

# TETHYS ENGINEERING BLAST



**11 March 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](mailto:tethys@pnnl.gov) to contribute!

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## Announcements

### PRIMRE

Did you know that *Tethys Engineering* is one of seven Knowledge Hubs within the Portal and Repository for Information on Marine Renewable Energy ([PRIMRE](#)) ecosystem? To learn more about PRIMRE and the other Knowledge Hubs, check out the [PRIMRE Factsheet!](#)

### ITEG Survey

The Integrating Tidal Energy into the European Grid (ITEG) project is planning to develop and validate an integrated tidal energy and hydrogen production solution for clean energy generation to be demonstrated in Orkney, Scotland. As part of this effort, ITEG has launched a [survey](#) to measure the acceptance level within society towards renewable energy in general, marine renewable energy, and hydrogen energy.

### ETIPP Applications

The US Department of Energy (DOE) is accepting applications from remote, island, and islanded communities for technical assistance to transform their energy systems and increase energy resilience through the [Energy Transitions Initiative Partnership Project \(ETIPP\)](#). Applications are due 15 April 2022.

## BECS Proposals

The International Network on Offshore Renewable Energy's (INORE) [2022 Call for Blue Energy Collaborative Scholarships \(BECS\) Proposals](#) is now open through 15 April 2022. Sponsored by Ocean Energy Systems (OES), the BECS grant aims to advance research and promote collaboration amongst early-career professionals from diverse disciplines and nations.

## Calls for Abstracts

The [Call for Abstracts](#) for the [Pan-American Marine Energy Conference \(PAMEC 2022\)](#) is now open through 27 March 2022. PAMEC is scheduled for 19-22 June 2022 in Ensenada, Mexico.

The [Call for Abstracts](#) for the International Conference on Ocean Energy (ICOE) and Ocean Energy Europe (OEE)'s annual event is now open until 31 March 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 [OCEANS 2022 Hampton Roads](#) is now open through 16 May 2022. The hybrid event will take place on 17-21 October 2022 in Virginia Beach, US and online.

## Calls for Papers

The American Society of Mechanical Engineers' *Journal of Offshore Mechanics and Arctic Engineering* is accepting submissions for a [Special Issue on Advanced Numerical Methods and Applications in Marine Hydrodynamics](#). Manuscripts are due 31 March 2022.

*Energies* is accepting submissions for several Special Issues, including "[Marine Renewable Energy Technology](#)" (due 28 April 2022) and "[Advanced Analysis and Techniques of Wave Energy Conversion and Integrated Storage](#)" (due 25 May 2022).

The *Marine Technology Society Journal* is accepting submissions for a [Special Issue on Advancements in Buoy Technology to Support Ocean Observations, Maritime Safety, and Environmental Characterization](#). Manuscripts are due 20 June 2022.

## Funding & Testing Opportunities

The Oceanic Platform of the Canary Islands (PLOCAN) recently announced the launch of its [Winter Access Call](#) for the use of its facilities and services by public research groups and by the private sector, both national and international communities. Applications are due 20 March 2022.

The [US Testing Expertise and Access for Marine Energy Research](#) (TEAMER) program, sponsored by DOE and directed by Pacific Ocean Energy Trust, is offering [open water support for marine energy testing](#). Open Water Support applications may be submitted at any time, while applications for its [6<sup>th</sup> Request for Technical Support](#) are now available and due 24 March 2022.

The Horizon Europe Framework Programme has launched a funding opportunity titled, “[Demonstration of innovative rotor, blades and control systems for tidal energy devices](#)”. Proposals are due 26 April 2022.

### Student & Employment Opportunities

Pacific Northwest National Laboratory is recruiting multiple [Undergraduate Technical Interns](#) from diverse backgrounds to join its Coastal Sciences Division and work in one of three focus areas, including marine energy and coastal resilience. Applications are due 13 March 2022.

WavEC Offshore Renewables is recruiting an [Electrical Engineer](#), with experience or training related to offshore electrical systems and infrastructures with special focus on the Portuguese legislation. Applications are due 15 March 2022.

