

TETHYS ENGINEERING BLAST



4 December 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 (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-MHK Graduate Student Research Program

The Oak Ridge Institute for Science and Education (ORISE) is still accepting applications for the [WPTO-MHK Graduate Student Research Program](#), which is designed to provide graduate thesis research opportunities in marine and hydrokinetics (MHK) at U.S. Department of Energy (DOE) laboratories and other Water Power Technologies Office (WPTO) approved facilities. Applications are due by 5:00pm EST (10:00pm UTC) on 9 December 2020.

Call for Abstracts

Abstract submissions for the [International Conference on Ocean Energy \(ICOE 2021\)](#) are being accepted until 18 December 2020. ICOE 2021 will be held online from 28-30 April 2021.

Funding/Testing Opportunities

The U.S. Testing Expertise and Access for Marine Energy Research ([TEAMER](#)) Program is now accepting applications for the second round of Requests for Technical Support (RFTS). Applications are due by 18 December 2020.

The TEAMER Network Director is also accepting applications for additional facilities to join the [TEAMER Test Facility Network](#) for RFTS round 3 and beyond. Potential facilities (both physical infrastructure as well as expertise capabilities, such as modeling and analysis services) can apply by 4 December 2020.

The U.S. DOE's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs recently announced the [FY 2021 Phase I, Release 2 topics](#), which include several MRE-related topics. DOE plans to issue the [SBIR/STTR Funding Opportunity Announcement](#) on 14 December 2020.

As part of the ADMIRALTY Marine Innovation Programme, the UK Hydrographic Office and Centre for Environment, Fisheries and Aquaculture Science (Cefas) have launched the [Offshore Renewable Energy Challenge](#). The Challenge invites participants to use marine geospatial data to identify suitable sites for wind, wave, and tidal energy development while minimizing impact on the environment. Applications are due by 31 December 2020.

The Supergen Offshore Renewable Energy (ORE) Hub has released its [Third Flexible Funding Call](#) and are seeking research proposals from universities or other institutions eligible to hold UK Research and Innovation awards to facilitate a programme of coordinated ORE research projects. Expressions of Interest are due by 5:00pm UTC on 11 January 2021.

Innovate UK has announced an upcoming [Smart Grants funding competition](#) for UK registered organizations to apply for a share of up to £25 million to deliver disruptive research and development innovations. The competition closes at 11:00am UTC on 20 January 2021.

Student/Employment Opportunities

The U.S. DOE WPTO is currently looking for a new member to join its team as a General Engineer with WPTO's MHK Program. As an MHK Technology Manager and Technical Project Officer, the position will manage research, development, and demonstration activities related to marine energy technologies. Learn more [here](#). Applications are due by 31 December 2020.

Australia's Blue Economy Cooperative Research Centre has launched a [PhD Scholars Program](#) with PhD topics available across its five research programs, including offshore renewable energy systems and sustainable development. Applications are due by 10 January 2021.

Nova Innovation is currently recruiting a [Project Manager](#) to lead the development of their Enlli tidal energy project in north Wales. The role encompasses a range of tasks including stakeholder engagement and overseeing the installation of the turbines and project infrastructure.

Upcoming Events

Upcoming Webinars

The European Technology and Innovation Platform for Ocean Energy (ETIP Ocean) will be hosting a webinar, “Best Consenting Practices for Ocean Energy”, at 11:00am CET (10:00am UTC) on 15 December 2020. The webinar will feature a presentation of the [new ETIP Ocean report](#) on ocean energy and the environment. Register [here](#).

The International Energy Agency’s Ocean Energy Systems (OES) will be hosting a webinar, “Ocean Energy in Islands and Remote Coastal Areas”, at 2:00pm UTC on 17 December 2020. Following the release of the [Ocean Energy Projects in Remote Locations report](#), the webinar will discuss practical challenges faced by developers dealing with ocean energy projects in remote locations. Register [here](#).

