Baltic
InteGrid

Integrated Baltic Offshore
Wind Electricity Grid Development

Interreg
Baltic Sea Region

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EU STRATEGY FOR THE BALTIC SEA REGION
FLAGSHIP

Baltic InteGrid: Towards a meshed offshore grid in the Baltic Sea

Final conference | 26/27 February 2019

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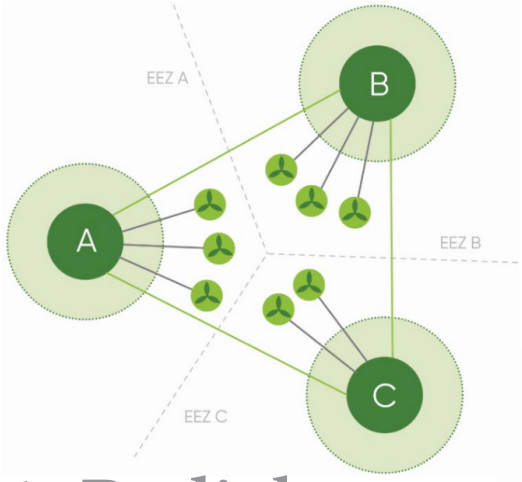
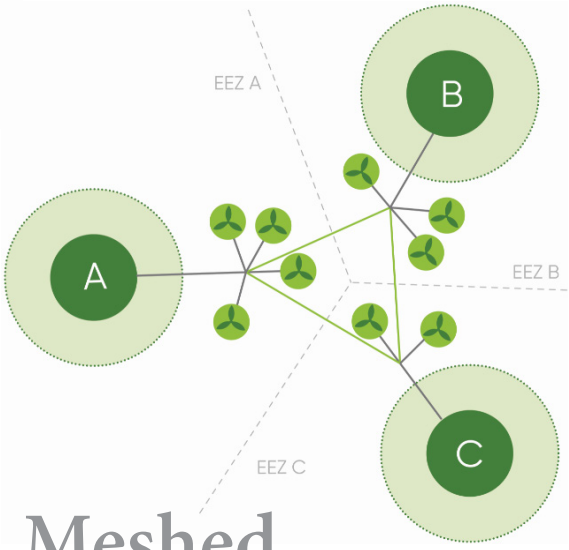
Meshed offshore grid

- High initial investment
- Complex regulatory, legal, market and policy obstacles

+ Annual savings compensate
+ Resilience for operators
+ RES & market integration



1. Radial



2. Meshed

So, what is the potential of a MOG in the Baltic Sea?

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The consortium

14 partners from the 8 EU Member States

1. IKEM | Germany
2. Foundation for Sustainable Energy | Poland
3. Rostock Business and Technology Development
4. Technical University of Denmark | Denmark
5. Energy Agency for Southeast Sweden | Sweden
6. Deutsche WindGuard | Germany
7. Maritime Institute in Gdansk | Poland
8. Stiftung OFFSHORE-WINDENERGIE | Germany
9. Latvian Association of Local and Regional Governments | Latvia
10. Aalto University | Finland
11. University of Tartu | Estonia
12. Klaipeda University Coastal Research and Planning Institute | Lithuania
13. Lund University | Sweden
14. Aarhus University | Denmark

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Core pillars of the Baltic InteGrid

Baltic Offshore Grid Forum

- Network & conference platform

Baltic Offshore Grid Concept

- Interdisciplinary research

Pre-feasibility studies

- In-depth perspective on 2 cases

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The Baltic Offshore Grid Forum

12

Thematic Working Groups

1. Policy & regulation (2)
2. Market & supply (2)
3. Technology & grid (2)
4. Environment & society (2)
5. Spatial planning (2)
6. Cost-benefit analysis (2)

- Disciplinary in scope
- Focus: Region-wide

6

Country workshop

- Latvia
- Poland
- Finland
- Lithuania
- Germany

- Interdisciplinary in scope
- Focus: national

4

Key events

- Kick-off conference
- First results conference
- PL-SE-LT case study
- Final conference

- Interdisciplinary
- Focus: Region-wide

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Results of the Baltic Offshore Grid Forum

1. Growing interest in meshed offshore grids
2. Transnational cooperation & continuous exchange key to progress
3. The Baltic Offshore Grid Forum will go on!

