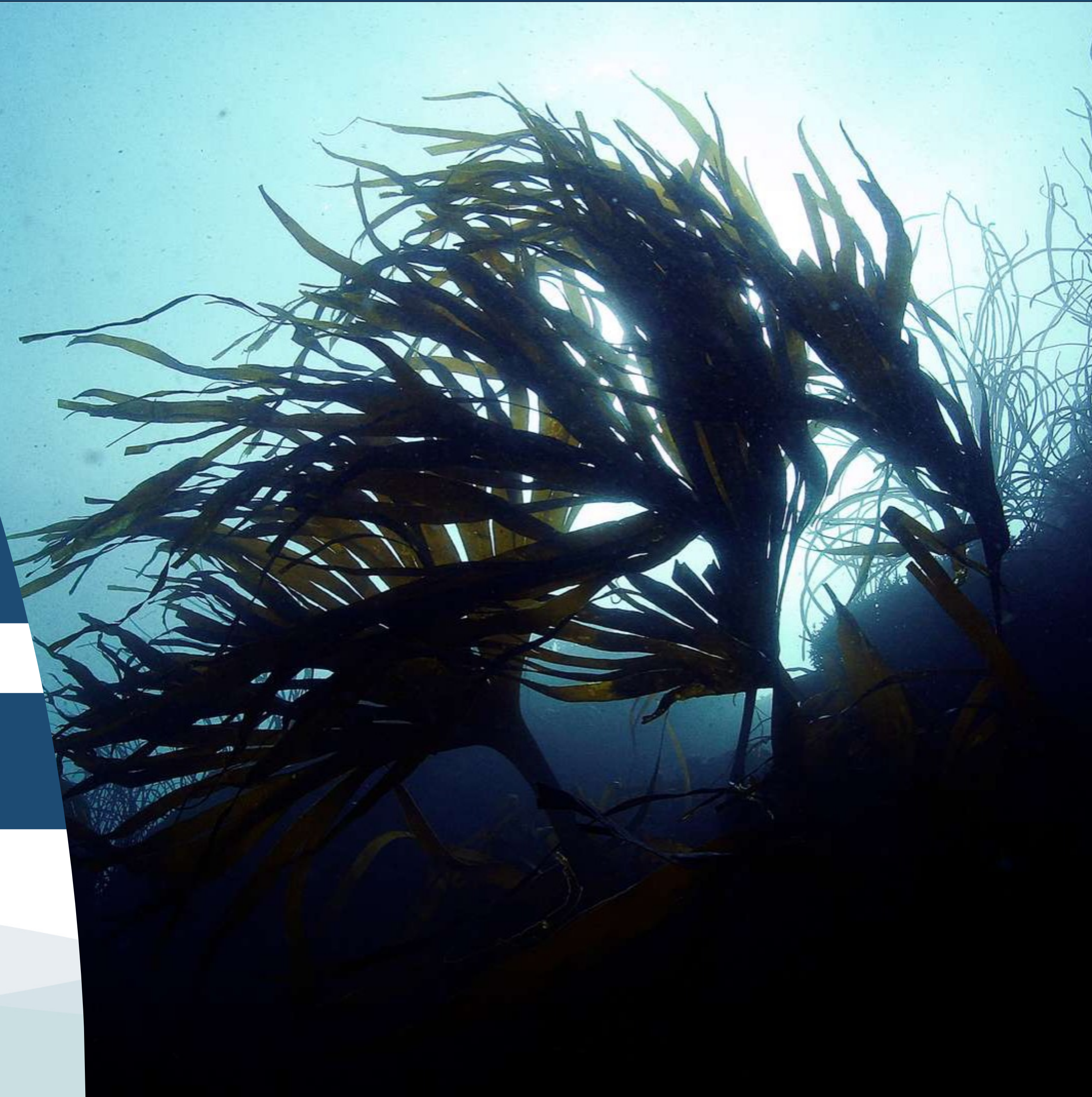


# Topics

 Auctioning

 Mitigation

 Fisheries





# Our webinar series



**On nature inclusive design**

**On national regulatory landscapes for OW and nature**

**On monitoring of marine environmental data**

# Questions?

# OCEaN activities related to the sustainability of offshore wind and grid infrastructure

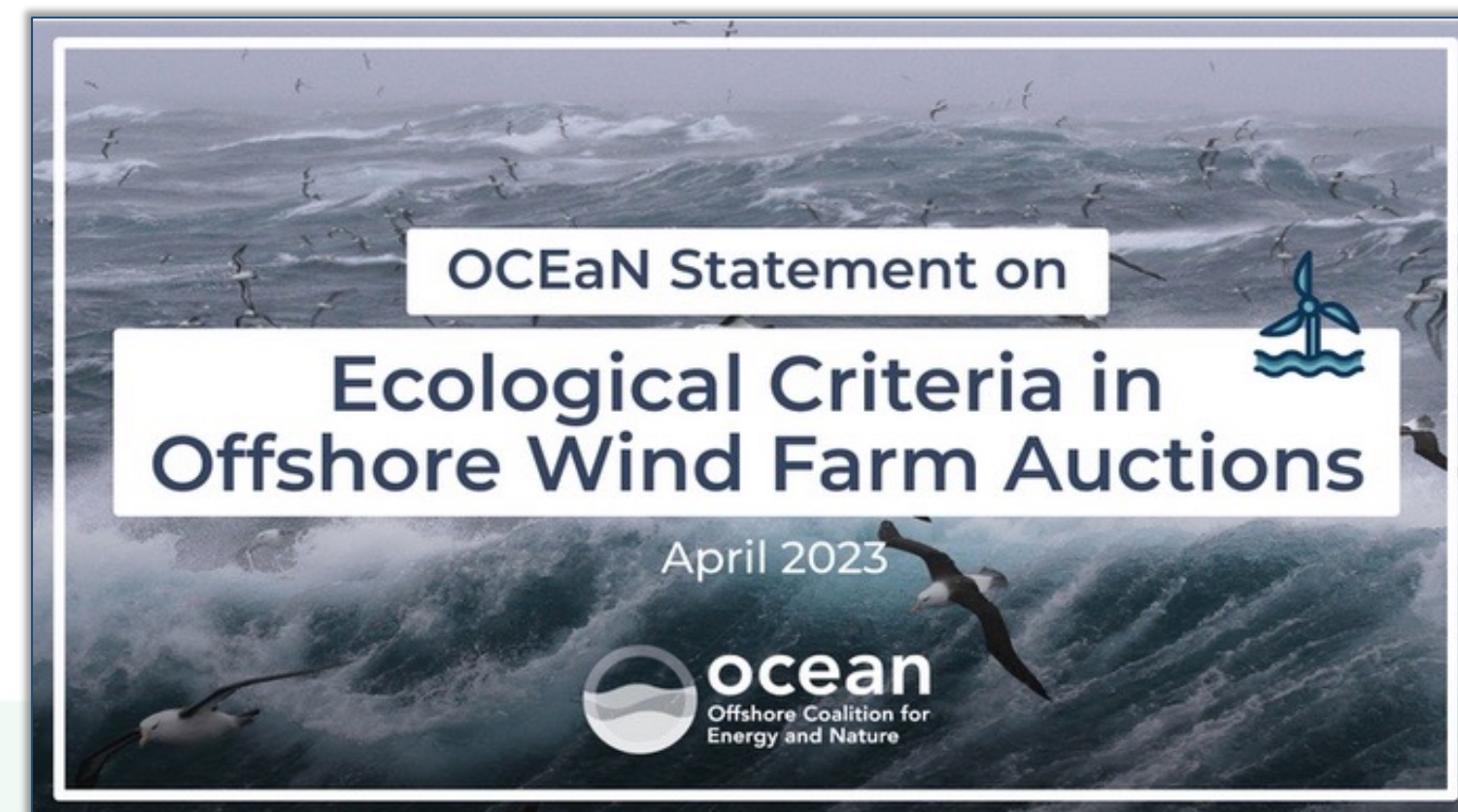
# OCEaN's work on auctioning – non price criteria

- Price- based auctions Vs non-price criteria
- Prequalification Vs award acriteria
- Experiences of non-price criteria: FR, BE, NO, NL, DE, DK
- Dutch tender based on ecology → Ecowende OWF (2026)
- Challenges of non-price

