

# TETHYS ENGINEERING BLAST



**23 April 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**

### *Tethys Engineering Knowledge Base*

Did you know the [Tethys Engineering Knowledge Base](#) currently contains over 5,100 documents about various technical and engineering aspects of marine energy? Check it out now!

### Marine Energy Collegiate Competition

The application period for the U.S. Department of Energy's (DOE's) [2022 Marine Energy Collegiate Competition \(MECC\): Powering the Blue Economy](#) is now open. The MECC encourages multidisciplinary teams of undergraduate and graduate students to unlock the power of the ocean, rivers, and tides to develop, design, and test the technologies that build resilient coastal communities and provide power at sea. Applications will close 7 May 2021.

### EuropeWave Prior Information Notice

Wave energy developers interested in participating in [EuropeWave](#)'s Pre-Commercial Procurement can now register their interest, ask questions, and provide feedback. The tender will open in June 2021. A [Prior Information Notice](#) has been published online and a free [webinar](#) will be held on 26 April 2021 at 2:00pm BST (1:00pm UTC) to provide an overview of the project and explain the innovative 'stage-gate' design of the procurement process.

## Calls for Abstracts

The Partnership for Research In Marine Renewable Energy (PRIMaRE) is now accepting abstracts for the [8<sup>th</sup> PRIMaRE Conference](#). Submissions are due by 30 April 2021. The 8th PRIMaRE Conference will take place online on 29-30 June 2021.

The deadline to submit abstracts for [Global OCEANS 2021: San Diego – Porto](#) has been extended to 9 May 2021. Global OCEANS 2021 will be a hybrid conference, taking place online and in San Diego, CA (US) on 20-23 September 2021.

## Funding & Testing Opportunities

The U.S. [Testing Expertise and Access for Marine Energy Research \(TEAMER\) program](#), sponsored by the U.S. DOE and directed by the Pacific Ocean Energy Trust, is now accepting applications for its third Request for Technical Support (RFTS) through 9 May 2021. Beginning with RFTS 3, TEAMER will allow for longer access periods of up to nine months to complete an RFTS. The access period for RFTS 3 will be from roughly September 2021 through June 2022.

The International Network on Offshore Renewable Energy (INORE) has extended the submission deadline for the [2021 Call for Blue Energy Collaborative Scholarship](#), sponsored by Ocean Energy Systems (OES). Submissions are now due by 14 May 2021.

The U.S. Northeast Sea Grant Consortium, in partnership with the National Oceanic and Atmospheric Administration's Northeast Fisheries Science Center and the U.S. DOE's Wind Energy Technologies Office and Water Power Technologies Office, is [seeking proposals](#) to improve understanding of the effects of ocean renewable energy development on coastal communities, including the fishing industry. Pre-proposals from eligible Northeast researchers are due 14 May 2021 and full proposals are due 16 July 2021 by 5:00pm EDT (9:00pm UTC).

The Ocean Startup Project has launched its second [Ocean Startup Challenge](#), which will provide funding to support innovators who are leveraging Canadian ocean assets and capabilities to develop solutions to ocean industry challenges, including offshore energy. Applications close 1 June 2021. Register [here](#) for an info session at 11:00am PDT (6:00pm UTC) on 6 May 2021.

## Student & Employment Opportunities

Swansea University's College of Engineering is seeking a [Research Assistant](#) to contribute to the SELKIE project. Specifically, the position will involve research in drone video remote sensing of tidal currents and a novel converging beam ADCP sensor for currents and turbulence. Applications are due 15 May 2021.

The University of Plymouth is seeking a [Research Fellow in Flexible Materials](#) to work on research related to material testing, characterisation, and numerical modelling of fibre reinforced polymeric composites for wave energy devices, as well as a [Research Fellow in Hydrodynamics](#) to work on research related to the hydrodynamics testing and analysis of wave energy devices.

Both positions will support the Flexible Responsive Systems in Wave Energy (FlexWave) project. Applications are due 31 May 2021.

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## Upcoming Events

### Upcoming Workshop

The U.S. DOE's National Renewable Energy Laboratory and the Hydropower Foundation are hosting a [STEM to Marine Energy Dialogue Workshop on Educational Resources](#) at 3:00pm MST (9:00pm UTC) on 18 May 2021. Register for free [here](#).

### Upcoming Course

In collaboration with the Marine Renewables Infrastructure Network for Enhancing Energy Technologies (MaRINET2), WavEC Offshore Renewables is organizing an online short course entitled, "Installation and O&M of Offshore Renewable Energy Systems", on 11-12 May 2021. Register for free [here](#).

