

# TETHYS ENGINEERING BLAST



**1 July 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

### AMEC Survey

The Atlantic Marine Energy Center (AMEC), the newest national marine energy center established by the US Department of Energy (DOE), is a university-led consortium with a mission to advance the marine energy industry and provide power solutions to blue/maritime economies and coastal communities. One goal of AMEC is to collect information about those who have interests in marine energy to help foster connections, create exchange, and develop relevant research. AMEC wants to know: Who are you? What is your stake in marine energy? What topics interest you? Visit the [AMEC website](#) and click the graphic to begin the survey.

### Ocean Hackathon

The Campus Mondial de la Mer has extended the Call for Challenges for its [Ocean Hackathon](#) until 3 July 2022. The Ocean Hackathon challenges applicants to use data for the sustainable development and preservation of oceans and seas.

### Calls for Abstracts

The [Call for ePosters](#) for [Environmental Interactions of Marine Renewables \(EIMR 2022\)](#) has been extended through 13 July 2022. EIMR will take place 4-6 October 2022 online.

The Call for Abstracts for the [2nd GloFouling Research & Development Forum on Biofouling Prevention and Management for Maritime Industries](#) is now open through 31 July 2022. Submit your 250-word max abstract to [glofouling@imo.org](mailto:glofouling@imo.org). The conference will take place on 11-14 October in London, UK.

The Marine Alliance for Science and Technology for Scotland (MASTS) has opened the Call for Abstracts for its [12th Annual Science Meeting \(ASM\)](#) through 19 August 2022. MASTS 2022 ASM will take place 8-10 November 2022 in Glasgow, Scotland.

The American Meteorological Society (AMS) has opened the [Call for Abstracts](#) for the [103<sup>rd</sup> AMS Annual Meeting](#), which will place 8-12 January 2023 in Denver, US. Submission deadlines vary depending on the conference or symposia, but most abstracts are due 24 August 2022.

Energy Technology Partnership (ETP), an alliance of 14 Scottish universities, has opened the [Call for Abstracts](#) for the ETP Annual Conference 2022 through 16 September 2022. The ETP Conference will take place on 1 November 2022 in Edinburgh, UK.

### Funding & Testing Opportunities

The International Union for Conservation of Nature has launched a new [Blue Natural Capital Financing Facility Call for Proposals](#) and is looking for coastal Nature-based Solutions and Green-Gray Infrastructure projects with potential to combine conservation and/or restoration of ecosystems with the selective use of conventional engineering. Applications are due 3 July 2022.

The Testing and Expertise for Marine Energy Research (TEAMER) program, supported by the US DOE, is now accepting [Request For Technical Support \(RFTS\) 7](#) applications through 16 July 2022. Developers can apply for support in numerical modeling and analysis, bench/lab or tank/flume testing, and open water activities. Visit the [TEAMER website](#) for RFTS updates.

The European Commission is launching the Innovation Fund's second [Call for Small Scale Projects](#) in renewable energy, energy-intensive industries including substitute products, energy storage, and carbon capture, use and storage. Applications are due 31 August 2022.

WEAMEC (West Atlantic Marine Energy Community) has opened a [Call for Projects](#) to support eligible French researchers with writing and structuring marine energy projects that will be carried out by academic members of the community. Applications are due 30 November 2022.

### Student & Employment Opportunities

The Environmental Research Institute (ERI) is recruiting for an [Energy Systems Modeller](#) with interest in net-zero aviation, renewable energy, and socioeconomics to improve understanding of the energy requirements of net-zero aviation. Applications are due 4 July 2022.

The Bath Beacon in Zero-Carbon Offshore Power is inviting Expressions of Interest from researchers who would like to be hosted at the University of Bath as a [Marie Skłodowska Curie Actions European Postdoctoral Fellow](#). Applications are due 14 July 2022.

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## Upcoming Events

### Upcoming Conferences

The Partnership for Research in Marine Renewable Energy ([PRIMaRE](#)), a consortium of marine renewable energy experts across higher education, research, and industry in the UK, is hosting the [9th PRIMaRE Conference](#) on 6-7 July 2022 in Cornwall, UK. Register [here](#).

