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[Tethys](#) is an online knowledge hub 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. Email tethys@pnnl.gov to contribute!

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Announcements

OES-Environmental Brochure

OES-Environmental recently published a new brochure, “[Marine Renewable Energy: An Introduction to Environmental Effects](#)”, that provides an overview of the latest scientific information on the potential impacts of installation and operation of marine energy devices.

OES-Environmental Survey

OES-Environmental is conducting a short, online survey (in [English](#) and [Spanish](#)) to collect any existing information relevant to the environmental effects of marine renewable energy development in tropical and Southern Hemisphere countries. Please complete the survey by 30 April 2022, and share it with any colleagues that may be able to provide additional information.

OES Workshop on Marine Energy Data Sharing

After a successful Ocean Energy Systems ([OES](#)) Workshop on Marine Energy Data Sharing in May 2021, the US-based Portal and Repository for Information on Marine Renewable Energy ([PRIMRE](#)) team is hosting a second online workshop on 11 May 2022 from 3:00-5:00 PM UTC. We are particularly looking for those who develop or manage marine energy databases, portals, and/or tools to participate. If you are interested in attending, please email tethys@pnnl.gov.

New In This Climate Podcast Episode

Listen to the [latest episode of the In This Climate podcast](#) to hear Pacific Northwest National Laboratory's Andrea Copping discuss environmental effects, industry collaborations, and several types of marine energy technologies.

Marine Energy Collegiate Competition

The US Department of Energy (DOE) has opened the application period for the [2023 Marine Energy Collegiate Competition](#), which challenges interdisciplinary teams of undergraduate and graduate students to offer unique solutions to the marine energy industry that can play a role in powering the blue economy. For more information, join the [informational webinar](#) at 12:00pm MDT (6:00pm UTC) on 20 April 2022. Applications are due 8 May 2022.

Collegiate Wind Competition

The US DOE is now accepting applications for the [2023 Collegiate Wind Competition](#), which challenges interdisciplinary teams of undergraduate students from a variety of programs to offer a unique solution to a complex wind energy project. For more information, join the [informational webinar](#) at 2:00pm EDT (6:00pm UTC) on 3 May 2022. Applications are due 1 June 2022.

MHKiT Survey

The [Marine and Hydrokinetic Toolkit \(MHKiT\)](#) team is conducting a short, online [survey](#) that will be used to shape future development, both in terms of architecture and content. MHKiT is an open-source marine energy software, developed in Python and MATLAB, that includes modules for ingesting, quality controlling, and managing data. Please submit responses by 15 April 2022.

BOEM Seeking Comments

The US Bureau of Ocean Energy Management (BOEM) is now [accepting public comments](#) on the draft Morro Bay Wind Energy Area Environmental Assessment through 6 May 2022.

NOAA Fisheries & BOEM Seeking Comments

The US National Oceanic and Atmospheric Administration (NOAA) Fisheries and BOEM recently released a [Draft Federal Survey Mitigation Implementation Strategy](#) that describes the approach NOAA Fisheries and BOEM will use to mitigate the impacts of offshore wind energy on NOAA Fisheries surveys in Northeast and Mid-Atlantic regions. The agencies are [seeking public comment](#) on the strategy until 6 May 2022.

Calls for Abstracts

The [Call for Abstracts](#) for the [International Conference on the Effects of Noise on Aquatic Life \(AN2022\)](#) has been extended to 20 April 2022. AN2022 will take place 10-15 July 2022 in Berlin, Germany.

The [Call for Abstracts](#) for the International Conference on Ocean Energy (ICOE) and Ocean Energy Europe (OEE)'s annual event has been extended to 22 April 2022. The Basque Energy Cluster and OEE will host [ICOE-OEE 2022](#) on 18-20 October 2022 in San Sebastián, Spain.

The [Call for Abstracts](#) for the North American Wind Energy Academy (NAWEA) Symposium and International Conference on Future Technologies in Wind Energy (WindTech) is now open through 22 April 2022. The [NAWEA/WindTech 2022 Conference](#) will take place on 20-22 September 2022 in Delaware, US.

