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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

Collegiate Wind Competition

Join the U.S. Department of Energy's (DOE's) virtual [Collegiate Wind Competition \(CWC\)](#) as multidisciplinary university teams present their past year's work in wind energy. The CWC challenges teams to design and test a model wind turbine, plan and financially analyze a wind plant, and create connections with the wind industry and their local communities. In addition to watching the student presentations 2-10 June 2021, viewers can join virtually to get to know the 2021 competitors at the industry networking event, take a tour of the National Renewable Energy Laboratory's (NREL's) Flatirons Campus, and cheer on the 2021 winners at the awards ceremony on 11 June 2021. The schedule is available on the [CWC website](#). Links to the virtual events will be added in the coming weeks.

Public PTEC Consultation

The Perpetuus Tidal Energy Centre (PTEC) in the UK is seeking public feedback on the development of a 30 MW tidal energy hub, located off the Isle of Wight. You can provide feedback via a short survey [here](#), or by attending one of two webinars scheduled for 5:00pm UTC on 7 June 2021 and 12:30pm UTC on 8 June 2021. Learn more [here](#).

Call for Abstracts

American Clean Power (ACP) is inviting abstracts submissions for the [ACP Offshore WINDPOWER Conference & Exhibition](#), which will take place in Boston, MA on 13-15 October 2021. Abstracts are due 1 June 2021.

Call for Papers

Animals is currently inviting submissions for a Special Issue entitled "[Bat Biology in Relation to Wind Energy Development](#)". This Special Issue focuses on advancements in the methodologies used to assess bat populations, technologies used to study bat activity and behavior, and physiological characteristics that relate to how bats respond to various stimuli (e.g., audio, visual, electromagnetic) that may serve as either attractors or deterrents to wind turbines. Manuscript submissions are due 30 September 2021.

Funding & Testing Opportunities

In collaboration with Innovate UK, the UK Department for Business, Energy and Industrial Strategy (BEIS) 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. An online briefing event will take place on 11 June 2021. Applications are due by 11:00am BST (10:00am UTC) on 25 August 2021.

The Basque Energy Agency, Ente Vasco de la Energía (EVE), recently launched the [Call for Applications](#) for its €2.5 million aid program, which aims to promote the demonstration and validation of emerging marine renewable energy technologies within the Basque Country. The call will remain open until 29 October 2021, or until the budget is exhausted.

[EuropeWave](#) is launching a €22.5m competitive Pre-Commercial Procurement programme for wave energy research and development on 21 June 2021, with an informational webinar scheduled for 6 July 2021. A [brokerage tool](#) is now available for all potential applicants until 20 July 2021, to help find the right partners. Tender submissions will be due 17 September 2021.

Student & Employment Opportunities

The U.S. DOE Water Power Technologies Office (WPTO) Operations Team is seeking a [Management and Program Analyst](#) to support operations (hiring and staffing, support service contract management, data management) and budget management tasks for the office and be responsible for analyzing the effectiveness and efficiency of office operations, developing recommendations for management to make process improvements, and implementing these improvements. Applications are due 31 May 2021.

Pacific Northwest National Laboratory (PNNL) is recruiting an [Offshore Wind Energy Engineer](#) to develop and implement offshore wind energy research projects with an emphasis on environmental monitoring and wildlife impacts, resource characterization, and grid integration. Applications are due 1 June 2021.

The Pacific Marine Energy Center (PMEC) at Oregon State University is recruiting a [Post-Doctoral Scholar](#) to support its marine energy research, development, and testing programs. Specifically, the position will support projects on sub-surface wave energy resources, upscaling wave energy converter (WEC) performance characteristics, and numerical and physical modelling of scaled WECs. Applications are due 1 June 2021.

Aquatera is recruiting an experienced [Environmental/Energy Data Analyst and Manager](#) to work on its Economic Value of Ocean Energy (EVOLVE) project, which is exploring the contribution that marine based renewables can make to Europe's future energy systems. Applications are due 4 June 2021.

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.

Upcoming Events

Upcoming Meeting

The U.S. National Academies of Sciences, Engineering, and Medicine will host the [Committee on Offshore Science and Assessment](#) (COSA) meeting focused on the Bureau of Ocean Energy Management's (BOEM's) Pacific Region from 12:00-5:00pm EDT (4:00-9:00pm UTC) on 1 and 2 June 2021. The committee will conduct focus groups with BOEM's regional staff to exchange perspectives on the development and application of science for Pacific energy and marine minerals programs. Register [here](#).

