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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

New WREN Short Science Summary

WREN (Working Together to Resolve Environmental Effects of Wind Energy) published a new [Short Science Summary: Offshore Wind Farms as Stepping Stones for Non-indigenous Species](#).

BOEM Seeking Comments

The US Bureau of Ocean Energy Management (BOEM) is accepting public comments to inform the preparation of Environmental Impact Statements for the [Mayflower Wind Proposal](#) (through 1 December 2021) and [New England Wind Proposal](#) (through 22 December 2021), and an Environmental Assessment for the [Morro Bay Wind Energy Area](#) (through 11 January 2022).

MHK Graduate Student Research Program

The US Department of Energy (DOE) Water Power Technologies Office Oak Ridge Institute for Science and Education are now accepting applications for the [Marine & Hydrokinetic \(MHK\) Graduate Student Research Program](#). The program is open to doctoral students at US institutions and provides access to relevant expertise and resources. Applications are due 10 December 2021.

EnergyTech University Prize

The US DOE Office of Technology Transitions recently launched the [EnergyTech University Prize](#), a collegiate competition challenging multidisciplinary student teams to develop and present a business plan that leverages DOE national laboratory-developed and other energy technologies. The Explore Phase will close on 31 January 2022.

Funding & Testing Opportunities

The US DOE's National Renewable Energy Laboratory (NREL) has opened a [Request for Proposals](#) to support research into behavior of bats at wind turbines and responses by bats to deterrent stimuli. Goals for awarded projects include understanding bat-turbine interactions to help minimize collisions and improving deterrent effectiveness. Awardees will receive \$450k to \$700k each to fund the research. Applications are due 8 December 2021.

The Offshore Renewable Energy Catapult is now accepting applications from UK innovators to join the second cohort of the [National Launch Academy](#), a technology accelerator programme for the offshore wind industry. Applications are due 15 December 2021.

The US California Energy Commission recently released a Grant Funding Opportunity titled, "[Propelling Offshore Wind Energy Research](#)", which will fund R&D projects to demonstrate, test, and validate innovative floating offshore wind components and tools. Applications are due 15 December 2021.

The US Testing Expertise and Access for Marine Energy Research (TEAMER) Program is now offering limited [open water support for marine energy testing](#) through its facility network. Applications for the next TEAMER Request for Technical Support are due 16 December 2021.

The European Maritime, Fisheries and Aquaculture Fund has launched a Call for Proposals to support strategic collaboration in the Atlantic, Black Sea, and Western Mediterranean. Proposals for Topic 1, "[Innovative multi-use projects combining offshore renewable energy with other activities and/or with nature protection in the Atlantic](#)", are due 12 January 2022.

Student & Employment Opportunities

The Selkie project is inviting applications for a [Post-Doctoral Researcher](#) to support the development of a Geographic Information Systems techno-economic tool suitable for Irish and Welsh wave and tidal energy applications. Applications are due 3 December 2021.

Pacific Northwest National Laboratory is seeking an [Undergraduate Technical Intern](#) to join its Coastal Science Division and support research on the environmental effects of wind and marine energy. The position will primarily support the *Tethys* and *Tethys Engineering* databases by identifying, adding, and curating content. Applications are due 6 December 2021.

Upcoming Events

Upcoming Workshops

The University Marine Energy Research Community (UMERC) is hosting the second workshop in its series, *Collaborating to Create a Marine Energy Research Landscape*, on three dates:

- [Tuesday, 30 November 2021 from 9:00-11:00am PST \(5:00-7:00pm UTC\)](#)
- [Wednesday, 1 December 2021 from 8:00-10:00am PST \(4:00-6:00pm UTC\)](#)
- [Thursday, 2 December 2021 from 10:00am-12:00pm PST \(6:00-8:00pm UTC\)](#)

The [SEAWave](#) (Strategic Environmental Assessment of Wave Energy Technologies) project is hosting a final knowledge sharing workshop on 2 December 2021 from 2:00-4:30pm GMT. The workshop will focus on challenges in environmental monitoring campaigns for deployed marine energy technologies. Register [here](#) by 26 November 2021.

