

TETHYS ENGINEERING BLAST



22 October 2021

Tethys Engineering is an online knowledge base that facilitates the exchange and dissemination of information on the technical and engineering aspects of marine energy. 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 marine energy community, please send it to tethys@pnnl.gov for consideration.

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Announcements

MHK Graduate Student Research Program

The US Department of Energy (DOE) Water Power Technologies Office is now accepting applications for the [Marine and Hydrokinetic \(MHK\) Graduate Student Research Program](#). The program is open to doctoral students at US institutions and is designed to advance their research by providing expertise, resources, and capabilities. Applications are due 10 December 2021.

EnergyTech University Prize

The US DOE Office of Technology Transitions recently launched the [EnergyTech University Prize](#), a collegiate competition challenging multidisciplinary student teams to develop and present a business plan that leverages DOE national laboratory-developed and other energy technologies. The Explore Phase will close on 31 January 2022.

Calls for Abstracts

The [Call for Student Research Posters & Videos](#) for the [Marine Renewables Canada 2021 Annual Conference](#) is open through 25 October 2021. Marine Renewables Canada 2021 will take place in Halifax, Nova Scotia on 24-25 November 2021.

The International Oceanographic Data Exchange is accepting abstracts for the [International Ocean Data Conference 2022 - The Data We Need for the Ocean We Want](#) through 29 October 2021. The conference will take place online and in Sopot, Poland on 14-16 February 2022.

The [Call for Abstracts](#) for the [All-Energy & Dcarbonise 2022 Exhibition and Conference](#) is open through 17 December 2021. The event will take place in Glasgow, UK on 11-12 May 2022.

Calls for Papers

Energies is accepting submissions for several Special Issues, including "[Advanced Analysis and Techniques of Wave Energy Conversion and Integrated Storage](#)" (due 17 November 2021), "[Wave Energy Converters and Fault Tolerant Control](#)" (due 20 December 2021), and "[Permanent Magnet Machines for Wave Energy Converters](#)" (due 20 January 2022).

The *Journal of Marine Science and Engineering* is accepting submissions for several Special Issues, including "[Numerical Analysis and Monitoring Techniques of Offshore and Coastal Structures and the Marine Environment](#)" (due 20 November 2021), "[Wave Climates](#)" (due 31 December 2021), and "[From High-Fidelity Models towards Engineering Tools for the Design of Offshore Renewable Energy Technologies](#)" (due 15 January 2022).

Ocean Engineering is accepting submissions for two future Special Issues, "[Hybrid Numerical Modelling in Wave-Structure Interactions](#)" (due 15 February 2022) and "[Safety, Reliability and Risk Analysis of Modern Marine Power and Energy Systems](#)" (due 20 February 2022).

Funding & Testing Opportunities

The US DOE plans to provide \$37 million for small businesses pursuing climate and energy research & development projects through its Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs. Letters of intent for the [SBIR/STTR Phase 2 Release 1 FOA](#) are due by 5:00pm EST (10:00pm UTC) on 9 November 2021.

The US Testing Expertise and Access for Marine Energy Research (TEAMER) Program is now offering limited [open water support for marine energy testing](#) through its facility network. Applications for the next TEAMER Request for Technical Support are due 16 December 2021.

The European Maritime, Fisheries and Aquaculture Fund has launched a [Call for Proposals](#) to support strategic collaboration in the Atlantic, Black Sea, and Western Mediterranean. Proposals for Topic 1, "[Innovative multi-use projects combining offshore renewable energy with other activities and/or with nature protection in the Atlantic](#)", are due 12 January 2022.

Student & Employment Opportunities

WavEC Offshore Renewables is recruiting a [Researcher in Economics](#) to conduct tasks related to ocean economics and financial analysis, with a particular focus on offshore renewable energies. Applications are due 27 October 2021.

The Pacific Marine Energy Center at Oregon State University is recruiting a [Post-Doctoral Scholar](#) to support its cutting-edge wave and offshore wind renewable energy research, development, and testing programs. Applications are due 1 November 2021.

The University of Plymouth is seeking a [COAST Research Fellow](#) to undertake research in marine and offshore renewable energy and carry out physical model experiments in the Coastal, Ocean and Sediment Transport (COAST) Laboratory. Applications are due 7 November 2021.

The University of Plymouth is also seeking an [ORE Integration Research Fellow](#) to investigate the integration of offshore renewable energy (ORE) using hydrogen and comparative analysis of the socioeconomic and environmental aspects. Applications are due 21 November 2021.

