

**SUPPLEMENT ANALYSIS**

**FOR THE SUPPLEMENTAL**  
**ENVIRONMENTAL ASSESSMENT/FINDING OF**  
**NO SIGNIFICANT IMPACT**  
**FOR THE**

**UNIVERSITY OF MAINE'S DEEPWATER**  
**OFFSHORE FLOATING WIND TURBINE**  
**TESTING AND DEMONSTRATION PROJECT**

**CASTINE, MAINE**  
**DOE/EA-1792-S1**

**US Department of Energy**  
**Office of Energy Efficiency and Renewable Energy**  
**Golden, Colorado**



**September 2013**

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## 1.0 Background

In March 2013, the U.S. Department of Energy (DOE) published the Final Supplemental Environmental Assessment (DOE/EA-1792-S1) for the University of Maine's Deepwater Offshore Floating Wind Turbine Testing and Demonstration Project, Castine, Maine. The associated Finding of No Significant Impact (FONSI) was issued by DOE on March 21, 2013. The Supplemental Environmental Assessment (EA) was prepared to evaluate potential environmental impacts of providing funding to the University of Maine (UMaine) for their proposed project offshore of Dyce Head in Castine, Hancock County, Maine (Castine site). As described in the FONSI, the Deepwater Offshore Floating Wind Turbine Testing and Demonstration Project would consist of deploying and testing one, 1/8th-scale wind turbine rated at 20-kW on a floating platform at the Castine site within state waters. The turbine would be connected to the Central Maine Power (CMP) grid via a cable along the seabed surface from below the turbine to shore and along the ground to an existing CMP power pole.

UMaine proposed to use congressionally directed funding administered through DOE to deploy the turbine, named VoltturnUS, for four months in the spring and summer of 2013 and the removal of VoltturnUS during summer 2013. Due to construction delays, UMaine did not deploy the floating platform and turbine at the Castine site until June 6, 2013 (Figure 1). UMaine is proposing to extend the turbine deployment until May 31, 2014 to conduct additional testing.

In compliance with NEPA (42 U.S. Code 4321, et seq.) and DOE's NEPA regulations (10 CFR 1021.330) and procedures, the purpose of this Supplement Analysis (SA) is to examine the potential environmental impacts of the proposed modification to the original project deployment period to determine whether a Supplemental EA should be prepared.



**Figure 1 - The VolturnUS 1/8th-scale floating offshore wind turbine, being towed to the Castine site.**

## **2.0 Description of the Modified Proposed Action**

UMaine is proposing to extend the four-month test period to approximately twelve months. The turbine test period would continue until May 31, 2014 under the modified Proposed Action. The extension to the test period is the only modification being proposed. UMaine would continue to comply with the applicant-committed measures as described in DOE/EA-1792-S1 section 2.5.

## **3.0 Potential Environmental Impacts of the Modified Proposed Action**

The Supplemental EA evaluated potential effects of project deployment, operation, and removal. Potential effects associated with deployment and removal of the floating turbine platform and underwater cable remain the same as what was evaluated in the Supplemental EA, and, therefore, the SA does not include a discussion of the effects of deployment and removal. The potential effects of keeping the onshore components (i.e., an electrical cable and associated equipment) in place for an additional eight months also are not discussed because that equipment was designed to minimize disturbances and has a very small footprint, and thus there would be no additional effects to the terrestrial environment from keeping that equipment in place.

Potential effects of operation remain the same as what was evaluated in the Supplemental EA, with the exception that the exposure of receptors to the potential effects will occur over twelve months, rather than four months. The subsequent sections include a discussion of the resources that could experience a change in impacts from extending the deployment period and are, therefore, included in this SA.

### **3.1 Biological Resources**

The degree to which the presence and operation of the project components would affect use of the area by marine life would be minimized over the proposed extended period of operation, and would not affect populations of species that use the area, because of:

- The small spatial scale of the project - the turbine is 1/8 the scale of a commercial turbine, having a hub height of about 41 feet from the waterline and a rotor diameter of about 32 feet;
- The short duration of the project – the proposed 12-month deployment still represents a temporary deployment.

