

# TETHYS ENGINEERING BLAST



**3 July 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 (MRE). 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

### Request for *Tethys Engineering Blast* Content

Do you have a relevant announcement, job or funding opportunity, or upcoming event or webinar you would like highlighted in an upcoming *Tethys Engineering Blast*? If you have specific content you would like circulated to the greater marine renewable energy community, please send it to [tethys@pnnl.gov](mailto:tethys@pnnl.gov) for consideration.

### Funding/Testing Opportunities

The U.S. Department of Energy's (DOE) Water Power Technologies Office (WPTO) and the National Oceanographic and Atmospheric Administration's (NOAA) Integrated Ocean Observing System program have [announced the focus](#) of the next stage of the [Powering the Blue Economy: Ocean Observing Prize](#). Starting this fall, the DEVELOP Competition will challenge U.S. innovators to integrate marine energy technologies to recharge autonomous underwater vehicles—specifically for the purpose of hurricane monitoring in the Atlantic Ocean.

The U.S. DOE WPTO's [2021 Marine Energy Collegiate Competition \(MECC\): Powering the Blue Economy](#) application period will open in August 2020. Building on the inaugural MECC, the 2021 competition challenges competitors to unlock the power of the ocean through the development of next-generation technologies that build resilient coastal communities and

provide power at sea. The competition is open to U.S. undergraduate and graduate-level students. Learn more [here](#).

The Testing Expertise and Access for Marine Energy Research (TEAMER) program, sponsored by the DOE and directed by the Pacific Ocean Energy Trust, is accepting applications for its 1<sup>st</sup> [Request for Technical Support](#) application period. Applications are due by 5:00pm ET (9:00pm UTC) on 31 July 2020.

TEAMER is also accepting applications to add new facilities (both physical test infrastructure as well as expertise capabilities such as modelling and analysis services) to the [TEAMER Test Facility Network](#). Facilities looking to apply are asked to submit the [facility questionnaire](#) by 17 July 2020 in order to be considered available for the 2<sup>nd</sup> Request for Technical Support testing and assistance period. See the [New TEAMER Facility Process page](#) for more information on how to apply as a facility.

The U.K. Research and Innovation's Engineering and Physical Sciences Research Council (EPSRC) has issued a [call to fund research grant proposals](#) in wave energy. EPSRC is looking to fund proposals in the key areas highlighted by the SuperGen Offshore Renewable Energy Hub's Wave Energy Roadmap, including novel designs for niche applications, survivability and reliability of devices, and power take off and control systems. An [Intent to Submit](#) is due by 14 July 2020 and the full proposal stage closes on 23 September 2020.

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## Upcoming Events

### Upcoming Webinars

The European Marine Energy Centre (EMEC) will host the first of a series of six [supply chain seminar events](#) as part of the TIGER (Tidal Stream Industry Energiser) project on 9 July 2020 at 9:30am BST (8:30am UTC). The first event, supported by the Ocean Power Innovation Network, will focus on subsea cables and connectors, aiming to integrate cross-sector supply chain capability and innovation into the development of world leading tidal energy projects. Register [here](#).

The Marine Technology Society (MTS) will host a virtual symposium focusing on material selection in marine structures and their performance in the marine environment on 8 July 2020 at 12:00pm ET (4:00pm UTC). The inter-relation of corrosion and marine biofouling on clean underwater surfaces of ships and biofouling load of offshore structures will also be discussed. Register [here](#).

### Event Updates

The [IMarEST \(Institute of Marine Engineering, Science & Technology\) Annual Conference 2020](#) will be held as a flexible two-week virtual event from 6-17 July 2020. Register for the free event [here](#).

The [7<sup>th</sup> PRIMaRE \(Partnership for Research in Marine Renewable Energy\) Conference](#) will be held online from 7-8 July 2020.

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

### **[Influence of hard marine fouling on energy harvesting from Vortex-Induced Vibrations of a single-cylinder](#) – Jadidi and Zeinoddini 2020**

Marine fouling changes the flow regime around sub-sea structures, such as Vortex-Induced Vibration Aquatic Clean Energy (VIVACE) converters. The present experimental study investigates the effects of marine fouling on mechanical power harvesting performance from the Vortex-Induced Vibration (VIV) of single circular cylinders. The towing tank VIV tests are conducted on elastically mounted rigid cylinders. Hard artificial marine fouling with aggregated spatial distribution is considered. Effects of coverage ratio and spatial distributions are investigated.

### **[Time-domain simulation of a slack-moored floating oscillating water column and validation with physical model tests](#) – Gomes et al. 2020**

The development of devices for extracting wave energy from the ocean is largely supported by numerical models, as they allow the simulation of different configurations without the large costs of tank testing. From the different available options, time-domain models offer a very good combination between accuracy, flexibility and computational time. In this paper, we present a time-domain model to simulate the dynamics and power performance of a slack-moored Spar-buoy OWC (Oscillating Water Column) wave energy converter. The model considers linear hydrodynamics, mean drift forces, viscous drag effects and air compressibility inside the OWC chamber.