The Environmental Research Institute at the University of the Highlands and Islands are recruiting for a [Research Fellow - Offshore Renewable Energy and the Environment](#) to work with Ørsted to design novel environmental and ecological monitoring techniques and next-generation oceanographic measurement platforms. Applications are due 22 November 2021.

Upcoming Events

Upcoming Workshop

The University Marine Energy Research Community ([UMERC](#)), a new initiative funded by the US DOE and administered by the Pacific Ocean Energy Trust, is hosting a [Workshop Series](#) to engage with the community and develop a Research Landscape. The first workshop will take place on 3 November 2021 from 9:00-11:00am PDT (4:00-6:00pm UTC). Register [here](#).

Upcoming Webinars

Interreg North-West Europe's Ocean Power Innovation Network is hosting a webinar titled, "[How internationalisation can support collaborative innovation](#)", on 5 November 2021. The webinar will present PLOCAN's (The Oceanic Platform of the Canary Islands) experience on how international collaboration has supported projects. More information coming soon.

Offshore Renewable Energy Catapult is launching a series of half-hour lunchtime events, [The Tidal Power Express Event Series](#), to introduce key tidal power innovators. The first event, at 1:00pm UTC on 24 November 2021, will feature Nova Innovation. Register [here](#).

Upcoming Conferences

WavEC Offshore Renewables, in collaboration with the Embassy of Japan in Portugal, is hosting the [WavEC Annual Seminar](#) on 30 November 2021 online. Register for free [here](#).

The American Geophysical Union (AGU) is hosting the [AGU Fall Meeting 2021](#) online and in New Orleans, US on 13-17 December 2021. Early bird registration ends 3 November 2021.

New Documents on *Tethys Engineering*

[White Paper on Ocean Thermal Energy Conversion \(OTEC\) – Ocean Energy Systems 2021](#)

This White Paper on Ocean Thermal Energy Conversion (OTEC) describes worldwide projects, different options to explore the thermal resource, the present status of the technology and barriers for its development, concluding with key recommendations to move beyond small demonstration plants to pre-commercial prototype units. This White Paper was developed as a task under the International Energy Agency's Ocean Energy Systems Technology Collaboration Programme (OES) to provide for Policymakers and Developers an update on the potential of OTEC, its history, present state of development and future prospects.

[Seasonality of turbulence characteristics and wave-current interaction in two prospective tidal energy sites – Perez et al. 2021](#)

Velocity fluctuations caused by unsteady flows substantially increase mechanical loads on tidal turbine blades and represent a major challenge to tidal energy converters. Overcoming the challenges posed by high levels of turbulence and large waves is a significant concern for turbine developers. Here we quantify turbulence and characterize wave-turbulence interaction in two prospective tidal energy sites in Australia: Banks Strait and Clarence Strait. Turbulence characterization was derived from deployments lasting up to 3 months. Our datasets represent the longest turbulence measurements at tidal sites published to date, setting a benchmark in tidal energy site characterization.

[Effects of power take-off parameters and harvester shape on wave energy extraction and output of a hydraulic conversion system – Gao & Xiao 2021](#)

Considering nonlinear hydrodynamic forces of a harvester in irregular waves and a nonlinear hydraulic power take-off system, a time-domain nonlinear motion model and nonlinear hydraulic power take-off models are established to investigate the harvester motion response, the hydraulic system dynamic performance, the power extraction, the motor output power and efficiency. Matlab/Simulink is used to establish and simulate the system models. The convolution identification of nonlinear radiation force is based on a state-space model. Under a given sea state, for cone, cylinder and hemisphere, the optimal hydraulic power take-off parameters are predicted based on a genetic algorithm for the maximum motor output power.

[ELEMENT D12.3 French Estuary Site Assessment – Castillo 2021](#)

This work was realized to satisfy deliverable D12.3 as part of the work package 12 of the ELEMENT (Effective Lifetime Extension in the Marine Environment for Tidal Energy) project. It aims to assess French estuary and river sites' potential for tidal stream energy projects. To achieve this work a multicriteria analysis was performed, including evaluation of technical criteria (such as current velocity, potential, and water depth), socio-economic criteria (such as employment and gross added value created), regulation

applicable to France (coastline regulation, Natura2000), human activities (including fishery or recreational boating) and environmental parameters (migratory fishes).

