

TETHYS ENGINEERING BLAST



22 April 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!

[Announcements](#)
[Upcoming Events](#)

[New Documents](#)
[News & Press Releases](#)

Announcements

Tethys Engineering Fact Sheet

A new [Tethys Engineering Fact Sheet](#) is now available that highlights the site's latest content and features, such as the [Knowledge Base](#), [Map Viewer](#), and [Photo Library](#). If you have documents or photos you wish to add to *Tethys Engineering*, simply email tethys@pnnl.gov to let us know!

OES Workshop on Marine Energy Data Sharing

After a successful Ocean Energy Systems ([OES](#)) Workshop on Marine Energy Data Sharing in May 2021, the US-based Portal and Repository for Information on Marine Renewable Energy ([PRIMRE](#)) team is hosting a second online workshop on 11 May 2022 from 3:00-5:00 PM UTC. We are particularly looking for those who develop or manage marine energy databases, portals, and/or tools to participate. If you are interested in attending, please email tethys@pnnl.gov.

Marine Energy Collegiate Competition

The US Department of Energy (DOE) has opened the application period for the [2023 Marine Energy Collegiate Competition](#), which challenges interdisciplinary teams of undergraduate and graduate students to offer unique solutions to the marine energy industry that can play a role in powering the blue economy. Applications are due 8 May 2022.

BLUE DEAL

Interreg Mediterranean's BLUE DEAL project is launching "[BLUE DEAL for the Future](#)", an International Blue Energy contest, created to raise awareness and involve future generations in building a blue future. Participation is open to High School Institutions from European Members States and Instrument for Pre-accession Assistance countries. Proposals are due 30 April 2022.

Calls for Papers

The *Journal of Marine Science and Engineering* is accepting submissions for several Special Issues, including "[Wind and Wave Climate](#)" (due 20 May 2022) and "[Tidal and Ocean Current Energy](#)" (due 20 July 2022).

Energies is accepting submissions for several Special Issues, including "[Advanced Online Condition Monitoring for Wind and Marine Energy Conversion Systems](#)" (due 31 May 2022) and "[New Challenges in Software for Marine Energy Applications](#)" (due 31 July 2022).

Sustainability is accepting submissions for several Special Issues, including "[Marine Renewable Energy: A Solution towards Energy Self-Sufficiency of Ports](#)" (due 15 June 2022) and "[Sustainability of Wave Energy Resources in the Sea](#)" (due 31 July 2022).

Calls for Abstracts

The [Call for Abstracts](#) for the International Conference on Ocean Energy (ICOE) and Ocean Energy Europe (OEE)'s annual event has been extended to 22 April 2022. The Basque Energy Cluster and OEE will host [ICOE-OEE 2022](#) on 18-20 October 2022 in San Sebastián, Spain.

The [Call for Abstracts](#) for the [Pan-American Marine Energy Conference](#) (PAMEC 2022) has been extended to 25 April 2022. PAMEC is scheduled for 19-22 June 2022 in Ensenada, Mexico, with workshops on 17-18 June 2022. This international meeting is a great opportunity for graduate students to present their research to international colleagues.

The Call for Abstracts for the [University Marine Energy Research Community \(UMERC\) and Marine Energy Technology Symposium \(METS\) joint conference](#) is now open through 1 May 2022. UMERC and METS will host the event on 13-14 September 2022 in Portland, US, in conjunction with the [Ocean Renewable Energy Conference \(OREC\)](#) on 14-15 September 2022.

The [Call for Speakers](#) for [Clean Currents 2022](#) is now open until 1 May 2022. The Clean Currents Tradeshow and Conference will take place 18-20 October 2022 in Sacramento, US.

The [Call for Abstracts](#) for the [37th International Conference on Coastal Engineering \(ICCE\)](#) is now open until 6 May 2022. ICCE will take place on 4-9 December 2022 in Sydney, Australia.

The [Call for Abstracts](#) for Structures in the Marine Environment (SIME 2022) is now open until 6 May 2022. SIME 2022 will take place on 7 June 2022 in Edinburgh, Scotland.

The [Call for Abstracts](#) for [OCEANS 2022 Hampton Roads](#) is open through 16 May 2022. The hybrid event will take place on 17-21 October 2022 in Virginia Beach, US and online.

Funding & Testing Opportunities

The UK Department for Business, Energy & Industrial Strategy has launched Phase 9 of the [Energy Entrepreneurs Fund](#), which aims to support the development and demonstration of green energy technologies. Applications are due 11 May 2022.

