

TETHYS ENGINEERING BLAST



25 September 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

PRIMRE Webinar Series

Pacific Northwest National Laboratory, National Renewable Energy Laboratory, and Sandia National Laboratories will be hosting a [two-part webinar series](#) to present new developments on the [Portal and Repository for Information on Marine Renewable Energy \(PRIMRE\)](#), a centralized access point that enhances the accessibility and discoverability of information relevant to MRE development and operations in the U.S. The first webinar, at 8:00am PDT (3:00pm UTC) on 7 October 2020, will highlight new sites and tools that have been developed within *PRIMRE*: the [MRE Technology Database](#), [MRE Software](#), and [Telesto](#). Register [here](#). The second webinar, at 8:00am PDT (3:00pm UTC) on 28 October 2020, will highlight new features of existing [PRIMRE Knowledge Hubs: Signature Projects](#), the [Tethys Engineering Photo Library](#), and the PRIMRE aggregate search. Register [here](#).

Marine Energy Collegiate Competition

The U.S. Department of Energy's (DOE's) Water Power Technologies Office (WPTO) is now accepting applications for the [2021 Marine Energy Collegiate Competition \(MECC\)](#). The competition challenges undergraduate and graduate students to explore opportunities for MRE technologies in existing maritime industries via real-world concept development. Applications are due 30 September 2020.

WPTO-MHK Graduate Student Research Program

The Oak Ridge Institute for Science and Education (ORISE) is now 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 DOE laboratories and other DOE/WPTO-approved facilities. Applications are due by 5:00pm EST (10:00pm UTC) on 4 December 2020.

UK Consultation

The UK Department for Business, Energy & Industrial Strategy (BEIS) has launched a [consultation](#) on how the government can support MRE projects, such as floating offshore wind, tidal, and wave energy. The consultation invites views from developers and other interested parties on project funding and costs, environmental impacts, and supply chain benefits. The consultation closes at 11:45pm BST (10:45pm UTC) on 30 September 2020.

Funding/Testing Opportunities

The Interreg Atlantic Area-funded [PORTOS \(Ports Towards Energy Self-Sufficiency\) Project](#), which aims to promote the implementation of wave, tidal, and wind energy at Atlantic Area ports, has opened its 2nd call for renewable energy device testing. Applications are due by 2 October 2020.

The Supergen Offshore Renewable Energy (ORE) Hub is accepting applications for the [Early Career Researcher \(ECR\) Research Fund](#), designed to be a flexible research fund for ECRs to support small activities that either supports and develops your existing research activities, or develops your skills further. Research activities should be aligned with the objectives of the Supergen ORE Hub and should be directed at offshore wind, wave, or tidal energy research. Applications are due by 12:00pm BST (11:00am UTC) on 9 October 2020.

The [Marine Renewables Infrastructure Network \(MaRINET2\)](#) has opened its fifth and final call for fully funded access to a world-leading network of testing and research infrastructures in Europe. An open call for [virtual access](#) to data sets and a free-of-charge [training programme](#) are also available through the project. Applications are due 16 October 2020. A webinar recording to assist candidates with their application and share updates on the process is available [here](#).

The Massachusetts Clean Energy Center (MassCEC) recently released a [Request for Proposals](#) as part of its [Catalyst Program](#), which provides grants of up to \$65,000 to researchers and early-stage companies looking to demonstrate initial prototypes of their clean energy technologies. Proposals are due 19 October 2020 at 11:59pm EST (3:59pm UTC).

The European Space Agency (ESA) Space Solutions, in partnership with the Dutch Marine Energy Centre (DMEC), has released an open competition [Invitation to Tender](#) for teams looking to investigate the technical feasibility and economic viability of space-based applications in support of MRE solutions, and define a roadmap for services implementation and demonstration.

Employment Opportunity

The Pembrokeshire Coastal Forum is seeking an [Operations Manager](#) to oversee the operation and delivery of the Marine Energy Test Area (META) project, currently under development in Wales. Applications are due 2 October 2020.