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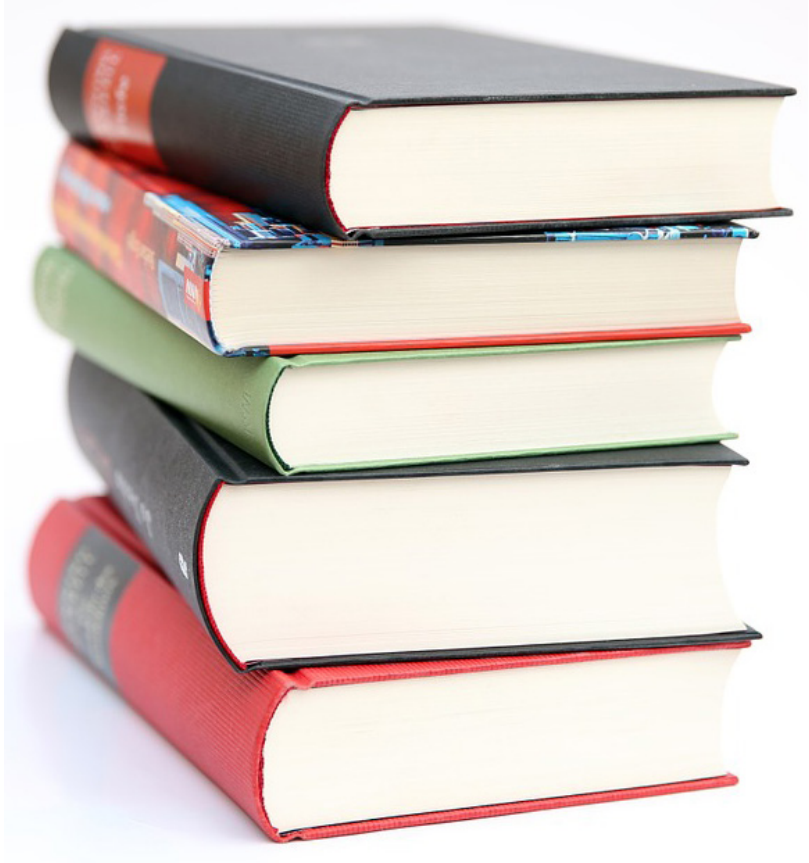
The Baltic Offshore Grid Concept

1. Policy & regulation
2. Market & supply
3. Technology & grid
4. Environment & society
5. Spatial planning
6. Cost-benefit analysis



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1. Policy & regulation

2. Market & supply

3. Technology & grid

4. Environment & society

5. Spatial planning

6. Cost-benefit analysis

MOG requires guidance from (EU) policymakers!

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1. Policy & regulation
2. **Market & supply**
3. Technology & grid
4. Environment & society
5. Spatial planning
6. Cost-benefit analysis

Market dominated by large players, but local companies can enter MOG service and maintenance sector

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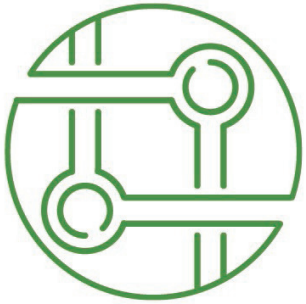

1. Policy & regulation
2. Market & supply
3. **Technology & grid**
4. Environment & society
5. Spatial planning
6. Cost-benefit analysis

Technology for a MOG is ready; price uncertainty around DC breakers remain

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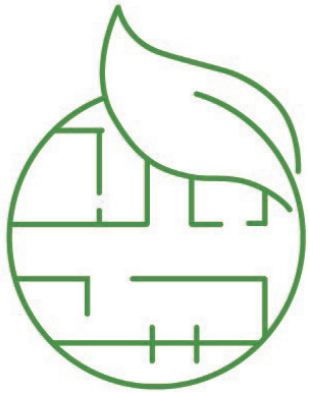

1. Policy & regulation
2. Market & supply
3. Technology & grid
4. **Environment & society**
5. Spatial planning
6. Cost-benefit analysis

Many users and stakeholders in the Baltic Sea, consultation is key to avoiding conflicts and delays

