

TETHYS ENGINEERING BLAST



18 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

New EERE Portal for Funding Opportunities

The U.S. Department of Energy (DOE) Office of Energy Efficiency (EERE) recently launched the [EERE Program Information Center](#)—a new portal for funding opportunities. Organizations interested in working with EERE can use the Center to identify and respond to open opportunities, including Funding Opportunity Announcements, Requests for Information, Notices of Intent, Notices of Technical Assistance, and Lab Calls.

ETIPP Community Technical Assistance

The National Renewable Energy Laboratory (NREL) is now accepting community technical assistance applications for the [Energy Transitions Initiative Partnership Project \(ETIPP\)](#), a partnership among DOE offices, national labs, and community organizations that will provide resources and access to on-the-ground support for remote and island communities in the U.S. seeking to transform their energy systems and lower their vulnerability to energy disruptions. Applications are due by 15 February 2021.

Calls 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.

Abstract submissions for the [OCEANS 2021 Porto Conference & Exhibition](#) are being accepted until 18 December 2020. OCEANS 2021 Porto will be held as a hybrid conference in Porto, Portugal from 17-21 May 2021.

Abstract submissions for the [14th European Wave and Tidal Energy Conference \(EWTEC 2021\)](#) are now being accepted until 8 January 2021. EWTEC 2021 will be held as a hybrid conference in Plymouth, UK from 5-9 September 2021.

Calls for Papers

The *Journal of Marine Science and Engineering* is accepting manuscript submissions for several upcoming Special Issues. Submissions for "[Dynamic Instability in Offshore Structures](#)" and "[Waves and Ocean Structures](#)" are due 5 January 2021. Submissions for "[Offshore and Onshore Wave Energy Converters: Engineering and Environmental Features](#)" and "[Selected Papers from the 7th PRIMaRE Conference 2020](#)" are due 31 January 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 U.S. DOE recently released its FY 2021 Phase I Release 2 Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) [Funding Opportunity Announcement](#). Eligible small business can apply to receive up to \$200,000 to test their innovative ideas. Letters of Intent are due by 5:00pm EST (10:00pm UTC) on 4 January 2021. An [informational webinar](#) will be held at 2:00pm EST (7:00pm UTC) on 18 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 is 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.

The European Commission recently announced a [Blue Economy Call for Proposals](#) to help advance market-readiness of new products, services, or processes, including MRE projects. Proposals are due by 5:00pm CEST (3:00pm UTC) on 16 February 2021.

The Interreg Atlantic Area's Blue-GIFT recently 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.

Student/Employment Opportunities

The U.S. DOE Water Power Technologies Office (WPTO) is currently looking for a new staff member to join its team as a General Engineer with WPTO's Marine and Hydrokinetic (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.

France Énergies Marines is currently seeking a [Research Scientist](#) in offshore renewable energy mooring systems and foundations to join the DTOceanPlus team. The candidate will contribute to the development of advanced design tools for the selection, development, and deployment of ocean energy systems. Applications are due by 15 January 2021.

Pacific Northwest National Laboratory (PNNL) is currently seeking a [Coastal and Marine Sciences Technical Intern](#) to join projects within one of three focus areas: (1) understanding the national laboratories' role and the unique place they have to accelerate work in coastal and marine ecosystems; (2) research and development of technologies focused on monitoring coastal ecosystems; and (3) MRE technologies and powering the blue economy. Applications are due by 25 February 2021.

Upcoming Events

Upcoming Webinar

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](#).

New Documents on *Tethys Engineering*

[Rotational sampling of waves by tidal turbine blades](#) – Draycott et al. 2020

The presence of waves exposes tidal stream turbines to large and cyclic hydrodynamic loads which significantly influence the design requirements for tidal turbine blades. Here we describe a loading phenomenon not previously considered in literature caused as blades rotationally sample an oscillating and vertically decaying wave-induced velocity field. Although implicitly incorporated into numerical models, the dominant causes and relative influence have not previously been considered. In this article this effect is described through theoretical analysis and validated through scaled experiments; including irregular waves at angles to the rotor and current field.

[The Wave Energy Converter Design Process: Methods Applied in Industry and Shortcomings of Current Practices](#) – Trueworthy & DuPont 2020

The unique design challenges for wave energy converter (WEC) design—integrating complex and uncertain technological, economic, and ecological systems, overcoming the structural challenges of ocean deployment, and dealing with complex system dynamics—have led to a disjointed progression of research and development. In this paper, we summarize the methods being employed in WEC design as well as promising methods that have yet to be applied. We contextualize these methods within an overarching design process. We present results from a survey of WEC developers to identify methods that are common in industry.

[Ocean thermal energy application technologies for unmanned underwater vehicles: A comprehensive review](#) – Wang et al. 2020

Firstly, this paper provides a review of the current state of ocean thermal energy utilization in vehicles. The application principles of phase change material thermal harvesting system are concluded, and several typical PCM-based unmanned underwater vehicles are listed. Then, several theoretical issues based on this type of vehicle have been discussed. Moreover, the basic principles of ocean thermal energy utilization approaches based on shape memory alloys, thermoelectric generators, thermodynamic cycle, and their potential application forms in vehicles are also reviewed. Finally, the challenges and difficulties involved in the application of ocean thermal energy in unmanned underwater vehicles are discussed as well.