### **[Strategic Research and Innovation Agenda for Ocean Energy](#) – Villate et al. 2020**

With zero carbon emissions, ocean energy will help tackle climate change and achieve a cleaner, more sustainable and more prosperous Europe. Ocean energy technologies have reached different stages in their development. For each of these stages, this Strategic Research & Innovation Agenda (SRIA) identifies the main ‘Challenge Areas’ that will deliver the greatest cost reductions. For each Challenge Area, a number of ‘Priority Topics’ are presented, identifying what the ocean energy sector should work on during the next period of 4-5 years.

### **[High-order sliding mode control of a doubly salient permanent magnet machine driving marine current turbine](#) – Chen et al. 2020**

Due to the harsh and changeable marine environment, one low speed stator-permanent magnet machine named doubly salient permanent magnet machine with toothed pole is applied for marine current energy conversion system. However, its permanent magnet flux-linkage has the same variation period as the inductance which leads to a strong

nonlinear coupling system. Consequently, the classical linear PI controller is difficult to meet the system requirement. In this paper, the high-order sliding mode control strategy based on the super-twisting algorithm for this system is utilized for the first time.

### **Enhanced power absorption of a point absorber wave energy converter using a tuned inertial mass – Haraguchi and Asai 2020**

A novel point absorber wave energy converter with a tuned inertial mass (TIM), which is capable of significantly increasing the energy absorption and broadening the effective bandwidth, is proposed in this paper. The mechanism of the TIM has originally been introduced in the field of civil engineering as a passive energy absorber for structures subjected to external loadings such as earthquakes. In this paper, numerical investigation on the power generation performance of a point absorber with the TIM is conducted under random sea waves.

### **Reverse electrodialysis for power generation using seawater/municipal wastewater: Effect of coagulation pretreatment – Mehdizadeh et al. 2020**

Reverse electrodialysis (RED) converts salinity gradient energy (SGE) into electrical energy. Seawater and river water are the most promising feed solutions for RED, but municipal wastewater instead of river water could be acceptable if the wastewater treatment plant is close to the sea because river water is often used for human demands, i.e., for drinking water and agricultural irrigation. Wastewater pretreatment is necessary to prevent performance reduction in the subsequent RED process. In this study, the effect of pretreatment using polyaluminum chloride as a coagulant on the RED performance was investigated using model and real municipal wastewater and seawater samples.

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## **News & Press Releases**

### **Ocean Power Technologies Launches hybrid PowerBuoy – Ocean Power Technologies (OPT)**

OPT announced the launch of their newest product, the hybrid PowerBuoy. Easily deployable and outfitted with multiple power sources the hybrid PowerBuoy power and communications platform is ready for use. OPT recently put the first hybrid PowerBuoy through an initial sea trial that included several tow configurations, roll and pitch stability measurements, Stirling Engine and solar power source operation and integration, and other tests in coastal New Jersey waters, where it met or exceeded stringent engineering requirements.

### **Swansea tidal energy: Hopes of backing for Dragon Island plan – BBC**

A council leader hopes the Welsh Government will back plans for a dragon-shaped island that could harness tidal energy within the next few weeks. Meanwhile, developers of the failed Swansea Bay tidal lagoon say planning permission is still active on the site. Tidal

Power plc launched a £1.2m fundraising scheme, selling shares, in December to pay for work needed to keep alive the planning permission, which otherwise would have lapsed at midnight on Tuesday. An alternative project, Dragon Energy Island emerged from Swansea Bay City Region a year ago.

### **[\\$725 Million Tidal Lagoon Will Help North Wales \(UK\) Economy Recover From COVID-19 – Renewable Energy Magazine](#)**

Plans have been unveiled for a \$725 million (£590 million) tidal lagoon capable of providing low carbon electricity to power 82,000 homes in North Wales. Building the 4.1 mile (6.7 kilometer) long lagoon, stretching from the breakwater at Mostyn to Point of Ayr in Flintshire, would create 300 jobs during the construction phase and up to 30 high-skilled permanent posts. In total there will be eight 16-MW turbines which will generate 298 Gigawatt hours of electricity annually from the lagoon which will enclose an area of 4.7 square miles (12.2 square kilometers) and has a design life of more than 100 years.

### **[National Labs Are Making Waves in Marine Energy Research and Development – DOE](#)**

The seemingly endless expanse of ocean that covers 70% of our planet remains a mystery, still largely unexplored—some estimates suggest we have mapped less than 10% of it. As we celebrate National Ocean Month, let's take a look at what the U.S. Department of Energy's (DOE's) National Labs supporting the Water Power Technologies Office (WPTO) are doing to harness the immense power of the waves and understand what lies beneath them.

### **[Clean energy for EU islands initiative will contribute to European Green Deal and economic recovery plan – European Commission](#)**

The Croatian Presidency recently informed EU Energy Ministers of the completion of the signature of a Memorandum of Understanding on the Clean Energy for EU Islands initiative. Energy Commissioner Kadri Simson signed for the Commission alongside 14 Member States. The Memorandum establishes a long-term framework for cooperation to advance the energy transition for European islands, with full respect for the different specificities of each island. It calls for the continuation of the Islands Secretariat and supports cooperation to identify common solutions and best practices helping islands facing common challenges that cannot be addressed simply at island-level.