

# TETHYS ENGINEERING BLAST



**4 June 2021**

*Tethys Engineering* is an online knowledge base that facilitates the exchange and dissemination of information on the technical and engineering aspects of marine energy. The bi-weekly *Tethys Engineering Blast* highlights new publications in the [Tethys Engineering Knowledge Base](#); relevant announcements, opportunities, and upcoming events; and news articles of international interest. If you have specific content you would like circulated to the greater marine energy community, please send it to [tethys@pnnl.gov](mailto:tethys@pnnl.gov) for consideration.

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[Announcements](#)  
[Upcoming Events](#)

[New Documents](#)  
[News & Press Releases](#)

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## **Announcements**

### Public PTEC Consultation

The Perpetuus Tidal Energy Centre (PTEC) in the United Kingdom (UK) is seeking public feedback on the development of a 30 MW tidal energy hub, located off the Isle of Wight. You can provide feedback via a short survey [here](#), or by attending one of two webinars scheduled for 5:00pm UTC on 7 June 2021 and 12:30pm UTC on 8 June 2021. Learn more [here](#).

### Public EMEC Consultations

The European Marine Energy Centre (EMEC) has opened up two consultations on the Decommissioning Programmes for the [Mocean Energy Blue X](#) and [AWS Ocean Energy Archimedes Waveswing](#) wave energy converters, and would like to invite stakeholders and members of the public to provide responses by 14 June and 28 June 2021, respectively.

### Calls for Papers

*Energies* is inviting submissions for several upcoming Special Issues, including “[Tidal Turbines](#)” (due 30 June 2021), “[Energy and Exergy Analysis of Renewable Energy Conversion Systems](#)” (due 20 August 2021), “[Women’s Research in Wind and Ocean Energy](#)” (due 1 September 2021), and “[Nearshore Wind and Wave Energy Potential](#)” (due 1 November 2021).

The *Journal of Marine Science and Engineering* is inviting submissions for several upcoming Special Issues, including "[Mooring of Floating Offshore Structures](#)" (due 1 August 2021), "[Offshore and Onshore Wave Energy Converters: Engineering and Environmental Features](#)" (due 30 September 2021), "[Optimization and Energy Maximizing Control Systems for Wave Energy Converters](#)" (due 10 October 2021), and "[Wave Climates](#)" (due 31 December 2021).

### Funding & Testing Opportunities

The [Pacific Marine Energy Center \(PMEC\)](#) is inviting applications for [collaboration grants](#) to facilitate short-term, on-site research opportunities in the U.S. The grants will allow graduate and undergraduate students to participate in marine energy projects underway at PMEC partner universities—Oregon State University, the University of Washington, and the University of Alaska Fairbanks. Applications are due by 30 June 2021.

In collaboration with Innovate UK, the UK Department for Business, Energy and Industrial Strategy launched an opportunity for businesses in England, Wales, and Northern Ireland to bid for funding from the [Industrial Energy Transformation Fund \(IETF\)](#). Applications for the [Phase 1: Spring 2021](#) IETF close on 14 July 2021.

Innovate UK has also launched another round of [Smart Grants](#) for eligible UK organizations to apply for a share of up to £25 million for game-changing and commercially viable research and development (R&D) innovation. An online briefing event will take place on 11 June 2021. Applications are due by 11:00am BST (10:00am UTC) on 25 August 2021.

[EuropeWave](#) is launching a €22.5m competitive Pre-Commercial Procurement programme for wave energy research and development on 21 June 2021, with an informational webinar scheduled for 6 July 2021. A [brokerage tool](#) is now available for all potential applicants until 20 July 2021, to help find the right partners. Tender submissions will be due 17 September 2021.

### Student & Employment Opportunities

Aquatera is recruiting an experienced [Environmental/Energy Data Analyst and Manager](#) to work on its Economic Value of Ocean Energy (EVOLVE) project, which is exploring the contribution that marine based renewables can make to Europe's future energy systems. Applications are due 4 June 2021.

Offshore Renewable Energy (ORE) Catapult is recruiting for several positions, including [Research Engineer – Electrical Systems Integration](#), [Senior Control Systems Engineer - Development](#), and [Strategy Analyst – Roadmapping](#). View all vacancies [here](#). Applications are due between 7-11 June 2021 depending on the position.

