

# TETHYS ENGINEERING BLAST



**24 September 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.

---

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

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

---

## **Announcements**

### UMERC Board of Directors

The Pacific Ocean Energy Trust (POET) recently announced the establishment of the University Marine Energy Research Community (UMERC). UMERC is sponsored by the US Department of Energy's (DOE) Water Power Technologies Office and is [seeking nominations](#) for the inaugural Board of Directors through 30 September 2021. Sign up for UMERC's email list [here](#).

### SEAI Seeking Feedback

In order to appropriately plan and manage the Atlantic Marine Energy Test Site (AMETS), the Sustainable Energy Authority of Ireland (SEAI) is seeking feedback from all ocean energy developers on their future requirements for AMETS. Complete this [survey](#) by 1 October 2021.

### Sandia Seeking Feedback

As part of the Power Take-off (PTO) and Mooring Lines Reliability Testing Facility project, Sandia National Laboratories is requesting input from researchers and developers to help them understand the testing needs around PTO, mooring line, and umbilical cable reliability for marine energy applications. Please contact [Budi Gunawan](#) to discuss your specific testing needs.

## Call for Abstracts

The Call for Abstracts for the [Ocean Sciences Meeting \(OSM 2022\)](#) has been extended to 29 September 2021. Please consider submitting an abstract to Scientific Sessions OT15: Measuring, Modeling, and Mitigating Environmental Effects of Ocean Renewable Energy or OP04: Marine Renewable Energy: Resource Characterization, Bio-physical interactions, and Societal Impacts. OSM 2022 will take place online and in Honolulu, US from 27 February to 4 March 2022.

## Calls for Papers

The *Journal of Marine Science and Engineering* is accepting submissions for several Special Issues, including "[Optimization and Energy Maximizing Control Systems for Wave Energy Converters](#)" (due 10 October 2021), "[Wind and Wave Climate](#)" (due 20 November 2021), and "[Mooring Systems for Offshore Structures and Devices](#)" (due 31 December 2021).

*Energies* is accepting submissions for several Special Issues, including "[Nearshore Wind and Wave Energy Potential](#)" (due 1 November 2021), "[Energy—History and Time Trends](#)" (due 22 November 2021), and "[Electrical Systems for Marine Renewable Energy Applications](#)" (due 31 December 2021).

## Funding & Testing Opportunities

EuropeWave has launched its Pre-Commercial Procurement (PCP) programme, which aims to accelerate the design, development, and demonstration of cost-effective wave energy converters. The [Request for Tenders](#) for EuropeWave's PCP is open until 1 October 2021.

The Horizon Europe Framework Programme has launched the [European Innovation Council \(EIC\) Accelerator Challenges](#) to support small and medium enterprises developing game-changing innovations, including renewable energy. Applications are due by 6 October 2021.

The Supergen Offshore Renewable Energy Hub is inviting applications for the [Early Career Researcher \(ECR\) Research Fund](#), which is designed to support ECRs involved in offshore wind, wave, or tidal energy research with up to £5,000. Applications are due 18 October 2021.

The Danish Energy Agency opened a [Technology Neutral Tender](#) of aid for electricity generated by onshore wind turbines, open door offshore wind turbines, wave power plants, hydroelectric power plants, and solar installations. The deadline for bids is 22 October 2021.

The Basque Energy Agency, Ente Vasco de la Energía, launched a [Call for Applications](#) for its €2.5 million aid program, which aims to promote the demonstration and validation of emerging marine energy technologies within the Basque Country. The call closes on 29 October 2021.

The Horizon Europe Framework Programme also recently launched two new Calls for Proposals titled, "[Next generation of renewable energy technologies](#)" and "[Innovative foundations, floating substructures and connection systems for floating PV and ocean energy devices](#)". Proposals for both Calls are due 23 February 2022.

## Student & Employment Opportunities

The US DOE is seeking candidates to serve as [Director of the Water Power Technologies Office](#). This position will oversee all office activities, including strategic planning, evaluation of long-term organizational objectives, and advancement of research, development, deployment, and demonstration activities, among other responsibilities. Applications are due 28 September 2021.

