

# TETHYS ENGINEERING BLAST



**8 November 2019**

The bi-weekly *Tethys Engineering Blast* highlights new publications on *Tethys Engineering*, opportunities in marine renewable energy, and news articles of international interest. We hope you find this a valuable resource to keep you connected to new research, opportunities, and industry milestones.

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## **Announcements**

### MHK Graduate Student Research Program

The U.S. Department of Energy's Water Power Technologies Office and Oak Ridge Institute for Science and Education (ORISE) are accepting applications for the [Marnie and Hydrokinetic Graduate Student Research Program](#). For more information, [register](#) for the ORISE Virtual Recruitment Fair which will be held on 13 November 2019 from 12:00 to 3:00pm ET.

### Call for Abstracts

Abstracts are being accepted for the [International Conference on Ocean Energy](#) (ICOE) in Washington D.C. on 19-21 May 2020. The theme for ICOE 2020 is "Energizing a Powerful Blue Economy." The event will showcase innovations in ocean energy technology research and development, prepare ocean renewable energy to benefit the larger "Blue Economy" and the electrical grid, and identify research needed to further advance the state of the technology. The content and abstract submission deadline has been extended to 15 November 2019.

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## **Upcoming Events**

### Upcoming Webinar

ETIP Ocean and OES-Environmental will be hosting a [webinar](#) on marine spatial planning opportunities and challenges in the ocean energy sector on 19 November 2019 at 7:00am PST / 3:00pm UTC / 4:00pm CET. Click [here](#) for log-in information.

## Upcoming Workshops

The European Marine Energy Centre will be hosting the [MONITOR Tidal Reliability Developer Forum](#) and the [OCEAN 2G End of Project Workshop](#) in London, United Kingdom on 12 November 2019. For more information on these events, click [here](#).

Ocean Energy Systems (OES) Task 10 will be hosting a [workshop](#) in Amsterdam, Netherlands on 14-15 November 2019. The workshop will overview wave energy converter modelling techniques, validation cases, and experimental test cases.

## Upcoming Conferences

The [4th International Conference on Energy Engineering and Environmental Protection](#) (EEEEP2019) will be held on 19-21 November 2019 in Xiamen, China. The final submission deadline has been extended to 10 November 2019.

The [Wave Energy Scotland Annual Conference 2019](#) (WESAC19) will be held in Edinburgh, UK on 5 December 2019. WESAC19 will showcase Wave Energy Scotland's past work and upcoming opportunities. Registration is free and available [here](#).

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

### **[Implementation of a Full Momentum Conservative Approach in Modelling Flow Through Tidal Structures](#) – Čož et al. 2019**

Understanding the impact of various hydraulic structures, such as coastal reservoirs and tidal range impoundments, has been one of the key challenges of hydro-environmental engineering in recent years. This study examined the impact of the fully conserved momentum through tidal structures using a novel approach. The method was applied to 2D and 3D versions of the regional model of Swansea Bay tidal lagoon, examining two different types of velocity distribution at turbine exit.

### **[Control Strategies Applied to Wave Energy Converters: State of the Art](#) – Maria-Arenas et al. 2019**

Wave energy's path towards commercialization requires maximizing reliability, survivability, an improvement in energy harvested from the wave and efficiency of the wave to wire conversion. In this sense, control strategies directly impact the survivability and safe operation of the device, as well as the ability to harness the energy from the wave. In this article, a review of the main control strategies applied in wave energy conversion is presented along their corresponding power take-off (PTO) systems.

### **[Thermodynamic and economic analysis of a hybrid ocean thermal energy conversion/photovoltaic system with hydrogen-based energy storage system](#) – Khosravi et al. 2019**

The purpose of this study is to define and assess a new, renewable and sustainable energy supply system for islands and remote area where ocean thermal energy conversion (OTEC)/photovoltaic with hydrogen storage system is proposed. To evaluate the proposed hybrid system, energy, exergy and economic analysis are employed. The results demonstrate that the maximum specific power of OTEC was achieved to be 0.3622 kW/m<sup>2</sup> for R717 and 0.3294 kW/m<sup>2</sup> for R423A working fluids.