Upcoming Webinars

The U.S. DOE's WINDEXchange Program 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 NREL will cover the basics of offshore wind development in the United States, global technology trends, economics and market status, siting considerations, and more. Register [here](#).

As part of its R&D Deep Dive Webinar Series, the U.S. DOE WPTO 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

Scottish Renewables is hosting its [2021 Onshore Wind Conference](#) on 1 June 2021, and its [2021 Marine Conference](#) on 23 June 2021. Both events will take place online. Register [here](#) for the Onshore Wind Conference and [here](#) for the Marine Conference.

American Clean Power’s [CLEANPOWER 2021 Virtual Summit](#) will take place online on 7-10 June 2021. Register [here](#).

The [Structures in the Marine Environment \(SIME2021\)](#) conference will take place online on 17-18 June 2021. The programme and abstracts are now available to view [here](#). Register [here](#).

Recordings Available

The [proceedings](#) and [recordings](#) from the American Wind Wildlife Institute’s (AWWI’s) 13th Wind Wildlife Research Meeting (WWRM 2020) are now available. AWWI hosted WWRM 2020 online on 1-4 December 2020.

New Documents on *Tethys*

Marine Energy

[A modelling evaluation of electromagnetic fields emitted by buried subsea power cables and encountered by marine animals: considerations for marine renewable energy development](#) – Hutchison et al. 2021

The expanding marine renewable energy industry will increase the prevalence of electromagnetic fields (EMFs) from power cables in coastal waters. Assessments of environmental impacts are required within licensing/permitting processes and increased prevalence of cables will increase questions concerning EMF emissions and potential cumulative impacts. It is presumed that protecting a cable by burial, may also mitigate EMF emissions and potential impacts on species. Focussing on a bundled high voltage direct current (HVDC) transmission cable, we use computational and interpretive models to explore the influence of cable properties and burial depth on the DC magnetic field (DC-MF) potentially encountered by receptive species.

Assessment of marine energy-biotopes for Cozumel Island's reefs: A resource for tourism and renewable ocean energy – Callejas-Jiménez et al. 2021

In general, ocean energy refers to renewable energy for human consumption, but less often relates to conservation and environmental protection. Within this context, this study describes and investigates energy-biotopes as a new concept, based on energy features, to use as a relevant resource for reefs conservation, marine-based tourism, and the harvesting of renewable ocean energy for Cozumel Island. Cluster analyses and linear trend models indicate an energy-tourism-economy connection with a similarity >90% and a correlation >0.976 between tourist arrivals, total revenue (US\$ 161.74), and electric energy consumption (~64.62 Wh), per tourist. Moreover, field measurements of ocean current velocities (U) were conducted to assess the spatial distribution of kinetic energy density (ED) over the western coast of Cozumel Island.

A Review on Environmental and Social Impacts of Thermal Gradient and Tidal Currents Energy Conversion and Application to the Case of Chiapas, Mexico – Rivera et al. 2020

Despite the proved potential to harness ocean energy off the Mexican coast, one of the main aspects that have restrained the development of this industry is the lack of information regarding the environmental and social impacts of the devices and plants. Under this premise, a review of literature that could help identifying the potential repercussions of energy plants on those fields was performed. The information gathered was used to address the foreseeable impacts on a hypothetical case regarding the deployment of an Ocean Thermal Energy Conversion (OTEC) plant off the Chiapas coast in Mexico. From the review it was found that for OTEC plants, the most important aspect to be considered is the discharge plume volume and its physicochemical composition, which can lead to the proliferation of harmful algal blooms.

Wind Energy

Environmental impacts of offshore wind installation, operation and maintenance, and decommissioning activities: A case study of Brazil – Hernández Carrascal et al. 2021

The objective of the paper is to perform a review of the environmental impacts of the installation, operation and maintenance (O&M), and decommissioning of offshore wind technologies. At first, a comprehensive review is presented on offshore wind

technologies and techniques related to the installation, O&M, and decommissioning stages. Then a thorough review of environmental issues using the main available studies in the literature associated with the activities of each stage is performed. The review employs an activity–stressor–receptor–impact framework in which the possible positive or negative impacts of an environmental stressor on a specific receptor are identified for each activity, such as pile driving, cabling, blade rotation, etc.

