

TETHYS ENGINEERING BLAST



20 May 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 to contribute!

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

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

Announcements

Marine Energy Data Pipeline

The Marine Energy Data Pipeline effort, led by the Pacific Northwest National Laboratory (PNNL), recently released the latest version of [Tsdats](#), a data ingestion pipeline that can be used to read, process, run quality control, and convert raw data to standard formats. To learn more about Tsdats and its architecture, join the “[Marine Energy Data Pipeline Updates](#)” webinar on 14 June 2022, from 12:00-1:00pm PDT (7:00-8:00pm UTC). A recording will be made available on the Portal and Repository for Information on Marine Renewable Energy ([PRIMRE](#)).

Tethys Engineering Survey

As part of the international community working to advance the marine energy industry, we would like to hear from you! We ask that you please fill out a brief, 3-minute [survey](#) by 27 May 2022 to help us evaluate and guide further development of *Tethys Engineering*.

MHKDR Survey

The *Marine and Hydrokinetic Data Repository (MHKDR)* team is also conducting a brief, 3-minute [survey](#) to help evaluate and guide further development of the *MHKDR*. Please respond to the survey by 27 May 2022.

Calls for Abstracts

The [Call for Abstracts](#) for the [International Conference on the Environmental Interactions of Marine Renewables \(EIMR 2022\)](#) has been extended to 23 May 2022. The University of the Highlands and Islands and Heriot Watt University will host EIMR online on 4-6 October 2022.

The [Call for Abstracts](#) for [OCEANS 2022 Hampton Roads](#) has been extended to 31 May 2022. The hybrid event will take place on 17-21 October 2022 in Virginia Beach, US and 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. The conference will take place on 11-14 October in London, UK.

Calls for Papers

Sustainability is accepting submissions for several Special Issues, including “[Marine Renewable Energy: A Solution towards Energy Self-Sufficiency of Ports](#)” (due 15 June 2022) and “[Sustainability of Wave Energy Resources in the Sea](#)” (due 31 July 2022).

Water is accepting submissions for the Special Issue, “[Numerical Models for Coastal and Offshore Engineering-Related Fluid-Structure Interaction](#)” (due 15 July 2022).

Funding & Testing Opportunities

The French Government’s Ministry of the Sea has launched the Maritime Intervention Fund’s second [Call for Applications](#) to support the sustainable development of maritime activities, including coastal and blue economy development. Applications are due 31 May 2022.

The Interreg Europe programme, financed by the European Regional Development Fund, has launched its first [Call for Proposals](#) in the 2021-2027 period, and is looking for interregional cooperation projects that will support a greener Europe. Applications are due 31 May 2022.

The Interreg North-West Europe Programme has launched its first [Call for Projects](#) in the 2021-2027 period, and is looking for transnational cooperation initiatives that can deliver concrete results for the North-West Europe area. The Call for Projects will close on 15 June 2022.

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.

Student & Employment Opportunities

The Oceanic Platform of the Canary Islands (PLOCAN) has opened an [Employment Call](#) for several permanent job positions, including administrative and technical positions.

The Oregon Department of Fish and Wildlife is recruiting an [Energy Program Coordinator](#) to coordinate its participation in the Energy Facility Siting Council site certificate application process to identify and mitigate for the impacts of energy facility projects on fish, wildlife, and habitat resources. Applications are due 26 May 2022.

The University of Hull is recruiting two [Lecturers in Renewable Energy](#) to join the Energy and Environment Institute and deliver masters level teaching alongside other staff from across the University. Applications are due 3 June 2022.

The Environmental Research Institute at the University of the Highlands and Islands (ERI-UHI) is looking for a [Marine Acoustic Engineer](#) to lead development of an integrated system for marine mammal mitigation from offshore developments (e.g. windfarm, oil & gas, harbour construction, etc.) on marine mammals. Applications due 13 June 2022.

The School of Marine and Atmospheric Sciences at Stony Brook University is looking to hire a [Glider Technician](#) to help monitor oceanographic conditions on the continental shelf and support wind farm developments. Applications are due 15 June 2022.

Upcoming Events

Upcoming Webinars

The VALID (Verification through Accelerated Testing Leading to Improved Wave Energy Design) project is hosting a webinar, “[Hybrid Testing of Wave Energy Converters: Improving Development Times Using Virtual Modelling](#)”, from 3:00-4:00pm CEST (1:00-2:00pm UTC) on 24 May 2022. Register [here](#).

The RENOVBLES project is hosting a webinar, “[The Importance of Data in the Fluid Dynamic Simulation of Floating Platforms for Marine Renewable Energies](#)”, from 11:00am-12:00pm CEST (9:00-11:00am UTC) on 3 June 2022. Register [here](#).

