

TETHYS ENGINEERING BLAST



16 July 2021

Tethys Engineering is an online knowledge base 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. If you have specific content you would like circulated to the greater marine energy community, please send it to tethys@pnnl.gov for consideration.

[Announcements](#)
[Upcoming Events](#)

[New Documents](#)
[News & Press Releases](#)

Announcements

DOE Request for Information

The United States (US) Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy recently released a [Request for Information](#) to understand the current barriers and actions needed to make its funding opportunities and innovation and entrepreneurship activities more inclusive, just, and equitable. Responses are due by 5:00pm EDT (9:00pm UTC) on 6 August 2021.

EMEC Consultation

On behalf of Orbital Marine Power, the European Marine Energy Centre (EMEC) has opened a [consultation](#) on the decommissioning programme for the second 2 MW tidal turbine, the Orbital O2.2, planned for EMEC's Fall of Warness site in Orkney. Responses are due by 4 August 2021.

Funding & Testing Opportunities

The Offshore Renewable Energy (ORE) Catapult's Marine Energy Engineering Centre of Excellence (MEECE) has launched an [Innovation Challenge](#) to support United Kingdom (UK)-based applicants developing monitoring methodologies for tracking underwater species behavior in and around tidal stream turbines. Applications are due 11 August 2021.

The US DOE has issued a Funding Opportunity Announcement (FOA) titled “[Advancing Wave Energy Technologies through Open Water Testing at PacWave](#)” to support research and development at PacWave South and advance wave energy technologies toward commercial viability. Concept papers are due 13 August 2021 and full applications are due 5 October 2021. An informational webinar will take place 22 July 2021. View the FOA for more details [here](#).

Innovate UK has also launched another round of [Smart Grants](#) for eligible UK organizations to apply for a share of up to £25 million for game-changing and commercially viable research and development innovation. Applications are due by 10:00am UTC on 25 August 2021.

Student & Employment Opportunities

The National Renewable Energy Laboratory (NREL) is recruiting a [Postdoctoral Researcher - Numerical Modeling for Marine Energy Systems](#) to develop, verify, and validate predictive numerical simulation tools that can be used to design and optimize ocean energy systems.

The University of Manchester is recruiting a [Research Associate in Electrical Power Take-off for Wave Energy](#) to join its Power and Energy Division. Applications are due by 20 July 2021.

Swansea University is seeking a [Research Assistant](#) to join a project aiming to synthesize ultra-low dissipative and high fatigue life filled polymers with the required stiffness to be used in flexible polymeric structures for wave energy. Applications are due by 22 July 2021.

EMEC is recruiting an [Electric Test Engineer](#) to assist in the management of its high and low voltage systems, including clients’ electrical connections and the acquisition, analysis, and reporting of electrical performance data. Applications are due by 12:00pm UTC on 28 July 2021.

EMEC is also recruiting a [Mechanical Engineer](#) to technically deliver its testing services into projects and manage its client projects. Applications are due by 12:00pm UTC on 28 July 2021.

The University of the Highlands and Islands, Scotland, are seeking an [Energy Knowledge Exchange Coordinator](#) to be the primary university interface into the energy business community enabling collaborative research projects. Applications are due by 30 July 2021.

Upcoming Events

Upcoming Course

In collaboration with MaRINET2, EMEC, WavEC Offshore Renewables, and the Marine Engineering Institute – Italian National Research Council, are organizing an online course entitled “[Methods and environmental data collection in Marine Renewable Energy sites](#)” on 30 July and 3 September 2021. Register for free [here](#).

Upcoming Webinars

The Selkie Project, which aims to support the marine energy sector in Wales and Ireland, is organizing a [‘Meet the Expert’ event series](#) focused on providing business support for companies looking to diversify into the marine energy sector. During the sixth event at 9:00am UTC on 22 July 2021, Creo Skills will discuss certifications and accreditations. Register [here](#).

As part of its *R&D Deep Dive Webinar Series*, the US DOE Water Power Technologies Office is hosting a webinar, “Contributing Data and Information to PRIMRE”, at 3:00pm EDT (7:00pm UTC) on 28 July 2021. This webinar will provide a brief introduction to [PRIMRE](#) (Portal and Repository for Information on Marine Renewable Energy), WPTO’s centralized system for storing, curating, and disseminating data and information for all aspects of marine energy, and then focus on how you can contribute your data to the various knowledge hubs that make up PRIMRE, including the *MHK Data Repository*, *Tethys*, and *MRE Software*. Register [here](#).

