

ISSUE BRIEF

HARNESSING THE WIND: HOW TO ADVANCE WIND POWER OFFSHORE



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This is an exciting moment for U.S. offshore wind energy development. With the encouragement of a broad coalition that includes organized labor, business groups, and the environmental community, many East Coast states have adopted ambitious offshore wind goals and are supporting a variety of offshore wind projects that provide healthier air—free of mercury and other pollutants—and thousands of well-paying clean energy jobs.¹ All told, projects capable of producing more than 25,000 megawatts of power could be operational along the Atlantic Coast within the next 15 years, ensuring enough renewable electricity to power at least 12.5 million homes.² West Coast offshore wind efforts are also starting to take shape under California’s lead, with advancements in newer technologies better suited for deeper waters.

Offshore wind power is coming not a moment too soon. A 2017 NRDC report titled *America’s Clean Energy Frontier* models a national path to reduce dangerous U.S. greenhouse gas emissions by at least 80 percent by 2050.³ The analysis shows the United States needs to rapidly scale up energy efficiency and all forms of clean energy—including solar power and land-based and offshore wind—to prevent the worst impacts of climate change. The most recent Intergovernmental Panel on Climate Change (IPCC) report describes in no uncertain terms the consequences for both humans and ecosystems if we fail.⁴ Increased droughts, more severe storms and heat waves, and greater flooding—even on sunny days—are flashing warning signs. In our oceans, climate change is already bleaching coral, displacing species worldwide, and acidifying the water, making it harder for shell-building organisms like oysters to grow shells and survive. We must kick our fossil fuel addiction.

Yet even with its immense long-term benefits, offshore wind power, like all types of energy development, poses risks to its immediate environment and must be developed responsibly.

Wind farm construction and operation can displace vulnerable ocean wildlife from prime feeding and breeding areas and interfere with animals’ abilities to navigate, communicate, and locate food. Many species, already under stress from decades of overfishing, pollution, and habitat destruction and facing new pressures from climate change, may struggle to adapt, resulting in further population declines.

U.S. offshore wind is still a new industry. We are only just beginning to learn from our nation’s first commercial project, the Block Island Wind Farm off the coast of Rhode Island, which came online in December 2016.⁵ Nearly three decades of offshore wind development in Europe have shown that offshore wind power can be sited and operated with appropriate mitigation measures needed to protect local wildlife.⁶ We need to build on these examples and apply lessons learned here in U.S. waters, where differences in our marine ecosystems present new challenges for responsibly developing and operating offshore wind projects.



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SMART OFFSHORE WIND IS WITHIN REACH

We can harness the clean energy we need while protecting our valuable marine wildlife heritage. It is critical that offshore wind projects be sited outside important and sensitive habitats—like the nearshore environment, shoals, shelf breaks, and other unique ocean areas—to minimize impacts to coastal and marine wildlife. We must also adopt science-based measures to avoid, minimize, and mitigate the impacts of wind farm construction and operation on vulnerable ocean life. And we need to support further research to improve our understanding of potential impacts so we can solve any problems and move beyond concerns that prove to be unfounded.

Responsible offshore wind development must seek to avoid, minimize, and mitigate underwater noise.

Offshore wind development activities, including surveys to determine turbine placement and foundation installation, can produce large amounts of underwater noise. Animals' responses to that noise can vary by species. The noise can drown out the sounds that whales and other marine mammals make to communicate and can divert animals from their typical migration routes into areas less suitable for feeding, migrating, or breeding. It could drive animals into

shipping lanes, putting them in the path of powerful ships.⁷ Some species may avoid areas even after the noise ends. In Europe, harbor porpoises have not returned to some areas that had been filled with the loud sounds of turbine construction.⁸ Lessening underwater noise benefits a wide range of ocean wildlife, from the largest whales to shellfish like scallops.⁹

To reduce risk, wind farms should be sited outside critical feeding and breeding areas for especially vulnerable species like the North Atlantic right whale (see page 5). Construction should be scheduled to occur during months when sensitive animals aren't around. Offshore developers can take a page from Europe and use quieter foundation types like gravity-based and suction caisson platforms.¹⁰ Developers can also use noise-reducing installation methods and technologies—like bubble curtains—to muffle the sound of loud pile-driving, which occurs when a foundation's steel platforms are hammered into the seabed.¹¹ It is also essential to use qualified wildlife observers and underwater recorders to monitor the area during construction, and to pause noisy activities when marine mammals and sea turtles are present.



Responsible offshore wind development must aim to minimize ship strikes.

Ship strikes are a leading cause of mortality for marine mammals as well as endangered and threatened sea turtles.¹² While wind farm activities are only one component of overall vessel traffic, they still generate an additional risk of ship strikes, both within and just outside project areas where a greater density of boats may be redirected during construction.

