

TETHYS ENGINEERING BLAST



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[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 (MRE). 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 MRE community, please send it to tethys@pnnl.gov for consideration.

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Announcements

WPTO Semiannual Stakeholder Webinar

Join the Department of Energy's (DOE's) Water Power Technologies Office (WPTO) on 1 March 2021 from 3:30-5:00pm ET (8:30-10:00pm UTC), for its [Semiannual Stakeholder Webinar](#), where staff will discuss some of the most pressing changes affecting water power research and development in 2021. Led by Acting Deputy Assistant Secretary for Renewable Power and WPTO Director Alejandro Moreno, the webinar will feature program managers and technical leads from across WPTO. Program representatives will provide an update on the administration transition and FY21 budget, highlight recent announcements and publications, share project updates, and discuss upcoming priorities. The presentation will close with Q&A. Register [here](#) and email questions ahead of time [here](#).

Industry Surveys

The EU-funded VALID (Verification through Accelerated testing Leading to Improved wave energy Designs) project has launched a short [survey](#) to gather stakeholder (e.g., developers, researchers, manufacturers, certification bodies) feedback on accelerated testing requirements for wave energy development.

The International Electrotechnical Commission System for Certification of Equipment for Use in Renewable Energy Applications (IECRE) has launched a [survey](#) to better understand the growing needs for certification in the marine energy sector. The survey closes 31 March 2021.

Call for Abstracts

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

Calls for Papers

The *Journal of Marine Science and Engineering* is accepting manuscript submissions for several upcoming Special Issues, including "[Optimization and Energy Maximizing Control Systems for Wave Energy Converters](#)" (due 31 March 2021) and "[Numerical Assessments of Tidal Stream and Wave Energy in Coastal Shelf Seas](#)" (due 12 April 2021).

Energies is accepting manuscript submissions for several upcoming Special Issues, including "[Marine Renewable Energies: From Technological Advancements to Environmental Impact Assessment](#)" (due 31 March 2021), "[Marine Renewable Energy Technology](#)" (due 11 May 2021), and "[Wave Energy Converters \(WECs\)](#)" (due 30 June 2021).

Funding/Testing Opportunities

Sustainable Energy Authority of Ireland (SEAI) has launched a €10 million funding call to support innovative energy research, development, and demonstration (RD&D) projects, including ocean energy, offshore wind, and green hydrogen-related developments. Applications for the [SEAI RD&D Funding Programme Call](#) are due by 3:00pm BST (2:00pm UTC) on 29 March 2021.

The Interreg Atlantic Area's Blue-GIFT has announced the [Third Call for Applications](#) to test MRE technologies at the project's test sites. This access will allow developers to perform low cost tests and validation of their floating offshore wind, wave, tidal, or floating solar energy technologies in real sea environments. Applications close at 5:00pm UTC on 2 April 2021.

The U.S. DOE has allocated \$100 million in funding through the Advanced Research Projects Agency-Energy's (ARPA-E) 2021 [OPEN Funding Opportunity](#) to support the development of potentially disruptive new technologies across the full spectrum of energy applications. Concept papers are due by 9:30am EDT (1:30pm UTC) on 6 April 2021.

The Sustainable Ocean Alliance (SOA) recently opened applications for its [Ocean Solutions Accelerator Program](#) 4th and 5th Cohorts. Applications are due 12 April 2021.

In collaboration with Innovate UK, the Department for Business, Energy and Industrial Strategy (BEIS) will soon launch the next opportunity for businesses in England, Wales and Northern

Ireland to bid for funding from the [Industrial Energy Transformation Fund \(IETF\)](#). IETF [Phase 1: Spring 2021](#) opens to applications on 8 March 2021 and runs to 14 July 2021.

Employment Opportunity

The Environmental Research Institute (ERI) at the University of the Highlands and Islands (UHI) is recruiting for a [Research Fellow in Marine Renewable Energy and the Environment](#) to join the multi-disciplinary team working across engineering, marine sensing, hydrodynamics and robotics to study environmental and bio-physical interactions. Applications are due 5 April 2021.

