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[Tethys](#) is an online knowledge base that facilitates the exchange and dissemination of information on the environmental effects of wind and marine energy. The bi-weekly *Tethys Blast* highlights new publications in the [Tethys Knowledge Base](#); relevant announcements, opportunities, and upcoming events; and news articles of international interest. [ORJIP Ocean Energy](#) has partnered with OES-Environmental to provide additional content. If you have specific content you would like circulated to the greater wind and marine energy communities, please send it to tethys@pnnl.gov for consideration.

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Announcements

Contributing to *Tethys*

Did you know the [Tethys Knowledge Base](#) contains over 6,900 documents from around the world? So long as an English title and abstract are available, *Tethys* can host documents in any language! If you know of any documents that belong on *Tethys*, send a link to tethys@pnnl.gov!

New *Tethys* Story

[The Risk Assessment Program \(RAP\) for Tidal Stream Energy: Combining hydrodynamics and acoustic tracking data to assess the risk of fish encountering a tidal stream device](#) by Tony Wright (Fundy Ocean Research Centre for Energy)

Regulators perceive the greatest potential risk of tidal turbine operations as collisions between marine animals and turbines blades. However, these types of interactions are difficult to observe directly: both because of the fast flowing, turbid waters of tidal energy sites and because of the limitations of monitoring instruments which have been designed for use in more benign marine environments. The Risk Assessment Program (RAP) for tidal stream energy creates a way forward. Read more [here](#).

Public EMEC Consultations

The European Marine Energy Centre (EMEC) has opened up two consultations on the Decommissioning Programmes for the [Mocean Energy Blue X](#) and [AWS Ocean Energy Archimedes Waveswing](#) wave energy converters, and would like to invite stakeholders and members of the public to provide responses by 14 June and 28 June 2021, respectively.

Funding & Testing Opportunities

The U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy recently announced its intent to issue a Funding Opportunity Announcement in summer 2021 to support open water research and development at the PacWave South test site. Please refer to the full [Notice of Intent](#) for additional information.

The [Pacific Marine Energy Center \(PMEC\)](#) is inviting applications for [collaboration grants](#) to facilitate short-term, on-site research opportunities in the U.S. The grants will allow graduate and undergraduate students to participate in marine energy projects underway at PMEC partner universities—Oregon State University, the University of Washington, and the University of Alaska Fairbanks. Applications are due by 30 June 2021.

BlueSwell, a collaboration between the New England Aquarium and SeaAhead, is now accepting applications for the second cohort of its [BlueSwell Incubator](#). The program is designed to help with the creation and growth of startups that have the potential for significant impact on ocean sustainability and global resilience. Applications close at 5:00pm EDT (UTC) on 1 July 2021.

In collaboration with Innovate UK, the UK Department for Business, Energy and Industrial Strategy launched an opportunity for businesses in England, Wales, and Northern Ireland to bid for funding from the [Industrial Energy Transformation Fund \(IETF\)](#). Applications for the [Phase 1: Spring 2021 IETF](#) close on 14 July 2021.

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 (R&D) innovation. Applications are due by 11:00am BST (10:00am UTC) on 25 August 2021.

Interreg North-West Europe recently launched the [4th Ocean DEMO](#) (Demonstration Programme for Ocean Energy Pilot Farms and Supporting Technologies) [Call for Applications](#). Successful applicants will receive free access to test their ocean energy products in real sea environments at the project's network of test centers. Applications are due 10 September 2021.

Student & Employment Opportunities

Marine Energy Wales is seeking a [Project Coordinator](#) to deliver the 'Dissemination Communication and Mobilisation' package of the SELKIE project, which aims to support the marine energy sector in Wales and Ireland. Applications are due 18 June 2021.

The Aura Centre for Doctoral Training (CDT) in Offshore Wind Energy and the Environment at the University of Hull, in partnership with the Offshore Renewable Energy (ORE) Catapult, is inviting applications for a [funded PhD project](#) looking at enhanced mixing of stratified waters by offshore wind infrastructure. Applications are due 20 June 2021.

The Pacific Northwest National Laboratory (PNNL) is seeking a [Post Doc Research Associate](#) to conduct marine energy modeling research and simulate the effects of tidal or ocean current energy extraction on physical and biogeochemical processes. Applications due by 26 June 2021.

PNNL is also seeking a [Post Masters Research Associate](#) who will work primarily on projects associated with developing marine energy projects for coastal communities and other small-scale markets, such as aquaculture, mariculture and ocean observing. Applications due by 9 July 2021.