The [Call for Abstracts](#) for the [Pan-American Marine Energy Conference](#) (PAMEC 2022) has been extended to 25 April 2022. PAMEC is scheduled for 19-22 June 2022 in Ensenada, Mexico, with workshops on 17-18 June 2022. This international meeting is a great opportunity for graduate students to present their research to international colleagues.

The Call for Abstracts for the [University Marine Energy Research Community \(UMERC\) and Marine Energy Technology Symposium \(METS\) joint conference](#) is now open through 1 May 2022. UMERC and METS will host the event on 13-14 September 2022 in Portland, US, in conjunction with the [Ocean Renewable Energy Conference \(OREC\)](#) on 14-15 September 2022.

The [Call for Speakers](#) for [Clean Currents 2022](#) is now open until 1 May 2022. The Clean Currents Tradeshow and Conference will take place 18-20 October 2022 in Sacramento, US.

The [Call for Abstracts](#) for the [International Conference on the Environmental Interactions of Marine Renewables \(EIMR 2022\)](#) is now open until 16 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](#) is open through 16 May 2022. The hybrid event will take place on 17-21 October 2022 in Virginia Beach, US and online.

Funding & Testing Opportunities

The Horizon Europe Framework Programme launched a funding opportunity titled, "[Demonstration of innovative materials, supply cycles, recycling technologies to increase the overall circularity of wind energy technology and to reduce the primary use of critical raw materials](#)". Proposals are due 26 April 2022.

The UK Department for Business, Energy & Industrial Strategy has launched Phase 9 of the [Energy Entrepreneurs Fund](#), which aims to support the development and demonstration of green energy technologies. Applications are due 11 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.

Student & Employment Opportunities

Pacific Ocean Energy Trust is seeking a [Program Coordinator](#) to provide administrative support to the Testing Expertise and Access for Marine Energy Research (TEAMER) Program. Applications are due 30 April 2022.

Menter Mon Ltd is accepting applications for an [Environmental Monitoring & Mitigation Plan Project Manager](#), a [Project Support Officer](#), and a [Selkie Project Coordinator](#). Applications for all positions are due 4 May 2022.

The University of Plymouth is accepting applications from eligible UK students for a funded PhD project titled, [Hybrid Oscillating Water Column-Overtopping Wave Energy Converter for Clean Energy and Coastal Protection](#). Applications are due 4 May 2022.

The National University of Ireland Galway is accepting applications for [5 PhD research positions](#) available through the TIDAL-GES (Tidal Energy – A transition to affordable and clean energy that can achieve ‘Good Environmental Status’ in coastal and marine waters) project. Applications are due 9 May 2022.

Marine Energy Wales, a longstanding Pembrokeshire Coastal Forum programme, is seeking a [Floating Wind Project Manager](#). Applications are due 9 May 2022.

Upcoming Events

Upcoming Summit

The Australian Ocean Energy Group is hosting the [Australian Ocean Energy Market Summit](#) on 10-11 May 2022 in Hobart, Australia and online. The event aims to create information-based connections between Australian market representatives and industry leaders. Register [here](#).

Upcoming Webinars

Pacific Northwest National Laboratory’s Triton Initiative is hosting the next webinar in its *Triton Talks* series on 21 April 2022 from 11:00am-12:00pm PDT (6:00-7:00pm UTC). Scientist and Science Communicator Cailene Gunn will dive into the strategies, successes, and lessons learned from the first year of implementing Triton’s communications framework. Register [here](#).

Ocean Energy Systems (OES) is hosting a public webinar, “[Study of Offshore Aquaculture as a Market for Ocean Renewable Energy](#)”, on 26 April 2022 from 12:00-1:00pm PDT (7:00-8:00pm UTC) that will provide an overview of the findings in the “Study of Offshore Aquaculture as a Market for Ocean Renewable Energy” report, which will be published in April. Register [here](#).

Upcoming Workshop

The Marine Offshore Renewable Energy Lab (MOREnergy Lab), in collaboration with the Centre for Ocean Energy Research (COER) Maynooth, is hosting the [7th Wave Energy Workshop](#) on 29 April 2022 in Turin, Italy. The workshop will cover a range of topics across wave energy conversion, with a broad focus on hydrodynamic modelling, control, and wave energy technology enhancement. Register [here](#).