The State of the Science on Operational Minimization to Reduce Bat Fatality at Wind Energy Facilities – Whitby et al. 2021

Bat Conservation International conducted a meta-analysis of publicly available research on the effectiveness of operational minimization to reduce bat fatality at wind energy facilities. Results indicate that a 5.0 m/s cut-in speed is estimated to reduce total bat fatalities by an average of 62% (95% CI: 54–69). The report also synthesizes efforts (e.g., incorporating temperature or bat activity) to improve the efficiency of operational minimization to reduce power loss. Power loss associated with curtailment is influenced by several factors, including the cut-in speed and wind regime. Additional considerations for curtailment include financial, technological and contractual liability. Therefore, strategies that meet renewable energy production, economic and conservation goals are necessary.

How could operational underwater sound from future offshore wind turbines impact marine life? – Stöber & Thomsen 2021

Offshore wind farms are part of the transition to a sustainable energy supply and both the total numbers and size of wind turbines are rapidly increasing. While the impact of underwater sound related to construction work has been in the focus of research and regulation, few data exist on the potential impact of underwater sound from operational wind farms. Here, we reviewed published sound levels of underwater sound from operational wind farms and found an increase with size of wind turbines expressed in terms of their nominal power. Using the National Oceanic Atmospheric Administration criterion for behavioral disruption for continuous noise (i.e., level B), a single 10 MW direct drive turbine is expected to cause behavioral response in marine mammals up to 1.4 km distance from the turbine, compared to 6.3 km for a turbine with gear box.

News & Press Releases

Marine Energy

SAE Achieves Another Tidal Milestone in Japan – Simec Atlantis Energy (SAE)

SAE is pleased to announce that its tidal power generation facility in Naru Island, Japan, has passed the Japanese government’s pre-use inspection tests. The site, which features the AR500 tidal turbine, is now recognised as an official power generation facility. The

tests were undertaken by the Ministry of Economy, Trade and Industry, which is a key stakeholder in consenting renewable energy projects in Japan. The Scottish built AR500 tidal turbine has been generating electricity since it was installed in January 2021, and has generated more than 90MWh of power, at a high turbine availability. This pilot is the first large scale project of its kind in Japanese waters and has shown how the tidal industry can make a meaningful contribution in Japan's ambition to diversifying its energy supply towards renewable sources.

Duke and Duchess of Cambridge Put Spotlight on Tidal Energy – European Marine Energy Centre (EMEC)

The Duke and Duchess of Cambridge visited Orkney this week to visit EMEC in pursuit of solutions for tackling climate change and supporting the UK's green economic recovery. Their Royal Highnesses met with EMEC's managing director, Neil Kermod, and external relationship manager, Eileen Linklater, to hear about the test centre's role in developing an ocean energy industry and green hydrogen economy. Discussions centred around the potential for ocean energy as a new sustainable energy resource stimulating job creation and supply chain development in coastal communities. Heading out to sea, courtesy of the Royal Navy, the tour included an excursion to Orbital Marine Power's O2 – the world's most powerful tidal turbine.

Expanded Data Sets and a Smooth-Sailing User Experience: Meet Marine Energy Atlas – National Renewable Energy Laboratory (NREL)

The promise of marine energy is seemingly boundless—and thanks to a recently upgraded tool powered by new high-resolution data sets, users can pinpoint promising sites. Developed by NREL's resource characterization team and funded by the U.S. DOE's Water Power Technologies Office, the Marine Energy Atlas (formerly MHK Atlas) will support everything from project siting to device design via access to uniquely high-resolution and spatially comprehensive data sets. The recently released Marine Energy Atlas features several new upgrades to modernize and streamline the user-friendly interface while supporting higher-resolution data.

TIGER project is on a mission to drive growth for tidal stream energy – Interreg Channel Manche

Interreg's biggest ever project Tidal stream Industry enerGisEr pRoject (TIGER), has been on a mission to drive growth for the sector since its launch in late 2019. The €46 million project is a cross-border partnership between 18 UK and French organisations from research, business and regional agencies. Despite the challenges faced during Covid-19 pandemic, the project has already made an impact for the industry attracting private investment and demonstrating genuine collaboration between technology developers. TIGER, led by Offshore Renewable Energy Catapult, set out to develop, test and further demonstrate tidal stream technologies at selected tidal sites across the Channel area.