The Centre for Advanced Sustainable Energy (CASE), an industry led, collaborative, sustainable energy research centre hosted at Queen's University Belfast, is seeking applications from suitably qualified consortia for research and development funding to support the decarbonisation of the energy system. The [Call for CASE Project Applications](#) closes 13 May 2022.

The Interreg Europe programme, financed by the European Regional Development Fund, has launched its first [Call for Proposals](#) in the 2021-2027 period, and is looking for interregional cooperation projects that will support a greener Europe. Applications are due 31 May 2022.

The Interreg North-West Europe Programme has launched its first [Call for Projects](#) in the 2021-2027 period, and is looking for transnational cooperation initiatives that can deliver concrete results for the North-West Europe area. The Call for Projects will close on 15 June 2022.

Student & Employment Opportunities

Bangor University's School of Ocean Sciences is looking for [four Research Officers](#) to work on research and development projects with industrial partners in the wave and tidal energy sector in Wales. Applications are due 29 April 2022.

The University of Plymouth is accepting applications from UK students for several funded PhD projects: [Security of Offshore Renewable Energy](#), [Biomimicry for De-risking Offshore Renewable Energy Installations](#), and [Hybrid Oscillating Water Column-Overtopping Wave Energy Converter for Clean Energy and Coastal Protection](#). Applications are due 4 May 2022.

The University of Caen Normandie's Laboratory of Applied Sciences of Cherbourg is offering a [full-time PhD position](#) focused on high resolution modeling of the hydrodynamics in a tidal stream turbine farm and applications to the Raz Blanchard. Applications are due 5 May 2022.

The European Marine Energy Centre (EMEC) is looking for a [Project Manager](#); [Health, Safety and Environmental Manager](#), and [Maintenance Technician](#). Applications are due 6 May 2022.

The National University of Ireland Galway is accepting applications for [5 PhD research positions](#) available through the TIDAL-GES (Tidal Energy – A transition to affordable and clean energy that can achieve 'Good Environmental Status' in coastal and marine waters) project. Applications are due 9 May 2022.

Upcoming Events

Upcoming Summit

The Australian Ocean Energy Group is hosting the [Australian Ocean Energy Market Summit](#) on 10-11 May 2022 in Hobart, Australia and online. The event aims to create information-based connections between Australian market representatives and industry leaders. Register [here](#).

Upcoming Webinar

Ocean Energy Systems (OES) is hosting a public webinar, “[Study of Offshore Aquaculture as a Market for Ocean Renewable Energy](#)”, on 26 April 2022 from 12:00-1:00pm PDT (7:00-8:00pm UTC) that will provide an overview of the findings in the “Study of Offshore Aquaculture as a Market for Ocean Renewable Energy” report, which will be published in April. Register [here](#).

Upcoming Workshops

The Marine Offshore Renewable Energy Lab (MOREnergy Lab), in collaboration with the Centre for Ocean Energy Research (COER) Maynooth, is hosting the [7th Wave Energy Workshop](#) on 29 April 2022 in Turin, Italy. The workshop will cover a range of topics across wave energy conversion, with a broad focus on hydrodynamic modelling, control, and wave energy technology enhancement. Register [here](#).

UMERC is hosting a workshop, [Power for Ocean Sensing: Creating Dialogue around Power Capabilities and Needs](#), from 10:00am-12:00pm PDT (5:00-7:00pm UTC) on 19 May 2022. During this workshop, marine energy developers will update oceanographers on new power technology development and discuss how to support big data in the ocean. Register for free [here](#).

As part of [European Maritime Day 2022](#), Mercator Ocean International, the European Investment Bank, and the Croatian Chamber of Economy are hosting a hybrid workshop, “[Ocean Technologies, Services and Financial Instruments](#)”, on 20 May from 10:45-11:45am CEST (8:45-9:45am UTC) in Ravenna, Italy and online. Register [here](#) by 12 May 2022.

Upcoming Conferences

The [Wave Energy Scotland Annual Conference](#) will take place on 3 May 2022 in Edinburgh, Scotland. The full conference agenda is now available. Register for free [here](#).

The Scottish Enterprise is hosting the Ocean Power Innovation Network (OPIN) Annual Symposium 2022 on 10 May 2022 in Glasgow, Scotland. Register for free [here](#).

The US Advanced Research Projects Agency–Energy (ARPA-E) is hosting the [ARPA-E Energy Innovation Summit](#) on 23-25 May 2022 in Denver, US. Register [here](#).