The OceanSET project is hosting its [3rd OceanSET Knowledge Sharing Workshop](#) online at 9:00am UTC on 8 December 2021. The workshop will present results of a survey carried out across ocean energy device developers in Europe, and provide an update on the EuropeWave pre-commercial procurement programme and upcoming wave energy projects. Register [here](#).

Upcoming Webinars

As part of the US Offshore Wind Synthesis of Environmental Effects Research ([SEER](#)) project, PNNL and NREL are hosting the [first of four webinars](#) on the environmental effects of offshore wind energy from 8:00-9:30am PST (4:00-5:30pm UTC) on 30 November 2021. The webinar will feature presentations and panel discussions on underwater noise and entanglement risk considerations for offshore wind farms. Register [here](#).

The Copernicus Marine Service is organizing a [webinar](#) on 30 November 2021 from 9:00-11:00am UTC to share its global ocean data products and knowledge that can be used to support sustainable blue economies and ocean conservation in Africa. Two [training workshops](#) will also be held on 7-8 December 2021 from 9:00-11:00am UTC. Register for all three events [here](#).

The US DOE's WINDEXchange Initiative is hosting a [webinar](#) from 12:00-1:00pm EST (5:00-6:00pm UTC) on 1 December 2021. During the webinar, NREL will discuss above-water offshore wind technology, including turbine technology and resource assessments and modeling.

Marine Energy Wales and Marine Renewables Canada are hosting a joint [webinar](#) from 3:00-5:00pm UTC on 1 December 2021 to promote international shared learning across the marine renewable energy sector. Register [here](#).

The US DOE's Water Power Technologies Office is hosting a webinar from 11:30am-1:00pm EST (4:30-6:00pm UTC) on 7 December 2021 to present the relevant [Phase 1 Release 2 Topics](#) for its [Small Business Innovation Research and Small Business Technology Transfer programs](#), which provide financial support for climate and energy R&D projects. Register [here](#).

The Blue Economy Cooperative Research Centre is hosting a webinar titled, “[Riding the Wave to Zero Emission Energy](#)”, from 11:30am-1:30pm AEDT on 8 December 2021. The webinar will outline the technical aspects, market potential, and barriers associated with different methods and technologies for capturing and converting wave energy to electricity. Register [here](#).

Upcoming Conferences

WavEC Offshore Renewables, in collaboration with the Embassy of Japan in Portugal, is hosting the [WavEC Annual Seminar](#) on 30 November 2021 online. Register for free [here](#).

The [Ocean Energy Europe 2021 Conference & Exhibition](#) will take place on 6-7 December 2021 in Brussels, Belgium. Register [here](#).

The Supergen Offshore Renewable Energy (ORE) Hub is hosting the [4th Supergen ORE Hub Annual Assembly](#) on 18-20 January 2022 in Plymouth, UK and online. To accompany the event, the Hub is also hosting an [Early Career Researcher Forum](#) on 18 January 2022. Register for free.

New Documents on *Tethys*

Marine Energy

[Shetland Tidal Array Monitoring Report: Subsea video monitoring](#) – Smith 2021

This report presents the results from analysis of subsea video footage gathered between October 2015 and March 2020 as part of Nova Innovation’s programme of environmental monitoring for the Shetland Tidal Array, Bluemull Sound. The use of turbine-mounted subsea cameras to monitor nearfield interactions with mobile species (fish, birds and marine mammals) commenced in October 2015, when the first turbine in the array was deployed. A second turbine was added in August 2016 followed by a third in August 2017. Subsea cameras have been used continuously throughout this period to monitor the nearfield environment around each of the turbines in the array and is ongoing.

