

# TETHYS ENGINEERING BLAST



**13 January 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](mailto:tethys@pnnl.gov) to contribute!

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## Announcements

Contribute to *Tethys Engineering*

The [Tethys Engineering Knowledge Base](#) currently contains 7,000 documents on the technical and engineering aspects of wave, current, salinity gradient, and ocean thermal energy. To contribute any new publications (e.g., journal articles, conference papers, workshop reports, theses), please send a link or PDF to [tethys@pnnl.gov](mailto:tethys@pnnl.gov).

Earthshot Prize Nominations

The European Marine Energy Centre (EMEC) is continuing its role as an Official Nominator for [The Earthshot Prize](#), which is seeking innovations that will help repair and regenerate the planet. EMEC has launched an [open call inviting submissions](#) for consideration until 17 January 2023.

Calls for Abstracts

The [Call for Abstracts](#) for the [Marine Energy Wales Conference 2023](#) is now open through 16 January 2023. The conference will take place 21-22 March 2023 in Swansea, UK.

The [Call for Abstracts](#) for the [15<sup>th</sup> 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

*Energies* is accepting submissions for several Special Issues, including “[New Challenges in Software for Marine Energy Applications](#)” (due 31 January 2023), “[The Advances in Wave Energy Extraction Systems](#)” (due 28 February 2023), and “[Recent Advances in Marine and Offshore Renewable Power Generation Technologies](#)” (due 28 March 2023).

*Water* is accepting submissions for the Special Issue, “[Numerical Modelling of Ocean Waves and Analysis of Wave Energy](#)” (due 28 February 2023).

## Funding & Testing Opportunities

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 European Union sea basins. Proposals are due 31 January 2023.

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.

Spain’s Ministry for the Ecological Transition and the Demographic Challenge recently published the first call for aid from the [Renmarinas Demos Program](#) to promote test platforms and the demonstration of new prototypes in the field of marine renewable energy. Applications will be accepted between 31 January and 24 March 2023.

The Basque Energy Agency has published the [Call for Tenders](#) for its "TurboWave" Pre-Commercial Public Procurement program for the development of air turbines that will be implemented in the Mutriku wave power plant. The Call will open 16 February 2023. An informational webinar will be held on 26 January 2023 at 9:00am UTC.

The Horizon Europe Framework Programme has 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.

## Student & Employment Opportunities

The Center for Ocean Engineering at the University of New Hampshire is inviting applications for a tenure-track position at the [Assistant, Associate, or Full Professor](#) rank who can contribute to ocean renewable energy research and other focus areas. Applications are due 22 January 2023.

The Environmental Research Institute (ERI) is recruiting for a [Research Fellow in Renewable Energy and the Environment](#) to advance understanding of the biophysical interactions of marine and offshore renewable energy with the environment. Applications are due 3 February 2023. ERI is also recruiting for a [Research Fellow in Marine Sensing](#) to support design, development, and deployment of autonomous marine multi-sensor platforms to investigate the environmental effects of marine and offshore renewable energy. Applications are due 3 February 2023.

The University of Massachusetts-Dartmouth is seeking applicants for one or more [Graduate Research Assistant](#) positions. The positions, funded for up to three years, involve the development of a new wave energy converter to power a telecommunications system.

CorPower Ocean is seeking a [Technical Project Manager](#), [Procurement Engineer](#), and [Subsea Design Engineer](#) to support development of its wave energy technology.

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## Upcoming Events

### Upcoming Webinar

OES-Environmental is hosting a webinar from 3:30-5:00pm UTC on 19 January 2023 to share tools for designing and siting MRE projects with environmental effects in mind. This webinar will highlight OES-Environmental's [Management Measures Tool](#), AZTI's [Wave Energy Converter - Environmental Risk Assessment \(WEC-ERA\) Tool](#), and the [Marine Energy Environmental Toolkit for Permitting and Licensing](#) developed by Kearns & West. Register [here](#).

### Upcoming Conferences

[Oceanology International \(Oi\) Americas 2023](#) will take place 14-16 February 2023 in San Diego, U.S. Register [here](#).