Upcoming Conferences

The [14th European Wave and Tidal Energy Conference \(EWTEC 2021\)](#) will now take place on 5-9 September 2021 in Plymouth, UK and virtually. Register [here](#).

The Pacific Ocean Energy Trust is hosting the [Ocean Renewable Energy Conference \(OREC 2021\)](#) on 22-23 September 2021 in Portland, Oregon (US) and virtually. Early bird rates are available until 21 August 2021.

New Documents on *Tethys Engineering*

[A review of tidal current energy resource assessment in China](#) – Liu et al. 2021

To evaluate the tidal current resource potential in China, both national assessments and regional investigations have been conducted with different methods and resolutions. However, these evaluation results have not been systematically collected, which are poorly informed to researchers, developers, and investors. At the same time, the conducted assessments sometimes show discrepancies, indicating the necessity of analysing data uncertainty and improving data quality. Under the circumstances, this work presents a review of tidal current resource assessment studies in China, and most existing evaluations for tidal current energy hotspots have been included, classified and compared. These regions of interest are further categorised with their exploitability, based on not only theoretical energy, but also bathymetry, transportation, policy, etc.

[Response of wave energy to tidal currents in the western sea of Jeju Island, Korea](#) – Hong et al. 2021

This study focuses on the changes in wave energy in response to tidal currents in the western sea of Jeju Island where high-energy wave conditions along with strong tidal currents are usual. Here, an ocean-wave coupled modeling system was used to investigate

the effect of tidal currents on the wave energy condition. A comparative experiment with and without tidal currents shows that the current largely affects wave energy in terms of the wave spectrum as a response to the relative direction between waves and currents. When the direction of the current is the same as that of wave propagation, the magnitude of wave height is reduced with energy transfer from shorter periods of 7–9 s to longer periods of 10–12 s, resulting in a decrease (increase) of shorter (longer) wave energy.

Ocean Thermal Energy Conversion - Flexible Enabling Technology for Variable Renewable Energy Integration in the Caribbean – Brecha et al. 2021

In this work, three central results are presented. First, through GIS mapping of all Caribbean islands, the potential for near-coastal deep-water as a resource for ocean thermal energy conversion (OTEC) is shown, and these results are coupled with an estimate of the countries for which OTEC would be most advantageous due to a lack of other dispatchable renewable power options. Secondly, hourly data have been utilized to explicitly show the trade-offs between battery storage needs and dispatchable renewable sources such as OTEC in 100% renewable electricity systems, both in technological and economic terms. Finally, the utility of near-shore, open-cycle OTEC with accompanying desalination is shown to enable a higher penetration of renewable energy and lead to lower system levelized costs than those of a conventional fossil fuel system.

Modelling hydrodynamics of fast tidal stream around a promontory headland – McIlvenny et al. 2021

Areas around headlands often have higher tidal flow, making them important foraging locations for seabirds and marine mammals, as well as of interest for tidal energy extraction. Using *in situ* field measurements and hydrodynamic modelling, this study investigated tidal features around the most northerly promontory headland on the United Kingdom mainland. An acoustic wave and current (AWAC) instrument and an acoustic Doppler current profiler (ADCP) were deployed for 109 days in upward-facing configurations. These data were used to calibrate a hydrodynamic model developed using the TELEMAC-MASCARET modelling suite. This study used a non-hydrostatic model with a vertical layer configuration to reproduce upwelling present in field data.

Timing value of marine renewable energy resources for potential grid applications – Bhattacharya et al. 2021

In this paper, the applicability of marine renewable energy (MRE) for potential grid applications is presented. We show that many of the unique value streams from marine-based electricity generation resources stem from their inherent temporal characteristics, especially when compared to wind and solar. Specifically, in this work, we evaluate the timing value for three types of MRE resources: (a) tidal, (b) wave, and (c) ocean currents. First, through a suite of novel metrics, such as resource availability, persistence, and versatility, we evaluate the temporal value characteristics of these resources. Second, through a more grid-oriented numerical study, we comment on the potential ramifications

of those temporal characteristics in context of energy balancing and effective load carrying capability for one marine-based resource i.e., wave.

