

TETHYS ENGINEERING BLAST



14 February 2020

[Tethys Engineering](#) is an online knowledge base that facilitates the exchange and dissemination of information on the technical and engineering aspects of marine renewable 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.

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Announcements

Waves to Water Prize

The Water Power Technologies Office at the U.S. Department of Energy has launched the second stage of the [Waves to Water Prize](#), which seeks to accelerate technology innovation in wave energy powered desalination systems. Submissions are due 13 March 2020.

Employment Opportunities

Natural Resources Wales (NRW) is looking to expand its marine team to join its new Offshore Renewable Energy Programme (OREP). A full list of available positions, including those seeking expertise in offshore renewable energy, marine licensing, and marine mammals, can be found [here](#). Applications close 26 February 2020.

Orbital Marine Power is currently seeking a full time [Loads & Control Engineer](#) to develop design improvements to the turbine dynamic controller. For a full job description and details of how to apply please contact: office@orbitalmarine.com.

Carnegie Clean Energy is currently seeking a [Hydrodynamic Engineer](#), an [Electrical Machine Expert](#), and a [Machine Learning Expert](#) to join their technical team. Applications should be sent to careers@carnegiece.com.

Call for Papers

The Journal of Ocean Technology (JOT) has launched a [call for technical papers, essays, and short articles](#) on marine spatial planning. The submission deadline for technical papers and expression of interest for essays and short articles is 21 February 2020. The submission deadline for essays and short articles is 24 April 2020.

Funding Opportunities

The Marine Energy Alliance (MEA) has opened their [2nd Call for Applications](#). The aim of MEA is to progress the technical and commercial maturity level of early-stage (TRL 3/4) marine energy technology companies with the overall goal of reducing the risk of device failure in subsequent demonstration phases. Applications are due 14 February 2020.

The U.S. Department of Energy (DOE) has released a [Funding Opportunity Announcement](#) for the DOE Small Business Innovation Research and Small Business Technology Transfer programs. Applications are due 24 February 2020.

The European Maritime and Fisheries Fund has launched the [Blue Economy Window call](#) to support the sustainable development of small and mid-size enterprises across the European Union. The deadline of the call is 27 February 2020.

Upcoming Events

Upcoming Webinar

ETIP Ocean and DTOceanPlus will be hosting a [webinar](#) entitled, “Stage Gate Design Tool for Ocean Energy” on 25 February 2020 from 7:00-8:00am PST. Register [here](#).

Upcoming Conferences

[The 2nd International Conference on Environment Sciences and Renewable Energy \(ESRE 2020\)](#) will be held in Vienna, Austria on 18-21 May 2020. Registration closes 20 February 2020.

The [5th Asian Wave and Tidal Energy Conference](#) will be held in Hobart, Australia on 8-12 November 2020. Abstracts are due 1 March 2020.

New Documents on *Tethys Engineering*

[Advances in the development of dielectric elastomer generators for wave energy conversion](#)
– Moretti et al. 2020

This paper presents a summary of recent progress towards the development and upscaling of an emerging class of electrostatic power take-off (PTO) systems for wave energy

converters (WECs), called dielectric elastomer generators (DEGs). DEGs are electromechanical devices able to convert mechanical energy into electrical energy by exploiting the deformation of rubber-like dielectric materials. A general lumped-parameter modelling approach for the design of DEG-based WECs is proposed.

[Power variability of tidal-stream energy and implications for electricity supply](#) – Lewis et al. 2019

Temporal variability in renewable energy presents a major challenge for electrical grid systems. Tides are considered predictable due to their regular periodicity; however, the persistence and quality of tidal-stream generated electricity is unknown. This paper is the first study that attempts to address this knowledge gap through direct measurements of rotor-shaft power and shore-side voltage from a 1 MW, rated at grid-connection, tidal turbine (Orkney Islands, UK). Tidal asymmetry in turbulence parameters, flow speed and power variability were observed.

[Salinity gradient power reverse electrodialysis: Cation exchange membrane design based on polypyrrole-chitosan composites for enhanced monovalent selectivity](#) – Tufa et al. 2020

Reverse electrodialysis (RED) is one of the most promising membrane-based processes for renewable energy generation from mixing two solutions of different salinity. However, the presence of Mg^{2+} in natural water has been shown to drastically reduce open circuit voltage and output power of RED. To alleviate this challenge, commercial cation exchange membranes (CEM) supplied by Fujifilm Manufacturing Europe B.V. were chemically modified by polypyrrole (PPy)/chitosan (CS) composites under controlled Pyrrole (Py) concentration (0.025–1 M) and polymerization time (0–8 h).