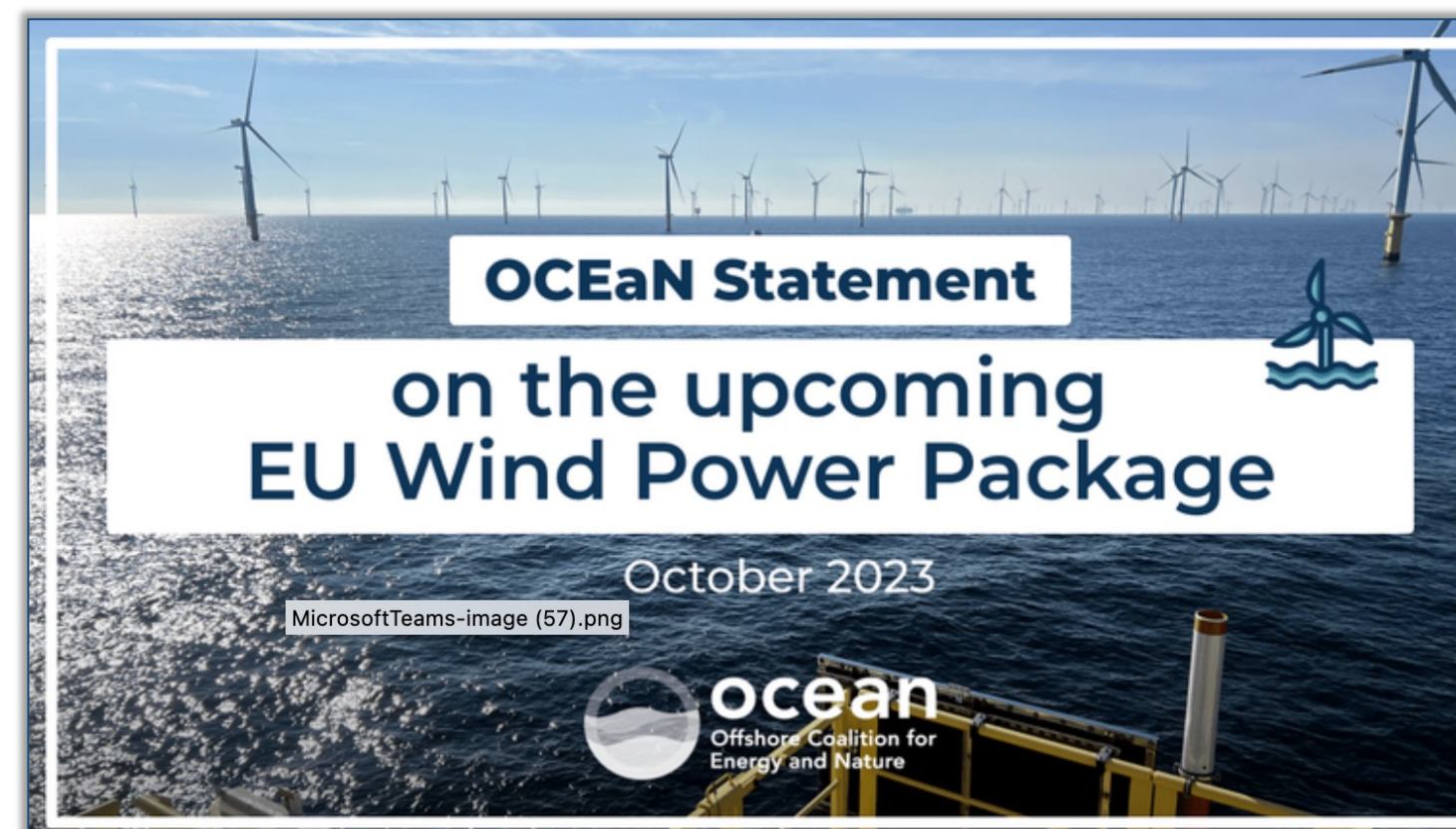


# Auctioning – ecological criteria

April 2023



October 2023



2024

- Analysis of tenders using non-price criteria
- Follow-up advocacy actions



# Questions?

# OCEaN's work on mitigation measures

Information fragmented (e.g. phase, industry/grid) and out of date

## Goals of our work

- Comprehensive collection of avoidance and minimisation measures
- Filling in knowledge gaps
- Finding common ground between diverse stakeholders
- Advocate for good practices becoming a standard

## Methodology

- Done so far: literature review, framework agreed upon, interviews and discussions with OCEaN Members, collection of 90 measures
- Planned: prioritisation of measures, interactions with other similar workstreams (OSPAR, MSs) + communication & dissemination and advocacy activities

# OCEaN's work on mitigation measures

## Examples of measures:

- **Siting** away from SPAs, MPAs and other habitats valuable for threatened species (e.g. spawning, nursery and feeding grounds) and biogenic reefs.
- **Speed:** Cable burial vessel should not travel at over 10 knots during installation operations to reduce the risk of fatal injury
- **Adjustment of piling energy** (soft start) in the beginning of pile-driving-process and gradual increase of the piling energy so that noise-sensitive animals are able to leave areas

## Initial findings and current status:

- Over 90 measures have been collected, around 50 grid related.
- Many avoidance and minimisation measures already available, however:
  - **Concrete gaps** in understanding more subtle pressures (e.g. primary production, microplastics) and effectiveness of certain measures
  - More **pilot projects** needed → costly
  - **Sea basin approach and standardisation** between MS needed for some to be effective (e.g. curtailment)
  - **Constraints** in application of some measures coming from stringent national legislation (e.g. light design)

# Questions?

# OCEaN's work on Nature Inclusive Design (NID)

*“Options that can be integrated in, or **added to, the design** of an anthropogenic structure with the aim **to enhance ecological functioning**” (Hermans, 2020)*

≠ Mitigation measures?

Positive effects proven?

≠ Restoration?

How to monitor?

≠ Stand alone structures?

Examples piloted?

≠ NIDs where not needed?

Costs and Management?



# Nature Inclusive Design (NID) - Events

## NID webinar series



**BELGIAN Energy Island** *Collective Early Planning for a Nature Positive Contribution in Offshore Electricity Infrastructure*



**Enhancing marine life around the subsea electricity grid in the Dutch North Sea**



**Subsea Grids Supporting Marine Biodiversity**  
*Improving Undersea Resiliency with Natural Materials*

with **red eléctrica** presented by **ocean** Offshore Coalition for Energy and Nature **Renewables Grid Initiative**

**26 October 2023**  
10:00 - 11:30 CET

Co-funded by the European Union

## Restortion Fair



- Fish Hotels - TenneT
- 3 Reef prints - Ørsted
- Stone reef reconstruction - 50Hertz

## Presentations at WindEurope Conference

### Reconciling Energy & Nature

OCEaN Events at the 2023 Wind Europe Annual Event

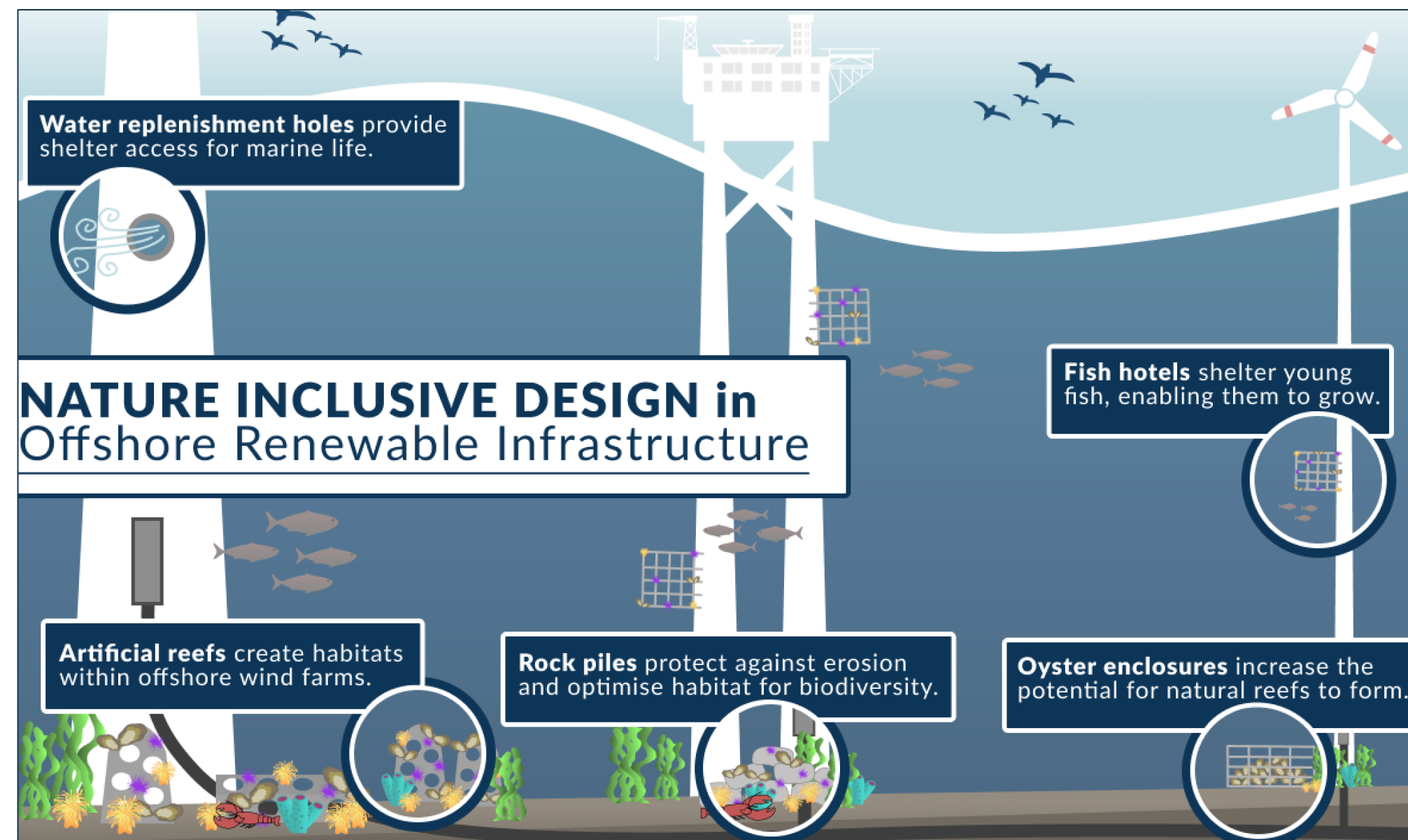
#### presentations

11:15 - 12:00 <b>APR 25</b>	<b>Artificial reefs to support biodiversity at Borssele Offshore Wind Farm</b> <i>Collaboration between Ørsted and The Rich North Sea</i> Location: Stand E-D30
16:15 - 17:00 <b>APR 25</b>	<b>Importance of successful stakeholder engagement and a nature inclusive design in developing the future grid</b> <i>Elia, 50Hertz, and Energinet present their experiences</i> Location: Stand E-F70
11:15 - 12:00 <b>APR 26</b>	<b>Nature inclusive design in turbine foundations at Hollandse Kust Zuid</b> <i>Collaboration between Vattenfall and The Rich North Sea</i> Location: Stand C2-B6