The European Marine Energy Centre is recruiting a [Metocean Data Engineer](#) to oversee environmental data management and a [Senior Metocean Engineer](#) to manage the collection and analysis of metocean measurement programmes. Applications are due 16 March 2022.

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## **Upcoming Events**

### Upcoming Workshops

The Ocean Power Innovation Network is hosting an online [masterclass](#) on dynamic cables on 15-16 March 2022. The training will provide developers, operators, and technology providers with a background knowledge in dynamic cables for offshore renewables. Register for free [here](#).

The US University Marine Energy Research Community (UMERC) is hosting its 3<sup>rd</sup> Research Landscape Workshop from 10:00-11:00am PDT (5:00-6:00pm UTC) on 16 March 2022. The workshop will discuss progress on the development of the UMERC Research Landscape and provide details on the new UMERC Community Portal. Register [here](#).

The US DOE’s Water Power Technologies Office (WPTO) and National Renewable Energy Laboratory are hosting a free, two-day [Marine Energy Data and Instrumentation Workshop](#) on 16-17 March 2022 to bring together industry, university, and laboratory experts in marine energy data collection and instrumentation. Participants will identify instrumentation and measurement needs, and discuss best practices for data collection. Register for Day 1 [here](#) and Day 2 [here](#).

### Upcoming Webinars

The US DOE’s WPTO is hosting the next webinar in its [R&D Deep Dive Webinar Series](#) from 3:00-4:00pm EDT (7:00-8:00pm UTC) on 16 March 2022. During the webinar, Oregon State University and the Pacific Marine Energy Center will present the latest design and testing program for the Laboratory Upgrade Point Absorber (LUPA), a robust, open-source wave energy converter designed for deployment in the O.H. Hinsdale Wave Basin Register [here](#).

Pacific Northwest National Laboratory's Triton Initiative is hosting the second in its series of Triton Talks, a webinar series that features a behind-the-scenes look at its US environmental monitoring field trials campaigns, at 11:00am PDT (6:00pm UTC) on 17 March 2022. Kate Buenau will discuss predictive modeling methods in marine renewable energy. Register [here](#).

ETIP Ocean (European Technology and Innovation Platform for Ocean Energy) and APPA Renovables are hosting a [webinar on ocean energy in Spain](#) at 11:00am CET (10:00am UTC) on 22 March 2022. The webinar will discuss the recently published Spanish Marine Energy Roadmap and review the funding opportunities available for ocean energy. Register [here](#).

The Ocean Power Innovation Network is hosting a [webinar](#) from 9:30-11:15am BST (8:30-10:15am UTC) on 29 March 2022 to present information about its Technology Assessment Process and Collaboration Innovation Groups services. Register [here](#).

The [Portal and Repository for Information on Marine Renewable Energy \(PRIMRE\)](#) is hosting a webinar on the [Marine and Hydrokinetic Toolkit \(MHKiT\)](#) from 1:00-2:00pm EDT (5:00-6:00pm UTC) on 31 March 2022. During the webinar National Renewable Energy Laboratory, Sandia National Laboratories, and Pacific Northwest National Laboratory will introduce new functionality in the open-source package and give demonstrations in Python. Register [here](#).

#### Upcoming Conferences

The National Hydropower Association is hosting [Waterpower Week in Washington](#) on 5-7 April 2022 in Washington, DC, US. Register [here](#).

The [2022 Offshore Technology Conference](#) will take place 2-5 May 2022 in Houston, US. Early bird registration is available through 1 May 2022. Register [here](#).

The Ocean Power Innovation Network is hosting its [2022 Annual Symposium](#) on 10 May 2022 in Glasgow, Scotland. Agenda and registration details will be published soon.

