

TETHYS ENGINEERING BLAST



10 March 2023

[Tethys Engineering](#) is an online knowledge hub that facilitates the exchange and dissemination of information on the technical and engineering aspects of marine energy, as part of the [PRIMRE](#) universe. 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

DOE Request for Information

The U.S. Department of Energy (DOE) Wind Energy Technologies Office (WETO) and Water Power Technologies Office (WPTO) are [requesting information](#) on university-based offshore wind energy centers and the co-location of aquaculture and ocean renewable energy. Responses are due by 5:00pm EDT (9:00pm UTC) on 15 March 2023.

Calls for Abstracts

The Partnership for Research in Marine Renewable Energy (PRIMaRE) has opened the [Call for Abstracts](#) for the [10th PRIMaRE Conference](#) through 10 March 2023. The conference will take place on 27-28 June 2023 in Bath, England.

The Pan American Marine Energy Conference (PAMEC) Association is now accepting [Expressions of Interest](#) to submit an extended abstract for presentation at [PAMEC 2024](#) through 15 March 2023. Extended abstracts will be due 26 June 2023. PAMEC will take place on 22-24 January 2024 in Barranquilla, Colombia, with pre-conference workshops on 19-20 January 2024.

The Call for Abstracts for the [9th International Ocean Thermal Energy Conversion Symposium](#) is open through 15 March 2023. The event will take place 4-5 May 2023 in Houston, Texas, U.S.

The [Call for Abstracts](#) for the [University Marine Energy Research Community \(UMERC\) 2023 Conference](#) is now open through 23 April 2023. UMERC 2023 will take place on 4-6 October 2023 in Durham, New Hampshire, U.S. Apply for travel/registration support by 15 June 2023.

Funding & Testing Opportunities

The European Commission has also launched the third call for large-scale projects under the [European Union Innovation Fund](#). The call is open until 16 March 2023 for projects located in European Union Member States, Iceland, and Norway.

The Horizon Europe Framework Programme recently launched a funding opportunity entitled, “[Demonstration of sustainable tidal energy farms](#)”, to de-risk tidal technology development and increase knowledge of potential environmental impacts. Applications are due 30 March 2023.

The Sustainable Blue Economy Partnership, a Horizon Europe co-funded partnership, recently announced its first [Joint Transnational Call](#) to support transnational research and innovation projects related to the blue economy. Pre-proposals are due 14 April 2023.

The U.S. DOE has opened applications for the [Energy Transitions Initiative Partnership Project \(ETIPP\)](#) for remote and island communities seeking technical assistance to transform their energy systems and increase energy resilience. An [informational webinar](#) will take place at 1:00pm MDT (7:00pm UTC) on 11 April 2023. Applications are due 19 May 2023.

The U.S. DOE's Office of Clean Energy Demonstrations [recently announced](#) \$300 million for projects that increase energy affordability and promote climate resilience and \$15 million for a [prize competition](#) to help rural communities build capacity needed for clean energy development and deployment. Concept papers for the [funding opportunity](#) are due 14 April 2023, and submissions for the first round of the prize are due 24 May 2023.

Student & Employment Opportunities

The European Marine Energy Centre is looking for a [Project Officer](#) to provide support with planning, resourcing, delivering, and monitoring projects and an [Environmental Officer](#) to implement its environmental monitoring program and provide guidance to manage risks associated with marine renewables. Applications are due 12 and 19 March 2023, respectively.

The Fundy Ocean Research Centre for Energy is recruiting an [Operations Manager](#) who will be responsible for operational oversight, stakeholder and community engagement, financials, and some business development. Applications are due 13 March 2023.

The Western Norway University of Applied Sciences has a vacancy for a [PhD Research Fellow](#) in hydrodynamics of floating ocean renewable energy technologies. The position will contribute to the HYDROMORE project, which seeks to establish new best-practice approaches for designing future ocean energy mooring systems. Applications are due 15 March 2023.

Pacific Northwest National Laboratory is seeking a [Coastal Modeler](#) to conduct numerical simulations using wave and coastal circulation models and analyze remotely sensed, in-situ collected, and numerically modeled datasets. Applications are due 24 March 2023.

The University of Vigo is seeking a [Post-doctoral Researcher](#) to join a project on the survivability of wave energy converters. The role will involve numerical modelling of point absorbers, validating experimental data, and researching and improving open-source solvers.

Upcoming Events

Upcoming Webinars

ETIP Ocean, the European Technology & Innovation Platform for Ocean Energy, is organizing a webinar on the development of a Lift-Based Wave Energy Converter (LiftWEC) on 21 March 2023 from 3:00-4:00pm UTC. This webinar will act as an end of project dissemination event where work completed will be outlined and key findings shared. Register [here](#).

The European Marine Board is organizing a webinar to launch its Future Science Brief n°9, “[European offshore renewable energy: Towards a sustainable future](#)”, on 4 April 2023 from 2:00-3:30pm CET (12-1:30pm UTC). The webinar will discuss the state-of-the-art of the offshore renewable energy sector globally and in Europe, gaps, and impacts. Register [here](#).