[Cost Efficiency of Environmental DNA as Compared to Conventional Methods for Biodiversity Monitoring Purposes at Marine Energy Sites](#) – Fu et al. 2021

The installation of marine energy systems may affect marine environments, and by extension, marine fish communities. Therefore, biomonitoring is an integral part of assessing impacts on species. Environmental DNA (eDNA) provides a noninvasive alternative to conventional monitoring surveys and the possibility of a more accurate assessment of species richness. Yet, its cost efficiency compared to traditional methods of monitoring is relatively unknown, especially when applied to monitoring around tidal, wave, and offshore wind energy installations. For this study, 202 peer-reviewed journal articles were dissected to inventory the diversity of supplies used for collecting and processing eDNA samples and to compile the average cost of eDNA surveys.

[Legal and Political Barriers and Enablers to the Deployment of Marine Renewable Energy](#) – Apolonia et al. 2021

Ocean energy is a promising source of clean renewable energy, with clear development targets set by the European Commission. However, the ocean energy sector faces non-technological challenges and opportunities that are frequently overlooked in deployment plans. The present study aimed to provide a critical evaluation of the ocean energy sector's legal, institutional, and political frameworks with an identification and analysis of both barriers and enabling features for the deployment of ocean energy. In the first stage, a literature review on the current political and regulatory frameworks of a set of European countries was carried out, setting the basis for the main challenges and enabling factors faced by the sector.

Wind Energy

[Activity Pattern and Correlation between Bat and Insect Abundance at Wind Turbines in South Sweden](#) – de Jong et al. 2021

We present data on species composition and activity of bats during two years at three different wind-turbines, located in south Sweden, both at the base and nacelle height. To test the hypothesis that bats are attracted to wind turbines because of feeding opportunities, insects were sampled at nacelle height at one wind turbine using a suction trap, simultaneously as bat activity were measured. At this wind turbine, we also compared two different technical systems for ultrasound recordings and collect meteorological data. The variation in bat activity was high between nights and between wind turbines. In addition to the expected open-air foraging species (*Pipistrellus*, *Nyctalus*, *Vespertilio* and *Eptesicus*), some individuals of unexpected species (*Myotis*, *Barbastella*, and *Plecotus*) were found at nacelle height.

[Noisy waters can influence young-of-year lobsters' substrate choice and their antipredatory responses](#) – Leiva et al. 2021

Offshore human activities lead to increasing amounts of underwater noise in coastal and shelf environments, which may affect commercially-important benthic invertebrate groups like the re-stocked Helgoland European lobster (*Homarus gammarus*) in the German Bight (North Sea). It is crucial to understand the impact tonal low-frequency noises, like maritime transport and offshore energy operations, may have on substrate choice and lobsters' behavior to assess potential benefits or bottlenecks of new hard-substrate artificial offshore environments that become available. In this study, we investigated the full factorial effect of a tonal low-frequency noise and predator presence on young-of-year (YOY) European lobsters' in a diurnal and nocturnal experiment.

[Energy Development and Production in the Great Plains: Implications and Mitigation Opportunities](#) – Ott et al. 2021

Energy is an integral part of society. The major US energy sources of fossil fuels (coal, oil, natural gas); biofuels (ethanol); and wind are concentrated in grassland ecosystems of the Great Plains. As energy demand continues to increase, mounting pressures will be placed on North American grassland systems. In this review, we present the ecological effects of energy development and production on grassland systems. We then identify opportunities to mitigate these effects during the planning, construction, and production phases by using informed methodology and improved technology. Direct habitat loss or habitat fragmentation can affect wildlife directly through increased mortality or indirectly through reduction in habitat quantity and quality.

News & Press Releases

Marine Energy

[Export Barbados \(BIDC\) Signs MOU To Explore Wave Energy – BIDC](#)

Export Barbados (BIDC) and Wello Oy, a company from Finland specializing in wave energy technology, have announced a new cooperation agreement to explore the opportunities that lie in Barbados' marine space for energy generation. There are three phases to the project – a feasibility study; the development of a prototype device; and the setting up of a commercial project. With all the necessary regulatory compliances in place, Phase 2 will see the full construction, deployment and testing of the prototype wave energy converter implemented under a contract negotiated between Wello and BIDC. Implementation of the final phase will see the establishment of a 5-megawatt commercial wave energy project.