The most effective way to prevent serious injury to marine mammals and sea turtles is to limit ship speeds to no more than 10 nautical miles per hour.¹³ The Bureau of Ocean Energy Management, the agency responsible for permitting offshore wind under federal law, should also help develop and test vessel design solutions (e.g., enclosed propellers or modified hull designs) to reduce ship-related noise and collision risks.

Responsible offshore wind development must avoid, minimize, and mitigate turbine conflicts.

Birds and bats can collide with turbine blades or be displaced by the turbines from key feeding areas or migratory pathways.¹⁴ Research from European offshore wind facilities has shown mixed results: Some studies provide grounds for optimism, offering little evidence of collision-caused bird mortality offshore; others note that direct mortality is difficult to quantify in an ocean environment and that even low collision levels can pose a serious risk to imperiled species.¹⁵

We need a far better understanding of where birds and bats—particularly species already experiencing population declines—fly offshore, including at what heights, to further guide wind farm siting to avoid important areas. We should explore smart turbine designs and operations to avoid and minimize impacts. Tactics like reduced lighting on wind platforms and the use of flashing lights on turbines may

help ward off seabirds.¹⁶ Bats may be attracted to turbines, so researchers are also exploring ultrasonic noise emitters and ultraviolet lighting to deter bats from approaching turbines. If needed, briefly stopping turbine blades (known as “feathering” or “operational curtailment”) during key migration times for bats (e.g., during warm, slow-wind-speed nights in autumn) could greatly reduce mortality.¹⁷

The mooring and transmission cables from floating turbine platforms also pose potential scouring issues for habitat and entanglement or displacement risks for marine life like whales.¹⁸ We need baseline studies to understand these risks and to develop best management practices to mitigate any impacts.

Developers must commit to scientific research and long-term monitoring.

Baseline data collection and long-term monitoring of offshore wind project sites are critically important. Knowing more about the status of wildlife populations and oceanographic details (e.g., water temperature, seafloor habitat) will help explain whether and how offshore wind development will impact a proposed site and its surrounding environment. In addition to the research needs described above, we should further explore the electromagnetic fields emitted by power cables that connect turbines to each other and to the shore, particularly their possible impact on species like sea turtles that use the earth’s magnetism as a directional cue.¹⁹ As more offshore wind projects come online, we must collect data on how sound levels from their operations in various environmental conditions change with different project layouts and foundation types. We must also develop verified technology capable of monitoring potential bird and bat impacts. Conducting this research and making it publicly available will help to calculate the cumulative impact of multiple projects and guide future offshore wind siting and development.



OFFSHORE WIND DEVELOPERS CAN PROTECT NORTH ATLANTIC RIGHT WHALES

With fewer than 420 individuals remaining, the iconic North Atlantic right whale is one of the most endangered marine mammals on the planet.²⁰ Right whales have been in a severe decline since 2010, largely due to entanglement in fishing gear and vessel collisions. We need to do everything we can to reduce stress on the species if it is to survive and recover.

In January 2019, the Natural Resources Defense Council, the National Wildlife Federation, and the Conservation Law Foundation reached a landmark agreement with offshore developer Vineyard Wind to protect endangered North Atlantic right whales during construction and operation of its 800-megawatt project for Massachusetts, which is on track to become the first large-scale offshore wind project in the United States. Under the agreement, construction will be curtailed in the winter and early spring when right whales are expected to be in the area. During other months, comprehensive monitoring through overflights and underwater surveillance will ensure that disruptive construction activities don't take place when right whales are near the site. Vineyard Wind will also dampen construction noise that impairs the ability of all marine mammals to communicate, find food, and stay on their migratory paths. Finally, the agreement sets speed limits for project vessels and includes additional commitments to long-term right whale research and conservation.²¹

This agreement sets the bar for other offshore wind developers and lays the groundwork for state and federal regulatory requirements. It is a practical demonstration of how the industry can comply with a set of best management practices that environmental groups and scientists have developed for ensuring protection of right whales during offshore wind construction and operation.²² Working together, we can grow the clean energy we need while protecting our most vulnerable ocean wildlife.



WE NEED OFFSHORE WIND NOW—AND WE NEED TO DO IT RIGHT

Tapping into the wind power off our coasts offers an unmatched opportunity to develop the carbon-free energy we need to address climate change. We can avoid, minimize, and mitigate threats to ocean life from offshore wind development. By placing projects where they are least

likely to cause harm, taking precautions when constructing and operating turbines, and committing to understand and protect our ocean wildlife, we can ensure that the offshore wind we need advances in harmony with the protection of our treasured ocean wildlife.

ENDNOTES

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