

TETHYS ENGINEERING BLAST



4 November 2022

[Tethys Engineering](#) is an online knowledge hub 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. Email tethys@pnnl.gov to contribute!

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Announcements

New PRIMRE Videos

The [Portal and Repository for Information on Marine Renewable Energy \(PRIMRE\)](#) is a free, online system that provides access to a variety of U.S. marine energy resources and information. Watch the new [PRIMRE Overview video](#) and [Contributing to PRIMRE video](#) to learn more.

ORISE Applications

The U.S. Department of Energy's (DOE) Water Power Technologies Office (WPTO) and Oak Ridge Institute for Science and Education (ORISE) recently opened applications for the next cohort of students for the [Marine Energy Graduate Student Research Program](#). The program is accepting applications from master's and doctoral students with a marine energy-focused research thesis and/or dissertation at a U.S. institution. Applications are due 2 December 2022.

SULI & CCI Applications

The Department of Energy (DOE) Office of Science is now accepting applications for the [Science Undergraduate Laboratory Internships \(SULI\)](#) program and the [Community College Internships \(CCI\)](#) program. Interns will work directly with national laboratory scientists and engineers that support the DOE mission. The application deadline is 10 January 2023.

Calls for Abstracts

The [Call for Abstracts](#) for the [International Ocean Data Conference - II \(IODC-II\)](#) is now open through 15 November 2022. IODC-II will take place on 20-21 March 2023 in Paris, France.

The [Call for Abstracts](#) for [OCEANS 2023 Limerick Conference & Exhibition](#) is now open through 20 December 2022. The event will take place on 5-8 June 2023 in Limerick, Ireland.

The [Call for Abstracts](#) for the [15th European Wave and Tidal Energy Conference Series \(EWTEC 2023\)](#) is now open through 28 January 2023. Full papers will be due 27 May 2023. EWTEC will take place on 3-7 September 2023 in Bilbao, Spain.

Calls for Papers

The *Journal of Marine Science and Engineering* is accepting submissions for several Special Issues, including “[New Frontiers in Marine Energy Conversion Technologies](#)” (due 25 December 2022) and “[Marine Renewable Energy and the Transition to a Low Carbon Future](#)” (due 15 January 2023).

Energies is accepting submissions for several Special Issues, including “[Advanced Control Technology of Integrated Wind and Wave Energy Conversion System](#)” (due 19 January 2023), “[Tidal Energy: Latest Advances and Prospects of Tidal Current Turbine](#)” (due 19 January 2023), and “[Wave Energy Technologies and Optimization Methods](#)” (due 26 January 2023).

Funding & Testing Opportunities

The U.S. DOE’s WPTO has issued a notice of intent to release a \$35 million funding opportunity, “[Bipartisan Infrastructure Law \(BIL\), Section 41006\(a\)\(2\): U.S. Tidal Energy Advancement](#)”, in early 2023 to develop a tidal or river current research, development, and demonstration site and to support in-water demonstration of at least one tidal energy system.

The U.S. Testing and Expertise for Marine Energy Research (TEAMER) program is now accepting [Request For Technical Support \(RFTS\) 8](#) applications through 4 November 2022. Developers can apply for support in numerical modeling and analysis, bench/lab or tank/flume testing, and open water activities. Visit the [TEAMER site](#) for the complete RFTS schedule.

The U.S. DOE’S WPTO has also released a \$10.3 million funding opportunity, “[Marine Energy Systems Innovation at Sea](#)”, to accelerate the development and testing of marine energy technologies with a focus on wave and ocean current. Concept papers are due 2 December 2022.

The European Commission has launched two new [Calls for Proposals](#) under the European Maritime, Fisheries and Aquaculture Fund aimed at supporting careers and regional projects for a sustainable blue economy in EU sea basins. Proposals are due 31 January 2023.

Student & Employment Opportunities

Newcastle University is recruiting a [Research Assistant/Associate in Electrical Machines and Wave Energy](#) to assist in the design build and deployment of a small-scale wave energy device. Applications are due 11 November 2022.

Oregon State University is seeking a [Marine Energy Testing Manager](#) to manage internal and external outreach and engagement with stakeholders including faculty, testing facilities, and marine industries. Applications are due by 16 November 2022 for full consideration.

University College Cork and MaREI are recruiting a [Research Support Officer](#) to lead the design, procurement, commissioning, and operation of the data acquisition system for the WEDUSEA (Wave Energy Demonstration at Utility Scale to Enable Arrays) project. Applications are due 18 November 2022.

European Marine Energy Centre (EMEC) is seeking a [Project Development Coordinator](#) to identify, develop, and contract opportunities for the Islands Centre for Net Zero (ICNZ) to grow its research and development activities. Applications are due 23 November 2022.

EMEC is also seeking a [Commercial Manager](#) to identify, secure and manage new commercial opportunities to support the long term growth of the company. Applications are due 25 November 2022.