[Mocean Energy Blue X wave machine completes sea trials – Mocean Energy](#)

Mocean Energy's Blue X wave energy machine has returned to dock after a successful five-month test period at sea. In the last few days the 20-metre long, 38-tonne wave machine has been towed from the European Marine Energy Centre's Scapa Flow test site to Kirkwall and has been lifted onto Hatston Pier, where it will be cleaned, inspected, and maintained until next year's testing programme commences. The innovative 10kW prototype began its test phase in mid-June and since then has completed 154 days at sea, delivering steady outputs of up to 5 kW and safe instantaneous peaks of 30 kW, and operating in sea states up to 2.3 meters maximum wave height. Next year, the wave pioneers plan to put the device to sea in Orkney again and will connect the machine to a subsea battery to power a remotely operated autonomous underwater vehicle.

[Ocean Harvesting commissions test-rig for InfinityWEC power take-off with instant force control capabilities – Ocean Harvesting Technologies](#)

Ocean Harvesting Technologies has commissioned a Hardware in the Loop test rig at scale 1:10 to validate the InfinityWEC power take-off (PTO) with instant force control capabilities. The test rig simulates the buoy motion with force feedback from the PTO

system, and will be used to validate the complete functionality of the PTO and control system as in a complete WEC for real sea conditions. The test rig will later be used as a platform to develop and evaluate AI-based control strategies and design principles, to further refine InfinityWEC's capability to capture maximum power from each wave. The developed control system will be used in the sea trial of a complete InfinityWEC system at scale 1:3, to take place on the Swedish west coast starting in 2022.

Orbital Marine Power secures strategic investment from TechnipFMC to accelerate global tidal energy market presence – Orbital Marine Power

Orbital Marine Power (Orbital) has established a strategic partnership with TechnipFMC to accelerate the global commercialisation of Orbital's pioneering tidal energy technology. Scotland-based Orbital recently completed the construction and installation of the world's most powerful tidal stream turbine, the O2, in the waters off the Orkney Islands, Scotland. It has been exporting low carbon electricity to the UK grid since July 2021. TechnipFMC is a leading technology provider to the traditional and new energy industries with a proven track record of successfully delivering large-scale, fully integrated offshore energy projects to customers around the world. The companies will now work together to accelerate the market scale-up and deployment of Orbital enabling technology in tidal energy projects.

EMEC Named H&I Blue Economy Enterprise of the Year – EMEC

The European Marine Energy Centre (EMEC) has been named Blue Economy Enterprise of the Year having won the Rural Blue Award at The SHIREs (Scottish Highlands and Islands Rural Economy) Awards. The SHIREs celebrate Scotland's modern rural economy, from the traditional to the innovative, from land and trees to the sea. EMEC's pioneering vision for a net zero future has put the Highlands and Islands on the global renewables map, having attracted attention from the world's media, politicians, and even Royalty. EMEC has also been working tirelessly to ensure that the UK government puts the required revenue support to ensure the Highlands and Islands can take full advantage of its ocean energy resources. As the first and only accredited ocean energy test facility of its kind, EMEC has hosted more ocean energy technologies than anywhere in the world.

Nova Innovation launches investment round – Offshore Energy

Scottish tidal energy company Nova Innovation has opened a crowdfunding campaign on the Seedrs investment platform. Nova Innovation generates revenue from manufacturing and installing tidal turbines, while additional revenue is generated from its expertise with smart energy systems. The company has recently entered into collaboration agreement with SIMEC Atlantis Energy, with the goal of delivering more UK-built tidal turbines in the water and turbo charging the tidal industry. Beforehand, Nova Innovation secured £6.4 million from the Scottish National Investment Bank to fund mass manufacturing and distribution of its innovative tidal energy turbines. The bank's investment is expected to support the company in meeting growing global and local demand for its tidal turbines.

