

# TETHYS ENGINEERING BLAST



**31 January 2020**

[Tethys Engineering](#) is an online knowledge base that facilitates the exchange and dissemination of information on the technical and engineering aspects of marine renewable 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.

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## **Announcements**

### MHKiT Code Hub

The Marine and Hydrokinetic Toolkit (MHKiT) Code Hub—developed by the National Renewable Energy Laboratory, Pacific Northwest National Laboratory, and Sandia National Laboratories—is now available for public use at <https://code.primre.org>. The MHKiT Code Hub is a Git repository of open-source marine renewable energy software modules for controlling, processing, visualizing, and managing data. Developed in Python and MATLAB, the MHKiT Code Hub provides robust and verified functions that are needed by the marine renewable energy community to standardize data processing.

### Ocean Observing Prize

The [Powering the Blue Economy: Ocean Observing Prize](#), a joint prize between the Water Power Technologies Office at the U.S. Department of Energy and the Integrated Ocean Observing System program at the National Oceanographic and Atmospheric Administration, is still open. Submissions for the first of a series of competitions, which seeks novel concepts that integrate ocean observing technologies with marine energy systems to address end-user needs, are due 12 February 2020.

## Calls for Papers

The Journal of Ocean Technology (JOT) has launched a [call for technical papers, essays, and short articles](#) on marine spatial planning. The submission deadline for technical papers and expression of interest for essays and short articles is 21 February 2020. The submission deadline for essays and short articles is 24 April 2020.

The Marine Technology Society Journal (MTSJ) is accepting manuscript submissions for a [special issue](#) entitled, *Utilizing Offshore Resources for Renewable Energy Development*. The deadline for manuscript submissions is 22 June 2020.

The Journal of Marine Science and Engineering (JMSE) is accepting manuscript submissions for a [special issue](#) entitled, *Advances in Wave Energy Harvesting*. The deadline for manuscript submissions is 26 June 2020.

The JMSE is also accepting manuscript submissions for a [special issue](#) entitled, *Environmental Interactions of Marine Renewable Energy Installations*. The deadline for manuscript submissions is 27 June 2020.

## Funding Opportunities

The €13 million [OceanDEMO project](#) has announced the [2<sup>nd</sup> call for applications](#). The project aims to accelerate ocean energy's transition from single prototypes to multi-device farms by providing access to world-leading test centers. Applications close 31 January 2020.

The Marine Energy Alliance (MEA) has opened their [2<sup>nd</sup> Call for Applications](#). The aim of MEA is to progress the technical and commercial maturity level of early-stage (TRL 3/4) marine energy technology companies with the overall goal of reducing the risk of device failure in subsequent demonstration phases. Applications are due 14 February 2020.

The Blue-GIFT (Blue Growth and Innovation Fast Tracked) project has opened the [2<sup>nd</sup> call for applications](#). The project aims to help Atlantic Area companies test the next generation of MRE technology in real sea environments. Applications close 30 April 2020 at 17:00 UTC.

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## **Upcoming Events**

### Upcoming Webinar

The Offshore Renewable Energy (ORE) Catapult will be hosting its first [Robotics in Offshore Renewables LIVE event](#) on 6 February 2020 at 10:00 GMT. The 90-minute livestream will feature four leading experts in the fields of robotics and offshore renewables who will discuss topics on how UK businesses can lead the global market for offshore wind and tidal operations and maintenance, products and services. Register [here](#).

## Upcoming Workshop

Oregon State University, the Pacific Marine Energy Center (PMEC), and Sandia National Laboratories will be hosting a [workshop](#) in Corvallis, Oregon from 3-4 February 2020. The workshop will overview the wave energy converter design theory and experimental testing approach, with specific attention focused on dynamics, control, signal processing, experimental design and analysis, and full-scale design.

## Upcoming Conferences

[Subsea Expo 2020](#) will be held in Aberdeen, U.K. from 11-13 February 2020. Both the exhibition and conference are free to attend.

[Oceanology International \(OI 2020\)](#) will be held in London, U.K. from 17-19 March 2020.

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

### **[A spatially nonlinear generalised actuator disk model for the simulation of horizontal axis wind and tidal turbines](#) – Edmunds et al. 2020**

This study describes a new Generalised Actuator Disk Computational Fluid Dynamics model (GAD-CFD), that achieves the required accuracy for the simulation of horizontal axis wind and tidal turbines and their wakes. The effectiveness of this approach is investigated and validated against two experiments, and demonstrates improvements over traditional source term methods, in particular the correct CFD approach to tip losses and consequent downstream wake prediction.

### **[Computational modelling and experimental tank testing of the multi float WaveSub under regular wave forcing](#) – Faraggiana et al. 2020**

A submerged wave device generates energy from the relative motion of floating bodies. In WaveSub, three floats are joined to a reactor; each connected to a spring and generator. Results from a 1/25 scale wave basin experiment are described. Here we show that a time domain linear potential flow formulation (Nemoh, WEC-Sim) can match the tank testing provided that suitably tuned drag coefficients are employed. Inviscid linear potential models can match some wave device experiments, however, additional viscous terms generally provide better accuracy.

