

A stepping stone to success

Accelerating Early-Stage Ocean Innovation

by Lisa MacKenzie, John Miller

Early-stage ocean energy developers face a difficult transition. Technologies that perform well in tank testing can encounter significant technical, operational, and financial challenges when exposed to real-world marine environments.

Moving directly from controlled tank testing to energetic, grid-connected deployments represents a major step-change for developers, exposing technologies to more complex and demanding conditions that cannot be fully replicated at laboratory scale. Managing this transition effectively is critical to reducing risk and supporting successful progression toward commercial deployment.

A new collaboration between the [Marine Renewable Energy Collaborative of New England \(MRECo\)](#) in Massachusetts, and the [European Marine Energy Centre \(EMEC\)](#) in Orkney, Scotland, is helping to address this challenge. By combining complementary test site capabilities and a shared approach to data quality, the partnership offers developers a clearer, lower-risk pathway from concept validation to commercial readiness.

Bridging the Leap from Tanks to Tides

While laboratory and tank testing are essential for early concept validation, many aspects of real-world operation cannot be fully replicated at this stage. As technologies are scaled up and exposed to the sea, developers must account for changes in components, structural loading, and prolonged operation in a salty, oxygen-rich marine environment, where corrosion, fatigue, and wear begin to influence performance and reliability.

Both MRECo and EMEC offer test environments positioned between laboratory testing and full-scale deployment, enabling the first stages of real-world testing following

tank tests. By operating in this intermediate space, developers can validate components, subsystems, and early prototypes in marine environments while avoiding the cost, complexity, and risk of more energetic sites.

MRECo is dedicated to advance marine energy by offering pre-permitted, cost-effective test sites for prototype turbines and sensors. Its first site, the Bourne Tidal Test Site (BTTS), is located in the Cape Cod Canal, providing fixed mounting structures in well-characterized tidal flows. This enables developers to focus on core hydrodynamic performance, control strategies, and sensor validation without the additional variables introduced by floating platforms or bespoke foundations.

EMEC, on the other hand, provides open areas of sea space (Figure 1) that allow technologies, tools, and techniques to be proven progressively before moving to its grid-connected test sites in more challenging oceanic conditions; typical spring tidal speed is around 1.1 m/s at its Shapinsay Sound scale site, compared with 4 m/s at the Fall of Warness grid-connected site. An overarching site licence simplifies the consenting process for site users, while pre-installed seabed anchor points and floating test platforms provide flexible options for connection, communications, and electricity dissipation, where required.

Together, these facilities act as “stepping stones” rather than leaps, supporting more efficient and resilient technology development pathways.

Building Confidence through Data

High-quality, comparable data is essential for reducing technical and commercial risk. Yet early-stage testing campaigns often struggle with inconsistent data collection, limited baseline measurements, and site-specific methodologies that make results difficult to compare or scale.

As part of this collaboration, EMEC is developing a new adaptable Data Acquisition System (DAQ) for the BTTS. The DAQ is



Figure 1: Wave energy deployment operations at EMEC scale test, Scapa Flow, Orkney.

being designed to deliver robust power and metocean data, with flexibility to integrate sensors most relevant to the technology being demonstrated. The high-quality datasets generated will aid the development of a range of ocean technologies, from turbines and components to sensors and instrumentation. Environmental monitoring will be conducted using hydrophones and underwater cameras. The system is being designed with flexibility in mind given EMEC's two decades of experience hosting a diverse range of wave and tidal energy technologies. Developers can integrate their own instrumentation while benefiting from robust, site-level environmental and performance data, improving confidence in results and accelerating learning.

Crucially, aligning data approaches across sites allows developers to build a coherent evidence base as they progress from one testing environment to the next. This continuity reduces duplication, improves decision-making, and strengthens investment cases.

Connecting Global Innovation Pathways

Given the diversity of testing and deployment environments, each presenting different climates, seabed characteristics, metocean conditions, and practical development challenges, collaboration between test sites is vital. By working together, test sites can offer interconnected pathways that support innovation and emerging ocean technologies.

In practice, this allows developers to move between test sites with a clearer understanding of what will be measured, how data will be collected, and how results can be interpreted alongside previous testing campaigns. This reduces repetition, shortens learning curves, and supports more informed technical and investment decisions.

The collaboration between BTTS and EMEC demonstrates how targeted capability building at the test site level can unlock global opportunities for early-stage developers. By combining complementary test environments with robust, adaptable data systems, the partnership helps reduce technical and financial risk, supports clearer development decisions, and smooths progression toward more energetic, grid-connected testing. In doing so, it helps ensure promising ocean energy technologies are supported through the critical early stages of development, rather than being lost in the gap between the lab and the ocean.

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