

Offshore Wind and Grid Workshop

Day 2: Integrated Offshore Planning: Aligning Energy, Nature and Space

03 July 2025

About this report

This report summarises the exchanges during [Day 2 of the Offshore Wind & Grid Workshop](#), co-organised by WindEurope and the Renewables Grid Initiative on 3 July 2025. It captures key messages and insights from expert presentations, as well as reflections from roundtable discussions. This report serves as a resource to guide follow-up dialogue, collaboration and policy development for further integrating cross-sector synergies and collaboration into offshore energy, nature and spatial planning.

DISCLAIMER

All statements in this document have been summarised by [Renewables Grid Initiative](#) and reviewed by [WindEurope](#) and the workshop's participants, based on the common understanding of the discussions carried out at the workshop. The opinions expressed in this document shall not be used to reflect the views of specific participants. You can access the expert presentations [here](#).

Background

The acceleration of offshore wind in Europe is reshaping marine space, creating new complexities for energy, nature, and maritime uses. Today, offshore energy planning, maritime spatial planning (MSP), and environmental protection are often pursued on parallel tracks – coordinated in principle, but frequently disconnected in practice.

As offshore wind and grid infrastructure deployment scales up, these gaps risk intensifying conflicts. Technical challenges such as wake effects, environmental constraints such as marine protected areas (MPAs), and socio-economic considerations like fisheries or coastal community impacts need to be addressed holistically. This calls for integrated, sea-basin-level planning that connects governance, technical system design, ecological priorities, and socio-economic realities.

Building on discussions from Day 1 (technical and economic foundations for cross-border offshore systems)¹, Day 2 focused on breaking down silos and exploring how to embed integrated planning into practical governance and planning processes. While the scope of the workshop was relevant for offshore energy development across Europe, its main scope focused on the North Sea basin.

¹A Meeting Report for Day 1 of the Offshore Wind & Grid Workshop, *Technical Challenges in Cross-Border Grid Planning*, was created and distributed solely to the workshop participants and WindEurope Members.

Objectives

The workshop aimed to:

- Showcase tools and modelling approaches to support early integration of spatial, environmental, and technical considerations.
- Explore how to optimise offshore grid design and wind farm layout while minimising environmental and social impacts.
- Foster cross-sector dialogue, facilitate expert community and identify governance pathways to improve sea-basin-level cooperation.
- Inform processes related to EU grid development and planning, as well as other relevant policy processes.

Workshop Format

The day was structured into **three thematic roundtables** and a **final interactive session**:

1. **Roundtable 1:** Governance and Sea-Basin Coordination
2. **Roundtable 2:** Grids, Generation, and Wake Effects
3. **Roundtable 3:** Nature and Socio-Economic Considerations
4. **Session 4:** Simulation and Recommendations – North C Neutral scenarios and stakeholder engagement tool

Each session combined brief expert presentations with moderated discussion, followed by cross-cutting reflections.

Roundtable 1: Governance and Sea-Basin Coordination

The opening session addressed the central question of how governance structures can enable truly integrated offshore planning at the sea-basin level. As Europe accelerates offshore wind deployment, the interplay between energy infrastructure planning, nature protection, and maritime spatial planning (MSP) is becoming more complex – and more urgent. Speakers framed the discussion around the gap between **policy ambition** and **practical delivery**. While cross-border cooperation is widely recognised as essential, it often remains fragmented in practice without a legal framework and with varying national rules, timelines, and sectoral priorities. This session explored opportunities to bridge these divides through governance alignment, shared data frameworks, and more consistent application of MSP principles.

Discussion Highlights

Representatives from the North Sea Energy Cooperation (NSEC), the Greater North Sea Basin Initiative (GNSBI) and ENTSO-E's Offshore Network Development Plan (ONDP) presented their initiatives in the framework of sea basin collaboration for energy and beyond. Participants noted that current MSP processes are **still largely national in focus**, even in regions with sea-basin strategies. In the absence of a clear legal mandate for transnational coordination, cooperation depends on voluntary or non-binding regional platforms. While these play a critical role (e.g. NSEC has been active for 15 years and GNSBI is among the newest and most promising platforms for dialogue), their recommendations are not always implemented consistently.

