

TETHYS ENGINEERING BLAST



20 November 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

Waves to Water Prize

The U.S. Department of Energy (DOE) Water Power Technologies Office's (WPTO) [Waves to Water Prize](#) is a 5-stage contest to accelerate the development of wave-powered desalination systems. The [ADAPT Stage](#), now open, challenges competitors to design flexible systems that meet specific site conditions. Successful competitors from this stage will be invited to build a prototype of their system for the CREATE Stage. Applications for the ADAPT Stage are due by 30 November 2020 at 5:00pm EST (10:00pm UTC).

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 WPTO approved facilities. Applications are due by 5:00pm EST (10:00pm UTC) on 4 December 2020.

Selkie Project O&M Survey

The Selkie Project is developing an open source Operations and Maintenance (O&M) decision-support tool for the MRE industry and is seeking industry input to identify what strategies the tool should be able to test and gather information to form generic case-studies. The [survey](#) will be open until 1 December 2020.

EWTEC Abstract Submission Deadline Extended

The University of Plymouth has extended the abstract submissions for the [14th European Wave and Tidal Energy Conference \(EWTEC 2021\)](#) until 1 December 2020. EWTEC 2021 will be held 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 "[Hybrid Systems for Marine Energy Harvesting](#)" are due 30 November 2020. Submissions for "[Dynamic Instability in Offshore Structures](#)" and "[Waves and Ocean Structures](#)" are due 5 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 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. Informational webinars will be held at [2:00pm EST \(7:00pm UTC\) on 17 November 2020](#) and at [3:00pm EST \(8:00pm UTC\) on 3 December 2020](#).

Student/Employment Opportunities

The Dutch Marine Energy Center (DMEC) is currently recruiting for a [Business & Innovation Advisor](#) to assist its clients in the MRE sector. Applications are due by 27 November 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.

Makai Ocean Engineering, Inc. is currently recruiting for an [Ocean, Aerospace, or Mechanical Engineer](#) to assist in the design of innovative subsea systems, including unmanned underwater vehicles and ocean thermal energy conversion plant components.

Ocean Power Technologies is currently recruiting for several positions, including [Senior Mechanical Engineer](#), [Electrical Engineer](#), and [Manufacturing Technician](#). View all available positions [here](#).

Ocean Renewable Power Company (ORPC) is currently recruiting for an [Electrical Engineer](#) to focus on the design of the electrical and control systems for ORPC's hydrokinetic devices and their connection to electrical grids.

Oscilla Power is currently recruiting for a [Hydrodynamicist](#) to assist in validating its concepts and innovations through numerical and physical models of its technology.

Upcoming Events

Upcoming Workshops

As part of the [Ocean Energy Europe Conference & Exhibition \(OEE 2020\)](#), the OceanSET Project will be hosting a free [online workshop](#) from 3:00-4:00pm CET (2:00-3:00pm UTC) on 1 December 2020. OceanSET is a European Horizon 2020 funded project which supports delivery of the European Strategic Energy Technology Plan (SET Plan) for Ocean Energy.

DTOceanPlus will also be hosting a free [online workshop](#) as part of OEE 2020, from 1:30-3:30pm CET (12:30-2:30pm UTC) on 2 December 2020. The workshop will give a general overview of the DTOcean+ software suite of tools, which will be released mid-2021 following validation by industrial partners in the consortium.

The Ocean Power Innovation Network (OPIN) and Ocean DEMO project will also be hosting a free [online workshop](#) as part of OEE 2020, from 3:45-5:15pm CET (2:45-4:15pm UTC) on 2 December 2020. OPIN partners will update participants on their activities and highlight the supports that members can access. The Ocean DEMO project partners will update on their progress to address significant challenges for the industry.

The Horizon 2020 Ocean Energy ERA-Net Cofund project will also be hosting a free [online side event](#) as part of OEE 2020, from 9:45-11:00am CET (8:45-10:00am UTC) on 3 December 2020. This side event will provide an update on the 9 ocean energy research and development projects funded under the Co-funded Joint Call 2017 and announce 3 new projects funded under the Second Joint Call 2019.

ETIP Ocean, the European Technology and Innovation Platform for Ocean Energy, will also be hosting a free [online workshop](#) as part of OEE 2020, from 11:15am-12:30pm CET (10:15-11:30am UTC) on 3 December 2020. This workshop will feature best practices and lessons learnt in specific research and innovation topics for ocean energy development.

Upcoming Webinars

Ocean Energy Europe and Mercator Ocean will be hosting a webinar, “[What can Copernicus Marine Service do for ocean energy?](#)”, from 10:30-11:30am CET (9:30-10:30am UTC) on 24 November 2020. The webinar will feature a presentation and training on the free ocean data offered by the program. Register [here](#).