Upcoming Events

Upcoming Workshop

As part of the Marine Alliance for Science and Technology Scotland's (MAST) [Annual Science Meeting \(ASM\)](#), MAST and the Society for Underwater Technology (SUT) will be hosting an online workshop on [Salvage, Decommissioning, & Wreck Removal](#) on 8-9 October 2020. Register [here](#).

Upcoming Webinars

Marine-i and the EU-funded ICE (Intelligent Community Energy) Project will be hosting a webinar, [Opportunities for Marine Technologies and Smart Solutions](#), at 10:00am BST (9:00am UTC) on 1 October 2020. Register [here](#).

The Selkie Project will be hosting a webinar, Operations & Maintenance in Marine Energy, at 2:30pm BST (1:30pm UTC) on 8 October 2020. Register [here](#).

Upcoming Conferences

The Institute of Electrical and Electronics Engineers' (IEEE's) [3rd International Conference on Renewable Energy and Power Engineering \(REPE\)](#) will now be held online from 9-11 October 2020. Registration closes 25 September 2020.

The [Offshore Energy Exhibition & Conference \(OEEC\)](#) will now be held online from 27-28 October 2020. Registration for the modified event will be available soon.

New Documents on *Tethys Engineering*

[Numerical modelling of hydrodynamics and tidal energy extraction in the Alderney Race: a review](#) – Thiébot et al. 2020

The tides are a predictable, renewable, source of energy that, if harnessed, can provide significant levels of electricity generation. The Alderney Race (AR), with current speeds that exceed 5 m/s during spring tides, is one of the most concentrated regions of tidal energy in the world, with the upper-bound resource estimated at 5.1 GW. Owing to its significance, the AR is frequently used for model case studies of tidal energy conversion, and here we review these model applications and outcomes. We examine a range of

temporal and spatial modelling scales, from regional models applied to resource assessment and characterization, to more detailed models that include energy extraction and array optimization.

Perspectives for harnessing the energetic persistent high swells reaching the coast of Chile
– Mazzaretto et al. 2020

The wave climate along the Pacific Chilean coast and its possible exploitation for marine energy generation between latitudes 33.00°S and 40.50°S are evaluated. A database of hindcast wave spectra in coastal waters between 1989 and 2013 is used to perform the analysis at four different depths: 15m, 20m, 50m, and 100m. Monthly wave power and mean wave direction statistics between deep and shallower water (20m) are analyzed. Furthermore, the variability of wave statistics is compared for the four different shallow-to-intermediate water depths and latitudes. The performance of five wave energy devices is assessed under their best operating conditions in terms of water depth: SeaPower, OEBuoy, Wavestar, CETO, and Seabased.

Constructal thermodynamic optimization for ocean thermal energy conversion system with dual-pressure organic Rankine cycle – Wu et al. 2020

A constructal thermodynamic optimization model for ocean thermal energy conversion system (OTECS) with a dual-pressure organic Rankine cycle (DPORC) to make better use of the ocean thermal energy is established in this paper. It is performed by combining constructal theory with finite time thermodynamics. Optimal design of the OTECS is conducted under the conditions of the fixed total heat transfer area of the heat exchangers and the total volume of the dual-pressure turbines. The optimal performance and optimal construct of the OTECS are obtained. The influences of total mass flow rate and mass flow rate ratio of the working fluid, inlet temperatures of the warm and cold seawaters, and wheel diameter ratio of the turbine on the optimization results are analyzed.

Reducing mooring and cable costs through assessment of corrosion, wear, fatigue, and VIV in turbulent tidal flows – Final Report – Baron et al. 2020

The wear, corrosion, fatigue, and VIV (vortex induced vibration) of moorings and cables for tidal energy applications is not yet well understood. Tidal environments contain turbulence, strongly directional currents, and large tidal elevation changes. Floating tidal platforms are moored in highly dynamic environments, and the unsteady hydrodynamic loading on the turbines and the structure is transmitted to its moorings and cables. Accurately predicting the lifetime of cables and moorings requires predicting platform motions and hydrodynamic loads, as well as hydrodynamic loading on the cables. This project was developed to assist in better understanding how to assess cables and moorings in tidal flows, with a focus on understanding VIV.