Marine Energy Wales is seeking a [Project Coordinator](#) to deliver the 'Dissemination Communication and Mobilisation' package of the SELKIE project, which aims to support the marine energy sector in Wales and Ireland. Applications are due 18 June 2021.

The University of Manchester is recruiting a [Post-Doctoral Research Associate](#) to undertake wave, multi-body, mooring interaction modelling and experimental investigation for WECs. Applications are due 21 June 2021.

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## Upcoming Events

### Upcoming Webinars

The Selkie Project, which aims to support the marine energy sector in Wales and Ireland, is organizing a [‘Meet the Expert’ event series](#) focused on providing business support for companies looking to diversify into the marine energy sector. During the second event, at 9:00am UTC on 10 June 2021, Renewable Risk Advisers will run through a number of accidents and failures in recent projects and how to minimize risk. Register [here](#) and view the full event series [here](#).

The Tidal Stream Industry Energiser (TIGER) project is hosting two Tidal Stream Supply Chain “Meet the Buyer” webinars for project and technology developers in France and the UK to share the details of their forthcoming development and procurement plans. Register [here](#) for the [French sites webinar](#) at 9:30am BST (8:30am UTC) on 10 June 2021. Register [here](#) for the [UK sites webinar](#) at 9:30am BST (8:30am UTC) on 15 June 2021.

ORE Catapult is hosting a webinar, [“Subsea Cables: The Cutting Edge Of Innovation And Opportunity”](#), at 1:00pm BST (12:00pm UTC) on 10 June 2021. During the webinar, in-house experts and guest speakers will introduce cutting-edge areas of research underway, new technologies for failure prediction, and disruptive insurance solutions for the subsea market. Register [here](#).

The European Technology and Innovation Platform for Ocean Energy (ETIP Ocean) & the European Energy Research Alliance (EERA) Ocean Energy Joint Programme are hosting a webinar, “Installation & Marine Operations”, at 2:00pm BST (1:00pm UTC) on 15 June 2021. During the webinar, speakers will present their experiences gained in wave and tidal energy deployments and share tips on getting your device in the water. Register [here](#).

The International Energy Agency (IEA) Ocean Energy Systems (OES) is hosting the second webinar in its series focused on ocean energy projects and key policies in IEA-OES member countries at 11:00am UTC on 24 June 2021. The webinar will provide an outlook on the latest initiatives and projects in the UK, Spain, and Denmark. Register [here](#).

As part of its R&D Deep Dive Webinar Series, the U.S. Department of Energy Water Power Technologies Office is hosting a webinar, [“Underwater Observations – Monitoring the Environment around Marine Energy Devices”](#), at 3:30pm EDT (7:30pm UTC) on 24 June 2021. The webinar will focus on the [Triton Initiative](#), which is researching various environmental monitoring technologies and methods to understand how different types of stressors caused by marine renewable energy devices can be tested. Register [here](#).

## Upcoming Conferences

The [2nd EMODnet Open Conference](#) will take place online on 14-18 June 2021. The event will bring together EMODnet partners, data providers, and users from Europe and beyond, and showcase current EMODnet data, data products, and services. Register [here](#).

Ocean Energy Europe is hosting an online conference, [Target 2025 – Empowering Europe to deliver on its ocean energy ambitions](#), on 22 June 2021. The conference will feature sessions on Europe’s vision for ocean energy, pilot projects, and coordinating support. Register [here](#).

The [40th International Conference on Ocean, Offshore & Arctic Engineering \(OMAE 2021\)](#) will take place online on 21-30 June 2021. The conference will include symposia, keynote lectures, several short courses, and networking events. Register [here](#) by 18 June 2021.

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## **New Documents on *Tethys Engineering***

### **Maybe less is more: Considering capacity factor, saturation, variability, and filtering effects of wave energy devices – Coe et al. 2021**

While a great deal of research has been performed to quantify and characterize the wave energy resource, there are still open questions about how a wave energy developer should use this wave resource information to design a wave energy converter device to suit a specific environment or, alternatively, to assess potential deployment locations. It is natural to focus first on the impressive magnitudes of power available from ocean waves, and to be drawn to locations where mean power levels are highest. However, a number of additional factors such as intermittency and capacity factor may be influential in determining economic viability of a wave energy converter, and should therefore be considered at the resource level, so that these factors can influence device design decisions. This study examines a set of wave resource metrics aimed towards this end of bettering accounting for variability in wave energy converter design.

