OPTIMIZATION TOOLS FOR PORT AND VESSEL OPERATIONS FOR LOW CARBON FUELS

Equinor is a leading broad energy partner to the UK, supplying natural gas from Norway, developing domestic energy resources and generating low-carbon electricity. Equinor has been operating in the UK for nearly 40 years and aims to reach net zero emissions globally by 2050. Headquartered in Norway, the company employs 22,000 people globally, and over 650 in the UK. Equinor supports the UK economy by investing billions in crucial energy infrastructure, working with over 700 suppliers across the country.

Equinor currently powers around 750,000 UK homes through its three operational wind farms; Sheringham Shoal, Dudgeon, and the world's first floating wind farm, Hywind Scotland. In partnership with SSE Renewables and Eni Plenitude, Equinor is building the largest offshore wind farm in the world, Dogger Bank, off the Northeast coast of England, and is maturing its plans to extend both the Dudgeon and Sheringham Shoal wind farms.

Challenge Background

To achieve UN Sustainable Development goals and combat climate change, reducing emissions from vessels and ships is an action being taken by many agencies. According to IMO's website, *" IMO has adopted mandatory measures to reduce emissions of greenhouse gases from international shipping, under IMO's pollution prevention treaty (MARPOL) - the Energy Efficiency Design Index (EEDI) mandatory for new ships, and the Ship Energy Efficiency Management Plan (SEEMP).*

In 2018, IMO adopted an initial strategy on the reduction of GHG emissions from ships, setting out a vision which confirms IMO's commitment to reducing GHG emissions from international shipping and to phasing them out as soon as possible."

Based on the next steps to implement the strategy to decarbonize international vessels, it is expected that many vessels will change to use low carbon fuels.

This challenge is seeking solutions for planning and optimization tools for port and vessel operations (Barges, Crew Transfer Vessels (CTVs) and Service Operation Vessels (SOVs)) considering the transition to low carbon fuels.

Proposed planning and optimization tools should be capable of analysing both current vessel technologies and potential future vessel technology developments expected on the industry.

Solution Requirements

Functional Requirements	It is expected that proposed solutions are capable of evaluating existing ports and the best locations for implementing the outcomes proposed by the planning and optimising tools. It is also expected the solution considers logistical optimisation of vessel operations considering the different expected runtimes of low-carbon vessels compared to current vessels, including considerations

	related to recharging/refuelling of vessels, especially during assembly and installation campaigns where vessel numbers are at their highest. It is important for proposed tools to be capable of analysing the transition period, when both fuels, carbon-based and low carbon-based, are used. The proposed planning and optimisation tools should be cable of (but not limited to): • Service and maintenance requirements/costs/logistics of current system during the transition • Assessment of How much storage would be need for the low carbon fuel, considering typical vessel demands • Assessing the infrastructure need for the implementation of the low carbon fuel transition, i.e. pipelines, tanks, available space • Modelling bunkering operations and equipment. This should include an emphasis on the bunkering operations and equipment being utilised safely.
Technical Characteristics	Proposed planning and optimisation tools should: • Consider vessels with characteristics for installation and maintenance of a 18MW turbine and floaters • Consider the typical ports in the Celtic Sea region. • Allow optimisation for cost as an outcome, as well as optimisation for the feasibility of implementation • Allow assessment of the sustainability of materials and impacts on environment • Should consider typical SOVs and CTVs for sizes and fuel consumption
Operating Conditions	• Not significantly impact existing operations on Ports in the region. The transition must be made with minimal impact • Not require significant maintenance increase. The new system should be maintained withing the same principals of the existing system. • Not create any additional HSE risks or environmental impacts
Cost Requirements	• No immediate cost requirements foreseen. However, the solution needs to consider the cost benefit of charging the vessel offshore versus the time consumed for the vessel to return to shore for re-charging.

Market Opportunity
This solution can benefit all wind farms around the Globe. As more and more vessels shift to more sustainable and greener sources of fuel, this solution can be implemented in all wind farms.

Eligibility and Further Information	
Eligibility	Entrants to this competition must be: • Established businesses, start-ups, SMEs (Small-Medium Enterprises) or individual entrepreneurs • UK based or have the intention to set up a UK base • Minimum of TRL (Technology Readiness Level) Four. See link for further detail on the TRL scale https://enspire.science/trl-scale-horizon-2020-erc-explained/
Assessment	Applications will be assessed on: • Applicability to the challenge • Innovativeness of the solution • Coherence of proposed business model and company vision • Feasibility and economic viability, including ability of the team to progress the solution • Development potential • Maturity of the solution • Ability to launch product and ease of implementation
IP & Commercial Route	• Existing background IP associated with a potential solution will remain with Launch Academy Applicant(s)/Participant(s). Where any new IP generation is envisaged during the Launch Academy programme, it will be subject to the mutual IP agreement of the Launch Academy Participant(s) and Launch Academy Sponsors if it is jointly developed. If new IP is developed solely by the Participant then it will remain with the Participant. • Where necessary, a non-disclosure agreement (NDA) may be signed to uphold confidentiality in the engagement between the Launch Academy Participant(s) and Launch Academy Sponsors. • ORE Catapult do not take any share of IP ownership or enter commercial ventures through the Launch Academy programme.