# Nature Inclusive Design (NID) - Other

Communication materials  
(under revision)



Contribution to  
EU projects/proposals

- LIFE - NID4BirdLIFE project (led by Elia)
- HEU - NiD4OCEAN project (led by NIVA)

**To be added:** Ports/landing point solutions, grid solutions, floating wind solutions, et. al.

# Questions?

# OCEaN's work on methodologies to measure net-gain

- June 2023 – IUCN workshop on how to measure contributions to restoration and biodiversity net-gain  
→ methodology under development
- October 2023 – Internal meetings to present methodologies on how to measure biodiversity net gain  
→ SSE Renewables: toolkit available [online](#)  
→ Ørsted: white paper on 'uniting action on climate and biodiversity' available [online](#)
- December 2023 – Launch of [GINGR](#) - framework will rely on agreed criteria and existing tools and methodologies for assessing impacts on and restoration of nature



# OCEaN's work on Maritime Spatial Planning

October 2022



## 10 Recommendations

### How to improve Maritime Spatial Planning to reach European climate, energy and biodiversity targets

Oceans have an essential role for life on Earth, but they are in face increasing pressures from economic activities, climate eutrophication, overfishing and pollution. Decades of uncoordinated planning at sea have led to the situation we face today. Many countries around the world are transitioning towards a fair management of their marine environment – with the EU the way thanks to its 2014 Directive establishing a framework for Maritime Spatial Planning (MSP Directive).

According to the MSP Directive, EU Member States must develop national Maritime Spatial Plans (MSPs) defining the possible uses of the sea following an ecosystem-based approach<sup>1</sup>. This Directive aims to ensure that the pressure of maritime activities within levels compatible with the Good Environmental Status (GES) of the sea<sup>2</sup>.

Offshore wind will play a central role in decarbonising our economy, and the EU to meet its climate targets, and achieve energy independence. Offshore wind projects in the early 1990's, actors from the offshore sector have been incrementally engaged with relevant stakeholders to lead the way. Offshore projects are developed in the most respectful manner, taking into account environmental protection interests and applicable laws. Offshore wind energy (OWE) will play a central role in decarbonising our economy, and ultimately help the EU meet its climate and biodiversity targets. Unleashing the full potential of OWE as a domestic clean energy source requires the allocation of adequate space for OWE and the electricity grid that supports it. A well designed and collaborative Maritime Spatial Planning process can support the identification of the most suitable areas for wind and grid infrastructure, while also securing space for nature to thrive. It can also reduce potential spatial conflicts, foster synergies between human activities at sea, and speed up OWE deployment.

As laid out by the MSP Directive, Member States had to publish their Maritime Spatial Plans by 31 March 2021. While the majority of coastal Member States have a plan in place, some plans are still in the preparatory phase. It is a good moment to assess and take stock of progress so far, identify what has been taken, and identify weaknesses that must be improved in the future. All human activities at sea, including the development of offshore wind energy, must be managed in a way that is compatible with the Good Environmental Status (GES) and the capacity of marine ecosystems to absorb induced changes<sup>3</sup> (Ansong, Gissi, & Calado, 2017, *An approach to ecosystem-based management in maritime spatial planning process*).

<sup>1</sup> Which has been defined as a "holistic approach with a focus on protecting and restoring ecosystems and maintaining ecosystem services to support human needs, while ensuring the management of human activities in a way that is compatible with the Good Environmental Status (GES) and the capacity of marine ecosystems to absorb induced changes" (Ansong, Gissi, & Calado, 2017, *An approach to ecosystem-based management in maritime spatial planning process*).

<sup>2</sup> Directive 2008/56/EC, 2008, *Marine Strategy Framework Directive*

November 2023



## Med OCEaN Recommendations

### to ensure nature-friendly offshore wind and grid development with robust and timely Maritime Spatial Planning

The Mediterranean basin is recognised as a biodiversity hotspot, representing 4 to 18% of the world's marine biodiversity, with an estimated 30% of species endemic to this region<sup>1</sup>. The sea basin is also severely impacted by human activities such as overexploitation of natural resources, various types of pollution, and climate change.

The European Union (EU) established a framework for Maritime Spatial Planning with the MSP Directive in 2014<sup>2</sup>. According to this Directive, EU Member States must develop national Maritime Spatial Plans (MSPs) defining the possible uses of their respective marine space, following an ecosystem-based approach<sup>3</sup>. This Directive aims to keep the collective pressure of maritime activities within levels compatible with the achievement of Good Environmental Status (GES) of the sea<sup>4</sup>.

Offshore wind energy (OWE) will play a central role in decarbonising our economy, and ultimately help the EU meet its climate and biodiversity targets. Unleashing the full potential of OWE as a domestic clean energy source requires the allocation of adequate space for OWE and the electricity grid that supports it. A well designed and collaborative Maritime Spatial Planning process can support the identification of the most suitable areas for wind and grid infrastructure, while also securing space for nature to thrive. It can also reduce potential spatial conflicts, foster synergies between human activities at sea, and speed up OWE deployment.

Members of the recently launched Offshore Coalition for Energy and Nature – Mediterranean basin (*Med OCEaN*) therefore strongly support an improved, robust, and timely Maritime Spatial Planning process. This will significantly contribute to accelerating OWE, as well as reducing investment risks and project delays. In this context, Med OCEaN Members, a coalition which includes stakeholders from Spain, Italy, France, and Portugal, recommend the following principles to be considered by EU Member States of the Mediterranean basin and adjacent Atlantic waters.

**Submit and regularly update MSPs to reflect renewables and biodiversity targets in line with the updated National Energy and Climate Plans (NECPs).** As laid out by the MSP Directive, Member States had to publish their Maritime Spatial Plans by 31 March 2021. While the majority of Mediterranean Member States have a plan in place, some of them have not yet submitted one. To keep the EU on track to meet its climate and biodiversity targets, it is crucial that Member States submit their plans and update them regularly based on their respective renewable energy targets and in consultation with all stakeholders involved.

Moreover, there are ongoing updates of the NECPs which EU Member States are due to conclude by June 2024. In these plans, Member States are requested to lay out their national climate and energy targets, along with a description of the corresponding policies and measures required to accomplish them. It is crucial to ensure that the renewable energy goals outlined in these updated NECPs are coherent and aligned with Maritime Spatial Plans. Achieving the EU and national targets requires appropriate allocation of space for the expected deployment of OWE and electricity grids within national MSPs. This is also highlighted in new obligations in the revised EU Renewables Energy Directive<sup>5</sup>.

<sup>1</sup> Mannino et al., 2017, *The Marine Biodiversity of the Mediterranean Sea in a Changing Climate*

<sup>2</sup> Directive 2014/89/EU, 2014, *MSP Directive*

<sup>3</sup> Ansong, Gissi, & Calado, 2017, *An approach to ecosystem-based management in maritime spatial planning process*

<sup>4</sup> Directive 2008/56/EC, 2008, *Marine Strategy Framework Directive*

<sup>5</sup> European Parliament and Council adopted the *revised RED* in October 2023.