New Documents on *Tethys*

Marine Energy

[Using Unmanned Aerial Vehicle \(UAV\) Imagery to Characterise Pursuit-Diving Seabird Association With Tidal Stream Hydrodynamic Habitat Features](#) – Slingsby et al. 2022

Tidal stream environments exhibit fast current flows and unique turbulent features occurring at fine spatio-temporal scales (metres and seconds). Bed-derived turbulent features, such as kolk-boils, transport organic material to the surface and may increase the availability of prey species (fish) for foraging marine megafauna (seabirds and marine mammals). Quantification of animal association and interactions with turbulent features is required to understand potential environmental impacts of tidal energy developments in these sites. Downward-facing unmanned aerial vehicle (UAV) imagery was collected within the Pentland Firth, UK. Resulting imagery was used to quantify the density distribution of pursuit-diving seabirds, called auks, distribution in comparison relation to concurrent surface imagery of kolk-boils and, analyse evaluate spatial relationships with individual kolk-boil features, and quantify body orientation relative to the water flow.

[Triton Field Trials - Changes in Habitats, a Literature Review of Monitoring Technologies](#) – Hemery et al. 2022

Marine energy devices are installed in highly dynamic environments and have the potential to affect benthic and pelagic habitats around them. Regulatory bodies often require baseline characterization and/or post-installation monitoring to determine whether changes in these habitats are being observed. However, a great diversity of technologies is available for surveying and sampling marine habitats. Selecting the most suitable instrument to identify and measure changes in habitats at marine energy sites can become a daunting task. We conducted a thorough review of journal articles, survey reports, and grey literature to extract information about the technologies used, the data collection and processing methods, and the performance and effectiveness of these instruments. We examined documents related to marine energy development, offshore wind farms, oil and gas offshore sites, and other marine industries around the world over the last 20 years.

[Impact of innovation in marine energy generation, distribution, or transmission-related technologies on carbon dioxide emissions in the United States](#) – Liguó et al. 2022

This study contributes to the energy economics literature by inspecting the association between innovation in marine energy generation, distribution, or transmission-related technologies and carbon dioxide emissions, with the gross domestic product per capita, expansionary monetary policy, trade openness, international collaboration in green technology development, and renewable energy consumption in the United States from 1990Q1 to 2018Q4. First, results from the canonical co-integration regression estimator, dynamic ordinary least squares estimator, and fully modified ordinary least squares estimator indicated that innovation in marine energy generation, distribution, or transmission-related technologies helps reduce carbon dioxide emissions. Second, the findings indicated that renewable energy consumption and international collaboration in green technology development were negatively associated with carbon dioxide emissions.

Wind Energy

IEA Wind White Paper Cumulative Effects Analysis for Wind Energy Development: Current Practices, Challenges, and Opportunities – Gill & Hein 2022

The increasing global deployment of wind energy has given rise to concerns about potential adverse effects on certain wildlife species and habitats. The United States and European nations use environmental impact assessments (EIAs) to evaluate the environmental effects of wind energy and inform wind energy planning, siting, and operational processes. A key component of the EIA is the cumulative effects analysis/assessment (CEA). CEAs consider the effects of a proposed development in the context of past, present, and future developments, as well as other (non-wind) activities. However, practitioners worldwide have struggled to implement cost-effective and consistent processes for CEAs. Further, there is no widely accepted scientific methodology to assess cumulative effects.

Demersal fish and invertebrate catches relative to construction and operation of North America's first offshore wind farm – Wilber et al. 2022

Effects of offshore wind farm (OSW) development in the US on fishery resources have been predicted based on European experience. A seven-year study of the first US OSW documented the response of demersal fish and invertebrates to construction and operation. Local fishermen and scientists designed a monthly demersal trawl survey using a Before-After-Control-Impact (BACI) design to assess potential effects of Block Island Wind Farm (BIWF), a pilot scale 30 MW project completed in 2016. Common species did not exhibit statistically significant ($\alpha = 0.10$) BACI interactions in catch per unit effort (CPUE) due to BIWF operation. Results from this first North American OSW fisheries monitoring study provide valuable information for future OSW development on the northeastern US coastline.

