

Developing Offshore Energy Grids in Norway as Capability Platforms

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Abstract : The energy and oil companies on the Norwegian Continental shelf come from a situation where each asset control and manage their energy supply (island mode) and move towards a situation where the assets need to collaborate and coordinate energy use with others due to increased cost and scarcity of electric energy sharing the energy that is provided. Currently, several areas are electrified either with an onshore grid cable or are receiving intermittent energy from offshore wind-parks. While the onshore grid in Norway is well regulated, the offshore grid is still in the making, with several oil and gas electrification projects and offshore wind development just started. The paper will describe the shift in the mindset that comes with operating this new offshore grid. This transition process heralds an increase in collaboration across boundaries and integration of energy management across companies, businesses, technical disciplines, and engagement with stakeholders in the larger society. This transition will be described as a function of the new challenges with increased complexity of the energy mix (wind, oil/gas, hydrogen and others) coupled with increased technical and organization complexity in energy management. Organizational complexity denotes an increasing integration across boundaries, whether these boundaries are company, vendors, professional disciplines, regulatory regimes/bodies, businesses, and across numerous societal stakeholders. New practices must be developed, made legitimate and institutionalized across these boundaries. Only parts of this complexity can be mitigated technically, e.g.: by use of batteries, mixing energy systems and simulation/ forecasting tools. Many challenges must be mitigated with legitimated societal and institutionalized governance practices on many levels. Offshore electrification supports Norway's 2030 climate targets but is also controversial since it is exploiting the larger society's energy resources. This means that new systems and practices must also be transparent, not only for the industry and the authorities, but must also be acceptable and just for the larger society. The paper report from ongoing work in Norway, participant observation and interviews in projects and people working with offshore grid development in Norway. One case presented is the development of an offshore floating windfarm connected to two offshore installations and the second case is an offshore grid development initiative providing six installations electric energy via an onshore cable. The development of the offshore grid is analyzed using a capability platform framework, that describes the technical, competence, work process and governance capabilities that are under development in Norway. A capability platform is a 'stack' with the following layers: intelligent infrastructure, information and collaboration, knowledge sharing & analytics and finally business operations. The need for better collaboration and energy forecasting tools/capabilities in this stack will be given a special attention in the two use cases that are presented.

Keywords : capability platform, electrification, carbon footprint, control rooms, energy forecasting, operational model

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