University of Southampton is offering a [PhD opportunity](#) to develop efficient deep water anchoring systems for floating offshore renewable energy infrastructure. Applications are due 9 December 2022.

The Institute for Cyber-Physical Infrastructure and Energy at Lehigh University is inviting applications for a tenure-track [Assistant Professor in Coastal Infrastructure and Energy](#) to begin August 2023. Applications are due 31 December 2022.

Upcoming Events

Upcoming Webinar

The U.S. DOE WPTO is hosting its [Semiannual Stakeholder Webinar](#) on 9 November from 1:30-3:00pm EST (6:30-8:00pm UTC). The webinar will feature the results of the 2022 Peer Review process and provide updates on major accomplishments and current funding opportunities. Register [here](#).

Upcoming Conferences

The 5th International Conference on Renewable Energies Offshore (RENEW 2022) is taking place on 08 - 10 November 2022 in Lisbon, Portugal. View the programme [here](#). Register [here](#).

WavEC Offshore Renewables, in collaboration with the Embassy of Spain in Portugal, is organizing the [WavEC Annual Seminar 2022 & TWIND Final Event](#) on 10 November 2022 in Lisbon, Portugal. Register for free [here](#).

The European Commission, with the support of Ireland Ministries and National Maritime College, is organizing [Mission Restore our Ocean and Waters by 2030: an Atlantic-Arctic Lighthouse](#) on 24-25 November 2022 in Cork, Ireland and online. Register [here](#).

New Documents on *Tethys Engineering*

[Increased efficiency of hydrokinetic turbines through the use of an obstacle on the channel bottom](#) – Espina-Valdés et al. 2022

Nowadays, the growing demand for energy and the current shift towards the eradication of fossil fuels has led to continuous research into and development of alternative clean energies. Among these, one of the least investigated is the extraction of hydrokinetic energy in hydraulic channels. This article highlights an investigation focused on improving the performance of a hydrokinetic turbine installed in a hydraulic channel through the use of an obstacle on the channel bottom, thus providing a solution involving minimum investment and without the need for maintenance. It was found through a series of tests carried out in a hydrodynamic water tunnel that the power produced increases with the height of the obstacle. In addition, a validated numerical model facilitated the completion of the research by studying the influence of the height of the obstacle on the flow rate that passes through the turbine rotor.

[A framework for feasibility-level validation of high-resolution wave hindcast models](#) – Ahn et al. 2022

The value of long-term wave hindcasts for investigating wave climates, wave energy resources, and extreme wave conditions has motivated research developing, calibrating and validating wave hindcast models. Past hindcast model validation studies examined the accuracy in modeling bulk wave parameters of overall sea states without considering the dependency of the model's skill within different sea states. In the present study, a framework for wave hindcast model validation is developed by examining the model accuracy for the most frequently occurring sea states, sea states contributing the most energy to total wave power, sea states associated with hurricane events, and those with the largest model error.

[Small-scale energy potential from salinity gradients at a transboundary riverine estuary in the Yucatán Peninsula](#) – Alcérreca-Huerta et al. 2022

This study estimates the environmental and technical energy potential of the thermohaline conditions in the Mexico–Belize riverine estuary. Site-specific conditions were considered based on monthly water temperature, salinity, and river discharge field

measurements along the Hondo River estuary from 2018 to 2019. The practical extractable energy assessment described the possibility of outlining a hypothetical ~3 MW salinity gradient energy (SGE) plant, which could support 5.4–15.1% of houses in the main urbanised area. Low-income housing benefits can be viable for up to 7700 houses with either mechanical or natural ventilation under tropical weather conditions. Alternatively, this energy may be directed towards commercial shared zones between Mexico and Belize.

Tidal turbine performance and loads for various hub heights and wave conditions using high-frequency field measurements and Blade Element Momentum theory – Perez et al. 2022

Understanding the impacts of unsteady flows on tidal turbine performance and loadings prior to device deployment is essential for mitigating the effects of large hydrodynamic forces and avoiding premature fatigue. High-frequency velocity measurements from an energetic tidal channel were fed into a model that couples Blade Element Momentum (BEM) theory with dynamic stall and rotational augmentation corrections. A model turbine operating in real-world conditions was used to investigate different hub submergence depths and also extreme wave conditions. Mean turbine coefficients were more affected by varying levels of shear than by waves while standard deviations were more sensitive to shear than to the proximity of surface waves.