Upcoming Events

Upcoming Webinars

The U.S. DOE Wind Energy Technologies Office [WINDEXchange](#) initiative is hosting a webinar, “[Overview of Fixed-Bottom Offshore](#)”, at 11:00am MDT (5:00pm UTC) on 16 June 2021. During the webinar, Walt Musial from the National Renewable Energy Laboratory will cover basic technical information, including offshore wind basics, a discussion of foundation types, and construction considerations. Register [here](#).

The New York State Energy Research and Development Authority (NYSERDA) is hosting a webinar, “[Learning from the Experts: The Science of Visibility](#)”, at 1:00pm EDT (5:00pm UTC) on 23 June 2021. During the webinar, experts will discuss the environmental factors that affect visibility of wind farms from shore and methods for modeling visual impacts. Register [here](#).

As part of its *R&D Deep Dive Webinar Series*, the U.S. DOE Water Power Technologies Office is hosting a webinar, “[Underwater Observations – Monitoring the Environment around Marine Energy Devices](#)”, at 3:30pm EDT (7:30pm UTC) on 24 June 2021. The webinar will focus on the [Triton Initiative](#), which is researching various environmental monitoring technologies and methods to understand how different types of stressors caused by marine renewable energy devices can be tested. Register [here](#).

The International Energy Agency (IEA) Ocean Energy Systems (OES) is hosting the second webinar in its series focused on ocean energy projects and key policies in IEA-OES member countries at 11:00am UTC on 24 June 2021. The webinar will provide an outlook on the latest initiatives and projects in the UK, Spain, and Denmark. Register [here](#).

Nova Scotia’s Offshore Energy Research Association (OERA) is hosting a webinar, “[Offshore wind – a global perspective on its applicability in Atlantic Canada](#)”, at 10:00am ADT (1:00pm UTC) on 24 June 2021. During the webinar, Aegir Insights will discuss global enabling conditions and the applicability of offshore wind for Atlantic Canada. Register [here](#).

Upcoming Conferences

The Offshore Renewable Energy (ORE) Catapult and RenewableUK are hosting a virtual conference on [Circular Economy in the Wind Sector](#) on 29 June 2021. Register for free [here](#).

Bangor University is hosting the [8th Partnership for Research in Marine Renewable Energy \(PRIMaRE\) Conference](#) online on 29-30 June 2021. Register for free [here](#).

The University of Plymouth is hosting the [14th European Wave and Tidal Energy Conference \(EWTEC 2021\)](#) on 5-9 September 2021 in Plymouth, UK. Early bird registration has been extended to 15 June 2021.

The Leibniz Institute for Zoo and Wildlife Research is hosting the [1st International Bat Research Online Symposium \(IBROS\)](#) on 2 November 2021. Registration opens soon.

New Documents on *Tethys*

Marine Energy

[Environmental Assessment of the Impacts and Benefits of a Salinity Gradient Energy Pilot Plant](#) – Marin-Coria et al. 2021

Although the technologies involved in converting saline gradient energy (SGE) are rapidly developing, few studies have focused on evaluating possible environmental impacts. In this work, the environmental impacts of a hypothetical 50 kW RED plant installed in La Carbonera Lagoon, Yucatan, Mexico, are addressed. The theoretical support was taken from a literature review and analysis of the components involved in the pressure retarded osmosis (PRO) and reverse electrodialysis (RED) technologies. The study was performed under a three-stage scheme (construction, operation, and dismantling) for which the stress-inducing factors that can drive changes in environmental elements (receptors) were determined.

[Eco-efficiency assessment of wave energy conversion in Western Australia](#) – Burgess & Biswas 2021

This paper examines the environmental and economic feasibility of energy generation from wave energy conversion in Western Australia by undertaking an Eco-Efficiency Analysis (EEA). The environmental impacts of wave energy converters (WEC) were assessed by application of a Life Cycle Analysis (LCA) while the economic performance considered the Life Cycle Costing (LCC). An eco-efficiency portfolio was developed to visualise the sustainability of coastal energy generation options – wave generation, offshore wind and diesel generation – finding that wave generation was the most eco-efficient option and could be deemed a sustainable energy generation technology. The LCA results were comparable to literature, validating the impact assessment.