The RENOVBLES project is also hosting a webinar, “[Artificial Intelligence for Marine Renewables: Use Cases in Marine Energy Generation Using Deep Learning](#)”, from 4:00-5:00pm CEST (2:00-3:00pm UTC) on 20 June 2022. Register [here](#).

Upcoming Conferences

The Dutch Marine Energy Centre (DMEC) is hosting its [Marine Energy Accelerator Conference](#) on 2 June 2022 in The Hague, Netherlands and online. Register [here](#).

The Joint Research Laboratory on Offshore Renewable Energy (JRL-ORE) is hosting the [VIII Marine Energy Conference](#) on 22 June 2022 in Bilbao, Spain. Registration will open soon.

New Documents on *Tethys Engineering*

[Marine Energy Workshop on Materials & Manufacturing: Summary Report, October 5, 2021](#) – National Renewable Energy Laboratory 2022

The U.S. Department of Energy's Water Power Technologies Office (WPTO) enables research, testing, development, and commercialization of emerging technologies to advance marine energy, as well as next-generation hydropower and pumped storage systems, for a flexible, reliable grid. This report summarizes the results of a WPTO-sponsored public workshop held virtually on October 5, 2021. In the first part of the workshop, several industry and university partners presented materials projects and identified gaps that currently prevent marine energy devices from reaching commercial viability. The workshop focused on three major research areas: current energy converters (CECs), conventional wave energy converters (WECs), and unconventional WECs.

[Global riverine theoretical hydrokinetic resource assessment](#) – Ridgill et al. 2022

Hydrokinetic energy conversion refers to the conversion of kinetic energy in moving water to electricity. It offers an alternative to conventional hydropower, with benefits of modularity and scalability, in addition to being environmentally and socially less impactful. This study aims to determine the theoretical global riverine hydrokinetic resource. We use a 35 year modelled daily discharge data set and vectorised representation of rivers, with near-global coverage and suitable spatiotemporal resolution, to determine the mean annual energy yield of 2.94 million river reaches. The mean global resource (excluding Greenland) is estimated to be $58\,400 \pm 109$ TWh yr⁻¹ (6.660 ± 0.012 TW). Consideration of global spatial distribution, by river reach, illustrates regional variation and shows a tendency for potential to be concentrated along major rivers and in areas of significant elevation change.

[Wave energy converter optimization based on differential evolution algorithm](#) – He et al. 2022

A parameter optimization method for an oscillating buoy-type wave energy converter (WEC) is presented from the perspective of submerged buoy volume; which affects both the power production and cost investment. The effects of submerged buoy volume on the optimal power capture are studied using the differential evolution algorithm and linear potential flow theory. The cost indicator V/P (V and P representing submerged buoy volume and power capture, respectively) is introduced to measure the cost-effectiveness of the WECs. The power capture and cost performance of the optimized WECs in regular and irregular waves are discussed. The results show that the WEC with the large power take-off (PTO) damping has good adaptability to a range of wave frequencies; however, the optimal submerged buoy volume is not cost-efficient due to the consequent relatively large cost indicators.

[Investigations on the effects of operational parameters in reverse electro dialysis system for salinity gradient power generation using central composite design \(CCD\) – Altıok et al. 2022](#)

Reverse electro dialysis (RED) can be utilized for the production of renewable energy from salinity gradients. However, there are many key parameters that could influence the performance of RED. This study investigates the use RSM for development of a predictive power density (PD) and open-circuit voltage (OCV) model for the RED system. A three-factor central composite design (CCD) was used to quantify the effects of flow velocity (X_1), salinity ratio (X_2), and number of cell pairs (X_3) towards PD and OCV. A total of 17 experimental data were fitted and ANOVA was used to validate the accuracy of the models. 3D and surface plots were created to foresee the optimal levels of each variable. It was found that flow velocity and salinity ratio have the most dominant influences on the RED performances as compared to number of cell pairs.

[A numerical study of a taut-moored point-absorber wave energy converter with a linear power take-off system under extreme wave conditions – Tagliafierro et al. 2022](#)

Probably the biggest challenge for wave energy is to ensure survival in harsh offshore conditions, in order to reduce costs for offshore repair operations and downtime, and achieve economic viability. This work presents a reliable numerical tool that can be used to study the dynamics and survivability of wave energy converters in violent wave conditions, possibly cutting down the costs of experimental campaigns. Within the Smoothed Particle Hydrodynamics framework, this research identifies a detailed procedure to model a taut-moored point-absorber wave energy converter together with its inherent power take-off device, which seamlessly exploits its functions of energy harvesting and load bearing.