Extending the deployment period has the potential to affect individuals of some species. For example, biofouling organisms would have additional time to grow on the underwater project components before the project would be removed, but any artificial reef effect of the project would still be temporary. Extending the deployment from four to twelve months would not be expected to change the habitat or the marine community in the deployment area (e.g. artificial reef effect, fish aggregation device effect, avoidance of or attraction to the project area by resident and migratory species) because of the small spatial scale of the project and its temporary nature.

As discussed in the Supplemental EA, there are a number of federally managed fish species with Essential Fish Habitat (EFH) in waters off of Castine. Habitat types that represent EFH include all portions of the water column and various substrate types (NOAA 2012). Diadromous fish species also occur in the project area that may serve as prey for a number of federally-managed species and several species are considered a component of EFH. The footprint of the anchors and cable might slightly decrease available bottom foraging habitat and areas considered to be EFH and the type of habitat to be disturbed is very prevalent along the Maine coast. However, the area covered by the anchors and the subsea cable is very small (combined area of about 64 ft<sup>2</sup> for drag embedment anchors and 357 ft<sup>2</sup> for the 2½-inch subsea cable and associated strip weights). Extending the deployment period would increase the length of time during which habitat within the project footprint, including EHF, would be less available for fish and invertebrates; however, this would still be a temporary loss of habitat.

UMaine conducted 20 boat-based visual surveys for marine mammals and birds before the turbine was deployed, including 17 surveys from March through June 2012 and three surveys in June 2013. Two surveys were also conducted in July 2013, following deployment of the turbine. No whales, other than harbor porpoise, were observed in the project area during these surveys (Kennedy 2012, 2013). Scheduled and unscheduled inspections, maintenance, and repairs would continue to be required periodically (i.e., weekly to monthly); thus, the extended deployment would result in a slight increase in vessel traffic for project maintenance and research, but it would continue to be a very small portion of the traffic in the area surrounding the platform. Effects to harbor seals, gray seals, and harbor porpoise would remain negligible for this small-scale and temporary project. The turbine platform was designed to limit the horizontal surfaces, and the platform deck height precludes the haul out of seals. The potential for a vessel and marine mammal interaction remains unlikely, but NMFS marine mammal avoidance procedures would be implemented in the event that a marine mammal is encountered by a service vessel. The small spatial scale of the project components and small size of service vessels visiting the site (i.e. similar in size to a typical lobster boat) are also expected to minimize any disturbance to marine mammals caused by project operations.

Because of the acute sensory capabilities of toothed whales (echolocation) and the small size and maneuverability of seals, it is expected that the marine mammal species that have been observed in the project area (harbor porpoise, harbor seals, and gray seals [Kennedy 2012, 2013]) would be able to detect and avoid underwater moorings, regardless of the deployment duration. The extended deployment of the project would not increase the risk of large whales encountering the project because it is unlikely that large whales would be present in the near-shore area where the platform is deployed, and because of the small size of the project footprint relative to the surrounding open ocean area of Penobscot Bay. By an email to DOE dated August 6, 2013, NMFS stated that it did not have additional concerns about the extended deployment with regards to the Marine Mammal Protection Act, and that there would be no additional effects to marine mammals.

The proposed extended deployment would increase the period during which migrating and foraging birds would be at risk of colliding with the turbine. With an extended deployment, there is a greater chance that some birds would collide with the turbine and be killed or injured. However, the rotor-swept area of the turbine is 779 feet<sup>2</sup>, which is much smaller than a commercial-scale wind turbine. The turbine design does not have external ladders or other structures that would allow birds to perch near the turbine blades with the exception of a web camera which is being used to monitor operations and bird use, the latter as agreed upon during consultation with USFWS, and required navigation lighting. The small rotor diameter of the Castine 1/8-scale turbine, the turbine design, and the still-temporary nature of the extended deployment would minimize collision risk for birds. UMaine is conducting boat-based visual surveys of birds and has been working with the USFWS to monitor for bird activity near the

turbine using a camera. No bird strikes have been observed to date. UMaine plans to continue bird observations in collaboration with the USFWS over the proposed extended period of deployment.

Because of the relatively small rotor diameter of the Castine 1/8-scale turbine and because the turbine is located about 800 feet from shore rather than on a forested ridgeline where bats are more common<sup>1</sup>, the probability of bats being injured by the operating turbine over the proposed extended deployment remains very low.