France Énergies Marines is recruiting for a [Programme Manager](#) to lead the Site Characterisation R&D Programme, which deals with the estimation of marine energy resources and covers R&D topics in the fields of modelling and observation. Applications are due 30 September 2021.

France Énergies Marines is also recruiting for a [Research Engineer](#) to study the design, installation, and operation of innovative mooring systems. Applications are due 6 October 2021.

Aquatera is looking for junior, senior, and expert [Technical and Environmental Consultants](#) in several areas, including energy systems, environment, and project delivery and management.

Nova Innovation is recruiting for an [Electrical Technician](#) and a [Mechanical Technician](#) with experience installing, commissioning, and servicing equipment and power systems.

---

## **Upcoming Events**

### Upcoming Workshops

As part of POET's Ocean Renewable Energy Conference ([OREC 2021](#)), the Portal and Repository for Information on Marine Renewable Energy ([PRIMRE](#)) team is hosting a free, online workshop on 24 September 2021 from 8:00-10:00am PDT (3:00-5:00pm UTC). The workshop will provide an overview of PRIMRE, its aggregate search, and ways to contribute, as well as live demonstrations of the newest Knowledge Hubs, the Marine Energy Atlas and MRE Software. Log in information is available [here](#).

OES-Environmental is also hosting a free, online workshop as part of [OREC 2021](#), on 24 September 2021 from 10:30am-12:30pm PDT (5:30-7:30pm UTC). The workshop will examine the scientific evidence from key stressor-receptor interactions to discuss risk retirement and move towards application in a regulatory context. The workshop will include presentations, discussions, and breakout groups, as well as an overview of the OES-Environmental guidance documents and their application in permitting processes. Log in information is available [here](#).

The US DOE Water Power Technologies Office (WPTO) is hosting a virtual [Workshop on Materials & Manufacturing for Marine Energy Technologies](#) on 5 October 2021 from 10:00am-2:30pm EDT (2:00-6:30pm UTC). During the webinar, industry and university partners will present their material projects on gaps within three major research areas including wave energy converters (WECs), tidal/current energy converters, and unconventional WECs. Participants will have the opportunity to help prioritize WPTO's investments and shape strategy. Register [here](#).

## Upcoming Webinars

The Selkie project, which aims to support the marine energy sector in Wales and Ireland, is hosting a webinar, “Testing & Validation (Ireland)”, at 9:00am UTC on 30 September 2021, as part of its [Meet the Expert event series](#). Register [here](#).

Interreg North-West Europe’s Ocean Power Innovation Network is hosting an online masterclass titled, “[OPEX modelling for marine renewable energy technologies and projects](#)”, on 6 October 2021 from 11:00am-1:00pm CEST (9:00-11:00am UTC). Register [here](#).

Interreg North-West Europe’s Ocean Power Innovation Network is also hosting a webinar titled, “[Improving confidence through standardisation and certification](#)”, on 13 October 2021 from 3:00-4:15pm CEST (1:00-2:15pm UTC). Register [here](#).

## Upcoming Conferences

The Marine Alliance for Science and Technology for Scotland (MASTS) is hosting the [MASTS Annual Science Meeting 2021](#) on 5-7 October 2021. Register [here](#).

WavEC Offshore Renewables, in collaboration with the Embassy of Japan in Portugal, is hosting the [WavEC Annual Seminar](#) on 30 November 2021 online. Register for free [here](#).

---

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

### **[Standardising Marine Renewable Energy Testing: Gap Analysis and Recommendations for Development of Standards](#) – Noble et al. 2021**

Marine renewable energy (MRE) is still an emerging technology. As such, there is still a lack of mature standards and guidance for the development and testing of these devices. The sector covers a wide range of disciplines, so there is a need for more comprehensive guidance to cover these. This paper builds on a study undertaken in the MaRINET2 project to summarise recommendations and guidance for testing MRE devices and components, by reviewing the recently published guidance. Perceived gaps in the guidance are then discussed, expanding on the previous study. Results from an industry survey are also used to help quantify and validate these gaps. A pathway to a standardised approach to MRE testing is presented, building on recommendations learnt from the MaRINET2 round-robin testing.