The University Marine Energy Research Community (UMERC) and the Marine Energy Technology Symposium (METS) are hosting a joint [UMERC+METS 2022 Conference](#) on 13-14 September 2022 in Portland (US). Register [here](#).

Directly after the UMERC+METS 2022 Conference, the Pacific Ocean Energy Trust is hosting the [Ocean Renewable Energy Conference \(OREC\) 2022](#) on 14-15 September 2022 in Portland (US). The conference agenda is now available. Register [here](#).

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## New Documents on *Tethys Engineering*

### [Potential and prospects of hydrokinetic energy in Malaysia: A review](#) – Maldar et al. 2022

Endlessly rising power demands coupled with the growing urge to tackle the effects of climate change has compelled governments worldwide to explore and utilize every possible clean energy option within their geographical vicinities. Malaysia aims to expand the share of renewables in its installed power generation capacity to 20% by the year 2025. To achieve this target, it is extremely important to carry out consistent advancements by unlocking the yet unexploited sustainable alternatives. This paper addresses the abundantly available hydrokinetic resource around Malaysia, which many researchers have suggested as a potential choice for fulfilling a reasonable proportion of Malaysia's power demand.

### [Effects of mooring configurations on the hydrodynamic performance of a floating offshore oscillating water column wave energy converter](#) – Gubesch et al. 2022

This paper presents the results of a systematic experimental investigation into the effects of different mooring configurations on the hydrodynamic performance of a 1:36 scaled Oscillating Water Column (OWC) Wave Energy Converter (WEC) model. The OWC WEC was tested in the fixed, free-floating and moored conditions with three different mooring configurations namely a tension leg, a taut mooring with 450 tendons, and a catenary mooring with heavy chains. Detailed analysis included hydrodynamic capture width ratios, fluid interactions between the OWC chamber and the incident waves, response amplitude operators, mooring tensions, and turbine damping coefficients.

### **Seawater desalination through reverse osmosis driven by ocean thermal energy conversion plant: Thermodynamic and economic feasibility – Liponi et al. 2022**

Seawater desalination is an effective way to reduce water scarcity affecting many world areas. However, desalination processes require considerable power that might not be available in remote areas, especially in insular zones. Ocean Thermal Energy Conversion (OTEC) is a promising technology to be coupled with reverse osmosis (RO) in remote tropical areas thanks to the constant electricity production, the high number of equivalent hours, and the zero carbon emissions. In this study, the thermodynamic and economic feasibility of a system made of OTEC and RO for freshwater production is assessed to determine the optimal design parameters of the plant.

### **Performance of a bidirectional horizontal-axis tidal turbine with passive flow control devices – Zhang et al. 2022**

Horizontal-axis tidal turbines (HATTs) have the acknowledged potential to extract a large amount of green renewable energy from ocean tides. Among these, bidirectional HATTs (BHATTs) with centrosymmetric hydrofoils have advantages in terms of reliability and maintenance cost. To improve the performance of BHATTs, this paper investigates the influence of different passive flow control devices (PFCs), such as wing fences, winglets, and squealers, on the performance of the BHATT. To the end, a three-dimensional (3D) numerical model with a  $k-\omega$  SST model and a sliding mesh method was applied to simulate a 18 m diameter BHATT.

### **Design, dynamic modeling and wave basin verification of a Hybrid Wave–Current Energy Converter – Chen et al. 2022**

Massive and high-density Marine and Hydrokinetic (MHK) energy is contained in the ocean, including waves, tidal streams, and ocean currents. Traditional MHK energy converters harvest energy from only a single MHK energy source, which does not fully exploit the energy potential that co-exists in multiple forms of MHK energy in the ocean. This paper presents the design and dynamics of a Hybrid Wave–Current Energy Converter (HWCEC) that can simultaneously convert both wave and current energy to electricity with a single Power Take-off (PTO) through the engagement and disengagement of the three one-way clutches.