[Experimental study on salinity gradient energy recovery from desalination seawater based on RED – Jianbo et al. 2021](#)

Recovery on salinity gradient energy (SGE) usually existing at the junction of rivers and sea, have attracted a large amount of researchers. However, recovery and utilization of the SGE between desalinated seawater and seawater discharged from desalination plants, is relatively unexplored. In this work, a reverse electro dialysis (RED) approach is introduced to recover the SGE and convert it into electric energy. The objectives of this work are: i) exploring the feasibility to recover the SGE by adopting the RED method; ii) investigating the influence of different inlet parameter on the performance of a RED stack. On the basis of above aims, comparative experiments are implemented to verify the feasibility. Then the factors affecting the performance of the RED stack are analyzed.

News & Press Releases

[TEAMER Network Director Announces RFTS 3 Technical Support Recipients – TEAMER](#)

The U.S. Testing Expertise and Access to Marine Energy Research (TEAMER) program selected 14 projects through its third Request for Technical Support (RFTS) for testing expertise and access to numerical modeling, lab testing, and tank/flume testing and expertise within the growing facility network. Chosen applicants, along with the supported Facility, will now submit their completed Test Plans, a requirement before assistance activities can commence. TEAMER will announce the next call for applications in August. Supported by the DOE 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.

[EMEC Prepare for Summer Acoustic Monitoring Programme – EMEC](#)

The European Marine Energy Centre (EMEC) has designed a programme of acoustic surveys to determine the potential impact that marine renewable developments may have on local species and habitats. This summer, EMEC will deploy a series of acoustic surveys designed to monitor noise levels of marine energy technologies at its ocean energy test sites in Orkney, Scotland. The acoustic survey programme will attempt to monitor wave energy converters demonstrated by Mocean Energy and AWS Ocean Energy at EMEC's Scapa Flow scale wave energy test site, via the European Maritime and Fisheries Fund SEA Wave project, and tidal energy technologies demonstrated by Orbital Marine Power and Magallanes Renovables at EMEC's Fall of Warness tidal energy site, funded by Horizon 2020 projects, FloTEC and MaRINET2.

SIDS DOCK and Global OTEC Announce Partnership to Develop and Deploy Floating Ocean Thermal Energy Conversion (OTEC) Technology in Small Islands – Global OTEC Resource Limited

SIDS DOCK, the Small Island Developing States (SIDS) Sustainable Energy and Climate Resilience Organization, has signed an agreement with the UK-based Global OTEC Resources Limited, to collaborate on developing and deploying a floating OTEC concept in SIDS. The signing ceremony took place on 2 July 2021, with representatives in Seychelles, Jamaica, Portugal, and the UK. His Excellency Mr. Ronald J. Jumeau, Chair of the Executive Council of SIDS DOCK, said, “The possibility of using ocean energy offers one of the most promising opportunities, not just for development of a competitive sustainable energy sector in island states, but for the construction, installation and operation of the first Floating OTEC Power Plant, to be named “Dominique,” in partnership with the Government of the Democratic Republic of Sao Tome and Principe”.

Anglesey tidal energy project in line for £9 million funding boost – Offshore Energy

The Morlais tidal stream energy project has taken a significant step forward following approval of its outline business case by the North Wales Economic Ambition Board. The approval means that Morlais, a tidal stream energy project led by Menter Môn, will now progress to the next stage – the last before construction can begin. If the final business case is approved, the board will invest up to £9 million of Growth Deal funding towards the infrastructure that connects the Morlais zone to the electricity network. The Morlais Demonstration Zone is planned to provide a consented area for the installation and commercial demonstration of multiple arrays of tidal energy devices, to a maximum installed capacity of 240MW.

WavEC and OceanPixel sign a Memorandum of Understanding on Marine Renewable Energies – WavEC

WavEC and OceanPixel have signed a Memorandum of Understanding (MoU) to encourage knowledge sharing on marine renewable energy—technology, projects, and more. This MoU is expected to help to strengthen collaborations between the two organisations with the aim of seeking opportunities presented by marine renewable energy developments in Europe and Southeast Asia, contributing to economic growth. The wide range of scope of cooperation extends to a variety of topics including marine renewable energy site selection and characterization, technology assessment, environmental monitoring and assessment, farm layout, LCOE assessment and offshore logistics, mooring design and power cable layout.