ORPC files for permit for 5MW Cook Inlet tidal scheme – Offshore Energy

Marine energy company ORPC (Ocean Renewable Power Company) has submitted a preliminary permit application to the Federal Energy Regulatory Commission for a tidal energy project at East Foreland in Alaska. Once the project is functioning, ORPC will collaborate with Homer Electric Association to sell the tidal energy produced, the U.S. based marine energy developer said. ORPC said it intends to develop a 5MW pilot project near East Foreland to verify the technical performance and environmental compatibility of its proposed marine energy devices. Project results will assist in planning a phased build-out of up to a 100MW commercial-scale project, according to ORPC. The company also said it had previously conducted site characterization and environmental studies in the region.

Wind Energy

Biden-Harris Administration Advances Offshore Wind in the Pacific – US Department of the Interior

Secretary of the Interior Deb Haaland, National Climate Advisor Gina McCarthy, Under Secretary of Defense for Policy Dr. Colin Kahl, and California Governor Gavin Newsom recently announced an agreement to advance areas for offshore wind off the northern and central coasts of California. This significant milestone is part of the Biden-Harris administration's goal to create thousands of jobs through the deployment of 30 gigawatts (GW) of offshore wind by 2030. These initial areas for offshore wind development could bring up to 4.6 GW of clean energy to the grid, enough to power 1.6 million homes. The Department of the Interior, in cooperation with the Department of Defense and the State of California, has identified an area that will support 3 gigawatts of offshore wind on roughly 399 square miles off California's central coast region, northwest of Morro Bay.

New coalition of industry and academia to commercialise solution for full recyclability of wind turbine blades – Vestas

A coalition of industry and academic leaders have developed a new technology to enable circularity for thermoset composites, the material used to make wind turbine blades. The new technology delivers the final technological step on the journey towards a fully recyclable wind turbine value chain. To enable the adoption of this new technology, and to advance a circular economy across the wind industry, a new initiative entitled CETEC (Circular Economy for Thermosets Epoxy Composites) has been established. Within three years, CETEC is aiming to present a fully scoped solution ready for industrial adoption, based on commercialisation of the novel circularity technology.

RWE to launch innovative airborne wind energy testing site in Ireland – RWE

RWE, one of the world's leading renewable energy players, is to establish its first test centre to investigate the potential of innovative airborne wind energy technologies. Planning permission to build the new facility in County Mayo, Ireland, has now been

granted and construction of the site infrastructure is expected to begin later this year. RWE is delivering the test site in partnership with Ampyx Power, a Dutch company that is developing the innovative wind energy technology. RWE's test site will first undertake testing, verification and demonstration of a 150 kilowatts demonstrator system, followed later by a larger commercial-scale 1 megawatt system. RWE will also test systems from other AWE developers during the eight year operational lifetime of its test centre.

UK tech pioneers join forces on a robotic solution for wind sector's 'millions upon millions' of bolts – Offshore Renewable Energy (ORE) Catapult

Two UK innovators have joined forces in a mission to develop a robotic solution for ensuring the integrity of the millions upon millions of bolts that hold wind turbines together, a move that is described as essential to the expansion of offshore wind – and the world's net-zero future. The new project recently announced by the ORE Catapult brings together the six-legged BladeBUG inspect-and-repair robot for turbine blades and EchoBolt's ultrasonic bolt inspection device. This collaboration, funded by Innovate UK, will expand BladeBUG's capabilities, allowing the robot to crawl turbine structures and test bolt integrity using ultrasonics. GE Renewable Energy, which plays a supporting role on the new project as technology advisor, estimates that the companies' technology fusion will unlock cost savings of 75 per cent in bolt maintenance and repair bills.

Are Vertical Turbines The Future Of Offshore Wind Power? – Forbes

What makes renewable energy so exciting is the immense economic potential of groundbreaking technology advancements. A recent discovery by engineers of Oxford Brookes University's School of Engineering, Computing, and Mathematics could change the design of offshore wind farms forever. The study, led by Professor Iakovos Tzanakis, demonstrates that deep sea and coastal wind turbines could achieve a 15% increase in power output if traditional horizontal axis wind turbines (HAWTs) are replaced by a vertical axis wind turbine (VAWT) design. While classic HAWT windmills produce energy with a standard three-blade "pinwheel" design, VAWT utilizes a more cylindrical shape with blades rotating around a central shaft.