### **[Simulated and experimental investigation of a floating-array-buoys wave energy converter with single-point mooring](#) – Sun et al. 2021**

A novel floating-array-buoys wave energy converter (FABWEC) system integrating multi-point absorption wave energy capturing technology and single-point catenary mooring technology is proposed in this study. The research contents of this paper mainly focus on the stability and survivability of the proposed FABWEC system under the rated sea

conditions. Numerical simulation and experimental validation are developed, and the comparisons of system performances between experimental and simulated results are performed. The results show that the maximum mooring tension occurs when the inclination angle of anchor chain is  $30^\circ$  under the environment loads of  $180^\circ$ . According to the simulated and experimental investigation, the stability and survivability of the FABWEC system are effectively confirmed.

### **An underwater flag-like triboelectric nanogenerator for harvesting ocean current energy under extremely low velocity condition – Wang et al. 2021**

Ocean current energy harvester is a promising infrastructure to achieve self-powered marine wireless sensing system. This study proposes and investigates an underwater flag-like Triboelectric Nanogenerator (UF-TENG) based on the flow-induced vibration. The UF-TENG consists of two conductive ink-coated polyethylene terephthalate membranes and one strip of poly tetra fluoroethylene membrane with their edges sealed up by a waterproof PTFE tape. In this way, the triboelectric layers are prevented from contacting water. It is verified that the vortex street induced by a cylinder enhances the vibration of the UF-TENG. The low velocity startup enables the UF-TENG to harvest extremely low-velocity ocean current energy, e.g., presently achieving 0.133 m/s as the startup velocity.

### **Investigation of Self-Driven Profiler with Buoyancy Adjusting System towards Ocean Thermal Energy – Xia et al. 2021**

An underwater profiler is one of the popular platforms for ocean observation. Due to energy limitations, conventional underwater vehicles have a short life span, which cannot meet the needs of long-term ocean exploration. Therefore, there is a growing interest in using ocean energy such as ocean thermal energy and wave energy for driving. This study aimed to investigate an energy-saving and ocean thermal energy (OTE)-powered buoyancy driving system of the ocean profiler. The purpose of this study was to explore an ocean profiler buoyancy driving system powered by ocean thermal energy (OTE). According to the seawater profile temperature gradient, an OTE-powered electro-hydraulic control system was designed, and the dynamic characteristics of this system are simulated and analyzed by using the power bonding diagram method.

### **Characterization of the wave resource variability in the French Basque coastal area based on a high-resolution hindcast – Delpey et al. 2021**

A wave resource characterisation is presented for the French Basque coastal region, with a specific focus on Bayonne nearshore area. The study is derived from a 10-year hindcast computation performed with a very high-resolution coastal implementation of a SWAN model. After a detailed validation of the model in intermediate and shallow water, the spatial, temporal, and spectral distributions of the local nearshore wave energy climate are characterized. Refraction over a local submarine canyon splits the coastal domain into two main regions with different general characteristics. In the southern Basque region, the spatial fluctuations of the wave resource increase drastically in shallow water. Variability nearshore was shown to be significantly higher than over the deeper part of the shelf. Noticeable hot-spots are found in the nearshore area around Bayonne.

## **Gap Confinement Effect of a Tandem Nanochannel System and Its Application in Salinity Gradient Power Generation – Wang et al. 2021**

As an important nanofluidic device, an artificial ion nanochannel could selectively transport ions inside its nanoconfinement space and the surface charge of the pore wall. Here, confinement effects were realized by tandem nanochannel units, which kept their cascade gaps less than 500 nm. Within these gaps, ionic conductance was governed by the surface charge density of the channel unit. Cations could be sufficiently selected and enriched within this confined space, which improves the cation transfer number of the system. Therefore, the tandem nanochannel system could greatly improve the diffusion potential and energy conversion efficiency in the salinity gradient power generation process. Poisson–Nernst–Planck equations were introduced to numerically simulate the ionic transport behavior and confirmed the experimental results.