## Key words:

- **Submit** and regularly update **MSPs**
- Align with **NECPs**
- Implement an **ecosystem-based approach**
- Establish an ecologically coherent **network of MPAs**.
- Collect **marine data** continuously
- Consider **multi-use** in OWE
- Improve **stakeholder participation**
- Enable **cross-border collaboration**



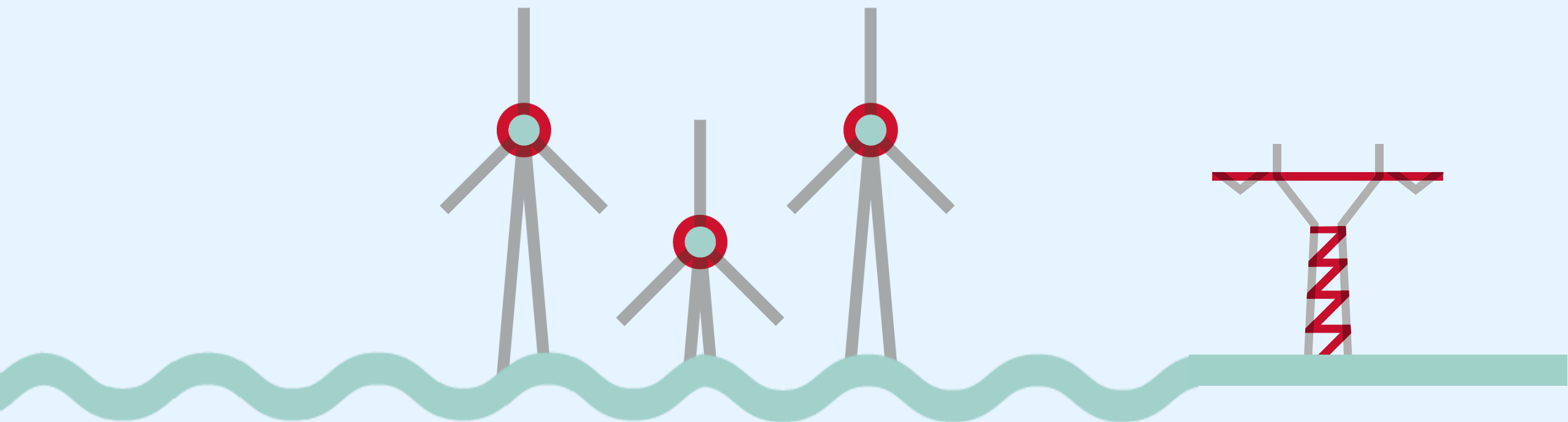


Thank you

# Forvaltningsregimet for fornybar energiproduksjon til havs – første leveranse

*Sigrun Kavli Mindeberg, NVE*





NVE

## Innspill til forvaltningsregime for havvind

Anbefaling om ny prosess for utvikling av havvind og strømnett til havs

18.01.2024

Møteunderlag AG3 samarbeidsforum



**DET KONGELIGE  
OLJE- OG ENERGIDEPARTEMENT**

Norges vassdrags- og energidirektorat  
Postboks 5091 Majorstuen  
0301 OSLO

Deres ref

Vår ref

Dato

23/934-1

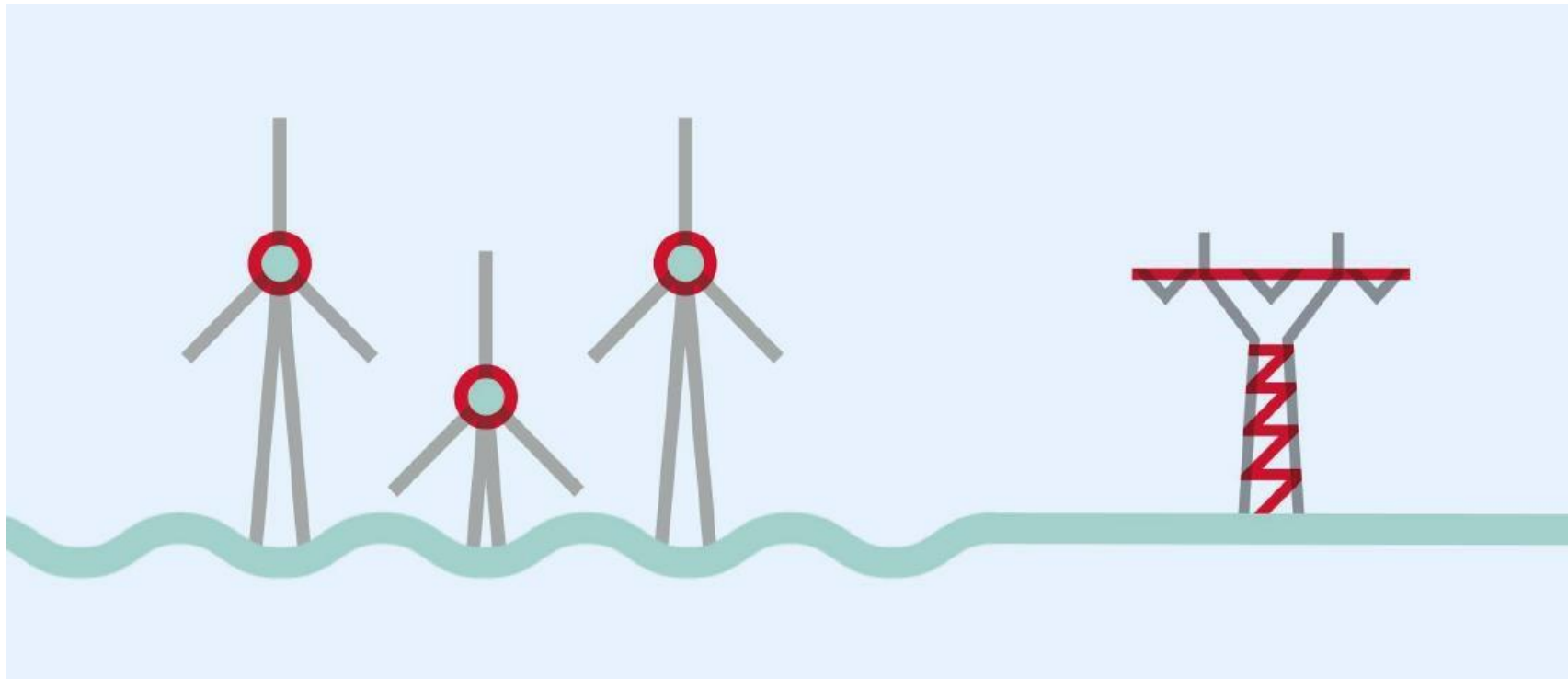
3. mai 2023

**Innspill til forvaltningsregimet for fornybar energiproduksjon til havs**



# Innhold

- Om oppdraget og status leveranser
- Om våre anbefalinger til Energidepartementet



## NVEs oppdrag besvares i 3 leveranser



Rammeverk for utvikling av havvind og nettilknytning



Forvaltning av forsyningsikkerhet til havs

Ferdigstilles samtidig med RMEs leveranse

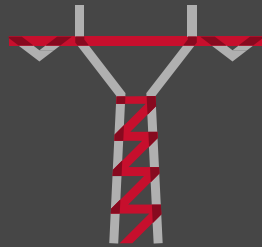
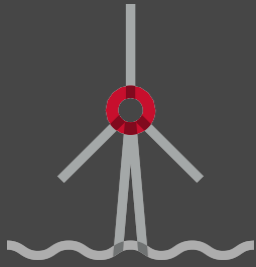


Tilsynsroller og grensesnitt mellom de

Ferdigstilles i løpet av Q1 2024



# Kort om våre anbefalinger om ny prosess



## Forslaget bygger på forutsetninger om at prosessene skal:

- sikre at viktige beslutninger fattes på et tilstrekkelig beslutningsgrunnlag og til riktig tid
- sikre effektive forvaltningsprosesser som ivaretar involvering og allmenne interesser
- øke forutsigbarheten for tiltakshaver

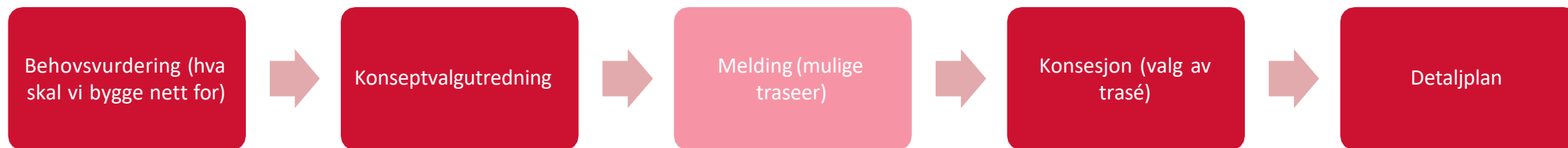


# Dagens prosesser havvind og nett

## Havvindprosess



## Nettutviklingsprosess



NVE anbefaler ingen endringer i prosessteg for nettutviklingen, men vi mener det vil være viktig å samkjøre utviklingen av havvinden bedre med nettutviklingen, og starte nettutviklingen tidligere enn det som har blitt gjort.

