Opportunities for an efficient future North Sea energy system - the case of the Netherlands

Summary:

Developing an integrated offshore energy system is vital in achieving national renewable energy and carbon emission targets. Two critical barriers were identified that limit the realization of such a system, namely, lack of coordinated engagement among the stakeholders in the spatial planning process to formulate a shared vision, and also, the absence of clear guidelines for developing and implementing integrated solutions (co-exist or combining mutually beneficial offshore activities).

By involving the respective stakeholders like oil & gas platform owners, wind farm developers (also, the stakeholders who are impacted indirectly in project operations), in the early stage of the spatial planning process, potential risks and opportunities can be identified and mitigated. Then, to materialize the opportunities successfully without any bottlenecks, clearly differentiating the responsibilities and obligations of the stakeholders involved in the projects of multi-/re-use of offshore infrastructures is of great importance. Eliminating the present barriers will positively contribute to national efforts in reducing net emissions in the short term (towards 2030) and also create a stepping stone for promising future solutions (Hydrogen economy, transnational electricity grid) that can help us achieve targets aimed for 2050.

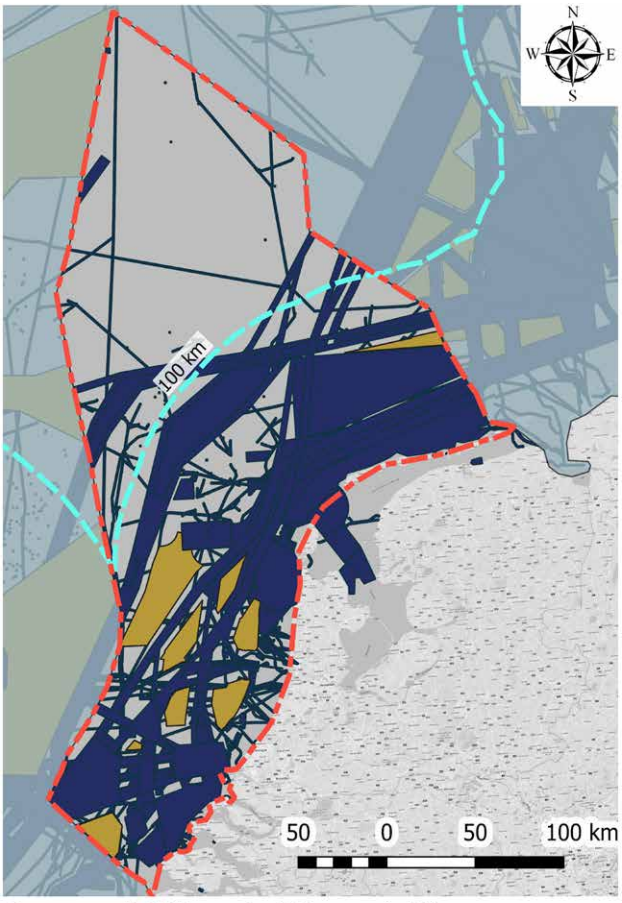
Introduction

The presence of the oil & gas industry in the Dutch part of the North Sea region is expected to cease between 2030 and 2050, due to depleting gas fields, low gas prices, and rising operational costs of platforms [1]. The estimated cost of cleaning up the offshore oil & gas installations over the next 20 years is around 3.7 billion EUR [2], excluding the cost of decommissioning the pipelines. The state will bear 70% of this cost.

On the other hand, the Netherlands targets for a minimum of 27% of all energy usage to come from renewable energy in 2030 (in 2018, the share is 7.4%)[3] and also wants to achieve zero CO2 emission from energy supply in 2050. Offshore wind (OW), one of the large-scale centralized electricity supply technologies, is set to play a crucial role in realizing those targets. The planned wind farm zones (11.5 GW total capacity by 2030) are located less than 100 km from the coast. With limited availability of space closer to the shore, future wind farms are expected to be built in the northern region of the Dutch EEZ zone (see Fig) [4]. This increased distance will result in higher transmission costs, and thereby increasing the direct subsidy that will be paid by the state to the TSO, Tennet [5].

By creating synergies between the two isolated events mentioned above, the government can save a portion of the expected investment costs, minimize the environmental pressures, and also bring the net emissions down. This process is referred to as **system integration** which intends to combine individual systems that can co-benefit each other and maximize the overall efficiency of the process [6].

Potential options to create synergies, in this case, including electrification of oil & gas platforms (reduces net emissions, reduces transmission costs for wind parks),



Space availability and offshore wind farms

- Dutch offshore maritime space
- Areas occupied by offshore activities (except offshore wind farms)*
- Planned and authorized areas for offshore wind farms
- Areas outside the Dutch Exclusive Economic Zone
- Distance to shore: 100km

* The activities/users of the offshore space included are: shipping routes, Natura 2000 areas, military areas, oil and gas platforms / wells, cables, pipelines, aggregate extraction areas (sand, gravel).