---

## **News & Press Releases**

### **Orbital to lead pioneering FORWARD-2030 tidal energy project – Orbital Marine Power**

The innovative Scottish technology developer, Orbital Marine Power (Orbital) will lead a pan-European consortium to deliver the €26.7m FORWARD-2030 project, set up to accelerate the commercial deployment of floating tidal energy. The FORWARD-2030 project consortium will receive €20.5m of grant support from the European Union's Horizon 2020 research and innovation programme to develop a multi-vector energy system for the future. This system will combine predictable floating tidal energy, wind generation, grid export, battery storage and green hydrogen production. The project will see the installation of the next iteration of the Orbital turbine, integrated with a hydrogen production facility and battery storage at the European Marine Energy Centre in Orkney.

### **Minesto launches Dragon Class power plants for commercial scale-up – Minesto**

Leading marine energy developer Minesto recently introduced a new range of power plants – the Dragon Class – an upgraded design of the company's Deep Green technology for predictable renewable electricity generation from tidal and ocean currents. Featuring increased performance and decreased manufacturing costs, the Dragon Class will be delivered and installed in all of Minesto's ongoing projects as well as in the build-out of the company's first array projects. Using extensive CFD (Computational Fluid Dynamics) modelling, ocean scale model testing and operational data from the grid-connected DG100 units in Vestmannastrandir, Minesto's technology development team has been able to improve the energy conversion and at the same time refine the power plant by reducing the number of power plant subsystems and components.

## **Oscilla Power's Triton wave energy devices tested at OSU – Offshore Energy**

U.S.-based wave energy company Oscilla Power has completed testing an array of seven Triton wave energy devices at the Oregon State University. The aim of the tests, completed on 18 September, is to bring insights into how the systems will work together in large arrays. According to Oscilla Power, each model is fully representative of a 1MW system. The Seattle-headquartered company added that the activities mark an important step towards the development of large-scale wave energy. The Triton device is a multi-mode point absorber that consists of a geometrically optimized surface float connected to a ring-shaped, vertically asymmetric heave plate by three taut, flexible tendons. In July 2020, Oscilla Power announced it was in the planning stages for a demonstration of its 1MW Triton wave energy system in Southern India.

## **With Their Waverider Buoys, Researchers Collect Data on the Powerful Clean Energy Available in Our Oceans – National Renewable Energy Laboratory**

Mike Muglia hates to miss a wave. A self-described surf junkie, Muglia catches waves on his surfboard off the coast of the Outer Banks in North Carolina. Further into those waters—15 nautical miles to be exact—sits another surfer. Aptly named Waverider, this surfer is a 440-pound, half banana-yellow, half beet-purple buoy that Muglia uses to study the energy that flows in our oceans. Now, Muglia and Miguel Canals just deployed two new Waverider buoys—one off the coast of North Carolina and the other off Puerto Rico. There, the surfers will collect detailed data on the surface waves in those areas of the Atlantic Ocean, adding to publicly available data sets on waves, currents, and water temperatures that will not only move marine energy closer to widescale use but also help scientists understand how climate change is affecting our oceans.

## **Seaturns' wave energy prototype undergoes basin testing – Offshore Energy**

Innosea and Seaturns have completed the wave basin testing of Seaturns' wave energy prototype at the Cantabria Coastal and Ocean Basin in Spain. The testing created an environment as close as possible to real sea conditions, utilizing an innovative tank testing procedure developed by Innosea. As a result of the trial, a new catenary mooring configuration was selected as the project moves forward into development, which is said to have proved to enable greater performance from the prototype at key periods. The aim is to develop a model that is resistant to different sea conditions, with energy conversion ability corresponding to different types of swell. The prototype is said to have been designed to minimise and facilitate maintenance operations, reinforce ease of installation, and increase the technology's versatility for deployment in different markets.