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Synergies at Sea: A combined infrastructure for offshore wind and grid interconnection

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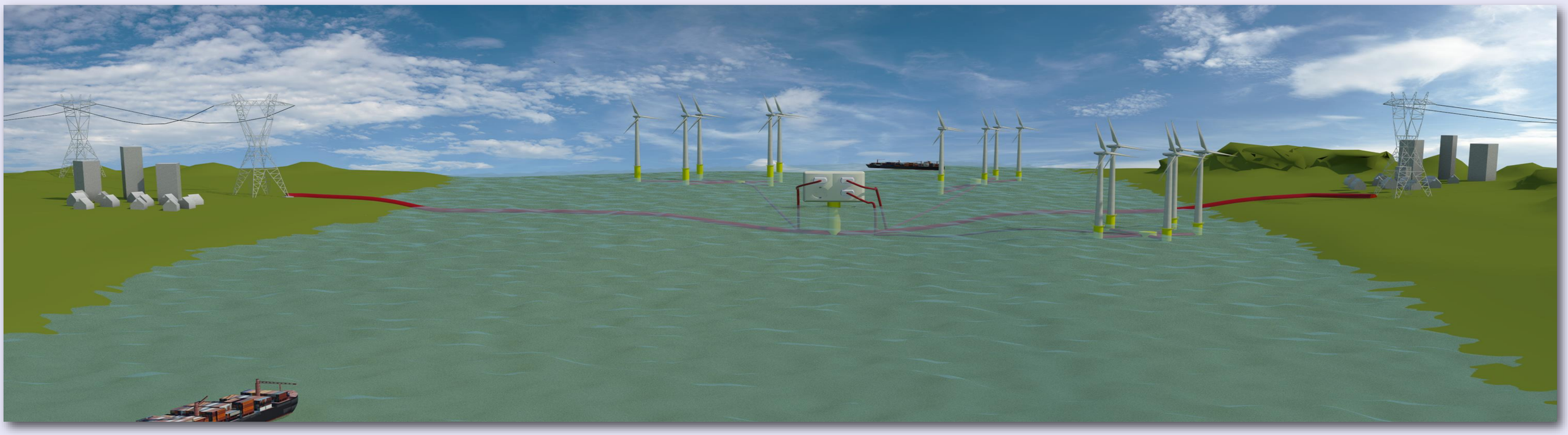
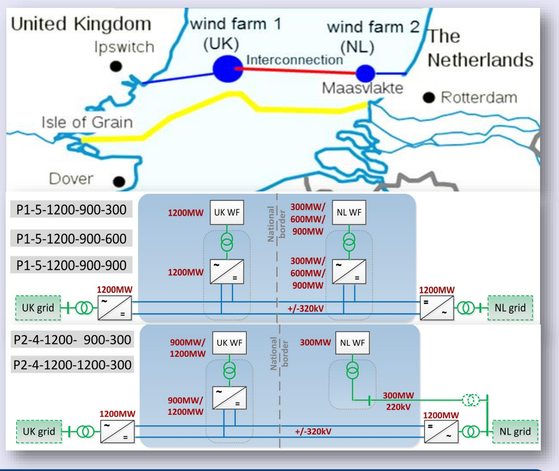
SYNERGIES AT SEA