Vulnerability of avian populations to renewable energy production – Conkling et al. 2022

Renewable energy production can kill individual birds, but little is known about how it affects avian populations. We assessed the vulnerability of populations for 23 priority

bird species killed at wind and solar facilities in California, USA. Bayesian hierarchical models suggested that 48% of these species were vulnerable to population-level effects from added fatalities caused by renewables and other sources. Effects of renewables extended far beyond the location of energy production to impact bird populations in distant regions across continental migration networks. Populations of species associated with grasslands where turbines were located were most vulnerable to wind. Populations of nocturnal migrant species were most vulnerable to solar, despite not typically being associated with deserts where the solar facilities we evaluated were located.

News & Press Releases

Marine Energy

[DOE Announces Winners of Wave Energy-Powered Desalination Prize Competition](#) – US DOE

The US DOE recently announced the winners of \$1 million in cash prizes in the final stage of the Waves to Water Prize, which challenged competitors to design, build, and test devices that use wave energy to produce clean drinking water from ocean water. Oneka Technologies won the grand prize of \$500,000 for its device Oneka Snowflake. The five-stage Waves to Water Prize, which is funded by DOE's Water Power Technologies Office and administered by the National Renewable Energy Laboratory, challenged teams to develop small, modular, wave energy-powered desalination systems and awarded \$3.3 million total over the last three years. This prize represents the first time DOE supported a competition to develop and test devices that can turn ocean water into drinking water using the natural energy in the ocean itself.

[Minesto launches tidal array build-out plan, empowering Faroe Islands towards 100% renewable energy](#) – Minesto

Leading marine energy developer Minesto has launched a detailed plan for large-scale build-out of tidal energy arrays in the Faroe Islands. The plan includes four new verified sites that would supply 40% of the nation's growing electricity consumption, enabling the Faroe Islands to reach its policy goal of 100% renewable energy by 2030. Together with utility company SEV, Minesto has presented the plan to a wide range of policy and local community stakeholders – including the Prime Minister and Minister of Environment, Industry and Trade – and it has been received very positively. The large-scale build-out plan sets out a stepwise installation of tidal kite arrays, each with 20-40 MW installed capacity, at four verified locations. In addition to Minesto's existing grid-connected site in Vestmannaund, the company points out Hestfjord, Leirviksfjord, Skopunarfjord and Svinoyarfjord as ideal arrays.

[Eco Wave Power Signs Agreement to Construct 2MW Wave Energy Power Station in Spain](#) – Eco Wave Power

Eco Wave Power, a leader in the production of clean electricity from ocean and sea waves, recently announced that it has entered an official agreement with Port Adriano, Spain, for the potential construction of a wave energy power plant of up to 2 MW. The agreement expands Eco Wave Power's presence in Europe and will help Spain achieve its aggressive goals for renewable power, leveraging its significant coastline capacity. According to the terms of the agreement, Port Adriano will assign a potentially suitable location to Eco Wave Power for a period of 20 years, while Eco Wave Power will be responsible for securing all the licenses, constructing, and commissioning the power plant/s and selling the electricity to be generated by the power plant in accordance with an approved production quota, to be determined for the site.

Sustainable Marine Ready to Launch Tidal Energy onto Nova Scotia's Grid – Ocean Energy Europe

Just days after the United Nations Intergovernmental Panel on Climate Change issued its call for action on the climate emergency, saying 'it's now or never', Sustainable Marine is poised to push the button and feed zero emission electricity generated from the immense tidal flows in the Bay of Fundy into the Nova Scotia grid. The company has delivered Canada's first 'grid-compliant' floating tidal energy system, ushering in a fresh dawn for the nation's marine renewable energy ambitions. The landmark achievement follows several months of intense activity in the Bay of Fundy by Sustainable Marine's Canadian, British and German team, supported by an international network of supply chain partners. After laying a 1km underwater cable in late January, the firm subsequently connected its PLAT-I 6.4 tidal energy system to a purpose-built substation, located on the shores of Grand Passage.