Sea trial results of the biradial and Wells turbines at Mutriku wave power plant – Gato et al. 2022

Open sea experience is essential to develop wave energy technology and reduce costs. One of the goals of the EU H2020 OPERA project was to advance the development of the biradial self-rectifying air turbine from TRL4 to TRL7. For this purpose, a 30 kW turbo-generation prototype was fabricated and tested at IST variable flow test rig, the shoreline Mutriku wave power plant and the offshore IDOM MARMOK-A5 spar-buoy device. The paper presents and analyses detailed operational data of the OPERA's 30 kW turbo-generation set at the oscillating water column device of the Mutriku harbour breakwater and unveils operational data of the Mutriku's Wells turbines collected during the testing period. The sea trials at the Mutriku wave power plant demonstrated that the biradial turbine exhibits a mean time-averaged peak efficiency 37% higher than the Wells turbines in operation at the power plant.

Optimization Design of the Organic Rankine Cycle for an Ocean Thermal Energy Conversion System – Yang et al. 2022

This study selects five parameters as decision variables for the optimization design of an ocean thermal energy conversion system, including the evaporating temperature, the condensing temperature, the pinch-point temperature difference between the evaporator and condenser, and the working fluid flow rate. The optimization goal is to maximize the net output power per unit area and the exergy efficiency. The final scheme is comprehensively screened out from the Pareto solution set through some evaluation

indexes. Finally, this study also analyzes the effects of four decision variables on the optimization objectives and the evaluation indexes. This study finds that evaporating temperature and condensing temperature have similar effects on the objective functions.

News & Press Releases

[AWS Waveswing trials exceed expectations](#) – AWS Ocean Energy

AWS Ocean Energy confirmed highly encouraging results from the current phase of sea trials of its wave energy device at the European Marine Energy Centre (EMEC) in Orkney. In a key highlight of the scientific testing programme to date at EMEC's Scapa Flow test site, the Waveswing wave energy converter captured average power over 10kW and peaks of 80kW, during a period of moderate wave conditions. These figures exceeded the developer's own predictions by 20%. Other key findings underline the survivability potential of the subsea Waveswing which continued to deliver power in poor weather conditions. AWS demonstrates this in the following simple but highly effective video clip, shot during Force 10 gales, showing a steel nut suspended on a string inside the device.

[ORPC Canada deploys its first hydrokinetic power system in Canada](#) – Ocean Renewable Power Company (ORPC)

ORPC Canada recently announced it is launching its first hydrokinetic power system in Canada, called the RivGen Power System, which generates proven, emission-free electricity from free-flowing rivers and tidal currents. Installed in partnership with the Canadian Hydrokinetic Turbine Test Centre (CHTTC) located at Seven Sisters Falls, Manitoba, the RivGen Power System can provide baseload renewable energy to remote communities and will play a key role in supporting Canada's goal for Net Zero Emissions by 2050. The RivGen device was fabricated by Stace in Quebec, then shipped to Manitoba where the device was re-assembled near the CHTTC with the help of Canadian partners and local contractors.

[Wavepiston starts accelerated wave energy tech testing](#) – Offshore Energy

Danish wave energy company Wavepiston has started accelerated tests of its technology at Technical University of Denmark's (DTU) test facility as part of the EU-backed VALID (Verification through Accelerated testing Leading to Improved wave energy Designs) project. In October 2022, Wavepiston kicked off the campaign for accelerated tests, which will enable the company to speed up the number of iterations of its wave energy system and shorten the necessary testing time prior to an offshore installation, ultimately reducing the risk of failure. Wavepiston is testing its power take-off (PTO) system, which is based on hydraulic pumps that send raw, pressurized seawater to a land-based turbine.

GKinetic Energy Announce a €2 Million Commercial Ramp Up Funding Round – GKinetic Energy

Irish based hydrokinetic developer, GKinetic Energy is delighted to announce the opening of a €2 million funding round focused on ramping up Commercialization activities, building out the sales pipeline to 2025 and execution of a hiring and expansion plan. GKinetic Energy's innovative hydrokinetic turbines enable clean, reliable energy generation. The company wishes to become the go-to supplier of distributed hydro solutions that can unlock clean energy from free flowing water just about anywhere and within a matter of hours. With over €5m soft funding gone into extensive development of the tech and numerous deployments completed, October last year saw GKinetic take strategic equity investment for the first time from Oslo based VC 'Katapult Ocean' and participate in their world-renowned accelerator programme.

Dutch company secures close to €5 million for tidal power technology – Offshore Energy

Dutch company SeaCurrent has closed a multi-million euro funding round, securing support from major organizations for the development of its tidal energy technology and projects. Together with the existing shareholders, SeaCurrent has welcomed EIT InnoEnergy, PMH Investments, Invest-NL, FOM (Fund for Frisian companies), and NOM (Investment and Development Agency for the Northern Netherlands) as its new shareholders, who have contributed over €4.8 million to the company. SeaCurrent is developing an innovative tidal energy converter, the TidalKite. Since 2016 and various scale model tests – at MARIN and in the Wadden Sea – SeaCurrent is now working towards a demonstration of the fourth model of the TidalKite at Ameland.