### **Bioinspired poly (ionic liquid) membrane for efficient salinity gradient energy harvesting: Electrostatic crosslinking induced hierarchical nanoporous network – Hu et al. 2022**

The development and utilization of salinity gradient energy are of great significance to the carbon-neutral strategic demand for clean energy in the new era. Conventional ion-exchange membranes have been employed to recover this wide-distributed energy by reverse electrodialysis membrane processes, however, the dense membrane structure and chemical instability limit the ionic transport in various working environments. Here, inspired by the rapid mass transport caused by the hierarchical structure of blood vessels, we employ two types of polyelectrolytes to fabricate a bioinspired three-dimensional

interconnect porous membrane by simply casting-soaking, and this membrane shows great chemical stability due to the ionic crossing enhancement.

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## **News & Press Releases**

### **[ORPC to Install Its First River Hydrokinetic Power System in South America](#) – ORPC**

Ocean Renewable Power Company (ORPC), a developer of renewable power systems that generate electricity from free-flowing river and tidal currents, and its wholly-owned subsidiary, ORPC Chile, recently announced that the company has an agreement with the Municipality of Chile Chico in the Aysén region of Patagonia to install a RivGen® Power System there in 2023. ORPC's first installation there will be a RivGen Power System deployed at the meeting point of General Carrera Lake and Bertrand Lake, where the Baker River begins. The initial device will be connected to the Edelaysen utility regional grid network.

### **[Havkraft inks deal to power fish farm using its wave energy device](#) – Offshore Energy**

Norwegian company Havkraft has signed an agreement for a project that will use its wave energy technology to provide clean power to a fish farm offshore Norway. The contract has been signed with fish producer Svanøy Havbruk for the installation of a full-scale Havkraft N-Class wave power plant at Sandkvia, close to the island of Svanøy, in western Norway. This marks the start of commercialization of Havkraft's oscillating water column (OWC) wave power plants, a technology expected to be competitive with any other energy source in its market segment nearshore. The project, supported by Sparebanken Vest and other unnamed partners, will be installed on site in 2023.

### **[TEAMER Network Director Announces RFTS 6 Technical Support Recipients](#) – TEAMER**

The U.S. Testing Expertise and Access to Marine Energy Research (TEAMER) program recently selected ten projects through its sixth Request for Technical Support (RFTS), reflecting a total funding amount of approximately \$1,021,050. These projects will receive support for testing expertise and access to numerical modeling, laboratory or bench testing, and tank/flume testing and expertise within the growing TEAMER Facility Network. Supported by the U.S. Department of Energy and directed by the Pacific Ocean Energy Trust, TEAMER accelerates the viability of marine renewables by providing access to the nation's best facilities and expertise to solve critical challenges, build knowledge, foster innovation, and drive commercialization.

### **[Consortium forms to deliver multi-purpose ocean station powered by renewable energy](#) – Offshore Energy**

The international consortium behind the FLOating RADar (FLORA) project has held the kick-off meeting to formalize the start of a scheme that will develop and demonstrate an industrial-scale prototype of a multi-purpose ocean station with renewable energy

generation and operational oceanography capabilities, dubbed the FLORA Ocean Station. Equipped with a novel sensor suite for bird and biodiversity data acquisition, the station will be deployable as a low environmental impact system. As an automated data acquisition tool, it is expected to accelerate oceanic multi-use by facilitating marine spatial planning and consenting for the offshore renewable energy industry, like floating and fixed offshore wind.

### **The Motion of the Ocean Could Be the Next Big Source of Green Energy – TIME**

Founded in 2003, the European Marine Energy Centre (EMEC) is headquartered in the Orkney Islands, off Scotland's northern coast. Neil Kermode, the center's director since 2005, has seen some 35 tidal-energy projects tested, by startups that have come and gone—some shuttered for lack of capitalization or nonviable technology, some absorbed by larger companies like GE. But the biggest project ever run at EMEC is still there, providing power for 1 in 12 Orcadian households. The O2, as it's dubbed, created by the Scottish company Orbital Marine, weighs some 680 tons, is longer than a Boeing 747, and skims the top of the water like the world's largest rowing scull.