Nova Innovation installs novel environmental monitoring kit in Canada – Offshore Energy

Nova Innovation has deployed a remote observation platform (ROP) in Petit Passage in Nova Scotia as part of its tidal energy array project. The ROP records live underwater video and sonar footage to gather data on marine wildlife in the area. It forms part of the environmental monitoring campaign Nova Innovation is performing for the Nova Tidal Array project, which is being developed in three separate 500kW phases, allowing for careful environmental monitoring at each stage. The ROP is a small steel frame structure with a ballast to hold it in place on the seabed. Nova Innovation has previously deployed this frame in Petit Passage and conducted many similar operations at its Shetland Tidal Array in Scotland. To remind, Fisheries and Oceans Canada gave an authorization to Nova Innovation to install five 100kW in-stream tidal turbines in Petit Passage.

Wind Energy

Germany gets ready to deploy more than 10 GW of new wind per year with historic package – WindEurope

The German Government passed the so-called "Easter Package", the most profound series of changes to German energy policy since the introduction of competitive auctions

in 2017. By 2030 Germany aims for 80% renewables in total electricity consumption. Already from 2025 onwards Germany wants to install 10 GW of new onshore wind energy every year alone. To deliver this expansion in onshore wind the Government proposal increases annual auction volumes to up to 12 GW. The package also increased the German offshore wind targets, meaning that Germany will build more than 10 GW of new wind every year from 2025. An additional package expected this May will include a national repowering strategy, new measures to ensure sufficient sites for wind energy, improvements to permitting, and a new strategy to harmonise the expansion of wind energy with biodiversity and nature protection.

Seattle developer pushes for WA's first floating offshore wind farm off Olympic Peninsula

– The Seattle Times

Offshore wind energy on the Pacific Ocean has long been dismissed as a pipe dream due to the abrupt drop-off along the edges of its continental shelf. But floating wind turbines could change that. Trident Winds, a wind energy developer based in Seattle, submitted an unsolicited lease request Monday to the Bureau of Ocean and Energy Management to build a floating offshore wind farm — the state's first — about 43 miles off the coast of the Olympic Peninsula, near Grays Harbor. The proposed site — dubbed the Olympic Wind project — would provide 2,000 megawatts of clean energy to 800,000 homes, according to the developer. If all goes the company's way, construction would begin in 2028 and the wind farm would become operational in 2030.

17 ScotWind project agreements confirmed – Crown Estate Scotland

Crown Estate Scotland have today confirmed that all 17 successful ScotWind applicants now have option agreements in place meaning that their projects can move into the development stage. It follows the announcement in January of the applicants who have been successful in a highly competitive process which attracted 74 applications. Full seabed leases are granted at a later stage once applicants have the necessary consents from regulators, such as Marine Scotland, and have secured grid connections and financing. A key focus of ScotWind is encouraging supply chain investment to develop the Scottish projects. In a world first, Crown Estate Scotland mandated that applicants must outline supply chain commitments as part of their application for an option agreement, with commitments then updated throughout development as project specifics such as timing and technology become clearer.

France commits to 40 GW offshore wind by 2050 – WindEurope

The French Government has signed an offshore sector deal with France's wind industry. The agreement recognises that offshore wind is a major energy and industrial opportunity. It commits France to build 40 GW of offshore wind by 2050 spread over 50 wind farms. To reach this France plans to organise auctions for a minimum of 2 GW of new offshore wind capacity each year starting in 2025. Right now they're auctioning 1 GW a year. This means 20 GW of capacity will be allocated by 2030 translating into 18 GW of operational offshore wind farms in 2035. So far France has put 3.5 GW of

offshore wind up for auction, 500 MW of which is floating wind. With this agreement the industry aims to quadruple this to over 20,000 direct and indirect jobs. This growth will be spurred by over €40bn in investments the industry committed to.

US Wind & UMCES Launch Major Offshore Wind Research Partnership – US Wind

Baltimore-based US Wind, Inc. (US Wind) recently announced \$11 million in funding over ten years to the University of Maryland Center for Environmental Science (UMCES) for three research projects aimed at understanding the potential effects of offshore wind development on marine mammals, fish, and birds. The research will take place in US Wind's 80,000-acre federal Lease area off the coast of Ocean City, Maryland. The three UMCES research projects include commercial and recreational fisheries monitoring, near real-time whale detection, and passive acoustic monitoring arrays. All data will be made available to government and academic researchers, and reports and information will be made publicly available to help protect these important species and ecosystems for generations to come.