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## **New Documents on *Tethys Engineering***

### **[On nodal modulations of tidal-stream energy resource in north-western Europe](#) – Thiébot et al. 2022**

Estimation of tidal-stream turbine loading and energy yield requires a thorough understanding of the hydrodynamic processes that influence tidal currents over a wide range of timescales. In this study, we focus on the long-term variability of the tidal-stream energy resource associated with the 18.6-year lunar cycle. Three sites in north-western Europe, with strong potential for tidal array development, are considered; the Alderney Race (English Channel), the Fromveur Strait (western Brittany) and the Ramsey Sound (Irish Sea). The investigation relies on harmonic analysis and associated predictions of depth-averaged tidal currents. Results show that the variability in predicted annual power densities is comparable at the three measurement locations.

### **Sea trial test on offshore integration of an oscillating buoy wave energy device and floating breakwater – Zheng et al. 2022**

Wave energy has not yet been commercialized due to its high cost and low efficiency. The combination of wave energy devices and breakwaters can greatly improve the utilization of breakwaters and also reduce the cost of wave power generation devices. In this paper, four oscillating buoy wave energy devices with different geometries are proposed, where a kind of dolphin buoy design method with excellent energy harvesting mechanism is formed. And the integrated method of wave energy device and floating breakwater is proposed and the integrated model is tested in the tank, and on the basis of that a one-year sea trial test of the prototype was carried out in the real sea area, and the power generation performances of the wave energy device under different sea conditions are analyzed.

### **Investigation of the potential of R717 blends as working fluids in the organic Rankine cycle (ORC) for ocean thermal energy conversion (OTEC) – Yang & Yeh 2022**

Ammonia, R717, has been considered as a useful working fluid of the organic Rankine cycle (ORC) in the OTEC. The aim of this study is to investigate the potentials of R717 blends on thermodynamic and economic performances to surpass pure R717 used in an OTEC. The environmentally friendly refrigerants of R32 and R1234YF are considered and selected as the components of R717 blends. The effects of mass fraction ratios for R717 blends and four pinch points of conditions for the ORC are applied to evaluate the net power output and energy cost of the OTEC. The performances of OTEC system with R717/R32 and R717/R1234YF are evaluated and compared with pure R717.

### **Study on hydrodynamic performance of a horizontal axis tidal turbine with a lobed ejector – Huang et al. 2022**

Although tidal energy resources are abundant, the energy acquisition efficiency of actual tidal turbines designed by traditional methods is limited due to the Beta theory. A horizontal axis tidal turbine with a lobed ejector was designed to efficiently utilize tidal energy by taking into consideration the effect of the lobed ejector. The optimal Latin hypercube design method (OLHD) was used to extract sample points for the geometric parameters of the lobed ejector. Then response surface methodology was used for the optimal design of the power coefficient, the main index of the hydraulic performance of tidal turbine. The CFD simulation results show that after optimizing the geometric parameters of the lobed ejector, the power coefficient of the turbine increases by 98.88%.

### **Wave Power Density Hotspot Distribution and Correlation Pattern Exploration in the Gulf of Mexico – Gu & Li 2022**

Wave energy has been studied and explored because of its enormous potential to supply electricity for human activities. However, the uncertainty of its spatial and temporal variations increases the difficulty of harvesting wave energy commercially. There are no large-scale wave converters in commercial operation yet. A thorough understanding of

wave energy dynamic behaviors will definitely contribute to the acceleration of wave energy harvesting. In this paper, about 40 years of meteorological data from the Gulf of Mexico were obtained, visualized, and analyzed to reveal the wave power density hotspot distribution pattern, and its correlation with ocean surface water temperatures and salinities.

### **Impacts of transmembrane pH gradient on nanofluidic salinity gradient energy conversion**

– Chen et al. 2022

Solution pH can impact the nanochannel surface charge density, thus, to regulate the transmembrane ion transportation. Here, the performance of nanofluidic salinity gradient energy conversion is investigated, where the solution pH at the high/low concentration side varies separately, rendering asymmetric pH configurations. Results reveal that the solution pH at the low concentration side ( $pH_L$ ) exhibits a significant impact on the salinity gradient energy conversion. When  $pH_L < \text{Isoelectric Point (IEP)}$ , the energy conversion indicators are most stable under various solution pH at the high concentration side ( $pH_H$ ). The energy conversion performance via nanochannels of different lengths under asymmetric pH configurations is also studied.