# Forslag til rammeverk for produksjon og nett

## Produksjon

NVE sammen med direktoratgruppe lager forslag KU-program

Senest ved tildeling bør utredningsprogram for havvindanlegg og nettilknytning være fastsatt

Behandling detaljplan havvindanlegg og nettilknytning bør i størst mulig grad samkjøres



Senest på åpningstidspunktet, men gjerne før. Eksempelvis: MW nettet skal dimensjoneres for, antall prosjektområder og geografisk plassering av disse

Energimyndighetene

Statnett utreder

Energimyndighetene

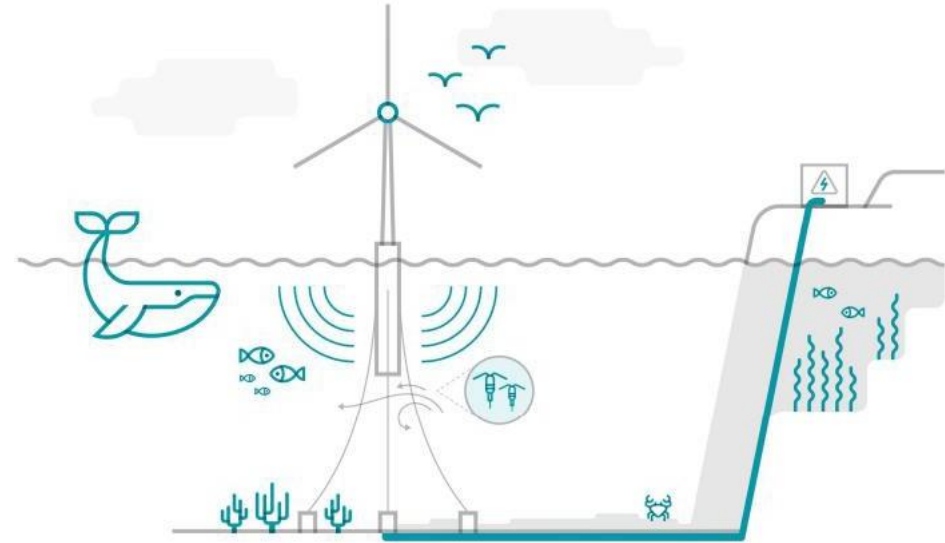
Tiltakshaver utreder

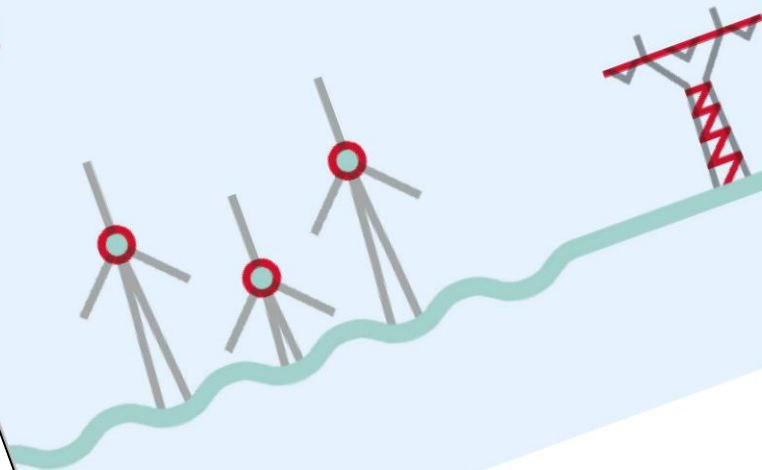
## Nett



# Anbefalinger om miljøkartlegging og overvåking

- Ved åpning bør det fastsettes et program for kartlegging og overvåking
- Kartlegging og overvåking i statlig regi, bidra til helhet og godt bilde av sumvirkninger





RAPPORT NR. 29 / 2023

# Innspill til forvaltningsregime for havvind

Anbefaling om ny prosess for utvikling av havvind og strømnnett til havs

SKREVET AV

Ingvild Andersson, Anine Mølmen Andresen, Tommy Haugen, Magnus Tandberg Holth,  
Sigrun Kavli Mindeberg, Nina Gjerde Nettum, Ane Næsset Ramtvedt, Anne Marte Schei og Anette Ødegård

[NVE Rapport nr. 29/2023: Innspill til forvaltningsregime for havvind – anbefaling om ny prosess for utvikling av havvind og strømnnett til havs](#)

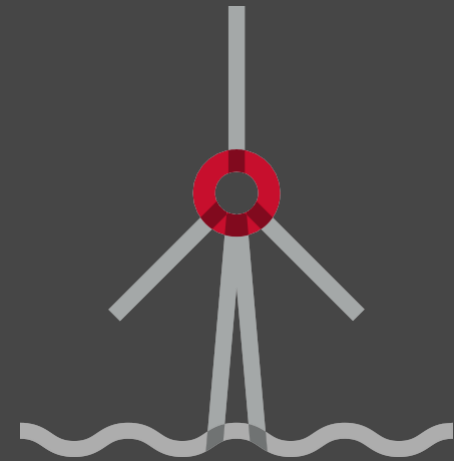




## Ta kontakt

Navn: Sigrun Kavli Mindeberg

E-post: [skmi@nve.no](mailto:skmi@nve.no)



# Status fra ekspertgruppen om teknologi for nettilknytning av flytende havvind

*Hans Petter Rebo, Norsk Industri*

# Ekspertgruppe for flytende havvind



- Arbeidet organiseres og ledes av Norsk Industri i partnerskap med Statnett. Oppdragsgivere er ledere for Arbeidsgruppe 2 og 3, henholdsvis Ståle Kyllingstad (Norsk Industri) og Håkon Borgen (Statnett)
- Oppstartsmøter i desember 2023, og med leveranse 2Q 2024. Evnt videre arbeid, vurderes deretter (mulig fase 2)
- Arbeidet skal være i tråd med konkurranserettslige retningslinjer
- Deltagere i tillegg til Statnett og Norsk Industri er Aker Solutions, Aibel, Hitachi, Siemens Energy, Nexans og NKT
- Det involveres øvrige ressurser fra utbyggere, myndigheter, leverandører og andre for ulike teknologiområder osv. etter behov
- Målet med arbeidet er:
  - Økt forståelse om eventuelle teknologi-gap for å realisere flytende havvind i tråd med myndighetenes mål og planlagte tildelinger av arealer fremover.
  - Forslag til hvordan eventuelle teknologi-gap kan lukkes i et 2030 og 2040-perpektiv
  - Gi økt forståelse for kapasitet i leverandørkjeden for havvind-parker, primært «nett-delen» av scopet (kabel, nett, HVDC, omformerstasjoner m.m.)
  - Beskrive eventuelle teknologivalg som vil ha stor betydning for kostnader eller fremdrift, samt formidle om det er andre hindringer Ekspertgruppa ser for å gjennomføre flytende havvind i tråd med planene



*Pause frem til kl. 10:30*  
*– Med matservering*

# Nettutredning Sørvest F

*Amund Ljønes, Utvikling Hav*

# Europeisk Offshoreplan 2024

*Erika Stadler, Statnett Langsiktig kraftsystemutvikling*



# Offshore Network Development Plan 2024 (ONDP) Northern Seas Offshore Grids (NSOG)



Arne Egil Pettersen, Statnett  
Erika Stadler, Statnett

# Europeisk offshoreplan 2024 - 500 GW i 2050

Europeisk regulering: TEN-E 2022 --> ENTSO-E offshore planansvarlig

- Jan. 2023 Member States offshore goals
- Jan. 2024 European Offshore Plans
  - Pan-European report
  - 5 offshore plans (incl. Northern Seas)
  - Methodology Report
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- Juni 2025 Cost-Benefit, Cost-Sharing (CBCS)

Offshore wind (GW)	2023	2030	2040	2050
1 Northern Seas	26	119	274	333
2 Baltic Sea	3	23	45	70
3 North Atlantic	1	6	19	28
4 West Mediterranean	0	5	17	21
5 East Mediterranean	0	9	26	44
	<b>30</b>	<b>162</b>	<b>381</b>	<b>496</b>

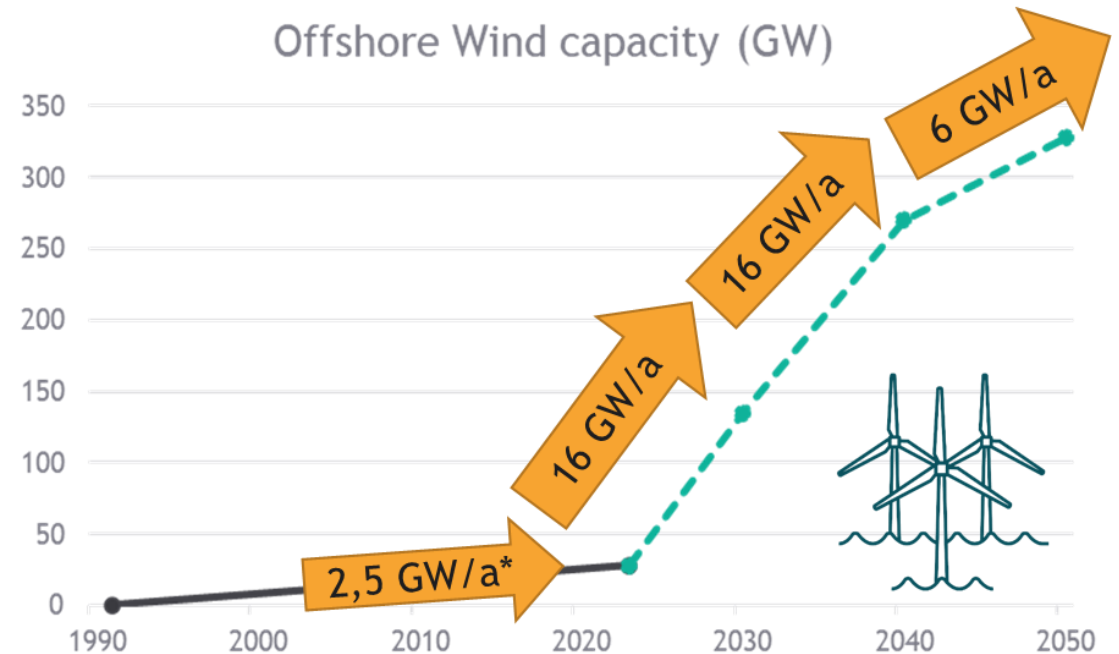
## 5 havbasseng med egen plan



# Northern Seas 330 GW (2050)

Baseres på NECPs, Oostende og TSO-input

(GW)	2023*	2030	2040	2050
Belgium	2,3	5,8	8	8
Germany	7,0	26,4	60	65,5
Denmark	0,8	5,3	19,3	35,3
France	0	2,1	10,5	14,5
Great Britain	13,7	55	95,2	96,9
Ireland	0	4,7	13	20
Northern Ireland	0	0,5	1	1
Netherland	2,5	16,3	50,3	72,3
Norway	0,1	3,1	15	(15) 30**
Sweden	0	0	2	4
Northern Seas	<b>26</b>	<b>119</b>	<b>274</b>	<b>333</b>



ONDP skal gi et første svar på nødvendig infrastruktur for å realisere målene?