### Threatened and Endangered Species

The project area overlaps with a migratory corridor used by juveniles and adults of three fish species listed as threatened or endangered under the Federal Endangered Species Act (ESA): Atlantic salmon, shortnose sturgeon, and Atlantic sturgeon. Because of the small footprint of the proposed project relative to the surrounding marine habitat, the limited time these fishes would be migrating through the area surrounding the project site, and the overall lack of potential mechanism for effects to fish, there would be very little or no additional risk to these three species from extending the deployment period.

As described in the Supplemental EA, the five ESA-listed whales that have the potential to occur in waters offshore of Maine are: North Atlantic right, fin, humpback, sei, and sperm whales. None of these species were observed during 22 boat-based visual surveys UMaine conducted from March through June 2012 and in June and July 2013 in the project vicinity (Kennedy 2012, 2013), nor are they expected to occur near shore in the upper Penobscot Bay where the turbine is deployed. The project area is not a known concentration area for these whale species; occasional transient right, humpback, and fin whales could be present in the area while migrating or moving between foraging areas (NMFS 2013). Because there will only be one test unit deployed in Penobscot Bay in an area where listed species are not known to concentrate, the likelihood of a whale encountering the project components during the extended deployment remains extremely low.

The three ESA-listed sea turtle species that have the potential to occur in the Gulf of Maine are Kemp's ridley, loggerhead, and leatherback sea turtles, although Kemp's ridleys are rare in waters this far north. These species generally occur in New England waters during the warmer months, and are most common off of Maine between July and October. The waters off of Maine are not high-use areas for these species, occurrence in the project area is relatively rare, and is likely limited to transient individuals migrating or moving between coastal foraging areas

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<sup>1</sup> Bat fatalities at wind energy facilities appear to be highest along forested ridgetops in the eastern U.S. and lowest in relatively open landscapes in the midwestern and western states (Kunz et al. 2007).

(NMFS 2013). The likelihood of exposure of these species to the proposed project during the extended deployment period would continue to be extremely small given that sea turtles are uncommon in the project area and the project footprint is very small relative to the surrounding Penobscot Bay.

There are two ESA-listed birds, the endangered roseate tern and the federally-threatened piping plover, and a number of state-protected birds that have the potential to occur in the project area. The red knot is a candidate for Federal listing. Of these, 10 unidentified terns (*Sterna* sp.), two razorbills, and one peregrine falcon were observed during the 22 boat-based surveys UMaine conducted from March through June of 2012 and June and July 2013 (Kennedy 2012, 2013)<sup>2</sup>. In a letter to DOE dated August 6, 2013, the USFWS noted that piping plover foraging habitat is absent in the project area, and that the project is 33 miles from the nearest roseate tern-nesting colony, which is a greater distance than these birds normally travel to forage. Because the rotor-swept area of the Castine 1/8-scale turbine is small (799 ft<sup>2</sup>), and because the turbine is located far from any nesting areas of ESA-listed species (USFWS 2013), the potential for protected birds to be harmed by the operating turbine during the additional eight months of deployment would continue to be so small that it is discountable.

There is no designated critical habitat for Federally-listed species in the project area.

In a letter to DOE dated August 6, 2013, the USFWS concurred with DOE's determination that the extended deployment of the turbine at Castine is not likely to adversely affect piping plover, roseate tern, or red knot (USFWS 2013). By emails to DOE dated July 31, August 1, and August 6, 2013, NMFS concurred that the extended deployment of the turbine is not likely to adversely affect ESA-listed species, Essential Fish Habitat (as regulated under the Magnuson-Stevens Fishery Conservation and Management Act), or marine mammals.

### **3.2 Noise And Vibration**

The Renewegy 20 kW turbine creates noise levels of about 50 dB at 120 feet (Renewegy 2012). For comparison, a 2-person conversation is about 47 dB (Bradley and Stearn 2008). Underwater noise associated with the visits to the site by service or research vessels during the extended deployment have the potential to cause some fish, marine mammals, birds, and other marine life to avoid the project area; however, this would be short term, with behavior returning to normal after the vessels leave the site. Because of the low level of noise created by a Renewegy 20 kW turbine, and because only a small amount of sound can transfer through the sea surface from

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<sup>2</sup> Roseate tern is federally and state endangered, least tern is state endangered, and Arctic tern is state threatened. Razorbill is state threatened and peregrine falcon is state endangered.



above (Jones et al. 2010), underwater noise levels resulting from turbine operation would be expected to continue to be very low during the extended deployment (DOE/EA-1792-S1).