Speakers emphasised the importance of MSP as a bridge between sectoral interests, highlighting best practices from regional coordination structures (e.g., NSEC, OTC). Participants noted that MSP needs stronger integration with energy system planning timelines and frameworks, while data sharing and transparency remain bottlenecks for cross-border planning. Basin-level cooperation can unlock synergies but requires political commitment and clearly defined governance roles.

"We need to think of governance as an enabling framework, not a barrier. The challenge is giving it the mandate and the resources to actually coordinate across countries."

Several contributors emphasised the **value of early integration**: aligning energy, nature, and maritime plans from the outset rather than retrofitting coordination later in the process. The group discussed the ONDP as an example of cross-border energy planning and, therefore, an opportunity to embed environmental aspects more firmly with a transnational relevance. Participants cautioned that this would require clearer governance structures if the ONDP is to move beyond the confines of a purely energy-sector approach.

Concrete examples were given of how unaligned national planning can lead to **suboptimal grid connections** (e.g. misaligned German-Danish hub scheduling), **misaligned wind farm siting**, and **avoidable ecological conflicts** across migratory routes or cumulative impacts on fisheries. At the same time, participants highlighted positive experiences with regional data-sharing initiatives, such as the NESEC scenario exchanges, revealing spatial trade-offs and helping stakeholders identify acceptable compromises earlier in the process.

"The ONDP could be a game-changer, but only if it truly reflects ecological and social constraints — not just energy system priorities."

Emerging Points of Consensus / Debate

- **Consensus:**

- Sea-basin level planning must become a **standard practice**, not an exception, to avoid fragmented decision-making.
- **Cost-effectiveness is a driver**, as coordinated, cross-border offshore build-out can reduce infrastructure needs and ecological impacts by improving system efficiency
- **Data-sharing and joint modelling** are powerful enablers of coordination, but they require common assumptions and transparent governance.
- **Debate:**
 - Balancing the **voluntary nature** of existing cooperation platforms with the need for stronger mandates remains a political and institutional challenge.
 - **Practical barriers**, such as language, uneven data availability, misaligned planning timelines, and incompatible modelling frameworks, are often underestimated obstacles to effective basin-level planning.
 - Integrating environmental considerations into energy-focused planning tools requires not only technical advancement and streamlining but also a **cultural change** toward cross-sectoral collaboration.

“Marine ecosystems and energy grids don’t stop at borders — neither should our planning.”

Roundtable 2: Grids, Generation, and Wake Effects

This roundtable session examined how offshore grid design and wind farm layouts can be optimised to mitigate wake effects while maximising overall system value. **Wake effects** — the reduction in wind speed and increase in turbulence caused by upstream wind farms — can influence the efficiency, layout, and spatial footprint of offshore wind projects. As offshore wind clusters grow larger and more interconnected, wake effects become not only a technical challenge but also a **strategic planning factor** with cross-border implications.

Discussion Highlights

This session examined how offshore grid design and wind farm layouts can be optimised to mitigate wake effects while maximising overall system value. Wake – the reduction of wind speed and energy yield caused by clustered wind farms – is no longer just a local or project-level concern but increasingly a **basin-scale challenge for both energy yield and grid stability** as offshore capacity grows.

Presentations from WindEurope, Ørsted and Elia/50Hertz emphasised that technical and layout optimisation - also at the regional level - can deliver not only higher energy yields but also ecological benefits. By designing smarter layouts and prioritising hybrid interconnectors,

fewer turbines would be needed to generate the same renewable capacity, reducing spatial pressures and potential impacts on marine ecosystems.