Wave energy converter physical model design and testing: The case of floating oscillating-water-columns – Portillo et al. 2020

This paper presents the model design and testing processes as part of wave energy projects and the results of experimental testing of two types of oscillating-water-column (OWC) wave energy converters (WEC). The model design aims at the creation of a reduced-scale model to simulate the physical phenomena found in full-scale devices. This design involves several approaches as different physical phenomena do not follow the same similarity conditions, requiring adjustments in scale, materials, and other relevant properties. Besides, the model testing process comprises the necessary planning and actions to execute the tests and post-processing of data. This process is addressed here through model design and testing of two WECs: the coaxial-duct and spar-buoy OWCs.

Boosting power generation from salinity gradient on high-density nanoporous membrane using thermal effect – Mai and Yang 2020

The potential for harvesting energy from salinity gradients using nanoporous membranes has attracted significant attention in the blue energy field. To maximize the harvesting efficiency, it is necessary to both enlarge the effective area of the nanopores and control the nanopore density in such a way as to suppress the ion concentration polarization (ICP) effect. However, this is not easily achieved in large-scale manufacturing due to technology limitations. Accordingly, this study proposes a method for minimizing the ICP in conventional high-nanopore-density membranes by imposing a temperature gradient across the low- and high-concentration salt reservoirs.

News & Press Releases

New floating device to undergo two years of trials at BiMEP facilities – Biscay Marine Energy Platform (BiMEP)

This year, the Basque Country will be the venue for trials on a new floating wave energy converter from Finnish technology developer Wello, to be installed at the BiMEP marine energy test site off the coast at Armintza (Bizkaia). An agreement was signed this month and the device is expected to be installed in the second half of October. The device will now undergo a two-week journey from its current location in northern Scotland. It will then take up position at its moorings in BiMEP, an open sea restricted site for trialing floating electricity generation (wave and wind powered) devices, located 1.5 km off the coast at Armintza.

Bombora taps Kingswood Engineering for mWave intervention tool structure – Offshore Energy

Ocean energy solutions company Bombora has recently selected Kingswood Engineering for the fabrication of the intervention tool structure for the mWave wave energy converter demonstrator. The intervention tool structure is the floating structure which facilitates the subsea installation and removal of modules. In January this year, Bombora said it had contracted more than 70 percent of its £17-million Pembrokeshire

demonstration project. Bombora's mWave demonstrator received full test site consents in the autumn of 2019, with trials scheduled for this year.

Microsoft Share Findings Following Data Centre Trials at EMEC – European Marine Energy Centre (EMEC)

Earlier this summer, marine specialists reeled up a shipping-container-size datacenter coated in algae, barnacles and sea anemones from the seafloor of the European Marine Energy Centre's Billia Croo test site, located off Scotland's Orkney Islands. The retrieval launched the final phase of a years-long effort that proved the concept of underwater datacenters is feasible, as well as logistically, environmentally and economically practical. Microsoft's Project Natick team deployed the Northern Isles datacenter 117 feet deep to the seafloor in spring 2018. For the next two years, team members tested and monitored the performance and reliability of the datacenter's servers.

GKinetic Energy welcome Indonesia to patent family – GKinetic Energy

GKinetic Energy recently announced that they have successfully secured an Indonesian patent. The Indonesian energy market holds huge potential for hydrokinetic solutions such as the GKinetic turbine thanks to a vast island network, excellent resources and growing need for cutting edge, adaptable energy solutions. Many of these islands consist of remote villages with people living without reliable sustainable power. A solution such as the GKinetic hydrokinetic turbine could provide these remote communities with 24/7 clean energy reducing the need for backup generation or 'stop-gap' solutions such as diesel generators.

Ocean Harvesting Technologies secures €300 000 investment from the Lundin Foundation – Ocean Harvesting Technologies

Ocean Harvesting Technologies, a Swedish pre-commercial renewable energy company striving to be a market leader in wave energy technology, recently announced a €300 000 investment from Lundin Foundation. The investment matches a €300 000 grant from the Swedish Energy Agency to provide Ocean Harvesting Technologies with the required funding to prototype the next development phase of the company's novel InfinityWEC technology. InfinityWEC is a modular and scalable wave energy conversion system that is capable of capturing and converting wave energy to electricity in a highly effective and cost-efficient manner.