

SHORT-TERM OPERATION PLANNING FOR MARINE RENEWABLE ENERGY PROJECTS

Master Thesis Proposal

Context

The potential of offshore renewable energy generation is immense and vastly unexploited. However, generating renewable energy offshore greatly increases project complexity. A very significant percentage of O&M costs within an offshore wind project can be attributed to the complex maintenance activities, which are weather sensitive and require large and costly vessels. Additionally, delays in the maintenance work may result in significant O&M expenses but also major revenue losses due to farm downtime. Optimizing the near-future maintenance plan based on weather forecasts, has the potential to support farm operators in their decision-making process to minimize their project risks and total costs.

Master thesis objectives

The purpose of this master thesis is to develop and validate a decision support tool for short-term planning of O&M operations.

1. Literature review of existing O&M support tools for offshore renewable energy farms
2. Definition of a risk assessment methodology to evaluate operational risks in an offshore mission under weather uncertainty.
3. Development of an optimization algorithm that selects the most suitable operation sequence based on weather restrictions, weather forecasts and energy production estimates.
4. Integration of bespoke methodologies and models into a decision support tool for short-term O&M planning.
5. Results validation with real data, namely from offshore wind projects.

Supervisor: Prof. Rui Castro (IST)

Co-supervisor: Eng. Francisco Correia da Fonseca (WavEC).

Student profile

1. Currently enrolled in Instituto Superior Técnico (IST), Universidade de Lisboa.
2. Fifth year student in Engineering (Mechanical, Electrical, Energy Management, or similar), looking for a MSc thesis project.
3. Intermediate/advanced level of Python 3.x. programming is required.
4. High degree of autonomy, compromise, and sense of responsibility.

5. An interest in renewable energy and the decarbonisation of the electrical sector.
6. Experience in machine learning is a plus.
7. Good writing knowledge of English.

About WavEC Offshore Renewables

WavEC – Offshore Renewables is a private non-profit organization with a strong R&D background, with the mission of developing sustainable solutions for the blue economy through innovation, knowledge transfer and dissemination. WavEC is a premier provider of engineering solutions and services for marine renewable energy technologies and projects, at different stages, from the conceptual design and tank testing, to the construction, deployment, and operational phases.

WavEC has been contributing to most of the core European R&D projects in these areas (40+), having provided business services to leading companies (Iberdrola, Gas Natural Fenosa, Shell, Repsol, Bosch, Galp, EDP, etc.). WavEC also works for, or collaborates with, key international institutions within the sector (Ocean Energy Europe, Joint Research Center, European Commission, Ocean Energy Systems of the International Energy Agency, etc). Furthermore, frequent involvement in technology evaluation exercises (from conceptual to real-scale data-supported levels), technology development processes and access to specific non-public information provides WavEC with a deep insight into the current challenges and needs of the marine renewable energy sector.

<https://www.wavec.org/>

Application:

Candidates should submit their applications by email to mail@wavec.org, 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.