WindEurope highlighted that wake has until now been optimised mainly at individual farm level, but that sea-basin coordination could deliver “very large gains” with only minimal disruption to current siting plans. Ørsted showed modelling where relocating capacity from densely planned German sites into Danish waters could improve full-load hours by up to 25–35% and lower LCOE by around 30%. 50Hertz presented a KEBA simulation for NL–DE–DK, showing that reducing power densities and shifting part of German capacity northwards could increase yields by nearly 20%.

The discussion centred on how grid design, spatial planning, and cross-border cooperation can be leveraged to minimise wake losses while supporting system value and environmental considerations.

"When farms are optimised individually, the system as a whole underperforms. We need to design for the basin, not just the project."

Participants recognised, however, that these optimisations are not purely technical questions. They require governance frameworks that enable basin-wide coordination, as the placement of wind farms in one country directly affects wind resources in neighbouring waters. Several interventions underlined that planning remains fragmented, with energy system models, MSP processes and ecological assessments often proceeding in parallel – leading to suboptimal layouts. It was also noted that current MSP rules focus on capacity targets rather than energy yield, which can unintentionally lock in inefficient layouts. A shift towards energy-based targets was suggested as an incentive for more efficient regional planning. To address this, MSP needs to better integrate wake modelling and system design rules into planning guidelines, alongside ecological and socio-economic considerations. Minimising wake should not come at the expense of biodiversity or coastal livelihoods, and trade-offs must be explicitly weighed.

Finally, the roundtable mentioned that making these linkages explicit could reduce conflicts and open pathways for cross-border solutions (e.g. cross-border hybrid projects) that improve overall system resilience while balancing with environmental protection. The roundtable concluded that wake effects must be treated as both a technical and governance challenge, one that links directly to broader discussions on spatial trade-offs and integrated planning.

Emerging Points of Consensus / Debate

- **Consensus:**
 - Wake effects must be addressed at a **sea-basin scale** through integrated technical, spatial, and environmental planning.
 - Cross-border **data sharing** and **joint modelling exercises** are prerequisites for effective solutions.

- **Hybrids** and **cross-border radials** can reduce site density, increase load factors, and lower overall system costs.
- **Debate:**
 - How to weigh wake reduction against other priorities such as biodiversity protection, fisheries access, and proximity to grid landing points.
 - The need for **better alignment** between project-level incentives and basin-wide optimisation goals.
 - Whether reopening national MSPs is feasible to redistribute capacity, or whether existing siting decisions lock in inefficiencies.

"Wake losses can be an invisible drag on the energy system — but their solutions can't be planned in isolation from nature and communities."

Roundtable 3: Nature and Socio-Economic Considerations

This roundtable explored how **conservation modelling and socio-economic assessments** can better inform and guide offshore spatial planning in ways that both safeguard marine ecosystems and support equitable development. The focus was on cumulative impacts, the role of Marine Protected Areas (MPAs), and modelling for sensitive species, as well as how socio-economic layers, such as fisheries and cultural heritage, can be integrated into planning.

Discussion Highlights

Contributions from MPA Europe, Wageningen University and the University of Glasgow demonstrated how ecological data and modelling are advancing rapidly: from identifying optimal MPA locations, to assessing cumulative impacts of offshore development, to accurately estimating bird risk exposure to anthropogenic activities.

Participants stressed that these tools are increasingly robust, but their value depends on how they are integrated into planning. **Cumulative impact assessments, for example, remain too often an afterthought in project permitting rather than a driver of early site selection.** Similarly, species models can flag risks to birds or fish, but only if they are embedded into planning frameworks at the right stage. **Socio-economic dimensions also need to be considered alongside ecological ones**, ensuring that spatial decisions balance both conservation priorities and community needs.

Discussion also pointed to persistent challenges: **data sharing is still patchy across borders and between sectors**, and without greater interoperability, models risk remaining siloed. Participants saw strong potential for using **spatial visualisation tools as a bridge** — providing a shared evidence base that makes trade-offs more transparent to decision-makers and stakeholders.

Crucially, several speakers noted that these conservation models should not be treated as constraints alone but as enablers of more strategic, forward-looking planning. By aligning them with MSP cycles and with processes such as the Offshore Network Development Plan, **ecological modelling can proactively guide development towards lower-conflict sites**, reduce risks of delays, and build trust with local communities and NGOs.