The U.S. DOE WPTO is hosting its next Semiannual Stakeholder Webinar on 4 April 2023 from 2:30-4pm EDT (6:30-8pm UTC). Staff and leadership will dive into current and future funding opportunities; other accomplishments, news, and updates; and the office’s newly released [2021-2022 Accomplishments Report](#). Register [here](#).

Pacific Northwest National Laboratory and National Renewable Energy Laboratory are hosting a Marine Energy Career Panel to highlight staff across various disciplines (engineering, biology, science communications, etc.) to discuss their marine energy careers including their background, education, career path, and current projects. The webinar will be held on 10 April 2023 at 3:00pm PDT (10:00pm UTC). Register [here](#).

Upcoming Workshop

The Portal and Repository for Information on Marine Renewable Energy ([PRIMRE](#)) is hosting a workshop focused on geospatial and permitting and licensing tools for U.S. marine energy projects on 18 April 2023 from 9:00-11:00am PDT (4:00-6:00pm UTC). The workshop will feature presentations on the [Marine Energy Environmental Toolkit for Permitting and Licensing](#), the [Marine Energy Atlas](#) and other geospatial data within PRIMRE, and PRIMRE capabilities to support marine energy projects. Register [here](#).

Upcoming Conferences

The [Marine Energy Wales Conference](#) takes place on 21-22 March 2023 in Swansea, Wales.

The [2nd EuropeWave Annual Conference](#) will take place on 28 March 2023 in Brussels, Belgium and online. Register [here](#).

Upcoming Deep Dive

The Dutch Marine Energy Centre is hosting a [Marine Energy Deep Dive on Offshore Innovations and the Blue Economy](#) on 21 March 2023 from 5:30-7:00pm CEST (4:30-6:00pm UTC) in The Hague, Netherlands. Register [here](#).

New Documents on *Tethys Engineering*

[Experimental assessment and validation of energy-maximising moment-based optimal control for a prototype wave energy converter](#) – Faedo et al. 2023

In recent years, a framework for control of wave energy converters (WECs), termed moment-based control, has been developed within the wave energy conversion literature, exhibiting a remarkable performance in terms of energy absorption, while retaining real-time computational capabilities. Nonetheless, to date, practical results regarding moment-based control for WEC systems have been exclusively provided in numerical simulation, i.e. there is currently a lack of ‘real-world’ assessment of this promising control framework. Motivated by this, we present, in this paper, an experimental assessment and validation of moment-based WEC control for a prototype Wavestar wave energy converter, at the tank-testing facilities of Aalborg University, Denmark.

[Tidal Energy in Malaysia: An overview of potentials, device suitability, issues and outlook](#) – Rahim et al. 2023

Malaysia is heavily dependent on non-renewable energy sources for electricity generation, particularly fossil fuels such as coal, oil, and gas. However, the alarming increase in CO₂ emissions and the depletion of fossil fuel reserves have given rise to imminent challenges in meeting the strong demand for electricity in Malaysia. Thus, this paper explores various types of tidal stream devices that have been experimentally developed for electricity generation and are well established, with a specific focus on potential devices to be implemented in the shallow water environment of Malaysia. The selection of the appropriate device is based on six fundamental criteria: (i) power density, (ii) scalability, (iii) durability, (iv) maintainability, (v) economic potential, and (vi) potential issues.

[Salinity gradient energy conversion by custom-made interpolymer ion exchange membranes utilized in reverse electro dialysis system](#) – Altıok et al. 2023

Reverse electro dialysis (RED) is one of methods to extract salinity gradient energy between two aqueous solutions with different salt concentrations. In this work, custom-made interpolymer ion exchange membranes were employed in the RED stack. The effects of divalent (Mg²⁺, Ca²⁺ and SO₄²⁻) and monovalent (Li⁺, K⁺ and Cl⁻) ions in

the feed solutions prepared from NaCl salt as a function of such process parameters as number of membrane pairs, flow rate, and salinity ratio on power generation by the RED method were studied. It was shown that the maximum power density of 0.561 W/m² was reached by using three membrane pairs using 1:45 of salt ratio with a feed flow rate of 120 mL/min using only NaCl salt in the feed solutions.

Sea trials of Sigma wave energy converter – Power and efficiency – Dragić et al. 2023

Sigma Energy has performed its foremost prototype tests of a scaled wave energy converter (WEC) in a real sea environment. The prototype was a point absorber with a circular buoy, a mechanical power take-off (PTO) system and a counterweight, moored to the seabed as a tension leg platform with three equal tendons. In these extensive experiments, numerous device characteristics were measured and analysed. The paper presents these sea trials, focusing on the power and efficiency of the device. The power has been calculated from the data recorded at 6 locations along the PTO system. In that way, a decay of capture width ratio (CWR) from the one absorbed from the waves to the one delivered to the electrical network was found and analysed.