Upcoming Events

Upcoming Workshop

The U.S. DOE's National Renewable Energy Laboratory (NREL) and the Hydropower Foundation will host a STEM to Marine Energy Dialogue Workshop from 5:00-7:00pm EST on 9 March 2021 to discuss the Marine Energy Collegiate Competition (MECC). The dialogue will review the structure and requirements of the first two MECCs to gather feedback and lessons learned that can be used to structure future competitions. Register [here](#).

Upcoming Conference

The [International Conference on Ocean Energy \(ICOE\)](#) will be held online from 28-30 April 2021. The theme for ICOE 2021 is "Energizing a Powerful Blue Economy". Register [here](#) by 31 March 2021 for early bird rates.

New Documents on *Tethys Engineering*

[Ocean Energy Key Trends and Statistics 2020 – Collombet 2021](#)

The annual key trends and statistics publication from Ocean Energy Europe gathers data from the sector to present the latest state-of-play in Europe and worldwide. The report covers capacity additions, power production and industrial milestones up to 2020. The challenges and uncertainty of 2020 tested the sector's resilience. The industry proved to be up to the task: several devices were installed in Europe, major industrial milestones were achieved, and political support continued to strengthen. Worldwide, a total of 36.3 MW of tidal stream and 23.3 MW of wave energy has been deployed since 2010.

[Marine Energy in the United States: An Overview of Opportunities – Kilcher et al. 2021](#)

This report provides a concise and consolidated overview of the United States' marine energy resources. The results reported herein are primarily based on U.S. Department of Energy (DOE)-funded marine energy resource assessments in the following technology

areas: wave, tidal currents, ocean currents, ocean thermal gradients, and river currents. This report also incorporates recent updates and refinements to the U.S. wave and tidal resource assessments performed by several national laboratories. Further, this report refines the analysis published to date by identifying the marine energy resources available in each state or region to the extent practical. In short, this report summarizes the best available data on U.S. marine energy resources at the state, regional, and national scales.

Study on power generation of single Point Absorber Wave Energy Converters (PA-WECs) and arrays of PA-WECs – Murai et al. 2021

Point Absorber Wave Energy Converter (PA-WEC) is one method of capitalizing on the ocean's wave energy. Past research provides methods for optimizing control force parameters for single PA-WECs. This paper provides methods for optimizing control force parameters for arrays of PA-WECs; optimization considers factors such as radiation hydrodynamic interactions, diffraction hydrodynamic interactions, array arrangements, and wave incident angles. In section 2, we outline the steps to determining optimal control forces. In section 3, we present numerical simulations of PA-WECs and compared the results between single PA-WEC systems and arrayed PA-WEC systems.

Rotor blade imbalance fault detection for variable-speed marine current turbines via generator power signal analysis – Freeman et al. 2021

This paper proposes a novel framework aimed at identifying and classifying the severity of rotor blade pitch imbalance faults experienced by marine current turbines (MCTs). In the framework, a Continuous Morlet Wavelet Transform (CMWT) is first utilized to acquire the wavelet coefficients encompassed within the 1P frequency range of the turbine's rotor shaft. From these coefficients, several statistical indices are tabulated into a six-dimensional feature space. Next, Principle Component Analysis (PCA) is employed on the resulting feature space for dimensionality reduction, and then the application of a K-Nearest Neighbor (KNN) machine learning algorithm is utilized for fault detection and severity classification.

Review of Marine Renewable Energy in Integrated Resource Plans – Cooke et al. 2020

As part of a literature review of reference material for grid applications of marine hydrokinetic energy capture technologies, Pacific Northwest National Laboratory (PNNL) surveyed U.S. electric utility integrated resource plans for the mention or treatment of marine renewable energy technologies, principally wave energy, tidal energy, and offshore wind energy. This review offers a window into utility decision-making and data utilization with regard to these generating technologies. The report also offers perspectives on the relationship between traditional and emerging resource planning paradigms and metrics.