The Global Underwater Hub is hosting the [Subsea Expo](#) from 21-23 February 2023 in Aberdeen, Scotland. Register for the conference and exhibition [here](#).

The [12<sup>th</sup> Annual North Carolina Renewable Ocean Energy Symposium](#) will take place 20-21 March 2023 in Wanchese, North Carolina, U.S. Register [here](#) by 24 February 2023.

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## New Documents on *Tethys Engineering*

### [The power balancing benefits of wave energy converters in offshore wind-wave farms with energy storage](#) – Kluger et al. 2023

With many countries planning to significantly increase grid renewable energy penetration levels, we consider the role of wave energy in supply–demand matching. We investigate how incorporating wave power into an offshore wind farm affects farm power predictability, smoothness, required energy storage capacity, and cost. In this paper, we do a first-order cost analysis of an offshore farm comprised of floating wind turbines and wave energy converters that are both standalone and combined and onshore compressed air energy storage. The intent of this paper is to provide baseline system technical results to help future researchers and policy makers make decisions about offshore hybrid wind-wave-storage farms.

### **Induction study of a horizontal axis tidal turbine: Analytical models compared with experimental results – Jouenne et al. 2023**

In a water channel, a scale horizontal axis tidal turbine is positioned in a low-disturbance uniform flow, and Particle Image Velocimetry (PIV) measurements are used to investigate turbulent-flow modifications in front of the turbine. The results confirm that even if the axial velocity deficit is mainly governed by the turbine rotational speed, a similar velocity profile is observed regardless of the rotational speed: the uniform flow evolves to a shear flow with a peak velocity deficit in front of the hub. The mean radial velocity component is not sensitive to the turbine rotational speed in front of the hub, whereas its amplitude increases near the tip of the blade as the Tip Speed Ratio increases.

### **Ocean Energy Market Investigation: A project of the Australian Ocean Energy Group – Thornton et al. 2022**

Australian Ocean Energy Group (AOEG) completed the first phase of its Market Investigation in June 2022. The study approach and results are summarised in this report. AOEG conducted its Ocean Energy Market Investigation program to provide evidence that potential demand for ocean energy exists, identify potential early-adopter customers and identify the constraints and opportunities to accelerate its uptake. Validating AOEG's assumption about the potential markets for ocean energy in Australia – local governments representing Blue Economy communities (e.g., coastal locations), ports and aquaculture were identified as key target markets.

### **Estimating Future Costs of Emerging Wave Energy Technologies – Ruiz-Minguela et al. 2022**

The aim of this paper is to increase the clarity, consistency, and utility of future cost estimates for emerging wave energy technologies. It proposes a novel three-step method: (1) using a combination of existing bottom-up and top-down approaches to derive the current cost breakdown; (2) assigning uncertainty ranges, depending on the estimation reliability then used, to derive the first-of-a-kind cost of the commercial technology; and (3) applying component-based learning rates to produce the LCOE of a mature technology using the upper bound from (2) to account for optimism bias. This novel method counters the human propensity toward over-optimism.

### **Method of variable-depth groove on vortex and cavitation suppression for a NACA0009 hydrofoil with tip clearance in tidal energy – Han et al. 2022**

Tidal energy has attracted great attention due to its massive potential and eco-friendly nature. Performance of ducted turbines used in tidal energy conversion is significantly influenced by tip clearance and associated leakage flow. In this work, a method of variable-depth (VD) groove is developed to suppress the tip leakage vortex (TLV) and the tip leakage vortex cavitation (TLVC) around a NACA0009 hydrofoil, and different variable-depth laws are proposed to improve the suppressing effect. The flow pattern

around the hydrofoil is investigated on basis of numerical method, which is validated by experiment results.