ENSYSTRA

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re-/multi-use of existing offshore structures (reduce investment cost and environmental pressures), development of a centralized offshore electrical grid (enhance energy security and reduces cost) [7].

Barriers in realizing system integration solutions

Two critical barriers that would require the attention of policymakers are,

- → lack of coordinated engagement among stakeholders in the spatial planning process to formulate a shared vision
- → absence of clear guidelines for developing and implementing system integration solutions

Inputs for policy formulation

Three inputs to positively respond to the barriers are listed below,

1) Formulating a shared vision between involved stakeholders for an integrated offshore system through efficient and transparent coordination of interests is essential. This step includes the promotion of the knowledge transfer between participating sectors, which is of non-existence currently. The already applied marine management tool (MSP- Marine Spatial Plan) [8] is an efficient platform that can facilitate the engagement of multiple stakeholders of interest, such as wind park developers, the O&G sector, fisheries, shipping, NGO's. The MSP also provides legal support to explore synergies. Involving relevant stakeholders in the early stages of the planning will help in the identification of functional synergies between offshore activities, suitable areas for further scoping, and timely proposals to plan future investments [9].

2) Concrete guidelines (what is allowed and what is not, i.e., authorization process) for the development and implementation of multi-use and reuse of infrastructure projects is critical in materializing the opportunities. The increasing spatial claims in the North Sea basin from both traditional users such as fisheries, shipping, oil & gas, and newcomers such as offshore wind, underscores the necessity in considering multi-use or coexistence of offshore activities. Recent policy updates on the creation of "area passports" for wind farm zones indicating suitable and preferable co-use activities, based on area-characteristics, is a proactive step in this direction [10]. With the small window of opportunity available for the reuse of several O&G platforms[1], there is an urgent need to be more concrete in defining the guidelines.

3) System integration solutions bring two isolated activities (utterly different sectors in some instances) together to maximize the benefits. **In such cases, differentiating the risks and liabilities of individual stakeholders is vital to avoid bottlenecks in the industry's growth and legal issues that can evolve at the later stages of the project's lifetime [11].** Currently, a direct connection from wind parks to electrify O&G platforms is not legally allowed, which limits platform electrification opportunities.

Besides, the legal basis in the transfer of liabilities in reusing O&G platforms (in long-term) for multi-use projects is also unclear, creating further uncertainties in developing a business case.

Policy Implications

This policy brief uses state of the art research to underline the current lack of collective shared vision and incoherent legal framework when integrating energy systems offshore in the Dutch part of the North Sea. The often delayed and inefficient alignment of goals between energy sectors has led to missed opportunities to reuse infrastructure and decrease the costs of energy production optimally. Therefore, new policies should focus on facilitating the communication between involved stakeholders, defining explicit authorization, and project application guidelines for system integration solutions. Implementing the recommendations mentioned above will provide a stepping stone for future system integration solutions, including offshore production of blue and green hydrogen, hybrid installations (microalgae production and wind parks), and transnational integrated offshore electricity grid (2030 - 2050 and beyond).

This policy brief addresses the legal and communication barriers that currently exist in the way of realizing an integrated energy system in the North Sea region. However, we acknowledge that other aspects could also be relevant to understand this transition, which includes techno-economic and system-level assessment (demand and supply) . [12].

References

[1] Nexstep: Re-use & Decommissioning of oil & gas platforms Report 2018
[2] Report: Offshore system integration as a transition accelerator in the North Sea, by TNO Energy Transition
[3] From Eurostat - Renewable Energy Statistics
[4] A snapshot of the Dutch part of the North Sea region describing current activities (both energy and non-energy) and available space.
[5] TenneT – Dutch Regulation for offshore transmission
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[7] Cost Evaluation of North Sea Offshore Wind Post 2030 – study on behalf of North Sea Wind Power Hub Consortium
[8] European MSP platform details the conflicting sectors, drivers of conflict and options to mitigate/resolve conflicts.
[9] Gusatu, Yamu, Zuidema, Faaij. A Spatial Analysis of the Potentials for Offshore Wind Farm Locations in the North Sea Region: Challenges and Opportunities. ISPRS Int J Geo-Information 2020; 9:96. https://doi.org/10.3390/ijgi9020096.
[10] Webinar Presentation Ministry of Economic Affairs and Climate Policy - Offshore Wind Policy Update (July 9, 2020)
[11] For example, not clearly defining the liabilities of different parties (TSO's and windfarms here) resulted in a setback in delivering offshore wind projects in Germany (between late 2000 to early 2010). Study: Offshore Wind Power Expansion in Germany - Scale, Patterns and Causes of Time delays and Cost Overruns
[12] A public-private research programme called "North Sea Energy" is analyzing these aspects of the system integration solutions.

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