Abstract

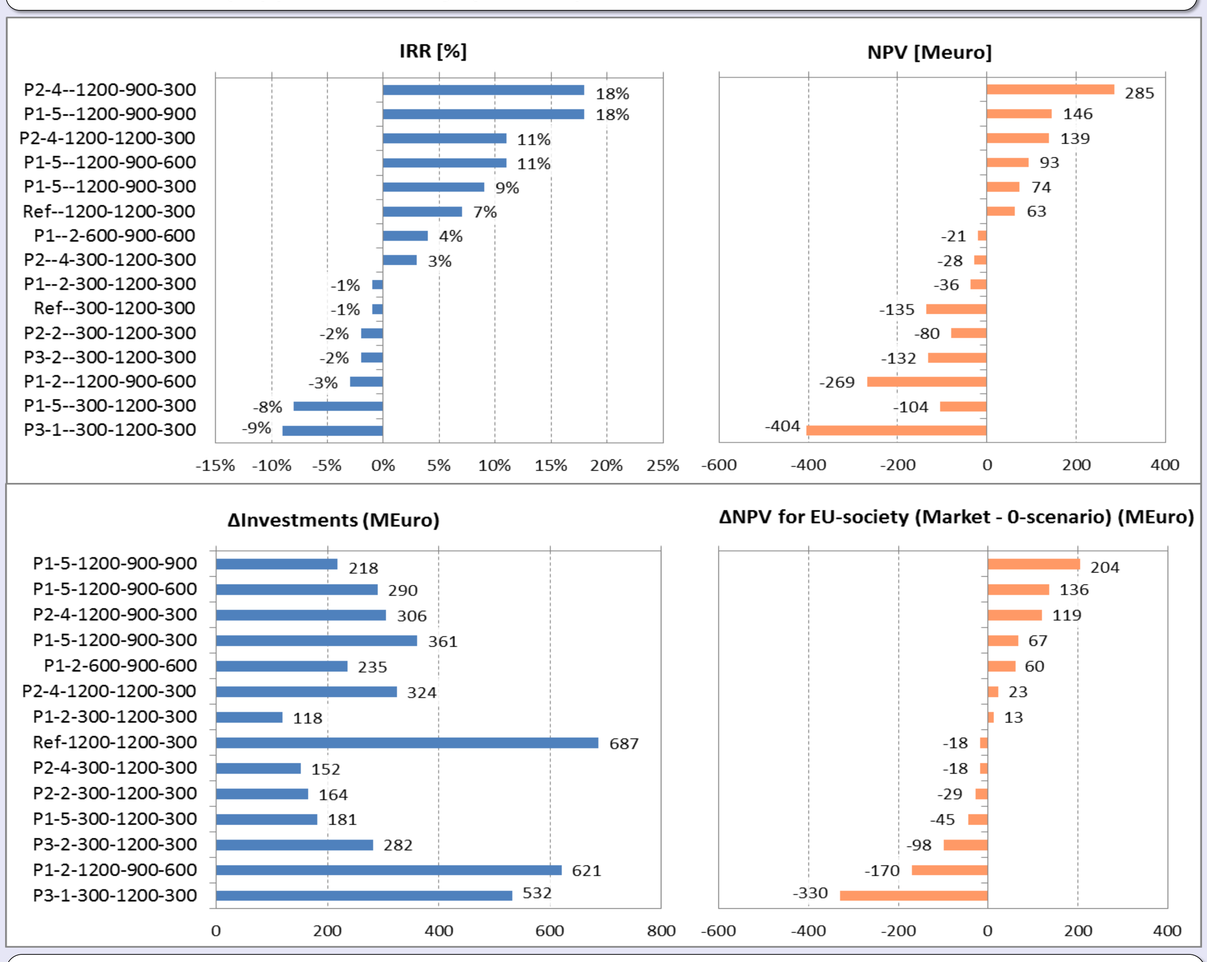
Within the “Synergies at Sea” project the feasibility of an interconnection between British and Dutch offshore wind farms is studied. Such an integrated solution promises cost savings on infrastructure, increased revenues from cross-border trade and increased flexibility.

The study assessed the regulatory and legal implications, main technical design trade-offs, and the business case from an investor’s and socio-economic perspective.



Economical aspects

Two costs-benefits analyses have been conducted, showing the economic feasibility of an interconnecting link to one or two wind farms from the perspective of an investor (top) and society (bottom).



Conclusion: Two scenarios show highly feasible from the perspective of both the private investor and EU-society:

1. P2-4-1200-900-300: A direct HVdc connection between a 900MW wind farm in the UK to the Dutch grid.
2. P1-5-1200-900-900: An HVdc connection between a 900MW UK wind farm to a 900MW Dutch wind farm.

Note: The second scenario is not possible in the current HVac rollout of the offshore grid connections in the Netherlands.

Regulatory aspects

Operation of a combined infrastructure for wind farms and cross-border trade is hampered by European and national legislation, although construction is allowed.

EU legislation does not provide a suitable definition for an interconnecting link or its operation. Additionally, the British OFTO regime, the Dutch legislation and the existing national subsidizing schemes create substantial barriers, which require both national and EU legislative developments.

Technical aspects

An interconnecting link is technically feasible, technology development is however slow due to a non-existing market. Stimulating the market by removing regulatory and political barriers will accelerate R&D, which is needed to reduce costs and risks.

Up to now, any proposed multi-terminal network is supplier specific, which results in a limited number of choices which limits the flexibility and the modularity of existing and future systems.

Standardizing a number of main characteristics such as voltage levels, platform capacities is needed to increase market size for the manufacturers, and reduce the costs of offshore networks. At the moment, CIGRE and CENELEC are the only European groups working towards defining DC grid standards.

Conclusions

An interconnection between British and Dutch offshore wind farms has shown to be economically and technically feasible for specific scenarios under the right conditions. Scenarios with 1200MW interconnection and a 900MW UK wind farm show significant net benefits. A careful consideration of the possible business cases must still be made to ensure positive results for investors, the involved TSOs and EU-society. Current European and national legislation however do not allow operation of such interconnection.

The most important recommendations can be summarized as follows:

- All possible links between European wind farms should be studied to find the possible economic gains;
- A mechanism for stimulating the most beneficial links should be put in place by the EU. This mechanism should take into account the interests and potential political resistance of single countries and/or TSOs;
- Legislation, licensing and support schemes in the UK and the Netherlands should be adapted and streamlined, to provide feasible possibilities for combined infrastructures for offshore wind energy generation and national grid interconnection;
- Further development and standardization of multi-hub HVdc technology should be stimulated, to build up practical experience and reduce costs and risks of new technology. Removing the mentioned barriers is a prerequisite for technological development as a market is needed to justify R&D costs.

1.Synergies at Sea: Feasibility of a combined infrastructure for offshore wind and interconnection, Final Report, SaS consortium, 2015
2.Technology review for the Synergies at Sea scenarios, Final report, TU Delft / ECN, 2013
3.Social welfare analysis for Synergies at Sea, Final report, 2013
4.Legal analysis for Synergies at Sea, Final report, Rijksuniversiteit Groningen, 2013

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