### Upcoming Webinars

The International Integrated Wave Energy Research group (IIWER) is hosting its second webinar at 9:00am PDT (4:00pm UTC) on 30 April 2021. During the webinar, Dr. Zhaoqing Yang from the Pacific Northwest National Laboratory will present on "Wave resource characterization at regional and nearshore scales using a multi-resolution modeling approach". Register [here](#) by 28 April 2021 to receive the meeting link.

As part of the MarineData4Asia international event, Copernicus Marine Service is hosting a webinar, "Dive into the Copernicus Marine Service", on 4 May 2021 at 7:00am UTC, and a two-day workshop, "Let's go further with the Copernicus Marine Data", on 11-12 May 2021. Learn more and register [here](#).

The European Technology and Innovation Platform for Ocean Energy (ETIP Ocean) & European Energy Research Alliance (EERA) Ocean Energy Joint Programme is hosting a webinar, "Connecting Your Kit: Quick & Reliable Connections", at 10:00am BST (9:00am UTC) on 11 May 2021. During the webinar, three experts will discuss their solutions for innovative connectors and how they help increase reliability and reduce the levelized cost of energy of the whole device. Register [here](#).

The Portal and Repository for Information on Marine Renewable Energy ([PRIMRE](#)) is hosting a webinar, "Marine Energy Data Pipeline", at 11:00am PDT (6:00pm UTC) on 11 May 2021. During the webinar, the Marine Energy Data Pipeline team, led by the Pacific Northwest National Laboratory, will introduce the development of an open source time series data utility that can be used to convert raw data to a standardized format. Register [here](#).

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 in to the marine energy sector. The first event, at 10:00am (UTC) on 20 May 2021, will help your business understand how to bid for tenders in Wales, register and navigate the Sell2Wales.gov.wales website, and create a profile for your business. Register [here](#).

### Event Update

Due to the current health situation in France, Bluesign has decided to postpone [Seanergy 2021](#) to 21-24 September 2021 in Nantes and Saint-Nazaire, France. Register [here](#).

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

### **[The impact of turbulence and turbine operating condition on the wakes of tidal turbines – Ebdon et al. 2021](#)**

Before initiating a study on the interaction of multiple wakes, it is imperative that turbine wake hydrodynamics are studied in isolation. In this paper CFD computer simulations of downstream turbine wakes have been run using a scale-resolving hybrid turbulence model known as a detached eddy simulation. To allow validation of the CFD simulations the computer models were supported by flume measurements with a lab scale tidal stream turbine run at three tip-speed ratios and three turbulence conditions, varying both turbulence intensity and length-scale.

### **[The power flow and the wave energy flux at an operational wave farm: Findings from Mutriku, Bay of Biscay – Ibarra-Berastegi et al. 2021](#)**

The Mutriku (Spain) wave farm is the only facility in the world continuously supplying electricity to the grid for ten years now. It is also the only wave facility with a TRL = 8. In the 1979-2019 period, the wave energy flux exhibits an increasing trend in the Bay of Biscay. Mutriku is a OWC wave farm and the changes in electricity generation driven by changes in wave energy flux have been analysed in this paper. Self-Organizing Maps have been used to estimate the electric yield at Mutriku for the 1979-2019 period. The results indicate that despite the increase in the energy of wave, the electric production would have remained constant in the 1979-2019 period.

### **[Commercialization Strategy for Marine Energy – National Hydropower Association’s Marine Energy Council 2021](#)**

Marine energy technologies are experiencing rapid innovation. However, without a unified focus on accelerating commercialization, these benefits will be delayed, if recognized at all. The National Hydropower Association’s Marine Energy Council is the U.S. national trade group dedicated to promoting technologies and related services to harness clean, renewable power from marine energy resources. Leading the charge for

commercialization, the trade group is calling for domestic marine energy deployment targets of at least 50 MW by 2025, 500 MW by 2030, and 1 GW by 2035.

### **[A platform for Kuroshio Energy Harvesters](#) – Yeh et al. 2021**

In response to the increasing renewable energy demand, harvesting the energy from Kuroshio become an important task in Taiwan. In this study, the ANSYS-FLUENT and ANSYS-AQWA were used to design a Spar platform for carrying multiple current energy harvesters. The designed spar model was established in OrcaFlex, and so as the mooring line system, including the anchor chain and duct chain was built. The simulated results show the spar is stable under normal and storm wave conditions. The pre-designed nozzle-diffuser-duct can capture 15 kW of current energy, however, as a megawatt power plant, 60 ducts are needed to be deployed.