The Selkie project will be hosting the [third](#) in a series of supply chain webinars from 2:00-3:30pm UTC on 26 November 2020. The webinar will focus on foundations and mooring systems for the tidal stream and wave energy sectors. Register [here](#).

Upcoming Conferences

[Oceanology International \(OI\) 2020](#) will be held online from 1-4 December 2020. The ocean technology exhibition and conference will feature video demonstrations, industry led speed networking, and interactive seminars. Register for free [here](#).

The [WavEC Annual Seminar 2020](#), Portugal and Canada: Advancing the Blue Economy through Intercontinental Collaboration, will be held online from 9-10 December 2020. The conference will feature updates on MRE projects such as HiWave-5 and Waveroller. Register for free [here](#).

New Documents on *Tethys Engineering*

[Efficiency and survivability analysis of a point-absorber wave energy converter using DualSPHysics](#) – Ropero-Giralda et al. 2020

Smoothed Particle Hydrodynamics (SPH) method is used here to simulate a heaving point-absorber with a Power Take-Off system (PTO). The SPH-based code DualSPHysics is first validated with experimental data of regular waves interacting with the point-absorber. The validated numerical tool is then employed to investigate the efficiency of the proposed system. The efficiency, which is defined here as the ratio between the power absorbed by the point-absorber and its theoretical maximum, is obtained for different wave conditions and several arrangements of the PTO. Finally, the effects of highly energetic sea states on the buoy are examined through alternative configurations of the initial system.

[Motion Responses Analysis for Tidal Current Energy Platform: Quad-Spar and Catamaran Types](#) – Junianto et al. 2020

One approach to support floating tidal current turbines is by using a moored catamaran, a barge type platform. Considering its low draft, one might expect that it performs best at typical straits with sea states of small wavelets to small waves. The problem is that the high rotational motion responses of the catamaran due to wave loads tend to reduce the turbine performance. This paper looks for a possibility to deteriorate these rotational responses by introducing a platform with four buoyant legs (quad-spar) considering its

good stability performance. The platforms are moored by four catenary cables as their mooring system. The motion response modeling was undertaken by Computational Fluid Dynamic simulation based on three-dimensional potential flow theory.

Numerical studies on the performance of ammonia ejectors used in ocean thermal energy conversion system – Zhang et al. 2020

Ocean thermal energy conversion (OTEC) has attracted lots of attention for its potential in clean energy production. In order to further improve system efficiencies, a new type of OTEC system using two ammonia ejectors is proposed. Effects of working pressures and geometrical parameters on vapor-vapor ammonia ejectors are studied numerically. The results show that performance characteristics of ammonia ejectors are mostly in subcritical mode for the working conditions of OTEC, which is different from other refrigeration applications. Entrainment ratios of ammonia ejectors range from 0.44 to 1.68 based on the working conditions in the present work.

The Influence of Ramp Shape Parameters on Performance of Overtopping Breakwater for Energy Conversion – Musa et al. 2020

Overtopping breakwater for energy conversion (OBREC) is integration between breakwater and wave energy converter that allows incoming waves to be stored in the reservoir. The higher the overtopping amount collected in a reservoir, the greater the energy generated will be. Hence, most of the overtopping concept has attempted to maximize the inclusion of water in the reservoir by optimizing geometrical parameters, particularly the ramp angle. There is still limited knowledge on the influence of different ramp shape parameters towards the overtopping wave. This paper aimed to push the border of available knowledge by investigating the influence of the ramp shape parameters to the overtopping wave discharge through simulation and experimentation.

Twin Marine Hydrokinetic Cross-Flow Turbines in Counter Rotating Configurations: A Laboratory-Scaled Apparatus for Power Measurement – Doan et al. 2020

This article proposes an experimental apparatus design to measure the power of a cross-flow marine hydrokinetic turbine system operating in a laboratory water tunnel. Data, from one Hall sensor output signal, was processed to capture the three types of torque exerted on the turbines: mechanical loss, brake, and hydrodynamic torque. The method was then applied to compare the power of a twin turbine system in different counter-rotating configurations. Controlled by a hysteresis brake, the tip-speed-ratio was varied in a constant freestream velocity of 0.316 m/s. While the braking torque was independent of the speed, the mechanical loss was found to depend on the system rotational speed and the amount of mass mounted on the mechanical support.