### **Efficient economic optimisation of large-scale tidal stream arrays – Goss et al. 2021**

As the tidal energy industry moves from demonstrator arrays comprising just a few turbines to large-scale arrays made up of potentially hundreds of turbines, there is a need to optimise both the number of turbines and their spatial distribution in order to minimise cost of energy. Previous work has largely focused on producing computational tools to automatically design the size and layout of large-scale tidal turbine arrays to optimise power. There has been some limited preliminary work to incorporate costs into these models, in order to improve the economic viability of tidal arrays. This paper provides the first in depth implementation and analysis of economic functionals, based upon metrics such as break even power and levelised cost of energy, used for design of explicit array sizing and spatial variation.

### **Plant siting and economic potential of ocean thermal energy conversion in Indonesia a novel GIS-based methodology – Langer et al. 2021**

Indonesia strives for a renewable energy share of 23% by 2025. One option to contribute to this goal is Ocean Thermal Energy Conversion (OTEC). Despite a global theoretical potential of up to 30 TW, its economically deployable share remains unknown. This paper proposes a novel methodology, which enables to determine OTEC's economic potential for any regional scope considering technical, economic and natural variables. The methodology was tested for 100 MWe OTEC in Indonesia on a provincial and national level. The proposed methodology can be a helpful quick-scan tool for determining economically interesting OTEC sites for follow-up in-depth feasibility studies. Limitations are discussed and future research, amongst others upscaling scenarios with cost reducing effects like technological learning, is recommended.

### **Reliability Modelling and Analysis of the Power Take-Off System of an Oscillating Wave Surge Converter – Heikkilä et al. 2021**

Wave power is a potential technology for generating sustainable renewable energy. Several types of wave energy converters (WECs) have been proposed for this purpose. WECs operate in a harsh maritime environment that sets strict limitations on how and when the device can be economically and safely reached for maintenance. Thus, to ensure profitable energy generation over the system life cycle, system reliability is a key aspect to be considered in WEC development. In this article, we describe a reliability analysis approach for WEC development, based on the use of reliability block diagram (RBD) modelling. We apply the approach in a case study involving a submerged oscillating wave surge converter device concept that utilizes hydraulics in its power take-off system.

### **Comprehensive experimental and numerical assessment of a drag turbine for river hydrokinetic energy conversion – Ramadan et al. 2021**

Nile River is considered as an auspicious area; in particular along with Upper Egypt, to produce electrical energy from the water current which called hydrokinetic energy. This sort of renewable energy is admitted deeply as a unique and uncommon solution for the electric power demand in the remote areas on the rivers' sides. The hydrokinetic energy of the river stream can be extracted by a submerged vertical axis turbine due to its specific advantages. The main objective of this work is to investigate experimentally the performance of two different Savonius rotor profiles inside an irrigation canal in Toshka, Aswan, Egypt. Furthermore, the rotor with the optimum performance is investigated numerically by adding two shielding plates to further enhancements.

### **Analysis of the Intake Locations of Salinity Gradient Plants Using Hydrodynamic and Membrane Models – Salamanca et al. 2021**

The gain in net power produced by Salinity Gradient plants in river mouths due to the optimal location of water intakes is analysed in this paper. More precisely, this work

focuses on stratified river mouths and the membrane-based technology of Pressure-Retarded Osmosis. A methodology for this analysis is proposed and then applied to a case study in Colombia. Temperature, salinity and water discharge data were gathered at the Magdalena river mouth to develop a hydrodynamic model that represents the salinity profile along the river channel. The net power production of a pressure-retarded osmosis plant is then estimated based on the power produced at membrane level, considering different locations for the saltwater and freshwater intakes.