Sandia National Laboratories will be presenting a webinar on the development of the Design Load Case Generator at 11:00am EST (4:00pm UTC) on 14 January 2021. The web-based tool was designed to streamline MRE system technology design and certification following the International Electrotechnical Commission (IEC) 62600-2 technical specification requirements. Register for the webinar, and the opportunity to provide constructive feedback, [here](#).

Upcoming Conference

The [Marine Energy Wales Conference 2021](#) will be held online from 27-29 January 2021. The event will bring together MRE technology developers, project developers, the supply chain, academia, and the public sector to discuss how Wales can become a global leader. Register [here](#).

New Documents on *Tethys Engineering*

[Innovation Outlook: Ocean Energy Technologies](#) – International Renewable Energy Agency (IRENA) 2020

Alongside other offshore renewable energy technologies, ocean energy – including wave, tidal, salinity gradient and ocean thermal energy conversion technologies – forms a crucial component in the world's emerging blue economy. This outlook from the International Renewable Energy Agency (IRENA) examines the status and prospects of ocean energy technologies. It examines the operating principles, current installed capacity and projected project pipeline, along with markets and theoretical energy potential for each ocean energy type. The report also identifies challenges and offers recommendations to accelerate the deployment and commercialisation of each technology.

[Sequential optimization of the geometrical parameters of an OWC device based on the specific wave characteristics](#) – Hayati et al. 2020

Conventional Wave Energy Converters (WECs) are designed to extract the wave energy from the oceans with the wave power of 20–50 kW-per-meter. If these WECs are used where the wave energy is less than the mentioned values they cannot work in their maximum performance. Therefore it is proposed to optimize the WECs for the average wave power in each place. In this research, an Oscillating Water Column (OWC) is

investigated to extract the maximum power based on the characteristics of the Faroor island waves in the Persian Gulf. Numerical simulation is performed using ANSYS-Fluent software. Waves are generated using nonlinear second order stokes theory.

Effects of turbulence modelling in AD/RANS simulations of single wind & tidal turbine wakes and double wake interactions – Tian et al. 2020

A comparative analysis of the RANS-based generalized actuator disc method (AD/RANS) with different turbulence models for simulating single wind & tidal turbine wakes and double wake interactions is performed. The tested turbulence models include the Realizable $k-\epsilon$, SST $k-\omega$, Linear Reynolds-stress (RSM) and two proposed RSM models with modified closure constants. The evaluation is based on comparing their results against five sets of published experimental data for various types of turbines operating under a wide range of inflow conditions.

Optimal design of the ocean thermal energy conversion systems involving weather and energy demand variations – Hernández-Romero et al. 2020

Ocean thermal energy conversion systems (OTEC) represent an attractive economic alternative in communities allocated in coastal areas for producing electric utilities reducing fossil fuel consumption and emissions. This paper presents a Non-Linear Programming multi-period and multi-objective model for the analysis of OTEC systems. The multi-objective approach aims to maximize the exergy efficiency of the cycle while the total annual cost of the system is minimized. Variations on solar resources availability, energy demands, and ambient conditions are addressed considering hourly and seasonal profiles from a given housing complex on the Pacific Coast from Mexico.

Numerical Assessment of Onshore Wave Energy in France: Wave Energy, Conversion and Cost – Sergent et al. 2020

There are few general analyses of the interest of onshore wave energy converters (onshore WEC) in terms of resources, efficiency and cost. The case of The Channel on the Atlantic coast of France is chosen here to illustrate the issues related to onshore WEC development. The paper presents a list of potential sites with their characteristics and a more in-depth analysis of a few sites. For four onshore WEC families, the production is given with a method of calculating the efficiency and economic analysis is carried out to estimate the energy cost at two selected sites.