[Frequency-domain hydrodynamic modelling of dense and sparse arrays of wave energy converters](#) – Wei et al. 2019

In this work, we develop a frequency-domain model to study the hydrodynamic behaviour of a floater blanket (FB), i.e., an array of floater elements individually connected to power take-off systems, which constitutes the core technology of the novel Ocean Grazer wave energy converter. The boundary element method open-source code NEMOH is used to solve the scattering and radiation problem. The floater elements that comprise the FB are mechanically interconnected via (cylindrical, revolutionary or spring) joints, which add extra constraint equations to the multibody problem.

[Riverine hydrokinetic resource assessment using low cost winter imagery](#) – d'Auteuil et al. 2019

In this paper, it is proposed that site selection for a hydrokinetic turbine can be improved in river environments in Canada by the use of winter imagery that is available at little or no cost. This is of particular value to remote communities who power their community using diesel fuel, as some pay over \$1.00 per kWh. It is shown that river sections that do not freeze during the winter have higher velocity magnitudes than sections that are

covered with ice. The average velocity magnitude for open ice locations is found to be 1.09 m/s, with a standard deviation of 0.48 m/s.

[Efficiency analysis and experimental validation of the ocean thermal energy conversion with phase change material for underwater vehicle](#) – Wang et al. 2019

This study proposes the ocean thermal energy conversion for underwater vehicles. It utilizes phase change material to collect ocean thermal energy from warm near-surface and converts it into the potential energy stored in a hydraulic accumulator, which is transformed into electrical energy for the power supply by using hydraulic motor, generator and other components. Based on its working principle, the heat to electricity power generation system efficiency model is established, and validated by comparing measurements and predictions for a laboratory system.

News & Press Releases

[Seabased is Partnering with EMEC to Prepare for Certification](#) – EMEC

Seabased Group has signed an agreement with the European Marine Energy Centre (EMEC) to design and implement a testing programme supporting Seabased's certification goal for its latest generation wave-to-grid wave energy park technology. Certification will pave the way for quality-controlled manufacture. A certified process will enable a reduction in manufacturing costs, logistics and transport, a faster track to local permitting and insurance, and an opportunity for Seabased to generate local jobs and training for future maintenance of their systems.

[Mocean teams up with subsea sector](#) - Mocean Energy

Mocean Energy has teamed up with energy major Chrysaor, subsea energy storage experts EC-OG and AUV specialist Modus in a project to look at using renewables for subsea power. The project, funded by the partners together with the Oil and Gas Technology Centre, will look to use Mocean Energy's Blue Star wave energy converter and EC-OG's HALO subsea energy storage system to power subsea tiebacks or residential AUVs. If industry feedback is positive, the partners will press ahead with a technology field trial using a prototype in the seas off Orkney later this year.

[The National Hydrogen Centre And PLOCAN Collaborate On The Use Of Hydrogen To Accelerate The Energy Transition In The Ocean Field](#) – PLOCAN

The National Hydrogen Centre (CNH2) and the Oceanic Platform of the Canary Islands (PLOCAN) will boost the collaboration of their infrastructures and resources in the production of hydrogen from renewable energies as an energy vector in the marine field and in sea applications. The next generation of multipurpose harvesting systems of marine resources will be introduced in a sustainable manner, consolidating hydrogen and water as vectors for high value-added energy storage (MUSICA project).

Ocean Drones Energized by Seatrec, a Monrovia Company – Monrovia Weekly

Dr. Yi Chao, the founder and CEO of Seatrec, a company founded in 2012 and based in Monrovia, recently spoke at a MADIA Tech Launch meetup to share the evolving success story of this innovative technology. The company's ocean drone technology is now poised for significant growth as it enters a new phase of manufacture and distribution. The drones are floating cylinders with materials that expand and contract with temperature changes. As the company simply states, "we create electricity from temperature differences."

Carnegie advances wave kit development – reNEWS

Australian outfit Carnegie Clean Energy is continuing to progress with the development of its Ceto wave energy technology, following the company's emergence from administration in October last year. Carnegie said it has been completing a range of corporate activities associated with the reinstatement of the business, delivering on the Ceto technology development pathway and operating its Garden Island Microgrid asset. The company will carry out tank testing in April or May at the Cantabria Coastal and Ocean Basin in Spain, after receiving funding from the Marinet2 program.