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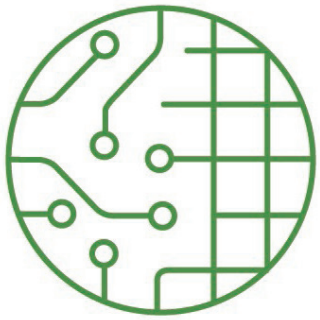

1. Policy & regulation
2. Market & supply
3. Technology & grid
4. Environment & society
5. **Spatial planning**
6. Cost-benefit analysis

MOG requires less sea cables and less maritime space, but needs transnational MSP coordination

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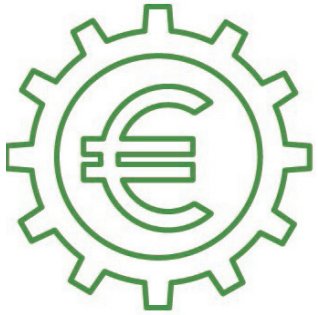

1. Policy & regulation
2. Market & supply
3. Technology & grid
4. Environment & society
5. Spatial planning
6. **Cost-benefit analysis**

Socio-economic benefits of a MOG: System stability, interconnection and jobs!

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Baltic Offshore Grid Concept

- Interdisciplinary research

Pre-feasibility studies

- In-depth perspective on 2 cases

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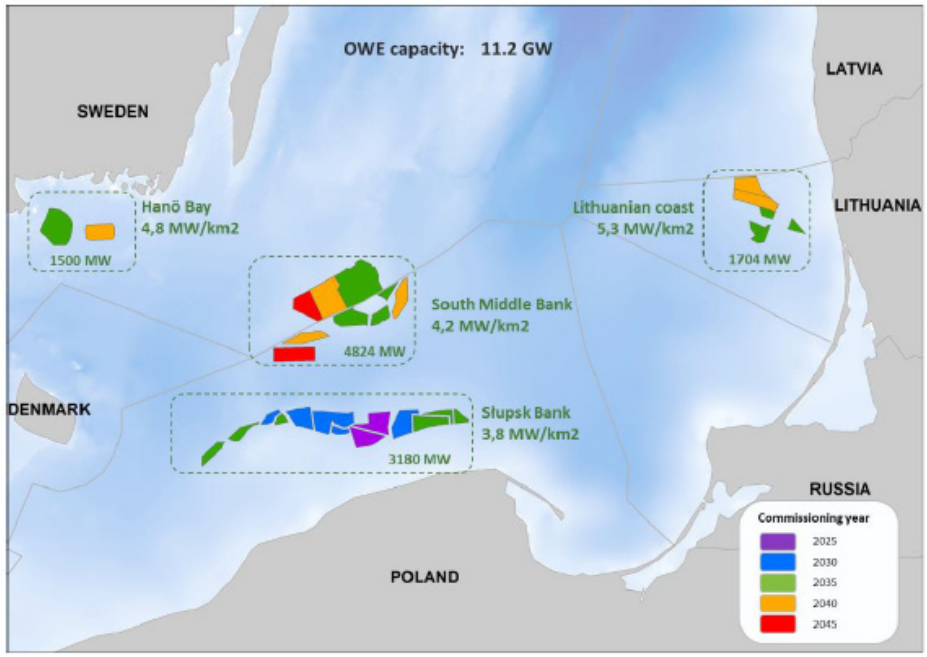
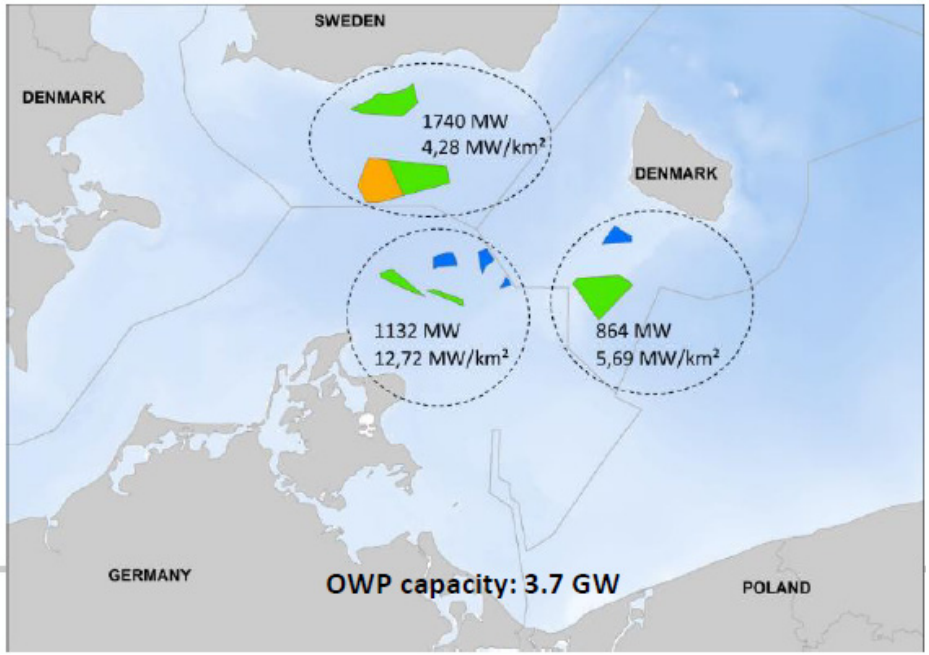
Pre-feasibility Studies