Faster speed needed

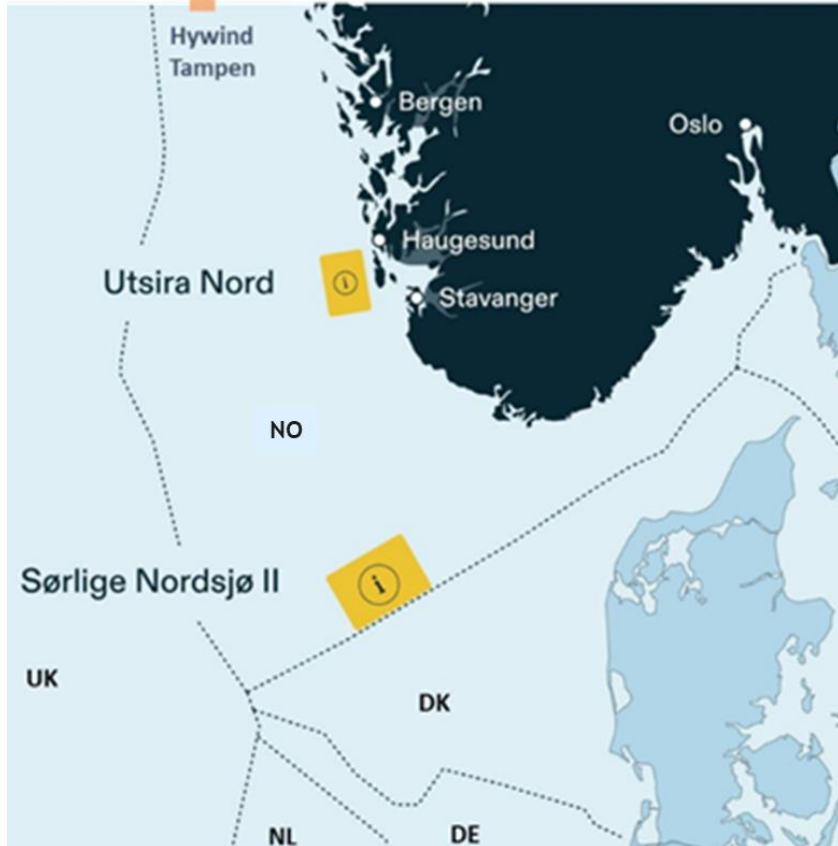
\* August 2023

\*\* 30 GW if very high consumption-growth. 15 GW modelled.



# Norge 3 GW - 15 GW - 30 GW

## Havvind medio 2030



Nordavind:  
500 MW (2040)

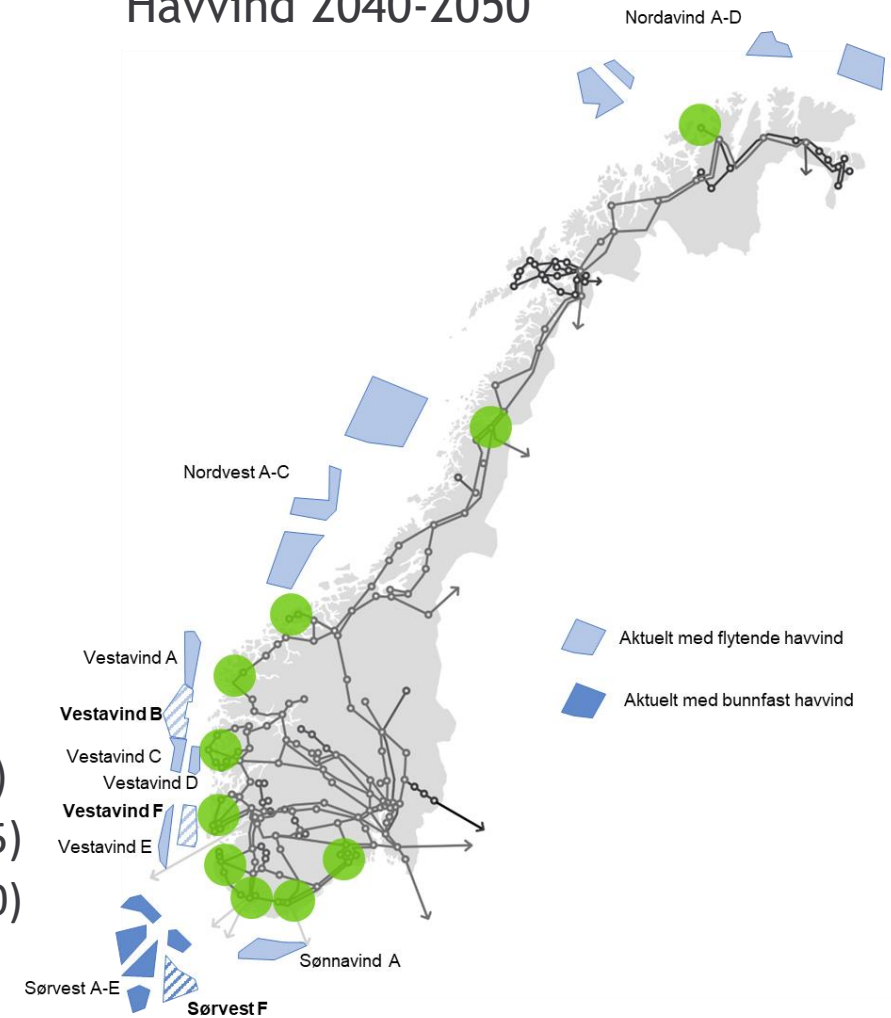
Nordvest:  
Fase 1: 2000 MW (2040)

Vestavind A/B/C  
Fase 1/2/3: 6000 MW (2040)

Utsira:  
Fase 1: 1500 MW (2030)

Sørlige Nordsjø II/Sørvest F:  
Fase 1: 1500 MW radial (2030)  
Fase 2: 1500 MW hybrid (2035)  
Fase 3: 2000 MW hybrid (2040)

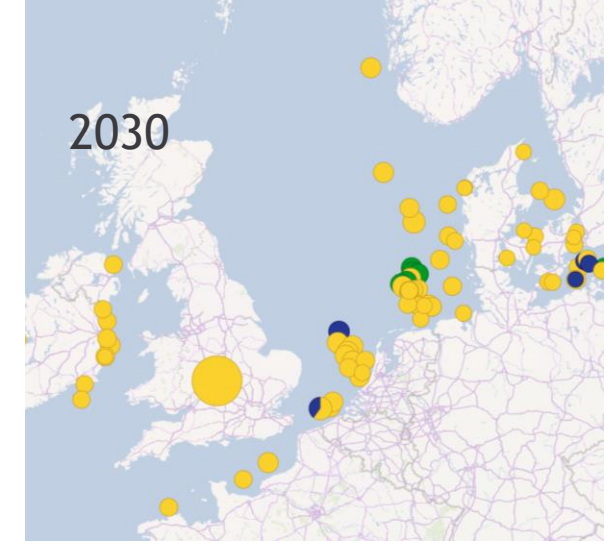
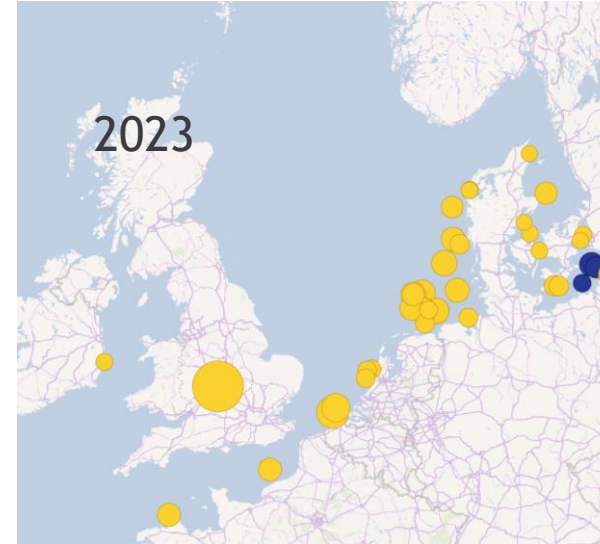
## Potensielle felt Havvind 2040-2050



