Title: Development and validation of logistic tools for offshore operations planning of marine renewable energy systems projects.

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Context

The potential of offshore renewable energy systems is immense and vastly unexploited. However, generating renewable energy offshore greatly increases project complexity, where a very significant percentage of Marine Renewable Energy (MRE) offshore project cost are attributed to Logistics. These costs include vessel, equipment and port hiring, which are mostly project specific and extremely dependent on the deployment site's characteristic weather conditions, device technology, operating principle, power rating and dimensions, to name a few.

In an early project stage, obtaining insights about potential logistical costs and difficulties resultant from a given design choice is far-reaching. However, in such early stage, the information related to device characteristics, station keeping subsystems (moorings/foundations) and electrical subsystems is very likely to be limited. Unveiling simplified relationships between logistic costs and design decisions would allow the identification of promising cost-reduction pathways and offshore project innovations.

Description

The FP7 funded DTOcean project produced a first generation of freely available, open-source design tools for wave and tidal energy arrays. These tools have been used on leading tidal and wave energy projects. Built upon this solid foundation, DTOceanPlus H2020 Project (www.dtoceanplus.eu) will develop and demonstrate a suite of 2nd generation advanced design tools for the selection, development and deployment of ocean energy systems, aligning innovation and development processes with those used in mature engineering sectors.

The integrated tools will include the Logistics and Marine Operation Planning tools, which will be developed for designing logistics solutions, that meet the project requirements and optimize logistical costs associated with logistical infrastructure selection and operation scheduling. These tools will be demonstrated with real world technology deployment projects, providing support to relevant decision makers and stimulating the offshore renewable energy sector growth.

Objectives

The purpose of this master thesis is to develop and validate a cost modelling tool for marine operations, contributing to the development of a decision support tool for marine operation planning.

1. Literature review of offshore marine operation requirements and weather window analysis.
2. Develop a cost-modelling tool to calculate port and vessel hiring costs for offshore renewable energy projects.
3. Develop a tool for maintenance operation planning, taking into consideration component reliability requirements.
4. Results validation with real data, namely from offshore wind projects.

During the development of this thesis it is expected that the candidate will submit a paper on a peer review journal.

The candidate should have a background in Engineering, capable of programming in Python and know-how in offshore operations for marine renewable energy.

Candidates should submit their applications by email to mail@wavec.org until 28th February, including in attachment their CV and short introduction letter. Emails should be addressed to Francisco Correia da Fonseca and include “Master Thesis application” in the subject line.

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