"Nature doesn't stop at an MPA boundary, and neither should our planning."

Emerging Points of Consensus / Debate

- **Consensus:**
 - Conservation and socio-economic layers must be integrated from the outset into offshore planning, not added later as constraints.
 - Regional coordination is needed to align how ecological data is collected, interpreted, and applied in MSP, ensuring that sensitive species and habitats are managed consistently across borders.
 - **Models and tools should be seen as enablers**, proactively guiding development toward lower-conflict sites.
- **Debate:**
 - How to balance **short-term deployment urgency** with **long-term ecological resilience** over the long term.
 - Varying interpretations of “no-go zones” and whether they should be **prescriptive** or **adaptive** in spatial planning frameworks.
 - Extent to which **cumulative impacts** can be realistically assessed basin-wide, given data gaps and fragmented planning cycles.

Session 4: Simulation and Recommendations

The final session was designed as an **interactive exploration** of how integrated planning tools can visualise spatial trade-offs between offshore wind deployment, ecological constraints, grid connection points, and socio-economic priorities. Using the [North C Neutral \(NCN\) simulation tool](#), participants examined pre-calculated scenarios illustrating the effects of different planning choices at the **Greater North Sea Basin** scale.

Discussion Highlights

Rather than focusing solely on tool functionality, the aim was to use different scenarios to spark a **cross-disciplinary dialogue** on how spatial modelling can inform policy, governance, and investment decisions — including potential contributions to the European grid planning process and other EU frameworks. North C Neutral presented a series of pre-calculated

scenarios comparing business-as-usual (BAU) to alternative configurations, each introducing constraints and cooperation strategies:

- **BAU vs. Cross-border Cooperation:** Highlighting efficiency gains from shared infrastructure and coordinated siting across national boundaries
- **BAU vs. Ecology + Wake effect restriction:** Demonstrating the combined impact of biodiversity safeguards and reduced wake zones on site selection and capacity

These scenarios integrated and visualised spatial layers across offshore wind deployment, grid connections, MPAs, fisheries zones, and ecological sensitivity areas to reveal the multi-dimensional nature of offshore trade-offs.

"Seeing the constraints and opportunities side-by-side makes it easier to explain why some sites just won't work — and to build consensus on where they might."

Focusing less on the technical outputs of the tool, participants provided feedback on the **practical implications** of its use in real-world planning:

- **Value of visualisation:** The layered maps made trade-offs tangible, helping stakeholders imagine the impact of different planning rules in a way that data tables alone cannot achieve. Visual trade-off tools can also help make complex decisions more transparent.
- **Policy integration:** Several participants noted that such tools could help inform **sea-basin level MSP revisions**, providing a shared evidence base for Member States. For tools to be policy-relevant, they must align with formal planning cycles (e.g., ONDP, MSP revisions) and governance processes.
- **Data gaps:** While powerful, the scenarios also exposed missing datasets – particularly for socio-economic layers beyond fisheries, and for high-resolution ecological modelling of seasonal dynamics. The choice of constraints (e.g., ecological, technical, economic) fundamentally shapes feasible options.
- **Risk of over-reliance:** Some cautioned that models should be treated as **decision-support tools**, not decision-makers, and must be paired with stakeholder engagement to capture local knowledge.

"We shouldn't forget that these models reflect our current assumptions. If we change the governance or the rules, the map changes too."

Emerging Points of Consensus / Debate

- **Consensus:**

- Scenario-based visualisation can play a key role in *pre-permitting dialogues*, helping to filter out low-viability sites early.
- Integration of energy, ecological, and socio-economic data in a single map strengthens the case for basin-level cooperation.