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## **News & Press Releases**

### **Smooth Ride for Tidal Testing Tool** – Marine Energy Test Area (META)

A scientific study to help developers pinpoint the best sites for tidal turbines has been put through its paces at Wales' National Marine Test Site, META, in the Milford Haven waterway. During a month-long trial by Swansea University, a full-scale triangular-framed device was lowered to the seabed to measure the speed of the current. Traditional instruments rely on diverging beams to measure peak flow velocity, but researchers led by Professor Ian Masters and his team modified the design to create a converging acoustic doppler current profiler. Each arm of the triangular frame was mounted with specialist sensors. By emitting converging beams they captured far higher quality data. The device is one of several open-source tools to come out of an EU Ireland-Wales funded alliance known as SELKIE.

### **RW Power installs wave-powered desalination pump off Canary Islands** – Offshore Energy

Norwegian company RW Power has installed its wave energy-powered seawater pumping device for a new set of trials at the Oceanic Platform of the Canary Islands (PLOCAN). The testing campaign has been financed by the €2.5 million Blue-GIFT project, within the Interreg Atlantic Area program, which helps bring marine renewable energy technologies to market by offering free access to a world-leading network of test centers. RWPower is a company founded in 2011 whose objective is to develop and market renewable energy generation devices, install and operate desalination plants and carry out research and development of new technologies based on renewable energy. One

of the potential applications of the recently deployed device is the pumping of seawater into desalination plants located near the coast without the need of electric power.

### **Severn estuary tidal energy plan back on agenda amid Ukraine crisis – The Guardian**

A major infrastructure project harnessing the vast tidal power of the Severn estuary is back on the agenda after the UK government said the Russian invasion of Ukraine had highlighted the need to find more secure sources of energy. An independent commission was launched on Tuesday to explore using the Severn estuary, which has the second largest tidal range in the world, to create energy. Michael Gove, the UK secretary of state for levelling up, backed the commission, which comes 12 years after the government dashed ambitious plans for a 10-mile energy-generating barrage. The commission has been set up by the Western Gateway “powerhouse”, a coalition of politicians, business and public sector leaders and academics covering an area stretching from Swansea to Swindon and straddling the Severn.

### **Trial by Water: NREL’s Wave-Powered Desalination Device Sets Sail – National Renewable Energy Laboratory (NREL)**

On a sun-filled winter day, NREL researchers visited Jennette’s Pier, which sits on the shore of Nags Head beach in North Carolina. Amid salty air and crashing waves, the crew deployed a wave-powered desalination test device and anchored it to the nearby seabed—a long-awaited feat for the research team. NREL researchers began designing the hydraulic and electric reverse osmosis (HERO) wave energy converter (WEC) device in summer 2020 and finished building it in January 2022. The team spent all of 2021 designing and constructing the HERO WEC, which is about 6 feet in diameter or roughly the size of a round dining table. After a year of facing unexpected supply-chain challenges, the team finally found a chance to test the device in the laboratory just before shipping it to North Carolina for ocean trials.

### **RINA, 5M Renewables to develop floating green hydrogen production vessel – Offshore Energy**

Italian classification society RINA has signed a memorandum of understanding with marine systems provider 5M Renewables for the collaboration on the concept development for the floating green hydrogen production vessel. The collaboration on the concept named Thessalonica Hydroship is expected to contribute to the decarbonisation efforts of the marine and energy segment. It includes a carbon credit offset program that will be beneficial for owners, charterers, and other stakeholders. According to RINA, Thessalonica HydroShip converts the energy from wind or tidal stream turbines into green hydrogen. It does not require the use of a floating production storage and offloading system, thus greatly reducing the overall levelized cost of energy to yield cost-competitive hydrogen.