1) Poland/Sweden/Lithuania

2) Germany/Sweden/Denmark

High OWP – 2045





- Various scenarios and connection possibilities
- Moderate/high OWE? MOG more efficient!

Baltic Offshore Grid #BOG2050

Towards 2050!

The EU has been at the forefront of climate policy, pledging to reduce emissions by 80%–95% by 2050. At least 15% interconnection among national electricity markets and 32% energy from renewable sources by 2030 are the major targets pursued by the EU's Energy Union. By fostering the integration of electricity markets and encouraging further deployment of renewable offshore wind energy, a meshed grid has a central role to play on the way to tomorrow's sustainable energy system!

About

The Baltic InteGrid project investigated the possibility to establish a meshed offshore grid in the Baltic Sea - an ingenious way to connect offshore wind farms and electricity markets. Extensive interdisciplinary research has shown that a meshed grid would provide substantial socio-economic benefits to the region, and could be a key component in an integrated, sustainable energy system by 2050. The Baltic InteGrid was funded by the European Union and Interreg Baltic Sea Region. All research results are available on: www.baltic-integrid.eu.

1 - Policy and regulation

A meshed grid would offer considerable socio-economic benefits to the Baltic Sea Region. It would, however, be contingent on regulatory drivers to reduce complexity and set incentives for developers. For starters:

- National policy makers should set offshore wind energy targets (and update them regularly!) as well as simple permitting procedures with one-stop-shops to create a stable environment that welcomes offshore wind investors.
- The encouragement of public participation at all planning stages could boost acceptance and bring value to communities!
- Offshore wind energy expansion can benefit from the 'super-shallow approach', which keeps the cost of grid connection with the TSOs rather than wind farm developers, reducing the latter's risk and costs.
- The complexity of multilateral offshore grid projects must be reduced. To this end, EU policy makers could develop a transparent CBCA methodology to distribute costs between the TSOs involved.
- EU policy makers can decrease transaction costs for investors by developing a regulatory framework for meshed grids. An alternative to such an EU-wide approach is for the EU to offer targeted assistance, financial or expertise-based, to specific regions or projects.
- EU policy makers should provide legal definitions for the components of a meshed offshore grid and set rules for its operation.
- The development of a meshed offshore grid requires close cross-border cooperation. The EU could facilitate this by offering a rulebook and by encouraging national governments to form a supranational body that could operate a meshed offshore grid.

2 - Regional value

A meshed grid would offer regional added value and create new jobs in the service and maintenance market. Thanks to its great port infrastructure and skilled labour, the Baltic Sea Region could become a leader in the installation and maintenance of offshore wind farms and grid components!

3 - A wind of change!

Offshore wind energy is expected to develop rapidly and on a large scale in the Baltic Sea Region, growing from 2.2 GW of installed capacity in 2018 to 9.5 GW by 2030 and up to 35 GW by 2050!

4 - Costs coming down!

The Baltic Sea Region has great offshore wind potential thanks to strong winds, shallow waters, short distances to shore and low tidal fluctuations. In fact, the levelised cost of energy in the south-western Baltic is forecast to be as low as €35/MWh by 2030!