### **[Modelling and experimentation of heat exchangers for Ocean Thermal Energy Conversion during transient operation](#) – Dijoux et al. 2019**

Ocean Thermal Energy Conversion (OTEC) is considered as a non-intermittent base energy resource. It consists in using the difference of temperature between the hot surface seawater in tropical seas and the cold deep seawater to produce electricity by mean of a thermodynamic motor cycle. A dynamic model of heat exchanger is presented with the

use of a Moving Boundary Model (MBM) in order to distinguish the monophasic and diphasic parts of the transfer. Moreover, experiments have been carried out on an onshore OTEC prototype located in Reunion Island and compared to simulations.

### **[Advancement of a Tidal Energy Converter Mount Through Integrated Design Process and Risk Management](#) – Colby et al. 2019**

The Verdant Power Kinetic Hydropower System (KHPS) is a 5<sup>th</sup> generation water-to-wire MRE system that utilizes horizontal-axis turbines installed in fast-moving tidal and river currents to generate renewable energy. The Verdant Power TriFrame™ (TF) mount is a triangular frame mount that supports three KHPS turbines. This paper presents an overview of the integrated design process related to innovative mounting systems for tidal energy converters (TECs) that shows potential to reduce capital and operating costs through improved performance, reliability, and maintainability.

### **[Advanced WEC Dynamics and Controls MASK3 Test](#) – Coe et al. 2019**

This report outlines the “MASK3” wave tank test within the Advanced WEC Dynamics and Controls (AWDC) project. This test represents the final test in the AWDC project. The focus of the MASK3 test was to consider coordinated 3-degree-of-freedom (3DOF) control of a WEC in a realistic ocean environment. A key aspect of this test was the inclusion of a “self-tuning” mechanism which uses an optimization algorithm to update controller gains based on a changing sea state.

### **[Carbonized peat moss electrodes for efficient salinity gradient energy recovery in a capacitive concentration flow cell](#) – Zhu et al. 2019**

The globally extractable salinity gradient (SG) energy from the mixing of seawater and river water is estimated to be 3% of worldwide electricity consumption. Here we applied carbonized peat moss (CPM) electrodes to a capacitive concentration flow cell that is capable of harvesting SG energy based on the capacitive double layer expansion (CDLE) together with the Donnan potential. This study provides a new method to efficiently and continuously harvest SG energy based on the CDLE without an external charge.

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## **News & Press Releases**

### **[MeyGen has now exported 24.7 GWh of renewable electricity to the grid](#) – Ocean Energy Europe**

MeyGen’s 2019 performance represents the longest period of uninterrupted generation from a multi-megawatt tidal turbine array ever achieved. MeyGen has now exported 24.7 GWh of predictable renewable electricity to the national grid. In 2019 alone, MeyGen exported over 13.8 GWh of predictable renewable electricity, equivalent to the average annual electricity consumption of around 3800 typical UK homes generating a revenue of

£3.9m. Phase 1A of MeyGen has generated total revenues since operations commenced of £7.1m as at the end of 2019.

### **Eco Wave Power Finalizes Assembly of the Hydraulic Energy Conversion Unit - Eco Wave Power**

Onshore marine energy developer, Eco Wave Power (EWPG Holding AB), has taken the next step towards commercialization of its wave energy technology. The company has finalized the assembly of the hydraulic energy conversion unit for its Jaffa Port project and entered the electrical assembly phase, to be executed by Siemens. The hydraulic conversion unit is an integral part of the Eco Wave Power technology as it is used to convert pressure (created by the waves) into clean electricity.

### **60 kW testing successfully concludes in Orkney Islands - DesignPro Renewable**

Irish company DesignPro Renewables has completed the deployment and successful testing of their 60 kW (DPR60) turbine at Kirkwall in the Orkney Islands, Scotland in conjunction with Leask Marine Ltd. The completely operational turbine and deployment system underwent a comprehensive series of tow testing to prove out all operating systems. Based in Limerick Ireland, DesignPro Renewables is developing and demonstrating 25 kW and 60 kW turbines.

### **Pioneering the Green Economy: Certification Opens Pathway to Diversify Renewable Energy Mix as WaveRoller is Certified by Lloyd's Register (LR) – AW-Energy**

Working to rigorous technical standards in collaboration with LR, AW-Energy committed to follow best practice from corresponding industries. It has helped to secure the first-of-a-kind grid connection with the WaveRoller® device deployed off the coast of Peniche in Portugal. WaveRoller® is a near-shore wave energy converter, mounted to the seabed with a panel that oscillates with the wave surge. Once the device is deployed offshore, it has minimal visual impact and has been proven to help create artificial bases for reef ecosystems to flourish.

### **Space@Sea Tests WEC Concept at DST – Marine Energy**

Horizon 2020-funded Space@Sea project is carrying out concept trials of wave energy converter (WEC) system and floater-floater connectors. The testing is being undertaken at international research institute DST (Development Centre for Ship Technology and Transport Systems), located in University of Duisburg-Essen and one of the project partners. Space@Sea began its work in November 2017 setting out to make a step in efficient use of the maritime environment.