From non-renewable energy to renewable by harvesting salinity gradient power by reverse electro dialysis: A review – Zoungrana and Çakmakci 2020

Wind and solar energy are leaders in the renewable energy market, but huge and accessible other energy sources such as salinity gradient power (SGP) exist and need to

be collected to contribute to the global energy demand. SGP is mainly extracted with reverse electrodialysis (RED) and pressure retarded osmosis (PRO) systems. The applicability of RED-SGP in a natural environment is the current challenge due to the low power density and the high levelized cost of energy of the process. The properties of the ion-exchange membranes, the spacers, the feed solutions characteristics and salinity, and the electrodes are among the most important parameters that control the performance of RED-SGP processes.

News & Press Releases

[New offshore renewables strategy sets the stage for large-scale deployment of ocean energy](#) – Ocean Energy Europe

The new European Offshore Renewable Energy Strategy, published today, clearly acknowledges the massive industrial and environmental benefits that ocean energy can bring to Europe. Ocean Energy Europe welcomes this important step towards scaling up a brand-new European industry, while calling for swift, concrete implementation of the Strategy's actions. The Strategy's commitment to support a pipeline of 100MW of ocean energy projects in the water by 2025, and at least 1 GW by 2030, will provide a boost to the sector in the coming decade. A 2050 deployment target of 40GW provides a good starting point for building out the sector over the longer term.

[CorPower awarded ten-year marine license by Portuguese authorities](#) – CorPower

CorPower Ocean is set to unleash a world-leading wave energy project in the Atlantic Ocean after securing a 10-year license. The TUPEM (title of private use of the maritime space) license – awarded by the national Directorate-General for Natural Resources – provides a 'Permit for the Private Use of the Maritime Space' up to 12 miles off the coast of Aguçadoura in northern Portugal. CorPower Ocean Country Manager Miguel Silva said the permit unlocks the demonstration phase of the firm's flagship HiWave-5 project, paving the way for a new class of high efficiency wave energy converter products.

[Mocean Energy raises £850k to bring power to subsea oil and gas](#) – Mocean Energy

Mocean Energy has secured major new investment to accelerate the commercialisation of their ground-breaking wave energy technology. The Edinburgh start-up has raised £612,000 equity seed funding plus £250,000 from Innovate UK to advance the design of their Blue Star wave machine and drive its adoption in subsea oil and gas. Earlier this year Mocean Energy announced a pilot project with the Oil and Gas Technology Centre (OGTC), oil major Chrysaor and subsea specialists EC-OG and Modus to study the potential to use their Blue Star prototype to power a subsea battery and a remote underwater vehicle.

[From the Garage to the Open Sea: NREL's Scott Jenne To Patent Inflatable Wave Pump Design](#) – National Renewable Energy Laboratory (NREL)

Sometimes innovation comes from unlikely places—and tomorrow's game-changing wave energy device may have just been born out of a Colorado garage. As a potential renewable energy source, wave energy holds promise nearly as immense as the sea itself. For this exciting new technology to make waves in our future energy generation mix, though, the math must add up. NREL researcher Scott Jenne may have inched the industry a bit closer to the affordable wave energy of the future with his design for a reliable, easily transportable, inflatable wave pump that can withstand large hydrodynamic loads and requires minimal installation and maintenance to boot.

DeepStar® Awards Subsea Systems Engineering Contract to Ocean Power Technologies – Ocean Power Technologies (OPT)

OPT has received a DeepStar® project award to study the deployment and operational requirements of utilizing OPT's PB3 PowerBuoy® to provide remotely controllable zero carbon power for deepwater subsea oil production applications. "Remote Zero Carbon Power for Electric Subsea Operations" is a techno-economic feasibility study funded by the DeepStar® CORE program and supported by project champion Total E&P Research and Technology USA. The project will explore utilizing OPT's PB3 PowerBuoy® and a subsea battery to reduce the cost and carbon emissions associated with conventional means of powering and controlling subsea oil and gas production equipment. The study will consider water depths of 1000, 2000, and 3000 meters.

Carnegie, Oceantera to Collaborate on Wave Energy Projects – Marine Technology News

Wave energy technology developer Carnegie Clean Energy has signed a memorandum of understanding with Oceantera, to share knowledge and expertise on wave energy development. Carnegie and Oceantera - which is a joint venture between UK's Aquatera and Singapore's OceanPixel - will cooperate and share knowledge on wave energy markets, customer requirements, and the CETO technology. CETO is a fully submerged, point absorber type wave energy technology. The two companies will investigate potential CETO project opportunities in South East Asia or other mutually agreed locations. They've also committed to exploring collaborative opportunities to use Carnegie's Garden Island Microgrid with a view to supporting the development of the wave energy industry.