Pool-Based Tow System for Testing Tethered Hydrokinetic Devices Being Developed to Harvest Energy From Ocean Currents – Vadlamannati et al. 2023

The immense potential for ocean current energy harvesting is being actively explored as the push for renewable energy becomes more urgent. This paper demonstrates a tow testing platform built to examine and validate mathematical models related to the performance of tethered, underwater, hydrokinetic devices in development to harvest energy from ocean currents, and presents experimental results illustrating how such a system can be used. The platform has been modularly designed to allow for the testing of various tethered, underwater energy-generation systems, including kite-based systems, coaxial turbines, and duct sails. Previous research on tethered energy-generating systems has primarily been focused on airborne systems.

Recent development of integrating CO₂ hydrogenation into methanol with ocean thermal energy conversion (OTEC) as potential source of green energy – Zulfarnain et al. 2023

Renewable energies have gained momentum in energy transition agenda based on the benefit of lower emissions of carbon and its compounds. Many technologies have been developed at different technology readiness levels addressing climate change impact with reduced emissions of greenhouse gases such as CO₂. Herein the perspective article, we have reviewed CO₂ capture technologies, such as absorption, adsorption, membrane separation, cryogenic separation and separation via hydrate formation, with further focus on the possibility of utilising ocean thermal energy conversion (OTEC) power to generate green hydrogen and produce low carbon fuels. The potential of OTEC generated hydrogen to produce methanol was explored using a simulation exercise utilising a scenario from a real-life offshore gas production facility.

News & Press Releases

The installation of ISWEC (Inertial Sea Wave Energy Converter) off the coast of Pantelleria has been completed – Eni

Eni recently announced that it has completed the installation of the world's first ISWEC device connected to the electricity grid of an island. It is located about 800 metres off the coast of the island of Pantelleria and can reach 260 kilowatts of peak power generation converted from wave energy. This experimental campaign, conducted under real operating conditions, will lead to useful results for developing the second-generation device currently under study. ISWEC was developed by Eni in collaboration with the Politecnico di Torino and Wave for Energy s.r.l. (a spinoff of the university). It is an innovative technology in the field of offshore renewable energy solutions, converting wave motion into electricity which then supplies energy to offshore infrastructure, small off-grid islands and coastal communities.

Collaborative wave power project aims to decarbonise subsea operations – Verlume

An ambitious collaborative project to power subsea equipment with wave power and subsea energy storage has taken to the seas in the north of Scotland. The £2million demonstrator project, called Renewables for Subsea Power (RSP), has connected the Blue X wave energy converter – built by Edinburgh company Mocean Energy – with a Halo underwater battery developed by Aberdeen intelligent energy management specialists Verlume. The two technologies have been deployed in the seas off Orkney and have now begun a minimum four-month test programme where they will provide low carbon power and communication to infrastructure including Baker Hughes' subsea controls equipment and a resident underwater autonomous vehicle provided by Transmark Subsea.

Project Update Vestmanna – A month of continuous production at record levels and tether upgrade ongoing – Minesto

Minesto, leading ocean energy developer, continues the operation of tidal energy power plants at the grid-connected site in Vestmanna, Faroe Islands according to plan. The 100-kW tidal power plant Dragon 4 has delivered the highest total production volume for a continuous month of operation at the beginning of the year. An upgraded tether that is set out to further improve the output of the system is now being implemented. In 2023, the 100 kW Dragon Class tidal power plant in Minesto's grid-connected site in Vestmanna has delivered the highest total production volume for a continuous month of operation, as well as increased peak output levels. Power production follows the four tidal cycles per day with generation reaching up to 200 kWh per tide. The offshore infrastructure completed in December 2022 to double capacity is online and awaiting installation of the second 100 kW Dragon Class kite.

Wave energy project on Nootka Island receives \$1-million grant – University of Victoria

University of Victoria's Pacific Regional Institute for Marine Energy Discovery (PRIMED) has received one of 10 million-dollar grants under the 2022 TD Ready Challenge for their solution designed to assist people and communities disproportionately affected by climate change and the transition to a low-carbon economy, TD Bank Group. PRIMED is the only recipient from British Columbia. PRIMED is working towards the development of a first of its kind renewable energy microgrid incorporating a wave energy device at Yuquot on Nootka Island, a National Historic site and traditional home of the Mowachaht/Muchalaht First Nation, located off the west coast of Vancouver Island.

Walton marina to assist BigMoon Power's tidal energy project in Minas Basin – CBC

Many have tried and many have failed, but now BigMoon Power is getting close to launching its attempt to harness the power of the world's highest tides and a new marina development in Hants County will be playing a key role. BigMoon will soon be filling its anchors — modified rail cars — with cement in Walton, N.S. They will then be transported across the Minas Basin to the tidal power site near Parrsboro. Unlike other failed tidal power projects that put turbines on the ocean floor, BigMoon's power generator floats on the surface of the water and a kinetic wheel spins with the current. BigMoon's main equipment is called the Falcon and is currently sitting in Saint John. It will be transported over the next few weeks and attached to the anchor base.