[A decision-making process for wave energy converter and location pairing](#) – Choupin et al. 2021

Wave energy converters harvest energy from waves and help reduce greenhouse gas emissions. This research covers major aspects of the wave energy field including converters and installation-locations, and proposes a Decision-Making Process to identify optimum converter-location pairs for wave energy harvesting. This Process is based on the wave energy converter Selection-Guideline arising from essential features, and the synthesis of previous works so far focused on pinched-point locations. This Process yields a single map, denoting hotspot-areas for energy harvesting, and thereby wave-farm installations, based on multiple input information from the converters (including performance and installation depth), wave climate, resource availability, etc.

[Active Control of Irreversible Faradic Reactions to Enhance the Performance of Reverse Electrodialysis for Energy Production from Salinity Gradients](#) – Oh et al. 2021

Irreversible faradic reactions in reverse electrodialysis (RED) are an emerging concern for scale-up, reducing the overall performance of RED and producing environmentally harmful chemical species. Capacitive RED (CRED) has the potential to generate electricity without the necessity of irreversible faradic reactions. However, there is a critical knowledge gap in the fundamental understanding of the effects of operational stack voltages of CRED on irreversible faradic reactions and the performance of CRED. This study aims to develop an active control strategy to avoid irreversible faradic reactions and pH change in CRED, focusing on the effects of a stack voltage (0.9–5.0 V) on irreversible faradic reactions and power generation.

News & Press Releases

[Carnegie Launches MoorPower Project](#) – Carnegie Clean Energy (Carnegie)

Carnegie has been awarded funding and launched of the MoorPower™ Scaled Demonstrator project in conjunction with prominent research institute, the Blue Economy Cooperative Research Centre (Blue Economy CRC). MoorPower™ is a CETO derived wave energy product designed for moored vessels and offers a solution to the challenge of securing clean and reliable energy for offshore activities, reducing reliance on diesel generation. The initial target market for MoorPower™ is offshore vessels such as feeding barges for the aquaculture sector, but the future market is broader and includes the many other offshore operations that require energy.

[BladeRunner launches first full-scale hydrokinetic prototype](#) – Offshore Energy

BladeRunner Energy, in collaboration with the Alaska Center for Energy and Power, has launched and tested its first full-scale hydrokinetic prototype in Alaska. The BladeRunner design places the turbine rotor at the end of a flexible but torsionally stiff cable that allows the turbine to submerge while keeping the generator housing on the water surface. This system architecture aims to address the multiple hurdles that exist for deploying hydrokinetic devices in remote riverine locations, with the management of debris being a key factor. This first testing campaign investigated rotor stability, deployment and retrieval methods, and debris resilience.

Marine Power Systems and Marine2o Join Forces to Produce Green Hydrogen – Marine Power Systems

Marine Power Systems and Marine2o are to work together to develop integrated solutions to support the production of green hydrogen utilising marine vessels to transport this energy vector to market. This first collaboration will support the developing pathway in the UK and other markets to deploy MPS' innovative offshore wind and wave energy capture devices to produce green hydrogen. Marine Power System's technology will play a crucial role in Marine2o plans to decarbonise ports and urban water ways around the UK and internationally. Marine Power Systems have developed a flexible floating technology that is the only solution of its type that can be configured to harness wind and wave energy either as a combined solution or on their own.

Ports set to drive uptake of wave energy projects – Offshore Energy

Portuguese, Dutch and Spanish wave energy stakeholders recently came together to mark the successful wrap-up of the BASEPOINT project, a laboratory test programme for the Symphony wave energy converter at Sines Tecnopolo in Portugal. During the event, Dutch wave energy developer Teamwork Technology presented its Symphony wave energy converter, a submerged point absorber that converts wave pressure into electricity via an innovative hydraulic power take-off (PTO) system. WEDGE Global, which is developing a point absorber device with a linear electrical PTO, and Kymaner, supplier of air turbines for oscillating water column solutions, also presented their achievements.

Eco Wave Power and CIMC OEI Enter into MOU for the Development and Commercialization of the Eco Wave Power's Technology in The People's Republic of China – Eco Wave Power

Eco Wave Power recently announced the signing of a Memorandum of Understanding (MOU) with CIMC Offshore Engineering Institute Co., Ltd (CIMC OEI). According to the terms of the MOU, the parties would work towards the promotion of a pilot plant in China based on Eco Wave Power's technology and explore possibilities for offshore application of the Eco Wave Power technology. The parties also plan to collaborate on preparing and submitting written joint submissions to various state and municipal entities in the People's Republic of China. In addition, it is CIMC OEI's intention to introduce Eco Wave Power to potential clients and support negotiations with CIMC OEI's existent clients and ports within China, for the purpose of technology commercialization.