



Operational tools

Why do we need operational tools?

- > **Marine energy deployments need to scale up in size quickly, in order to make best use of often scarce resources and make an acceptable commercial return on investment. However, planning for offshore operations is complex, particularly in the harsh environments required for successful wave and tidal current energy extraction. Mistakes made in the choice of operational resources can result in much higher downtime or costs than expected, adversely affecting the return on investment and therefore the success of early arrays.**

Planning for operations cannot start too soon. The design of each marine energy device can have large impacts on the cost of operations and maintenance (O&M) activities. Fortunately, the offshore wind sector already has experience with conducting complex operations offshore. Even though the operating conditions for offshore wind parks are more severe than for marine energy, tools for operational planning can be adapted to make the life of device developers and array planners easier.

Operational tools are required to increase the efficiency and profitability of marine energy, helping the business case for these new technologies.

The DMEC approach

Within DMEC we are working on tools which can be used directly by the marine energy sector to plan offshore operations.

Translate existing knowledge

Tools for estimating costs and downtime for offshore wind farms are applicable to wave and tidal energy, after some adjustment to account for the predictability of tidal currents. ECN's O&M Calculator is used in offshore wind energy to optimise O&M plans, through evaluating their cost and downtime, taking account of:

- Capabilities of vessels available
- Technician numbers and shift patterns
- Requirements of different repair actions, for all components on the farm (using RDS-PP breakdown)
- Corrective/preventative maintenance strategy
- Multiple simulations to take account of uncertainty in:
 - weather conditions over the farm lifetime (winds, waves, currents, tides)
 - component failure times

This tool is now available in a bespoke version for tidal farms, tested using Tocado's technology at the two major test centres in Orkney, Scotland and Bay of Fundy, Canada.

Develop new knowledge

While uncertainty can be simulated, often the true failure modes and rates for components are not known, especially for first-of-a-kind machines. Guidelines for avoiding corrosion and

fatigue are being developed for the marine industry, transferring best practices from other offshore industries. Within DMEC, we try to aggregate existing knowledge and pass on lessons learned from the experience of Dutch maritime and offshore sectors.

Which DMEC-partner can do what?



ECN

ECN is one of the leading energy research centres in Europe, focused on enabling the world transition to a sustainable energy system. The Offshore Wind unit of ECN has extensive experience in addressing industrial challenges for designing, constructing and operating offshore energy farms. In particular, ECN provides fully validated and widely-used tools and services for simulating costs and yields of operational offshore wind plants, which have already been adapted and applied to tidal current farms in the DMEC Innovation Accelerator project.



TNO

TNO is a broad-ranging applied research institute focussing on energy, safety, health, environment and industry. TNO has experience with physics- and statistics-based modelling of failure modes for wind farms, which is important for the planning and implementation of operations.



What can DMEC do?

DMEC assists in finding the answers to your questions regarding O&M of marine energy deployments. We have a comprehensive overview of the available knowledge regarding the design, construction or operation of offshore energy farms. Therefore, we can direct developers to the scientific institute or department with the right knowledge and expertise to tackle the question. Choices made in design and planning often interact and have a large impact on the output and expenditure of the operational farm. Planning for weather is also very complex, particularly in the harsh environments required for commercial ocean energy farms. For such questions, DMEC can assist the farm developer to find the right consortium, so the optimum combination of expertise can be employed.



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