Our policy briefs are summaries of scientific knowledge produced in BONUS BALTIMARI, connected to current management and policy actions concerning the Baltic Sea. The briefs engage in and respond to important issues that support long-term sustainability of ecosystem goods and services of the Baltic Sea.

OFFSHORE RENEWABLE ENERGY AND SHIPPING – WE MIGHT HAVE A MATCH!

Maritime spatial planning – many stakeholders, limited space

The Baltic Sea is a relatively small and shallow intracontinental sea with limited space and a number of neighbouring countries. Every new installation or expansion of existing offshore wind parks will influence the Maritime Spatial Planning (MSP). As shown in the graphic below many stakeholders have to be consulted, when planning for new installations offshore, shipping maybe the main opponent fighting for the available very limited sea space.

However, a growth in offshore renewable energy is strongly desired and supported by the European Commission. Especially offshore wind energy as a recognised stable, cost efficient and widely public accepted source of clean energy has to move further offshore because of many competitors for sea space. Therefore, the planning, installation and operation of offshore wind parks is a major challenge.

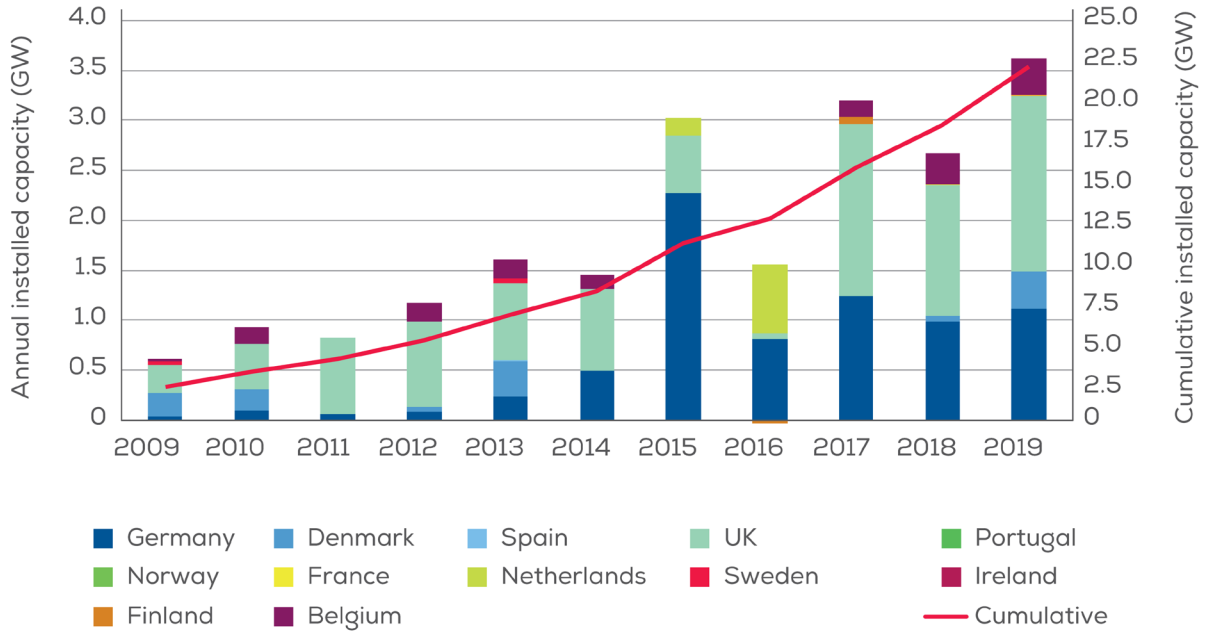
As any installation will have an influence on the macro system Baltic Sea, particularly the shipping is put at risk: long time and well established shipping lanes can be constricted by wind parks an impose an additional risk at ships, crew and marine environment in case of any accident.

Therefore, the **BONUS BALTIMARI** project had put the methods of risk assessment on the table. As part of the project, a study has been carried out specifically investigating risk assessment on offshore renewable energy installations. As a preliminary result it was found, that state-of-the-art risk assessment has potential for improvement by taking into account dynamic characteristics (manoeuvring behaviour) of vessels passing along offshore installations in the respected areas.

Dovetailing offshore renewable energy and common shipping lanes

Changing climate and grown ecological consciousness led to a rapidly increasing number of offshore renewable energy installations (OREI). They supplement the existing offshore energy production platforms and the most prominent appearance are parks of offshore wind turbines (OWT), growing in number and size. In 2019 alone, 502 new offshore wind turbines were connected to the grid in ten projects were installed in Europe.