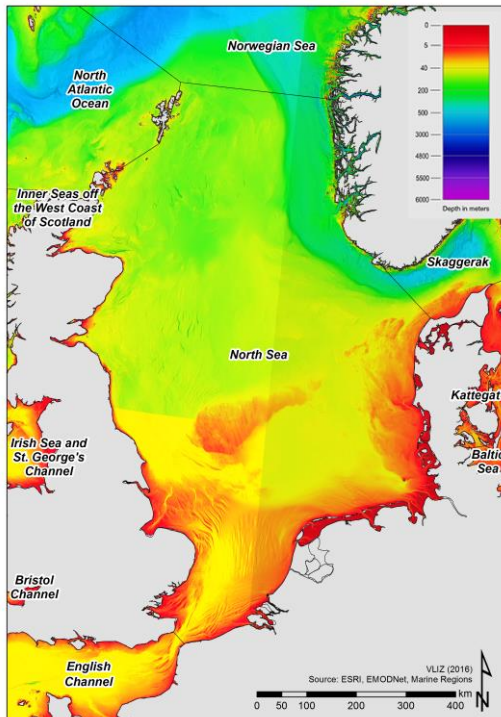
Kun Sørvest F analysert som del av Nordsjønett

# Northern Seas 330 GW (2050) - HVOR ?

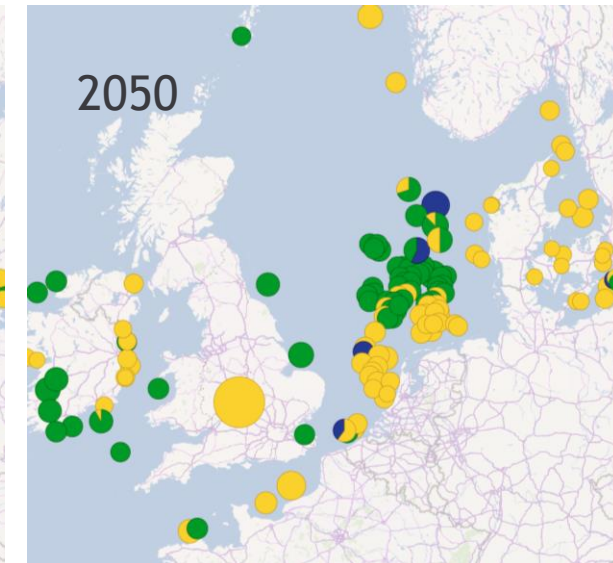
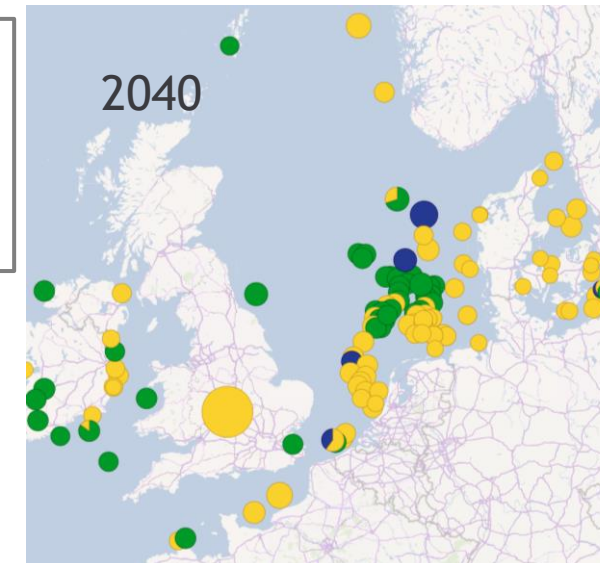
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<b>Northern Seas</b>	<b>26</b>	<b>119</b>	<b>274</b>	<b>333</b>



● Hybrid ● Potential hybrid ● Radial



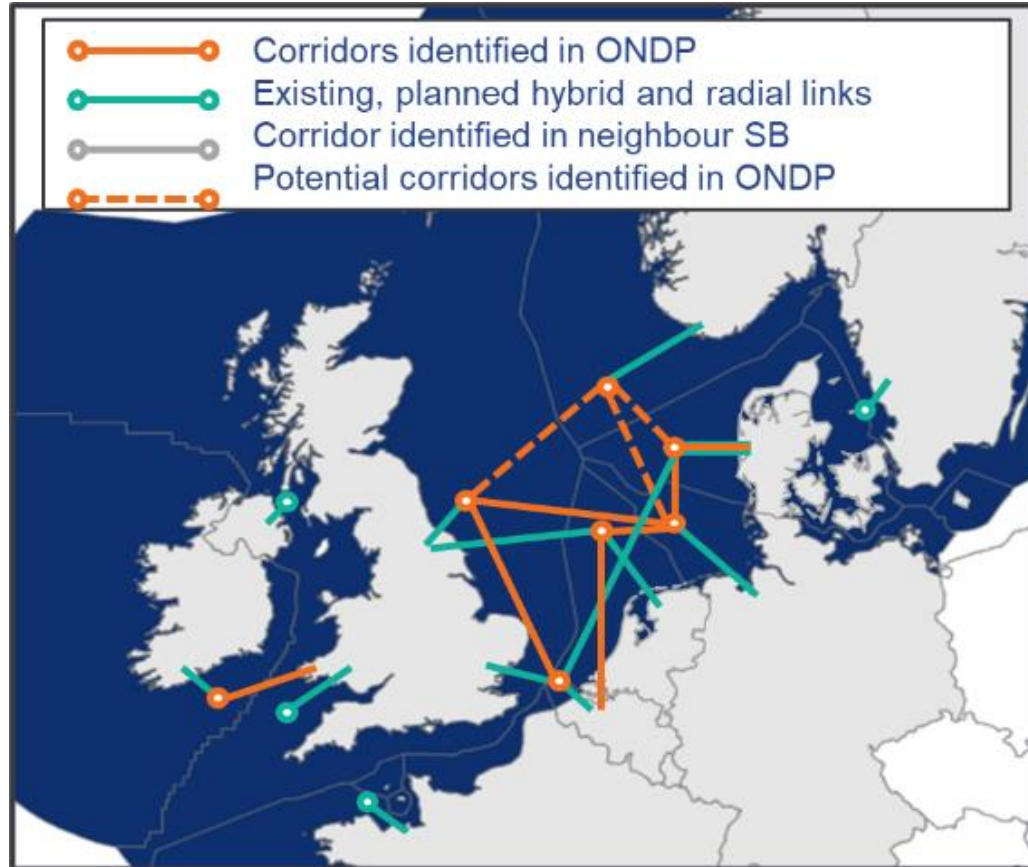
- Havvind der det er grunt
- Havvind nært land
- Havvind nært forbrug
- Energibalanse





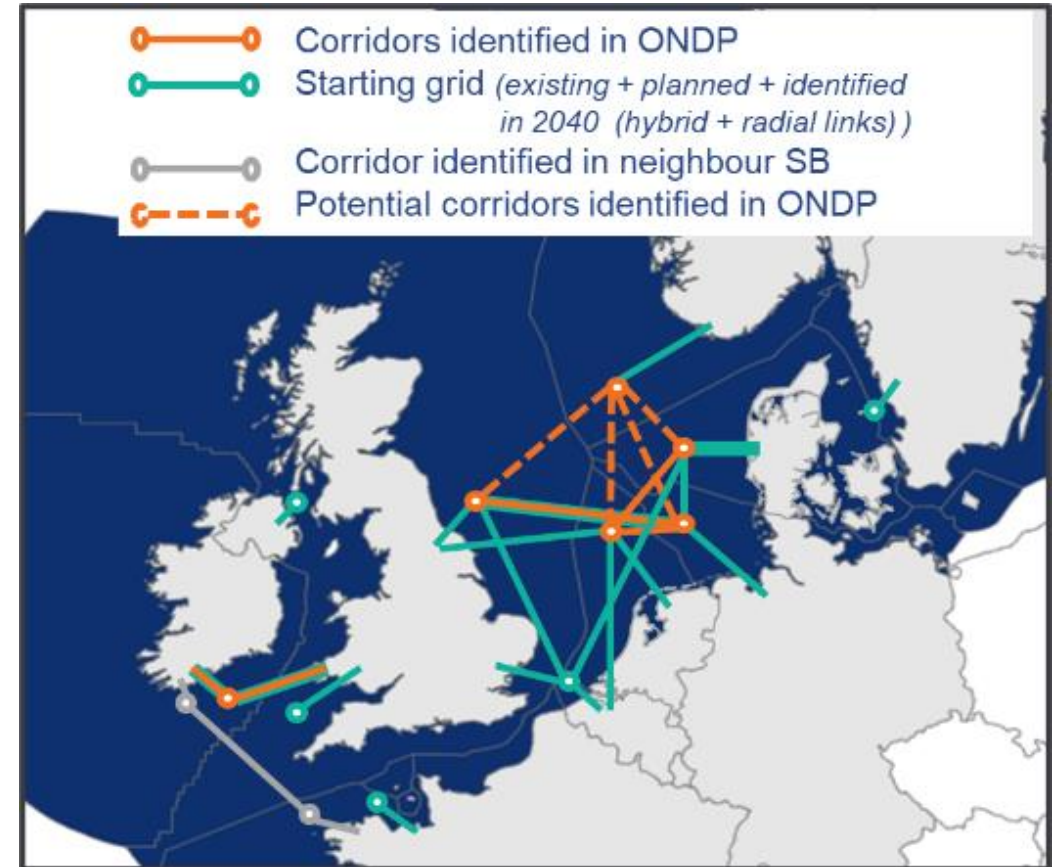
# 2040/2050 offshore grid - Korridorer med positive kost/nytte

(scenario with HVDC breaker)



**2040:**

Lønnsomhet for hybride forbindelser fra Norge mot GB, DK og DE.