Wind Energy

[Vineyard Wind Breaks Ground on First-in-the-Nation Commercial Scale Offshore Windfarm](#) – Vineyard Wind

Vineyard Wind, a joint venture between Avangrid Renewables, a subsidiary of AVANGRID, Inc., and Copenhagen Infrastructure Partners, recently broke ground on Vineyard Wind 1, the nation's first commercial scale offshore wind farm. The 800-megawatt project, located 15 miles off the coast of Martha's Vineyard, will generate electricity for more than 400,000 homes and businesses in the Commonwealth of Massachusetts, create 3,600 Full Time Equivalent job years, save customers \$1.4 billion over the first 20 years of operation, and is expected to reduce carbon emissions by more than 1.6 million metric tons per year, the equivalent of taking 325,000 cars off the road annually. Vineyard Wind 1 will begin delivering clean energy to Massachusetts in 2023.

[Ørsted, Falck Renewables, BlueFloat Energy Consortium Team Up with Scottish Association for Marine Science to Investigate Environmental Effects of Floating Wind](#) – Falck Renewables

The Ørsted, Falck Renewables, BlueFloat Energy consortium currently bidding for offshore wind leases for floating wind projects has announced a link up with the Scottish Association for Marine Science (SAMS) to investigate the potential effects of floating wind developments on the marine environment. Areas under discussion for future research projects if the consortium's ScotWind bids are successful range from investigating how fishing interests and offshore wind can work together to a study into how fish, marine mammals and seabirds interact with floating offshore wind farms. Future studies could also focus on increasing the role of marine robotics in collecting data before and after the construction of floating offshore wind farms at remote sites.

[Spain auctions 2.2GW of onshore wind and retracts clawback measures](#) – WindEurope

The Spanish Government published the results of its 3.3GW technology-neutral renewable energy auction. Onshore wind won a total of 2.258MW at an average of €30.18. This is amongst the cheapest strike prices in Europe ever and only slightly above the price in January's auction in Spain. These new projects will bring an investment of more than €2.5m with them and will be supported by the 30,000-strong local Spanish wind industry. However, the auction was slightly undersubscribed. A number of companies decided not to compete due to Government plans to apply a new charge linked to the rise in gases prices that would have effectively clawed back revenue of certain wind farms. The Government has decided retract the bulk of this measure.

[Funding boost for Australia's first offshore wind project](#) – Star of the South

Star of the South – Australia's first offshore wind project – recently entered a \$43.1 million partnership with the Victorian Government to progress key development activities and kick-start a local offshore wind industry. The boost will allow Star of the

South to continue investing in site investigations in Gippsland, including onshore and offshore geotechnical investigations, transmission design, industry development and ongoing community and stakeholder engagement. Located off Gippsland's south coast, Star of the South would harness Bass Strait's strong offshore winds with up to 200 turbines in the sea, connecting to the grid in the Latrobe Valley – one of the strongest points in the National Electricity Market.

Towards circular wind turbines: LM Wind Power to produce zero waste blades by 2030 – General Electric

LM Wind Power, a GE Renewable Energy business, recently announced that it will produce zero waste blades by 2030, a significant milestone for the industry as it seeks to reduce the carbon footprint of its products. The commitment represents a step forward in the company's sustainability journey after becoming the first carbon neutral business in the wind industry already in 2018. LM Wind Power will play a central role in supporting its customers to develop fully circular wind turbines that generate less waste during their production. In practice, LM Wind Power's vision of zero waste blades means the company aims to send no excess manufacturing materials and packaging to landfill and incineration without energy recovery by 2030.

Italy Receives 64 Expressions of Interest to Build Floating Offshore Wind Farms – Offshore Wind

Italy's Ministry of Ecological Transition has received 64 Expressions of Interest (EoI) for the development of floating offshore wind projects off the country's coast. The Ministry is working at encouraging the development of a new generation of floating offshore wind farms, and the first round of bilateral meetings with the individual companies and groups who submitted their EoIs is coming to an end. At least 20 of the EoIs proposed detailed projects, which in many cases involve floating wind farms located over 12 miles offshore, the Ministry said. In total, 40 floating offshore wind projects were examined. More than 20 projects are located off the coast of Sicily and Sardinia, more than ten along the Adriatic coast, with the remainder distributed between the Ionian and Tyrrhenian Seas.