[Validation of a turbulence numerical 3D model for an open channel with strong tidal currents](#) – Novo & Kyojuka 2020

Turbulence characteristics of tidal currents, essential to predict the performance of tidal stream energy converters, present a significant spatial and temporal variability. This paper introduces an FVCOM (Finite Volume Community Ocean Model) numerical model validated with current velocity and turbulent kinetic energy data from three measuring devices installed in the Tanoura and Naru Straits (Goto Islands), one of them

covering different vertical layers of the water column, confirming its capacity to estimate turbulence conditions at various depths when these are mostly generated by tidal currents. Correlation coefficients obtained under these conditions at the three locations are higher than 0.84 and 0.8 for current velocity and turbulent kinetic energy, respectively.

[Double stage controller optimization for load frequency stabilization in hybrid wind-ocean wave energy based maritime microgrid system](#) – Latif et al. 2020

The momentum towards reduction of greenhouse gas emissions by reduced use of conventional source in marine power networks as well as significant development of renewable energy resources (RRs) have been the motivating factors for inclusion RRs in hybrid maritime microgrid system (HM μ GS) and investigation of consequent frequent control mechanism. This article presents an approach of load frequency control in an independent HM μ GS consisting of wind driven generation (WDG), Archimedes wave power generation (AWPG), marine biodiesel generator (MBG), solid-oxide fuel cell energy units, heat pump and freezer.

[Ocean salt basins energy harvesting](#) – Arias et al. 2020

In this work, the potential of harvesting energy from ocean salt basins is discussed. These deep ocean depressions which host thick salts deposits whose salinities could be up to 5-10 times higher than normal seawater open an interesting -and so far, unexplored possibility for ocean energy. Although the extractable osmotic energy density is certainly low in comparison with other ocean energy sources, nevertheless, ocean basins can be several kilometers broad and then a vast amount of energy is stored in those basins, which, in addition, could be steadily extracted without interruption avoiding the intermittence problem besetting traditional renewable energies.

News & Press Releases

[NetBuoy heads to Cromarty Firth for trials](#) – Wave Energy Scotland

Tension Technology International's NetBuoy has started sea trials in the Cromarty Firth this month. The trials will assess the effect of long-term exposure to sea water, environmental loading, biofouling, and ozone. Sea trials will be followed by additional tank testing to demonstrate NetBuoy's application to wave energy converters other than point absorbers. The long-term vision for the proposed solution is integration into wave energy converters, utilising the NetBuoy to provide the prime mover water plane, swept volume and buoyancy requirements. NetBuoy integrates two enabling technologies for cost competitive wave energy – impermeable membranes to manufacture buoyant modules and fibre rope nets to encapsulate the buoyant modules.

[Walker Subsea starts work on renewable energy-powered subsea motor](#) – Offshore Energy

UK-based specialist engineering firm Walker Subsea Engineering has been awarded funding to develop a novel offshore renewable energy-powered subsea motor. The motor will be used to drive propulsion systems for marine craft and ROVs, for pumps and compressors on subsea production systems, and generating offshore renewable energy from tidal turbines. The machine uses the Axial Flux technology platform supplied by AVID Technology. It is designed for operation in up to 1000-meter water depth, producing 200kW peak power output, at a weight less than 150 kilograms. Prototype build is already in progress, while the testing is due to begin in the third quarter of 2021.

Celtic Ocean Energy Innovation Hubs Connect – Marine Energy Test Area

Following a signed agreement between Marine Energy Wales and the European Marine Energy Centre (EMEC), based in Orkney, Scotland, EMEC has provided on the ground operational support to the Marine Energy Test Area (META) in Pembrokeshire, Wales. META consists of eight pre-consented test sites located in and around the Milford Haven Waterway, de-risking the development of marine energy projects by providing the opportunity to test scale and full-scale devices, sub-assemblies and components in sites that are accessible yet still representative of real sea environments, offering a range of conditions and exposure. Marine Energy Wales' META team have collaborated with EMEC to obtain support on test centre best practices and operational procedures.

Ireland eyes new marine renewable energy site – Offshore Energy

Ireland's regional authority, Údarás na Gaeltachta, has unveiled plans to investigate the opportunities of establishing Ros an Mhíl harbour on the country's west coast as a centre for marine renewable energy. The study will include a review of the marine renewable energy sector, as well as the opportunities, requirements, and advantages that Ros an Mhíl harbour and Gaeltacht companies have to meet future demands. The regional authority will collaborate with the appropriate state authorities and government departments to agree on an integrated approach to develop this valuable resource.

Eco Wave Power signs Collaboration Agreement with Meridian Energy Australia – Eco Wave Power

Eco Wave Power recently announced the signing of a collaboration agreement with Meridian Energy Australia (MEA), a wholly owned subsidiary of Australasia's largest renewable energy generator Meridian Energy Limited. The purpose of the collaboration is for the parties to jointly investigate the development of commercial wave energy power projects in the Australian National Electricity Market. Eco Wave Power will recognize MEA as a supporting partner, lead the investigation into the application of wave energy in Australia, and identify opportunities for the application of the Eco Wave Power Background IP.