New Documents on *Tethys Engineering*

[Robust validation of a generalised actuator disk CFD model for tidal turbine analysis using the FloWave ocean energy research facility](#) – Badoe et al. 2022

Coupled blade element momentum-computational fluid dynamic (BEM-CFD) approaches have been extensively used to study tidal stream turbine performance and wake development. These approaches have shown to be accurate when compared to tests conducted in tow-tanks or in regulated flumes with uniform flows across the turbine. Whilst such studies can be very useful, it is questionable as to what extent the results would differ in a larger scale environment where the flow is more representative of real-world conditions, being either unsteady or non-uniform. In this work, the effectiveness of a generalised actuator disk-computational fluid dynamics (GAD-CFD) approach in accurately capturing fluid-machine interaction for single and multiple tidal energy converters models is further assessed.

[Recent advances in wave energy conversion systems: From wave theory to devices and control strategies](#) – Gallutia et al. 2022

Harnessing energy from ocean waves, although not a new concept, is beginning to gain traction in the renewable energy research community. This largely untapped energy resource has considerable potential; however, researchers are still seeking to understand how to make it economically viable. This paper presents an overview of wave energy conversion as follows. It identifies various advantages of wave energy conversion as well as challenges that researchers and industry developers must overcome before large-scale installations can be fully realized. This paper also reviews the devices that have been designed to achieve efficient energy conversion. Multiple studies concerning wave energy converters placed in an array are reviewed and discussed, focusing specifically on consistent trends concerning array performance. The paper also reviews recent control methods for wave energy conversion.

[Extracting energy from ocean thermal and salinity gradients to power unmanned underwater vehicles: State of the art, current limitations, and future outlook](#) – Jung et al. 2022

Thermal gradient energy-generation technologies for powering unmanned underwater vehicles (UUVs) or autonomous sensing systems in the ocean are mainly in the research development phase or commercially available at a limited scale, and salinity-gradient energy-generation technologies have not been adequately researched yet. The demand for self-powered UUVs suitable for long-term deployments has been growing, and further research related to small-scale ocean gradient energy systems is needed. In this study, we conducted a comprehensive review about harvesting energy from ocean thermal or salinity gradients for powering UUVs, focusing on gliders and profiling floats. Thermal gradient energy systems for UUVs based on phase change materials (PCM) cannot provide the energy required for powering autonomous sensing systems because of the systems' low energy conversion efficiency.

Design and Dynamic Stability Analysis of a Submersible Ocean Current Generator Platform Mooring System under Typhoon Irregular Wave – Lin et al. 2022

This research proposes a mooring system for an ocean current generator that is working under the impact of typhoon waves. The turbine and the platform are kept stable at a designed water depth to ensure that the generator remains undamaged and continuously generates electricity under excessive water pressure. In this design, the turbine generator is mounted in front of the floating platform by ropes and withstands the force of ocean currents, while the platform is anchored to the deep seabed with lightweight, high-strength PE ropes. In addition, two pontoons are used to connect the generator and the platform with ropes. When the balance is reached, the depth of the generator and the depth of the platform's dive can be determined by the length of the ropes. In this study, typhoon irregular wave is represented by the Jonswap wave spectrum.

The effect of the environment humidity on the performance of an oscillating water column wave energy converter – Gonçalves & Teixeira 2022

The sea wave energy has a significant potential to be converted in electrical one. However, there are still many difficulties to its harvesting. The most studied device is the Oscillating Water Column (OWC) wave energy converter, in which the majority of researchers consider the air inside the chamber as a dry air. This study aims to investigate the influence of the environment humidity on the behavior and the performance of this device equipped with Wells and Impulse turbines. A numerical model, that uses the first law of thermodynamics to analyze a piston movement in a air chamber with a turbine, is developed to compare results of an ideal gas with those of a real gas. The behavior of the real gas inside the chamber is based on empirical parameters. A typical case of an onshore OWC in atmospheric conditions with high level of humidity of the south of the Brazilian coast is studied.

Similarity principle based multi-physical parameter unification and comparison in salinity-gradient osmotic energy conversion – Ren et al. 2022

Nanofluidic osmotic energy conversion has the potential of directly converting renewable salinity-gradient energy into electricity. Existing research mainly focuses on the ion selectivity and robustness of nanoporous membranes. However, the multi-physical governing parameters of salinity-gradient osmotic energy conversion have never been unified and compared. In the current study, a similarity principle is constructed for ion selective transport in nanofluidic channel through dimensionless analysis, which lays a theoretical foundation for experimental design and data analysis to develop engineering correlations in osmotic energy conversion under a salinity-gradient. The derived dimensionless governing parameters are grouped into four categories with different physical meanings including ion driving source, ion selectivity, ion transport characteristics, and nanoporous membrane configuration.