[Compression-assisted absorption refrigeration using ocean thermal energy – Hu et al. 2022](#)

Renewable ocean energy is regarded as an attractive candidate resource for the development of maritime cold chain systems. To meet the refrigeration requirement of seafood freezing and preservation storage, this study proposes two-type compression-assisted ammonia-water absorption refrigeration cycles using ocean thermal energy. The effects of intermediate pressure on the exergy efficiency and primary energy rate ratio are analyzed and discussed. Moreover, the role of the heat source and sink temperatures on the primary energy rate ratio was examined. The results indicated that the absorption refrigeration system with a compressor in the low-pressure stage has a higher exergy efficiency and a higher primary energy rate ratio than the corresponding compressor in the high-pressure stage.

News & Press Releases

[Tidal blade facility at leading edge of green energy testing – University of Edinburgh](#)

The world's first rapid testing facility for tidal turbine blades, which researchers say can speed up development of marine energy technologies while helping to reduce costs, has opened for business. FastBlade's pioneering technology will stress test blades made from composite materials – which must withstand harsh ocean conditions for 20 years – more quickly, and using significantly less energy than any other facility of its kind, the team says. Based in Rosyth, Fife, the £4.6 million facility – which was officially opened by UK Government Minister for Scotland Malcolm Offord – aims to maintain Scotland's position at the forefront of tidal energy development. The facility's 75-tonne reaction frame is capable of exerting powerful forces on turbine blades more than 50 feet long.

Sustainable Marine Delivers First Floating Tidal Power to Nova Scotia Grid – Sustainable Marine

Sustainable Marine recently announced it has successfully harnessed the enormous tidal currents in Canada's Bay of Fundy, delivering the first floating in-stream tidal power to Nova Scotia's grid. It demonstrates that the Bay of Fundy's huge tidal energy resource - which contains more than four times the combined flow of every freshwater river in the world – can be effectively harnessed providing up to 2500MW of clean and predictable energy for Canada. Nova Scotia has allocated circa 30MW of capacity via demonstration permits and berths at FORCE (Fundy Ocean Research Center for Energy) for developers to demonstrate the effectiveness, cost and environmental effects associated with this new form of energy generation.

Inna Braverman, CEO of Eco Wave Power, Conducts Site Visit at Port Adriano in Mallorca to Promote its First Wave Energy Project in Spain – Eco Wave Power

Inna Braverman, CEO of Eco Wave Power, recently visited Port Adriano on the island of Mallorca, Spain, a month after the Company signed an agreement to install an up to 2 MW wave energy project at the location. The installation will be the first application of Eco Wave Power's wave energy technology in Spain and will produce clean electricity from waves to be used by Port Adriano, one of the most modern marinas in the Mediterranean and an exceptional base for superyachts. During her visit, Braverman met with the CEO of OCIBAR and the Port engineering team to tour and discuss the logistics and implementation plan. The project will commence with a detailed feasibility study and project licensing, which the parties aspire to secure by the end of 2022.

Yell and Islay's Net Zero Ambitions Boosted – Nova Innovation

Global tidal pioneer Nova Innovation recently welcomes the news that the island of Yell in Shetland and Islay (alongside Hoy, Great Cumbrae, Raasay and Barra) have been selected as two of six islands included in the Scottish Government's Carbon Neutral Islands (CNI) project. The announcement recently made by Mairi Gougeon, Cabinet Secretary for Rural Affairs and Islands, will set Yell and Islay as two of Scotland's "net zero lighthouse communities" boosting awareness, knowledge, and investment strategies to further assist them becoming net zero by 2040. Yell has superb tidal resource around both sides of the island precisely where Nova Innovation's existing projects are located,

but these leases only scratch the surface in terms of potential. The Carbon Neutral Island Project could be revolutionary in helping Yell realise its renewable resource potential.

REPowerEU offers new innovation opportunities for renewables – Ocean Energy Europe

Ocean Energy Europe (OEE) welcomes the European Commission's REPowerEU initiative, which at its heart has a massive and accelerated roll-out of renewables. The Commission recognises that this is Europe's only path to escape fossil fuel dependency and to rapidly decarbonise. Much of REPowerEU focuses on important steps to speed up permitting processes. A new law will recognise renewable energy as 'an overriding public interest'. And renewable projects can be fast-tracked in new 'Go To' areas. But REPowerEU also recognises that Europe must remain a global leader in renewable energy technology – and this is backed up with new funding later this year. The text confirms that the Innovation Fund's large-scale call this autumn will have a doubled budget of circa €3bn and 3 separate funding windows.