Assessment of the Tidal Current Energy Resources and the Hydrodynamic Impacts of Energy Extraction at the PuHu Channel in Zhoushan Archipelago, China – Wu et al. 2021

An unstructured model FVCOM (The Unstructured Grid Finite Volume Community Ocean Model) with sink momentum term was applied to simulate the tidal current field in Zhoushan Archipelago, China, with focus on the region named PuHu Channel between Putuo Island and Hulu Island. Hydrodynamic influence due to the deployment of the tidal array was simulated by the modified FVCOM model. The simulation showed that the tidal level did not significantly change because of the operation of the tidal array. The velocity reduction covered a 2 km² area of the downstream the tidal array, with a maximum velocity reduction of 8 cms⁻¹ at mid-flood tide, whereas the streamwise velocity on both sides of the farm increased slightly.

Wind Energy

Mitigating biodiversity impacts associated with solar and wind energy development: guidelines for project developers – Bennun et al. 2021

Large-scale expansion of renewable energy can play a critical role in meeting the world's growing energy demands and in the fight against climate change. However, even 'clean' energy sources can have significant unintended impacts on the environment. The guidelines aim to provide practical support for solar and wind energy developments by effectively managing risks and improving overall outcomes related to biodiversity and ecosystem services. They are industry-focused and can be applied across the whole project development life cycle, from early planning through to decommissioning and repowering, using the mitigation hierarchy as a clear framework for planning and implementation.

Observations and Simulations of a Wind Farm Modifying a Thunderstorm Outflow Boundary – Tomaszewski & Lundquist 2021

On June 18, 2019, National Weather Service (NWS) radar reflectivity data indicated the presence of thunderstorm-generated outflow propagating east-southeast near Lubbock, Texas. A section of the outflow boundary encountered a wind farm, and then experienced a notable reduction in propagating speed, suggesting that interactions with the wind farm impacted the outflow boundary progression. We use the Weather Research and Forecasting model and its Wind Farm Parameterization to address the extent to which wind farms can modify thunderstorm outflow boundaries. We conduct two simulations of the June 2019 outflow event, one containing the wind farm and one without.

Predicting migration routes for three species of migratory bats using species distribution models – Wieringa et al. 2021

While there are many species of migratory bats in North America, little is known about their seasonal movements. In terms of conservation, this is important because the bat fatalities from wind energy turbines are significant and may fluctuate seasonally. Here we

describe seasonally resolved distributions for the three species that are most impacted by wind farms (*Lasiurus borealis* (eastern red bat), *L. cinereus* (hoary bat) and *Lasionycteris noctivagans* (silver-haired bat)) and use these distributions to infer their most likely migratory pathways. Finally, we describe proposed migratory pathways for these species that can be used to identify stop-over sites, assess small-scale migration and highlight areas that should be prioritized for actions to reduce the effects of wind farm mortality.

News & Press Releases

Marine Energy

[TTI recovers NetBuoy after half-year trial in Scottish waters](#) – Offshore Energy

Tension Technology International (TTI) has retrieved its NetBuoy following six months of sea trials in the Cromarty Firth. The trials served to assess the effect of NetBuoy's long-term exposure to sea water, environmental loading, biofouling and UV and ozone, TTI said earlier. Sea trials represent only one element of TTI's multifaceted project, according to the company, as it announced the return to the wave tank next month to demonstrate the applicability of NetBuoy to different wave energy converter types. NetBuoy integrates two enabling technologies for cost competitive wave energy – impermeable membranes to manufacture buoyant modules, and fibre rope nets to encapsulate the buoyant modules.

[Seabased Will Install Utility Scale Wave Park in Brittany](#) – Seabased

In the race to commercialize wave energy, the Brittany region in France may plant a flag as home to Europe's first utility scale commercial wave energy park. With the support of the region, Seabased, a wave energy company led by French CEO Laurent Albert, is planning to build a 10 MW wave power park in Audierne Bay. Bretagne Ocean Power has already developed ocean energy projects in the area, identified the zones that work for different technologies, and worked with local stakeholders such as local fishermen. The planned wave power park will begin with a pilot 2 MW and scale up to 10 MW and will be connected to the French grid.

[CorPower joins world-class consortium in €5m VALID Project](#) – CorPower

CorPower is delighted to be part of a world-class consortium delivering the €5m Horizon2020 VALID (Verification through Accelerated testing Leading to Improved wave energy Designs) Project. Our joint mission is to develop a new hybrid platform to test the reliability and survivability of wave energy converters, influenced by proven methods from the automotive industry. The extensive 3-year project, which began in Dec 2020 and will complete in late 2023, combines virtual and physical environments in efforts to reduce product development costs, tackle scaling challenges and derisk final demonstration projects.