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## News & Press Releases

### [Seabased Will Install Utility Scale Wave Park in Brittany](#) – Seabased

In the race to commercialize wave energy, the Brittany region in France may plant a flag as home to Europe's first utility scale commercial wave energy park. With the support of the region, Seabased, a wave energy company led by French CEO Laurent Albert, is planning to build a 10 MW wave power park in Audierne Bay. Philippe Thieffry, Manager of Bretagne Ocean Power noted that the project will help maintain the region of Bretagne as a unique showroom of ocean energy technology. Bretagne Ocean Power has already developed ocean energy projects in the area, identified the zones that work for different technologies, and worked with local stakeholders such as local fishermen. The planned wave power park will begin with a pilot 2 MW and scale up to 10 MW and will be connected to the French grid.

### [ORPC files for permit for 5MW Cook Inlet tidal scheme](#) – Offshore Energy

Marine energy company ORPC (Ocean Renewable Power Company) has submitted a preliminary permit application to the Federal Energy Regulatory Commission for a tidal energy project at East Foreland in Alaska. Once the project is functioning, ORPC will collaborate with Homer Electric Association to sell the tidal energy produced, the U.S. based marine energy developer said. ORPC said it intends to develop a 5MW pilot project near East Foreland to verify the technical performance and environmental compatibility of its proposed marine energy devices. Project results will assist in planning a phased build-out of up to a 100 MW commercial-scale project, according to ORPC. The company also said it had previously conducted site characterization and environmental studies in the region.

### [Eco Wave inks MoU to develop wave energy station at Brazil's Pecém port](#) – Renewables Now

Swedish-Israeli marine energy developer Eco Wave Power has signed a memorandum of understanding (MoU) with Brazil's Pecém Complex, outlining the partners' plan to install an up to 9 MW wave energy array at the port of Pecém. The partnership is interested in the construction and operation of Eco Wave Power's wave energy converters (WECs), which are to be installed on the breakwater of the Pecem port, the developer said. The terms of the MoU specify that the WECs would be re-designed to be



used in tropical waters to maximise the net capacity factor. The parties are to also collect real-life data and experience regarding onshore WECs investment, construction and operation, as well as gather information on permitting in compliance with relevant laws and standards for wave energy projects such as this one.

### **SAE Achieves Another Tidal Milestone in Japan – Simec Atlantis Energy (SAE)**

SAE is pleased to announce that its tidal power generation facility in Naru Island, Japan, has passed the Japanese government's pre-use inspection tests. The site, which features the AR500 tidal turbine, is now recognised as an official power generation facility. The tests were undertaken by the Ministry of Economy, Trade and Industry, which is a key stakeholder in consenting renewable energy projects in Japan. The Scottish built AR500 tidal turbine has been generating electricity since it was installed in January 2021, and has generated more than 90 MWh of power, at a high turbine availability. This pilot is the first large scale project of its kind in Japanese waters and has shown how the tidal industry can make a meaningful contribution in Japan's ambition to diversifying its energy supply towards renewable sources.

### **Construction set to begin this month on Oregon State's wave energy testing facility – Oregon State University**

After nearly a decade of work to obtain regulatory approval, Oregon State University is set to begin construction this month on a wave energy testing facility to be located about seven miles off the coast near Newport. PacWave South will be the first commercial-scale, utility grid-connected wave energy test site in the United States. The approximately \$80 million facility will offer wave energy developers the opportunity to try different technologies for harnessing the power of ocean waves and transmitting that energy to the local electrical grid. Power and data cables buried below the seafloor will connect the ocean test site to a shore-based facility in Seal Rock. Construction will begin with underground installation of the conduits that will house the subsea cables.

### **Mission Innovation 2.0 to spearhead \$250 billion clean energy innovation decade – Offshore Energy**

At the global Innovating to Net Zero Summit, 23 governments responsible for over 90% of global public investment in clean energy have collectively launched bold new plans to catalyze action and spearhead a decade of innovation to drive global investment in clean energy research, development and demonstrations. The move comes in the form of the second phase of Mission Innovation, and is said to represent the most significant inter-governmental clean energy initiative in the run up to COP26 climate conference. Mission Innovation 2.0 will catalyze public-private action and investment through sector-specific 'missions' that will accelerate the frontiers of innovation and drive down the cost of technologies by increasing public-private action in areas critical to global clean energy transition, starting with power systems, clean hydrogen, and shipping.