News & Press Releases

[Minesto launches tidal array build-out plan, empowering Faroe Islands towards 100% renewable energy](#) – Minesto

Leading marine energy developer Minesto has launched a detailed plan for large-scale build-out of tidal energy arrays in the Faroe Islands. The plan includes four new verified sites that would supply 40% of the nation's growing electricity consumption, enabling the Faroe Islands to reach its policy goal of 100% renewable energy by 2030. Together with utility company SEV, Minesto has presented the plan to a wide range of policy and local community stakeholders – including the Prime Minister and Minister of Environment, Industry and Trade – and it has been received very positively. The large-scale build-out plan sets out a stepwise installation of tidal kite arrays, each with 20-40 MW installed capacity, at four verified locations. In addition to Minesto's existing grid-connected site in Vestmannasund, the company points out Hestfjord, Leirviksfjord, Skopunarfjord and Svinoyarfjord as ideal arrays.

[The Ocean Comes to Colorado: NREL's First Wave Tank Could Fast-Track Novel Marine Energy Technologies](#) – National Renewable Energy Laboratory (NREL)

Ocean energy, also known as marine energy, is renewable power generated from the motion of ocean waves, currents, and tides. But no marine energy technology has achieved commercial success—yet. That is where NREL comes in. At the laboratory's Flatirons Campus, NREL researchers help shepherd marine energy prototypes from abstract concept to the market. And the laboratory just installed a new tool that fills a critical gap in that soup-to-nuts support. “There was still a big piece missing,” said Rebecca Fao, a research engineer in NREL's water power technology group. “We still couldn't fully emulate the conditions that these devices will experience when they go offshore.” Now, they can—well, almost. Thanks to funding from the U.S. Department of Energy's Water Power Technologies Office, Fao and her team installed their first wave tank in Spring 2022.

[Eco Wave Power Signs Agreement to Construct 2MW Wave Energy Power Station in Spain](#) – Eco Wave Power

Eco Wave Power, a leader in the production of clean electricity from ocean and sea waves, recently announced that it has entered an official agreement with Port Adriano, Spain, for the potential construction of a wave energy power plant of up to 2 MW. The agreement expands Eco Wave Power's presence in Europe and will help Spain achieve its aggressive goals for renewable power, leveraging its significant coastline capacity. According to the terms of the agreement, Port Adriano will assign a potentially suitable location to Eco Wave Power for a period of 20 years, while Eco Wave Power will be responsible for securing all the licenses, constructing, and commissioning the power plant/s and selling the electricity to be generated by the power plant in accordance with an approved production quota, to be determined for the site.

Crown Estate Scotland shares offshore energy data with the world – Offshore Energy

Through a new website, Crown Estate Scotland has made available the information on offshore wind farms, wave and tidal energy sites, along with cable and pipeline agreements as free open datasets for the public. Crown Estate Scotland manages property – including buildings, land, coastline, and seabed – on behalf of the Scottish people. Together, these assets and property form the Scottish Crown Estate. The estate’s purpose is to invest in property, natural resources, and people to generate lasting value for Scotland. To make data widely available, Crown Estate Scotland has launched a dedicated website – the [Crown Estate Scotland Spatial Hub](#) – that provides access to data layers that can be added to personal GIS applications, and to downloadable datasets in formats such as PDF, CSV, and GIS shapefile.

Sustainable Marine Ready to Launch Tidal Energy onto Nova Scotia’s Grid – Ocean Energy Europe

Just days after the United Nations Intergovernmental Panel on Climate Change issued its call for action on the climate emergency, saying ‘it’s now or never’, Sustainable Marine is poised to push the button and feed zero emission electricity generated from the immense tidal flows in the Bay of Fundy into the Nova Scotia grid. The company has delivered Canada’s first ‘grid-compliant’ floating tidal energy system, ushering in a fresh dawn for the nation’s marine renewable energy ambitions. The landmark achievement follows several months of intense activity in the Bay of Fundy by Sustainable Marine’s Canadian, British and German team, supported by an international network of supply chain partners. After laying a 1km underwater cable in late January, the firm subsequently connected its PLAT-I 6.4 tidal energy system to a purpose-built substation, located on the shores of Grand Passage.