Blue X installation about to begin – Offshore Energy

Leask Marine is about to begin the installation of the mooring system and Blue X device at the European Marine Energy Center (EMEC) nursery site in Scapa Flow. The company will be installing the wave energy converter between 8 June and 30 June 2021. After the initial trials set to take place at Scapa Flow test site, the Blue X prototype will be deployed at the centre's large scale Billia Croo test site in summer 2021. Next year, Mocean Energy plans to connect the device to a subsea battery which will be used to power a remotely operated autonomous underwater vehicle (AUV). EMEC recently opened up a consultation on the decommissioning programme for stakeholders and the public to submit their responses and possible concerns.

Eco Wave Power Partners in ILIAD Project, which was Awarded €17 million by the EU – Eco Wave Power

Eco Wave Power recently announced its' participation in the ILIAD Consortium, which has been awarded €17 million by the European Union (EU) as part of the €1 billion European Green Deal. The ILIAD Project, which is comprised of 56 partners from 18 different countries in Europe, the Middle East and North Africa, will develop, operate, and demonstrate the ILIAD Digital Twin of the Ocean (DTO). ILIAD will commercialize an interoperable, data-intensive, and cost-effective DTO, capitalizing the explosion of new data provided by many different earth sources, modern computing infrastructure including Internet of Things, social networking, Big Data, cloud computing and more.

Wind Energy

Interior Department to Explore Offshore Wind Potential in the Gulf of Mexico – U.S. Department of the Interior

The Department of the Interior today announced its intent to assess potential opportunities to advance clean energy development on the Gulf of Mexico Outer Continental Shelf (OCS). This significant milestone is part of the Biden-Harris administration's goal to create thousands of jobs through the deployment of 30 gigawatts of offshore wind by 2030. The Bureau of Ocean Energy Management (BOEM) will publish a Request for Interest (RFI) in the Federal Register on Friday, June 11 to assess interest in potential offshore wind development in the OCS. The RFI will be focused on the Western and Central Planning Areas of the Gulf of Mexico offshore the states of Louisiana, Texas, Mississippi, and Alabama.

Ørsted commits to sustainable recycling of wind turbine blades – Ørsted

Ørsted recently announced its new commitment to either reuse, recycle, or recover all of the wind turbine blades in Ørsted's global portfolio of onshore and offshore wind farms upon decommissioning. Today, between 85 % and 95 % of a wind turbine can be recycled, but recycling of wind turbine blades remains a challenge, as the blades are designed to be lightweight, yet durable, making them challenging to break apart.

Consequently, most decommissioned blades are landfilled today. Should the challenge with recycling blades take longer to solve than anticipated, Ørsted will not use landfilling for decommissioned wind turbine blades, but will instead temporarily store the blades.

All turbines installed at Kriegers Flak Offshore Wind Farm – Vattenfall

Despite the logistical challenges that the Covid pandemic has brought, the schedule for the construction of Vattenfall's Kriegers Flak offshore wind farm has been kept. The 72 offshore wind turbines are now all installed 15-40 kilometres off the east coast of Denmark. When the farm is operating at its full capacity, it will have a capacity of 604 MW, covering the electricity consumption of approximately 600,000 Danish households. Kriegers Flak will be Denmark's largest offshore wind farm to date and will increase Danish wind production by approximately 16 per cent. It will be serviced out of Vattenfall's new service facility at the Port of Klintholm approximately 100 kilometres south of the Danish capital Copenhagen.

UK's Largest Offshore Decarbonisation Development Would Rapidly Cut Emissions and Safeguard Thousands of Jobs – Cerulean Winds

Green infrastructure developer Cerulean Winds has revealed an ambitious plan to accelerate decarbonisation of oil and gas assets through an integrated 200-turbine floating wind and hydrogen development that would shift the dial on emissions targets and create significant jobs. The £10 billion proposed green infrastructure play would have the capacity to abate 20 million tonnes of CO₂ through simultaneous North Sea projects West of Shetland and in the Central North Sea. Cerulean has undertaken the necessary infrastructure planning for the scheme to ensure the required level of project readiness, targeting financial close in Q1 2022. Construction would start soon after with energisation commencing in 2024.

Multi-Turbine Floater Unveiled, Costs Said to Be On Par with Fixed-Bottom OW – Offshore Wind

A new floating wind system using multiple 1 MW turbines has been unveiled by a Norwegian company which said this floating wind technology could produce electricity at bottom-fixed prices. According to the developer, the technology – which will have a design life of 50 years – can cut acreage use by more than 80 per cent, significantly increase efficiency in comparison to conventional floating offshore wind farms, and will cost substantially less to maintain than today's floating offshore wind solutions. The technology developer and its partners plan to complete the technical testing and verification this year and offer the solution commercially in 2022.