### **Objective Functions and Performance Optimization of Ocean Thermal Energy Conversion (OTEC) Cycle with CO<sub>2</sub>-Based Binary Zeotropic Mixture Power Cycle – Shi et al. 2023**

Ocean thermal energy is a huge renewable and clean energy. For different applications of the Ocean Thermal Energy Conversion (OTEC) system, new objective functions are proposed and optimal CO<sub>2</sub>-based binary zeotropic mixtures for each objective function are discussed. Propane, butane, isobutane, and pentane were selected as the secondary component of the mixture working fluid. Based on each objective function, some parameters of the CO<sub>2</sub>-based binary zeotropic mixture power cycle were studied and the optimal working fluids were obtained.

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## **News & Press Releases**

### **Sabella gets green light to deploy tidal turbines in the Gulf of Morbihan – Offshore Energy**

French company Sabella has received the official authorization for the deployment of two tidal turbines offshore Brittany region in France, as part of the European Union-backed TIGER (Tidal Stream Industry Energiser) project. The authorization for the deployment of Sabella's two 250kW tidal energy turbines has been signed by the Morbihan region's prefect Pascal Bolot. The permit will allow the installation of the turbines for a period of three years, to be conducted by Morbihan Hydro Energies, which is a collaborative company established by 56 Energies and Sabella. The deployment is part of €45.4 million TIGER project, a European cooperation initiative between France and the United Kingdom, supported by the Interreg program.

### **Proposed Funding Opportunity Expanded With \$10 Million to Support Community-Led Tidal and Current Energy Planning and Development – U.S. Department of Energy**

The U.S. Department of Energy's Water Power Technologies Office recently announced the addition of a \$10 million topic area to its proposed funding opportunity from President Biden's landmark Bipartisan Infrastructure Law to advance tidal and current energy systems, bringing the total funding to \$45 million. This new topic area will support at least one tidal or current energy planning and execution project in the United States, preferably led by a community-based organization or local/municipal government entity. This topic area builds on the success of community-led technical assistance programs, like the Energy Transitions Initiative Partnership Project (ETIPP), and will help advance projects from energy resilience design to technology validation.

### **Partners get ready to demonstrate 'renewables for subsea power' solution – Offshore Energy**

The partners in the innovative industry-led project that aims to demonstrate the effectiveness of renewable energy for powering subsea production systems and vehicles are getting ready to demonstrate the integrated system offshore Orkney in Scotland. The project, dubbed 'Renewables for Subsea Power', is being developed by Verlume, Baker Hughes, Mocean Energy, and Transmark Subsea. It will combine Verlume's Halo seabed battery energy storage system and Mocean Energy's Blue X wave energy converter to deliver emission-free, renewable power and communications within harsh, deep-sea environments to subsea infrastructure such as subsea production control systems and residential remotely operated vehicles, as well as autonomous underwater vehicles.

### **Minesto secures strategic port access and onshore operations site for large-scale commercial buildout in the Faroe Islands – Minesto**

Minesto has signed a long-term lease agreement with the Vestmanna municipality and Faroese utility company SEV for port access and onshore operations and maintenance (O&M) work site. The agreement grants access to a 2,050 m<sup>2</sup> site in the inner harbour of Vestmanna, Inni á Fjørð; including a new grid connection. Site preparations have been completed and installation of the control station and maintenance infrastructure has been initiated. This site will accommodate the O&M hub for tidal energy production at the existing site in Vestmannasund, and the planned buildout of commercial tidal energy arrays in Hestfjord and Skopunafjord.

### **Plans unveiled for first Chilean 'home-made' wave energy device – Offshore Energy**

Chilean University of Bío-Bío has presented its Lafkenewen wave energy project in the commune of Lebu, in southern Chile which will, once installed, provide clean power to local tourist sector. The project will take 24 months to be developed and it will be financed by the Innovation Funds for the Competitiveness of the Regional Government of Bío-Bío. Prior to its installation on the shores of Boca Lebu sector, the device is planned to be completely designed and assembled in Chile. The plan for the initiative is to supply the electricity to small and medium enterprises with an objective to boost tourism in the area. The university also pointed out that Lebu is expected to be the first commune in the country to be able to harness the power of waves, sun, and wind.