Annual offshore wind installations by country (left axis) and cumulative capacity (right axis) (GW)

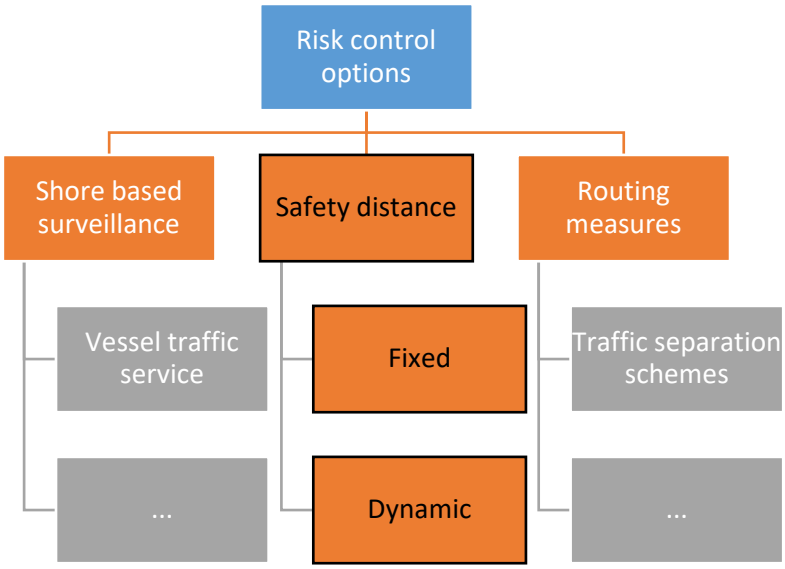


Source: WindEurope

Any installation in vicinity of shipping lanes is treated as detrimental for the safety of navigation of vessels passing there. If offshore wind parks reduce the space of a common shipping route this results in increased traffic density by narrowing the marine space for navigating vessels, mostly resulting in an increased risk for navigation.

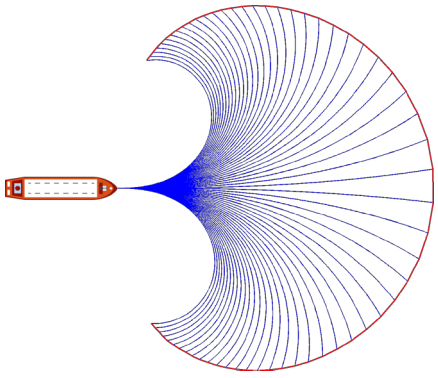
The possible consequences are human casualties, environmental damage and financial loss for both, the maritime traffic and the OREI industry. Accepting this fact the risk mitigation is in the interest of all stakeholders, demanding a modern spatial risk assessment. Therefore, the **BONUS BALTIMARI** project's focus is set on the risk assessment for the maritime traffic close to OREIs – the navigational risk assessment (NRA) in restricted waters.

Controlling the risks various methods are commonly used and state of the art. The commonly first choice is the definition of a **safety distance** between a single offshore wind turbine and a vessel. The safety distance sets a “no-entry-zone” around the installation.



Prescriptive fixed safety distances might not meet all demands for a safe navigation, either they are not entirely safe enough or they are not using the available sea space effectively.

Furthermore, the public available classification of vessels as per **Automatic Identification System** (AIS) is very coarse. A vessels carrying bulk cargoes such as iron ore with very limited manoeuvrability is classified as “Cargo Ship” together with a general cargo carrier or a container ship. To use the broad and over many years collected data of traffic flow for future risk analysis including the specific characteristics of the different ship types, additional databases should be consulted.



For attaining a **dynamic safety distance,** an operational **dynamic risk assessment** must be carried out providing a value for the current risk for the particular ship. This calculation comprises a larger number of information and parameters describing the involved objects, the environment and the operation possibilities and constrains (including human factor). The dynamic safety distance takes the area into account that a particular vessel can reach within a certain time using its machinery. This can be visualised as a manoeuvring envelope as shown (Manoeuvring area a sample ship can reach within three minutes).

The **dynamic risk assessment** can provide a decision support for the operator taking real-time decisions. This approach was used before in aviation and automotive industry. This method gets progressively more attention when considering autonomous vehicles, also in the maritime domain. New operational tools displaying a *safe manoeuvring room* incorporating all possible manoeuvres can help the onshore operator determining actions in a safe and efficient way.

Three vital steps to improve – Recommendations

Harmonising risk management

- As a finding from the literature review a need for harmonisation of the applied risk management guidelines amongst the Baltic Sea neighbouring countries appear obvious.

Applying dynamic risk assessment

- The study shows, that including methods of dynamic risk assessment to the existing toolbox of risk management approaches are recommended. This can help to use the sea area more efficiently.

Applicable ship types

- The AIS-based ship types should be enriched with information derived from additional database to provide an applicable set of standard ships for the risk assessment procedure. This will give the planning and operational staff a more detailed picture of the traffic adjacent to an OREI.

References

MEHDI, Raza Ali, Michael BALDAUF, and Hasan DEEB. *A dynamic risk assessment method to address safety of navigation concerns around offshore renewable energy installations* [online]. Proceedings of the Institution of Mechanical Engineers, Part M: Journal of Engineering for the Maritime Environment. 2019, 24(4), 147509021983740. Available from: 10.1177/1475090219837409.

Contact details and acknowledgements

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