- **Debate:**

- To what extent should governance processes rely on model outputs? Some stressed their enabling role, others warned against over-reliance given shifting assumptions.
 - How to prioritise next-generation data inputs (e.g., dynamic seasonal layers, socio-economic trade-offs) and ensure stakeholder co-design of scenarios.
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Strategic Takeaways for Policy and Practice

1. Make integrated sea-basin planning the default approach

Offshore wind, grid, and nature planning must be coordinated at the sea-basin scale to optimise space use, minimise environmental impact, and enable cross-border synergies. This requires stronger links between MSP, European offshore grid planning processes, environmental planning cycles and clear governance responsibilities for basin-level planning.

✓ **Policy Hook:** *Support MSP Directive implementation and revision, while ensuring grid planning processes are better aligned with spatial constraints such as nature and other human activities at sea basin scale.*

2. Reinforce governance and cross-border coordination

Strengthen voluntary cooperation platforms, such as NSEC and GNSBI to ensure timely, transparent, and well-resourced planning by addressing cross-border energy and nature challenges, aligning objectives, and integrating ecological, technical, and socio-economic priorities.

✓ **Policy Hook:** *Advance NSEC and GNSBI commitments and inform governance provisions in the Grids Package.*

3. Embed technical system design into spatial planning

Planning must reflect technical realities – including wake effect modelling, hybrid grid configurations, and landing point constraints – at both national and basin levels. Technical models should be aligned with ecological and socio-economic constraints from the outset to enable smarter, conflict-avoiding site selection.

✓ **Policy Hook:** *Provide evidence for integrating grid design and offshore hybrids into system planning methodologies and national energy-climate plans.*

4. Integrate environmental and socio-economic factors early

Cumulative impact assessments, biodiversity models, and socio-economic considerations (e.g., fisheries, community impacts) should inform site selection and planning timelines from the earliest stages, ensuring projects are both environmentally and socially sustainable.

✓ **Policy Hook:** *Deliver actionable insights for the Wind Power Action Plan's acceleration measures while upholding EU nature directives and the Biodiversity Strategy.*

5. Use integrated data and tools as a common reference point

Scenario and visualisation tools that combine technical, ecological, and socio-economic layers can bridge silos, facilitate stakeholder engagement, and make trade-

offs explicit. Outputs must be interoperable across datasets and directly actionable for decision-makers.

✓ **Policy Hook: Support Digital Twin initiatives, MSP review processes, and cross-sector data-sharing commitments in the Grids Package.**

6. Accelerate and align planning timelines

Current sequential planning processes are too slow to meet offshore wind targets. Parallel and coordinated processes – especially between energy, nature, and MSP – can reduce delays while safeguarding environmental goals.

✓ **Policy Hook: Inform RED III permitting acceleration provisions and ensure consistency with MSP and environmental timelines.**

Conclusions and Way Forward

The governance challenges raised during the workshop echoed across all sessions. Discussions on spatial trade-offs and modelling highlighted the need for governance frameworks that directly integrate **technical design constraints** — such as wake effects and offshore grid optimisation — into Maritime Spatial Planning (MSP) rules. MSP can act as the **essential bridge** between sectoral interests, aligning energy, nature, and socio-economic objectives. While regional coordination structures such as **NSEC** and the **Offshore Transmission Cooperation (OTC)** already provide best practices, participants underlined that basin-level cooperation will only unlock its full potential if supported by stronger political commitment and clearly defined governance roles.

This expert workshop also had a concrete stakeholder impact:

- **Dena** included wake effects in its consultation on MSP and nature protection.
- **RGI/OCEaN** were invited as one of three key speakers for the **North Sea Summit stakeholder consultation**.
- **NSEC** invited RGI to present on integrated planning at the Ministerial.
- **GNSBI** is seeking RGI's support for a forthcoming **declaration** ahead of the North Sea Summit.

These steps show that the workshop not only provided a forum for dialogue but also **catalysed follow-up action** in the regional and political context, reinforcing the importance of integrated, transdisciplinary approaches to offshore planning.