Energy absorption characteristics in hybrid composite materials for marine applications under impact loading: Case of tidal current turbine – Laaouidi et al. 2020

The tidal current turbine is the most efficient way to extract energy from the sea. This system can be prone to critical loads such as impact accidental in the installation and maintenance phase. Indeed, several complex modes of damage susceptible to harming the stability of the structure are studied to conceive hybrid composite nozzles with better resistance to damage. For this reason, two scenarios of low-velocity impact of a hybrid

composite nozzle (glass/carbon) were investigated. In both cases, the impact was realized in the region of the trailing edge of the nozzle, and the results obtained were compared between three different laminated.

News & Press Releases

[Minesto reaches historic milestone – delivers first tidal energy to the Faroese grid](#) – Minesto

As a part of the ongoing commissioning work of its DG100 tidal kite system Vestmannaund, Faroe Islands, leading marine energy developer Minesto has reached the milestone of delivering electricity to the Faroese grid facilitated by the Power Purchase Agreement with the utility company SEV. Following the installation of project infrastructure, including the foundation, export cable and onshore control station, Minesto installed and commenced commissioning activities of its 100kW DG100 tidal kite system in October. After demonstrating the DG100 system in Vestmannaund, the joint ambition of SEV and Minesto is a large-scale buildout of both microgrid (<250kW) and utility-scale (>1MW) Deep Green systems in the Faroe Islands.

[Bombora and TechnipFMC to develop multi-MW floating wind-wave platform](#) – Offshore Energy

TechnipFMC and Bombora Wave Power have entered into a partnership to develop a floating offshore energy platform, integrating wind with the mWave wave energy technology. Bombora and TechnipFMC are now forming a consortium to develop the 12MW platform at an established European test site as part of the Integrated Semi-submersible Platform with Innovative Renewable Energy (InSPIRE) project. The first phase of the project will comprise the design and buildout of a 12MW demonstrator, with integrated 4MW mWave and 8MW wind turbine on a shared floating platform. The second phase will see the construction of a commercial-scale platform, that will integrate 6MW mWave device with 12MW wind turbine on a single platform.

[Carnegie signs Collaboration Agreement with Hewlett Packard Enterprise Company \(HPE\) to develop a reinforcement learning based controller for CETO](#) – Carnegie Clean Energy

Carnegie Clean Energy is excited to announce that it has signed a Collaboration Agreement with Hewlett Packard Enterprise Company (HPE) in which the parties will work collaboratively on a project to develop a reinforcement learning based controller for the CETO wave energy technology. The work will extend the artificial intelligence development already underway at Carnegie. Hewlett Packard Labs will contribute their reinforcement learning (RL) expertise and computational resources to the project, working alongside Carnegie's team, which is already developing an intelligent controller for the CETO technology. The RL based controller development in this project will occur

in parallel with, and provide an opportunity to enhance, the Carnegie team's ongoing work on a machine learning (ML) based intelligent controller.

Norway issues permit for wave power plant off Ålesund – Offshore Energy

Marina Solutions has received permission from the Norwegian authorities to temporarily moor a wave energy test plant outside the Atlantic Ocean Park in Ålesund. The project represents a collaboration between Havkraft, Ulstein Betong Marine and others, where the project owner Marina Solutions will install a complete wave power plant for testing. The concept consists of a floating concrete breakwater construction, with integrated power plant that will feature Havkraft's patented H-WEC wave energy technology, which uses pumped air to spin the turbines to produce power. The goal for testing is to verify how much power one can get out of the generators that are on the outside of the floating pier, according to Marina Solutions.

RESOURCECODE Bank One Year of Hindcast Data for Marine Toolbox – European Marine Energy Centre (EMEC)

The RESOURCECODE project, funded by Ocean Energy Era-Net Cofund, has made a significant step forward with the first year of hindcast data being produced for the project's marine data toolbox and the development of the new online platform. RESOURCECODE aims to support the investment and growth in the wave and tidal energy sector through the creation of an integrated marine data toolbox. The toolbox is due to be launched in 2021 using 28 years of hindcast wave data from across North West Europe. It will provide technology developers and supply chain companies with world leading resource characterisation, enabling them to improve designs, optimise operations in demanding marine environments, and increase investor confidence.