Tidal Energy in Australia: Assessing Resource and Feasibility in Australia's Future Energy Mix – Penesis et al. 2020

The Australian Tidal Energy (AUSTEn) project has mapped Australia's tidal energy resource in unprecedented detail, assessed its economic feasibility and ability to contribute to the country's future energy needs, and characterised in detail two potentially prospective tidal energy development sites to aid forthcoming developers. The outcomes of this project provide considerable benefit to the emerging tidal energy industry, the strategic-level decision makers of the Australian energy sector, and the management of Australian marine resources by helping them to understand the resource, risks and opportunities available, and overcoming current barriers to investment by increasing the competitiveness of tidal energy against other forms of ocean renewables.

News & Press Releases

[SafeWAVE project launch, addressing environmental concerns of emerging wave energy technologies](#) – SafeWAVE project

A €1.5 million project has been funded by European Maritime and Fisheries Fund programme of the European Union, which addresses environmental concerns of emerging wave energy technologies. The project SafeWAVE – Streamlining the assessment of environmental effects of wave energy – aims to overcome non-technological barriers that could hinder the future development of one of the main pillars of the EU Blue Growth strategy: ocean energy. The Consortium, led by AZTI, includes a multidisciplinary team of partners aiming to involve the wider community of ocean energy key stakeholders from across Portugal, Spain, France, and Ireland.

[CorPower extends equity funding to 20.3 MEUR for commercial scale demonstration](#) – CorPower

After securing a private placement of 9 MEUR (million Euros), CorPower has extended its equity funding to 20.3 MEUR, enabling the commercial scale demonstration of its wave energy technology. The equity together with public investments from Sweden, Portugal and EU brings the total funding secured for CorPower's HiWave-5 program to 38 MEUR, supporting CorPower's pan-European efforts in Sweden, Portugal, Ireland, Scotland and Norway. The HiWave-5 demonstration project aims to convert CorPower's wave technology into a bankable product by 2024, by proving the survivability, performance and economics of a grid-connected array of WECs in northern Portugal.

[Minesto joins forces with TECHNIA for sustainable global design](#) – Offshore Energy

Swedish tidal energy developer Minesto has partnered up with engineering and PLM company TECHNIA to ensure sustainable product design and development for global market. The partnership with TECHNIA furthers Minesto's ambition of global, sustainable energy generation. TECHNIA is a Product Lifecycle Management (PLM) company committed to making technology and innovation work in practical world by combining industry-leading PLM tools with specialist knowledge. Under the business

agreement, TECHNIA will consult, deploy and support seamless design collaboration with Dassault Systemes' ENOVIA solutions on the 3DEXPERIENCE platform.

Bombora and Mitsui O.S.K. Lines Forge Partnership to Identify Marine Energy Project Opportunities in Japan – Bombora

At a time when there is a strong push for offshore renewable power generation in Japan, Mitsui O.S.K. Lines, Ltd. (MOL) have entered into an agreement with leading marine energy developer Bombora to identify wave energy potential across the region. Following the completion of a detailed internal technology review of Bombora's unique mWave wave energy converter by the global marine transport group, MOL and Bombora are now progressing to the second phase of their collaboration. The partnership will identify potential sites for both mWave energy projects and combined wind and mWave energy projects in Japan and the neighboring regions.

North America's oldest tidal power plant set for closing – Offshore Energy

Nova Scotia Power, the owner of the Annapolis Tidal Generating Station, has decided to retire the 37-year-old power plant following a failure related to its electrical system. The Annapolis station was the first tidal plant in North America, and at the time of its commissioning in 1984, one of only three tidal power plants in the world. Located in the Bay of Fundy and Annapolis River, in Canada's Nova Scotia Province, the plant features a single effect 7.6-metre diameter horizontal axis Straflow turbine designed to generate power during discharge from the reservoir into the sea. It has a capacity of 20MW and a daily output of roughly 80-100MWh, depending on the tides.