**2050:**

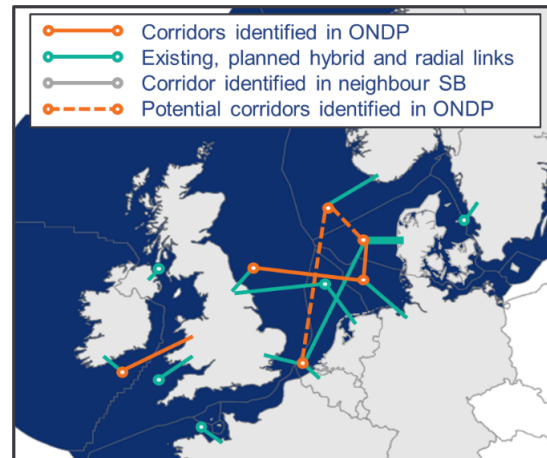
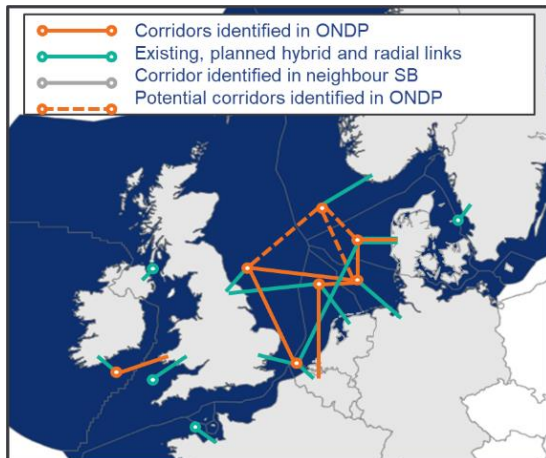
Også lønnsomhet for hybrid forbindelse mot NL/BE.



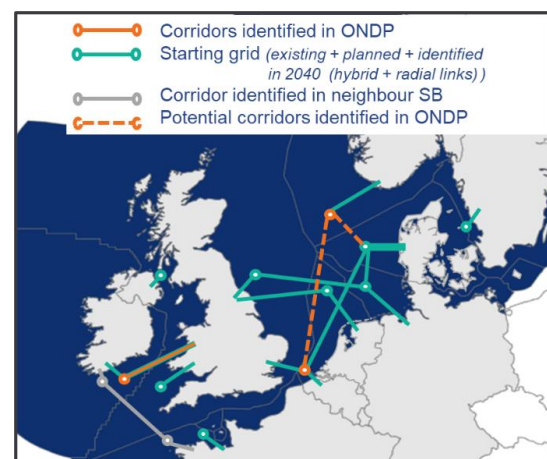
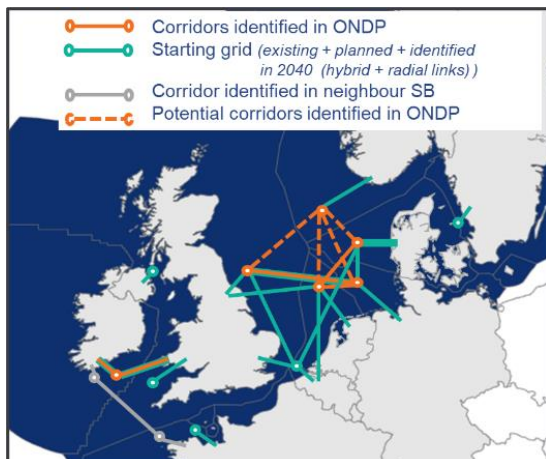
# 2040/2050 offshore grid – med/uten HVDC-bryter

- HVDC-bryter nødvendig for masket nett
- HVDC-bryter er ikke utviklet
- Uten HVDC-bryter → Dyre offshore omf.stasjoner
- Langt lavere overføringskapasitet for samme sum

2040



2050



With DC-breaker

Without DC-breaker

Additional equipment	Scenario with DC breaker	Scenario without DC breaker
2031...2040		
Number of expansions selected	15	6
Total transmission capacity	21.5 GW	7.5 GW
Offshore route length	19,890 km	17,790 km
Onshore route length	1250 km	1,250km
Number of offshore DC converter stations	53	59
Number of onshore DC converter stations	58	56
Offshore AC substations	5	11
Amount of DC circuit breakers	15	0
Cost	148 bn€	148 bn€

Additional equipment	Scenario with DC breaker	Scenario without DC breaker
2041...2050		
Number of expansions selected	6	4
Transmission capacity	8.5 GW	3.0 GW
Offshore and onshore route length	8,020 km	7,950km
Onshore route length	0 km	0 km
Number of offshore DC converter stations	22	22
Number of onshore DC converter stations	28	30
Offshore AC substations	0	4
Amount of DC Circuit breakers	6	0
Cost	59 bn€	57 bn€

# Europeisk offshoreplan 2024

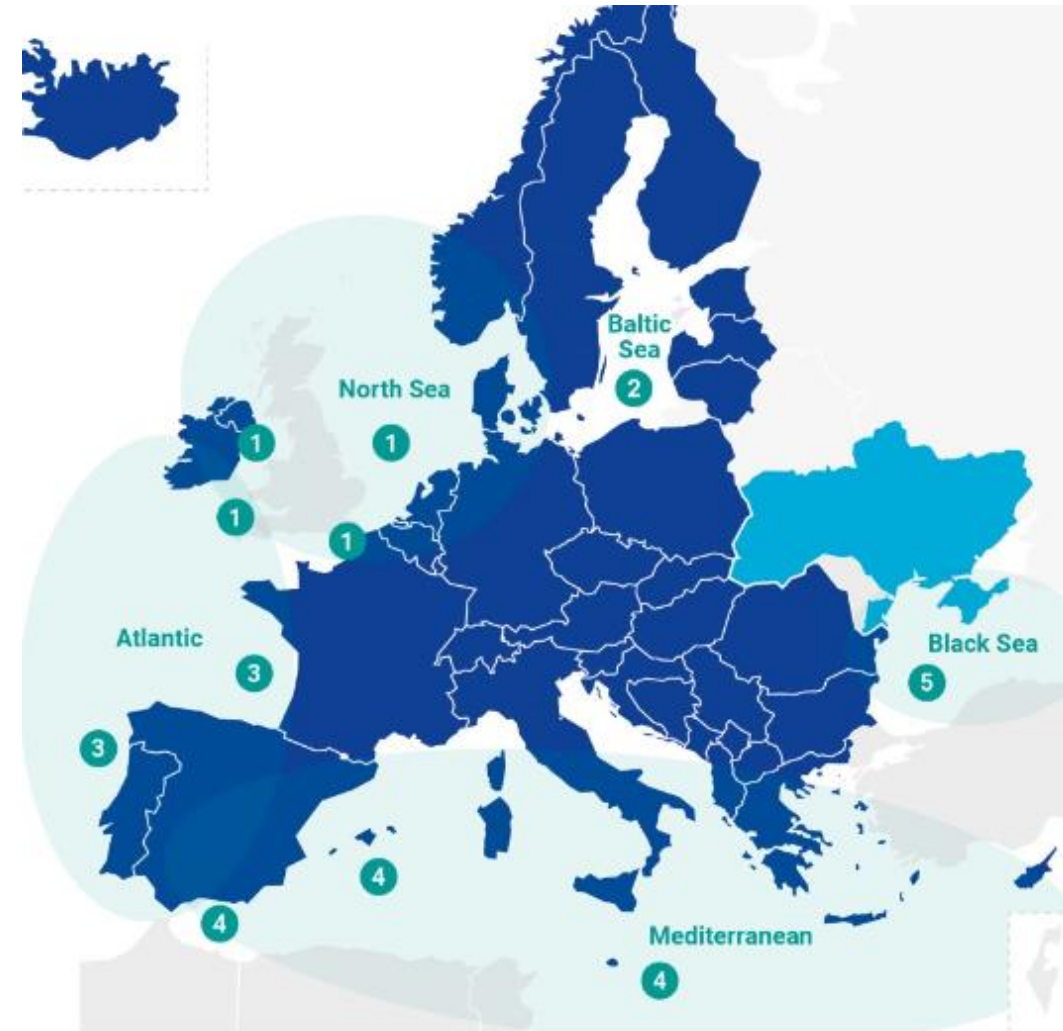
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Publication 23. January (High-level event)

Public webinar 24. januar 2024 (10-12)

[ENTSOE.eu](https://www.entsoe.eu)

## 5 havbasseng med egen plan



Our values define who we are, what we stand for and how we behave.  
We all play a part in bringing them to life.



## EXCELLENCE

We deliver to the highest standards.  
We provide an environment in which people can develop to their full potential.



## TRUST

We trust each other, we are transparent and we empower people.  
We respect diversity.



## INTEGRITY

We act in the interest of  
ENTSO-E



## TEAM

We care about people. We work transversal and we support each other.  
We celebrate success.



## FUTURE THINKING

We are a learning organisation.  
We explore new paths and solutions.

**We are ENTSO-E**