### **[A practical approach to wave energy modeling and control](#) – Coe et al. 2021**

This brief paper summarizes a simple, yet powerful approach to wave energy dynamics modeling, and subsequent control design based on impedance matching. Our approach leverages the same concepts that are exploited by a simple FM radio to achieve a feedback controller for wave energy devices that approaches optimal power absorption. If fully utilized, this approach can deliver immediate and consequential reductions to the cost of wave energy. Additionally, this approach provides the necessary framework for control co-design of a wave energy converter, in which an understanding of the control logic allows for synchronous design of the device control system and hardware.

### **[Charged porous asymmetric membrane for enhancing salinity gradient energy conversion](#) – Hou et al. 2021**

Salinity gradient energy is an abundant renewable energy source that can help satisfy the growing global demand for energy. Although current approaches based on membrane design for salinity gradient energy conversion have been demonstrated to improve conversion efficiency they suffer from the trade-off between selectivity and intrinsic resistance of the membranes, which impedes the rates of energy conversion. In this study, a charged porous asymmetric membrane was fabricated, consisting of a thin charged nanopore (~1 nm) layer and a charged porous structure (80–100 nm) layer.

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## **News & Press Releases**

### **[Orbital Marine Power Launches O2: World's Most Powerful Tidal Turbine](#) – Orbital Marine Power Ltd (Orbital)**

Orbital, Scottish-based developers of floating tidal turbine technology, successfully launched its 2MW tidal turbine, the Orbital O2, from the Port of Dundee on 22nd April. The operation was managed by Osprey Shipping Ltd. and saw the 680-tonne tidal turbine transferred from the Forth Ports quayside facility in Dundee into the River Tay using a

submersible barge. The launch marks the completion of the turbine build, managed by TEXO Fabrication, and the O2 will now be towed to the Orkney Islands where it will undergo commissioning before being connected to the European Marine Energy Centre where it will become the world's most powerful operational tidal turbine.

### **DOE and NOAA Announce Winners of the Ocean Observing Prize DESIGN Contest; Launch BUILD Contest – U.S. DOE**

The U.S DOE and the National Oceanic and Atmospheric Administration (NOAA) recently announced 7 winners of the DESIGN Contest, the first of three contests in the Powering the Blue Economy: Ocean Observing Prize DEVELOP Competition. These 7 winners were selected for their innovative ideas to integrate marine renewable energy with ocean observing platforms to help us improve our ability to forecast hurricane intensity and protect coastal communities from oncoming storms. The selected teams will advance to the next stage of the competition, the BUILD Contest, where they will construct working prototypes based on their designs.

### **Mocean Energy unveils wave energy prototype – Ocean Energy Europe**

Wave power specialists Mocean Energy recently unveiled their Blue X wave energy prototype which will take to the seas in Orkney next month. The 20-metre long, 38-tonne wave machine has been fabricated wholly in Scotland and will be deployed at EMEC's Scapa Flow test site for sea trials initially, and then later deployed at EMEC's large scale Billia Croo test site this summer. Next year, the wave pioneers plan to connect the device to a subsea battery which will be used to power a remotely operated autonomous underwater vehicle. The manufacture and testing programme is supported by £3.3 million from Wave Energy Scotland through their Novel Wave Energy Converter programme.

### **Verdant Power's Tidal Power Project Celebrates Earth Day Milestones – U.S. DOE**

This Earth Day, Verdant Power is celebrating a major milestone—exactly six months since its Roosevelt Island Tidal Energy (RITE) Project, featuring its TriFrame™ mount housing three tidal power turbines, successfully deployed in New York City's East River – a tidal strait. In that time, the one-half scale demonstration array has continuously operated and generated 200MW—a U.S. record for marine energy production. Most importantly, the turbines performed at over 99% availability, and overall water-to-wire efficiencies reached to over 46%. Partially funded by the U.S. DOE's Water Power Technologies Office, the Verdant Power project was recently recognized as the first tidal energy project to be issued a license from the Federal Energy Regulatory Commission.

### **Sustainable Marine Adopts German Aerospace and Wind Energy Technology to Advance Tidal Turbine Foils – Sustainable Marine Energy**

Sustainable Marine is adopting cutting-edge aerospace and wind energy technology in a new project to drive the evolution of tidal turbine foils (blades). The marine renewables specialist is leading the EvoFoil project in partnership with German organisations M&D

Composites Technology and Leibniz Universität Hannover Institute of Production Engineering and Machine Tools. The EvoFoil project aims to deliver a series of design innovations to optimise the performance of tidal turbine foils while driving down production and operation costs. Earlier in 2021, Sustainable Marine launched its new 420kW PLAT-I 6.40 floating tidal energy platform in the Bay of Fundy, Nova Scotia, Canada which will form part of the world's first floating tidal energy array.