**[A review of hydrokinetic turbines and enhancement techniques for canal installations: Technology, applicability and potential](#)** – Niebuhr et al. 2019

The present study addresses the advances and limitations of near-zero head hydrokinetic technologies and the possibility of increased potential and applicability when enhancement techniques within the design, implementation and operational phases are considered. Its goal is threefold: to review small-scale state-of-the-art near-zero hydrokinetic-current-energy-conversion-technologies, to assess barriers including gaps in knowledge, information and data as well as assess time and resource limitations of water-infrastructure owners and operators.

**[Investigation on the hydrodynamic scaling effect of an OWC type wave energy device using experiment and CFD simulation](#)** – Dai et al. 2019

This paper presents a study of the effect of model scale on the performance of a fixed Oscillating Water Column (OWC) type Wave Energy Converter (WEC). Tank tests at two different scales, including the effect of scaling of the test tanks to minimise the bias introduced by different wave blockage effects. CFD simulations based on Reynolds Average Navier Stokes (RANS) method were then carried out for both scaled OWCs to investigate whether CFD simulation is able to reproduce the scale effect.

**[Radiation-grafted cation-exchange membranes: an initial ex situ feasibility study into their potential use in reverse electrodialysis](#)** – Willson et al. 2019

A variety of radiation-grafted cation-exchange membranes (RG-CEM) were synthesised, using a high-dose rate electron-beam peroxidation method, for an initial evaluation of their applicability to reverse electrodialysis cells (RED, a type of salinity gradient “blue” energy). This study highlights that the future development of both radiation-grafted cation-exchange and anion-exchange membranes for RED (and other electrodialysis applications) should utilise flexible crosslinkers (such as BVPE) to ensure adequate permselectivities.

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## News & Current Events

**[Supergen ORE Hub launches interactive webtool to bring together UK Offshore Renewable Energy research](#)** – Supergen ORE

The Supergen Offshore Renewable Energy (ORE) Hub has launched an interactive Research Landscape to communicate Offshore Renewable Energy (ORE) research. The mission of the Supergen ORE Hub is to connect academia, industry, policymakers and the public to inspire research and innovation and maximise the societal value in offshore wind, wave and tidal energy. Following a series of consultation events with over 180 partners, the Hub has developed a series of research themes, challenges and opportunities faced by the ORE community.

### **[DOE Announces \\$24.9 Million Funding Selections to Advance Hydropower and Water Technologies](#) – DOE**

The U.S. Department of Energy (DOE) announced selections for up to \$24.9 million in funding to drive innovative, industry-led technology solutions to advance the marine and hydrokinetics industry and increase hydropower's ability to serve as a flexible grid resource. Projects were selected across four Areas of Interest (AOI)—Hydropower Operational Flexibility, Low-Head Hydropower and In-Stream Hydrokinetic Technologies, Advancing Wave Energy Device Design, and Marine Energy Centers Research Infrastructure Upgrades.

### **[Nova Innovation Launches Funding Round to Power a Tidal Energy Revolution](#) – Nova Innovation**

Nova Innovation is offering the opportunity to invest in the next generation of sustainable energy. The award-winning company is looking to crowdfund £500,000 on investment platform Seedrs, to fast-track tidal energy technology and accelerate growth across Europe and North America. In 2016, Nova installed the world's first offshore tidal array. Located in the Shetland Islands, Scotland, the turbines have been generating clean electricity and exporting to the grid for over three years.

### **[Sea trial in the Principality of Monaco announced for SBM Offshore's innovative S3® Wave Energy Converter](#) – SBM Offshore**

The Prince's Government of Monaco and SBM Offshore presented the press with a key step in the Wave Energy Converter S3® project (WEC), which uses wave energy to produce electricity. Already tested in the laboratory, the system still needs to be tested at sea before its commercialization, and a prototype will be deployed in Monegasque waters (off Fontvieille heliport) in 2021, for an estimated test duration of one year. The demonstrator will be in the form of a "floating rubber tube", 60m long and 1.2m in diameter submerged at about 4m deep.

### **[Progress on £60M Marine Energy Project Welcomed by Marine Energy Wales](#) – Marine Energy Wales**

The Swansea Bay City Deal's Joint Committee has signed-off a detailed business case for the £60 million Pembroke Dock Marine project, which will now be submitted to the UK and Welsh Governments for final approval. The project that will place Wales at the heart

of global marine energy innovation is seeking £28 million from the £1.3 billion Swansea Bay City Deal programme. The collaborative project between the Port of Milford Haven, Marine Energy Wales, Wave Hub and the Offshore Renewable Energy Catapult will play a key role in increasing innovation and lowering the cost of marine energy.