5 - Planning for the future

Meshed offshore grids have a cross-border scope. For this reason, maritime spatial planning in the Baltic Sea requires institutionalised transnational cooperation. Moreover, the long-term needs of the region must be reflected in maritime spatial plans by considering the needs of strategic sectors, like energy and the environment.

6 - The march of technology

Offshore wind technology has experienced a rapid fall in costs over the past decade, with the first subsidy free tender submitted in 2017. Cost decreases are also expected for HVDC technology as well as for floating foundations for offshore wind farms, meaning future farms can be built in greater water depths. Finally, optimising the layout of sea cables can allow for costs to be reduced even more!

7 - All hands on deck!

A meshed offshore grid would share the sea with many other users, some of which have been around for centuries. Natural protection zones, shipping lanes, military areas, cables, gas pipelines, fishing and tourism must all be included in stakeholder consultations at an early stage of development to avoid future conflicts and acceptance problems.

8 - Happy as a clam

The Baltic Sea is the youngest sea on our planet, and its brackish waters are home to a unique ecosystem of fish, seals, porpoises, crabs, mussels, benthos, birds and many more! The careful application of environmental assessments will ensure that a meshed offshore grid does not impact this rich marine life.

9 - Save some space

The Baltic Sea is a very densely used maritime space! A meshed grid offers a real benefit in this sense: by combining radial and interconnector cable infrastructure, it needs fewer transformer stations, landfall points and subsea cables, thereby taking up less space.

10 - Costs and benefits

Assuming a moderate to high expansion of offshore wind in the Baltic Sea in the coming decades, cost-benefit analyses have demonstrated that a meshed offshore grid will be the most efficient way to connect wind farms and countries. Financial savings, local job creation, increased system stability, improved market integration, lower electricity prices and a green energy supply… a meshed grid has a lot to offer!

11 - Starting the BOG

The pre-feasibility studies of the Baltic Offshore Grid show that the development of a meshed grid should start in the South Baltic, where planned offshore wind development aligns well with interconnector needs. Considering the long lead times of offshore wind and grid infrastructure projects, the coordination process in the South should start as soon as possible, before business-as-usual developments lock the area into an inefficient grid infrastructure!

12 - Better together

The Baltic InteGrid built a strong stakeholder network, uniting hundreds of experts around the topic of offshore wind and meshed grids at workshops and conferences. This exchange must continue to keep the momentum and interest in the topic of meshed offshore grids! To that end, our conference platform, the Baltic Offshore Grid Forum, will go on beyond the project lifetime and bring regional stakeholders together for years to come.

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Window of opportunity!

- 2.2 GW offshore wind capacity in the BSR
- *Time to act:*
  Bold policy-making and transnational collaboration

Baltic InteGrid

26 February

12:00 - 13:00	**Registration and light lunch**
13:00 - 13:10	**Welcome and introduction to the Baltic InteGrid** Anika Nicolaas Ponder | IKEM
13:10 - 13:30	**Offshore wind and meshed grids: Innovative pathways for the Energy Union** Anne-Maria Ide | European Commission
13:30 - 13:50	**Staying on course: Offshore wind leadership and the EU** Giles Dickson | WindEurope
13:50 - 14:20	**Offshore wind and integrated markets: Chances for the Baltic Sea Region** Izabela Kielichowska | Navigant
14:20 - 15:10	**Panel discussion with the speakers and the audience** Moderation: Claire Bergaentzlé | Danish Technical University
15:10 - 15:40	**Coffee break**
15:40 - 16:00	**Offshore wind and grid solutions in the Baltic Sea** Lykke Mulvad Jeppesen | Ørsted
16:00 - 16:20	**Policy and regulation:** **Steps towards meshed offshore grid development in the Baltic Sea** Bénédicte Martin | IKEM
16:20 - 16:50	**Meshed offshore grids in the North Sea:** **Challenges, solutions and synergies with the Baltic Sea** Ivan Savitsky | Carbon Trust | PROMOTioN
16:50 - 17:30	**Panel discussion round with the speakers and the audience** Moderation: Ceciel Nieuwenhout LL.M | University of Groningen
17:30 - 18:30	**Networking apéro**

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Thank you!

IKEM - Lead Partner of the Baltic InteGrid

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