Acknowledgments

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Annex 1: Agenda

03/07/2025	Integrated Offshore Planning: Aligning Energy, Nature, and Space
09:30 - 10:00	Registration and Breakfast
10:00 - 10:10	Welcome and introduction
10:10-10:20	Opening Remarks by RGI and WindEurope Need for integrated offshore planning across energy, nature, and space
10:20 - 11:30	Roundtable 1: Governance & Regional Cooperation <i>Key Question:</i> How can national and cross-border planning timelines, frameworks, and political commitments be better aligned to enable coordinated, sea basin-level spatial planning? Topics & Contributions: - Insights from Belgium, as GNSBI co-coordinator and NSEC presidency holder – <i>Jana Caulier and Kim Pauwels</i> - Reflections from ENTSO-E on first ONDP experience and the needs for further improvement – <i>Francesco Celozzi</i>
11:30 - 12:45	Roundtable 2: Grids, Generation, and Wake Effects <i>Key Question:</i> How can we optimise offshore grid design and generation layout to address wake effects and maximise system value? Topics & Contributions: - Introduction to the wake phenomenon – WindEurope – <i>Riccardo Longo</i> - The system value of cross-border collaboration and spatial design – Ørsted / Thema Group – <i>Roman Schliszio</i> - Integrated planning for mitigation of wake and consideration of maritime spatial planning: A TSO perspective for the North Sea – 50Hertz / Elia Group – <i>Felix Fliegner</i>

Integrated Offshore Planning

EXPERT WORKSHOP Aligning Energy, Nature and Space

DAY 2 OFFSHORE WIND & GRID WORKSHOP

12:45 - 13:45	Lunch
13:45 - 15:15	Roundtable 3: Nature and Socio-Economic Considerations <i>Key Question:</i> How does conservation modelling inform spatial planning in terms of risk avoidance, no-go zones, and the distribution of Marine Protected Areas (MPAs) and sensitive species? Topics & Contributions: - Cumulative Impacts Assessment tool in the context of offshore developments in the North Sea and North-East Atlantic – Wageningen University - <i>Gerjan Piet</i> - A biologically realistic method for estimating seabird home range and spatial exposure: implications for offshore wind farm planning – University of Glasgow - <i>Holly Niven</i> - Contributions from MPA Europe on optimal locations for MPAs – Ocean Biodiversity Information System (OBIS) - <i>Silas Principe</i>
15:15 - 15:30	Coffee break
15:30 - 17:00	Session 4: Simulation and Recommendations <i>Key Questions:</i> - What are the implications from an energy, conservation perspectives of moving offshore energy further offshore? - What is needed to progress with a sea-basin level planning that integrates governance, technical, ecological and socio-economic inputs? Activities: Interactive simulation with North C Neutral's tool, testing spatial planning scenarios - Providing input to produce key recommendations, feeding into the ONDP process and other important offshore energy system policy planning
17:00 - 18:00	Networking reception at WindEurope premises

Annex 2: Participating organisations

In-person	Online
50Hertz	50 Hertz
Amprion	ACER
BirdLife Europe	Aktis hydraulics
Deutsche Energie-Agentur (dena)	Baltic Cable
ENTSO-E	BWO Offshore
Equinor	Deutsche Energie-Agentur (dena)
FPS Economy, DG Energy; GNSBI	DG Ener
KU Leuven / Etch - EnergyVille	DG Mare
National Grid	Elia
OBIS/IOC/UNESCO	ENTSO-E
Orsted	European MSP Platform I European Blue Forum – North Sea
Red Eléctrica Redeia	Fundacion Renovables
Renewables Grid Initiative	Hitachi Energy
Renewables Grid Initiative OCEaN	National Grid
Statnett	RSPB
TenneT / OTC	Statnett
TenneT De	
TenneT NL	
University of Glasgow	
Vattenfall Vindkraft	
Wageningen Marine Research	
WindEurope	

For any questions or further interest or opportunities to collaborate on this topic, please contact Cristina Simioli (cristina@renewables-grid.eu), Andrzej Ceglaz (andrzej@renewables-grid.eu) and Amanda Schibline (amanda@renewables-grid.eu).