### Threatened and Endangered Species

Noise associated with project maintenance and research activities (vessel operations) over the extended deployment period has the potential to cause threatened and endangered fish, whales, birds, and sea turtles to avoid project service vessels, as they might avoid any vessels commonly used along the coast. Any avoidance of service vessels associated with the project would be infrequent and short term with behavior returning to normal after the service vessels leave the site. In addition, there would be very few project vessels relative to current traffic in the area. Effects of project noise resulting from the proposed extended deployment period would be minimized because of the small scale of the turbine, the low likelihood that listed species would be exposed to the project, the low level of turbine noise, and because only a small amount of sound is expected to result from transfer of above-water sound through the sea surface.

### **3.3 Ocean and Land Use**

Restrictions on lobstering and commercial fishing within a 35-acre area surrounding the platform and an additional area immediately along the electrical cable would continue for an additional eight months. This is a very small area relative to the surrounding bay, so the project is anticipated to only minimally reduce or temporarily limit lobstering or commercial fishing activities during the extended deployment period.

The relatively small area of the navigation safety zone in comparison to the rest of Penobscot Bay would not reduce recreational fishing, recreational boating and cruising, and other recreation activity that occurs in the area. The Town of Castine, Maine Maritime Academy (located in Castine), and many residents have expressed support for extending the deployment of the turbine<sup>3</sup>. Recreational boats are frequently observed passing by the turbine, and the turbine has become an attraction to residents and tourists<sup>4</sup>.

A navigation safety plan has been developed for the project and approved by the U.S. Coast Guard (USCG). The proposed extension of the deployment has also been approved by the USCG (USCG 2013). The Navigation Safety Plan and the small scale of the project minimize

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<sup>3</sup> Support was expressed at three town meetings where the extended deployment was discussed, at a July 2, 2013 public outreach meeting organized by UMaine to discuss the extended deployment with residents of Castine, and in discussions between Maine Maritime Academy staff and Castine residents and visitors.

<sup>4</sup> This has been observed from the video surveillance of the unit: boats are seen circling the unit, and schooners, groups of kayaks, etc. pass by. Interest in the turbine has also been indicated during discussions between recreational boaters with Maine Maritime Academy staff who work on the waterfront.

the chance of boat collisions with the floating platform during the proposed extended period of deployment.

The cable would cross one private residential property from which landowner permission has been granted for the extended deployment<sup>5</sup>. The project does not otherwise affect terrestrial land use.

### **3.4 Cultural Resources**

Based on the analysis in the Supplemental EA, DOE concluded, and the Maine Historic Preservation Office concurred, that there would be no direct adverse impacts to underwater historic properties from deployment and retrieval of the floating platform or indirect adverse impacts to the viewshed from historic properties on the Castine peninsula. Visibility of the platform and turbine from most or all historic properties would continue to be limited during the extended deployment period. Consistent with the analysis in the Supplemental EA, there would also be no direct adverse impacts or indirect adverse impacts due to the proposed extended deployment period. In an email dated June 24, 2013 to UMaine, the Maine Historic Preservation Commission stated “The revised deployment timeline is acceptable to our office.”

### **4.0 Conclusions and Determination**

The potential impacts associated with the modified Proposed Action were evaluated and found to be similar to those identified for the Proposed Action in the 2013 Supplemental EA. DOE has, therefore, determined that the modified Proposed Action would not constitute a substantial change in actions and would not present any new circumstances or information relevant to the environmental concerns and bearing on the previously analyzed action or impacts, within the meaning of 40 CFR 1502.9(c) and 10 CFR 1021.314. An additional Supplemental EA is, therefore, not required.

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<sup>5</sup> A previous Memorandum of Understanding was signed by the landowner which expired at the end of July. He has since given verbal consent for the extended deployment.

## 5.0 Literature Cited

- Bradley, D.L. and R. Stern. 2008. Underwater Sound and the Marine Mammal Acoustic Environment, A Guide to Fundamental Principles. Prepared for the U.S. Marine Mammal Commission. [Online] URL: [http://www.mmc.gov/reports/workshop/pdf/sound\\_bklet.pdf](http://www.mmc.gov/reports/workshop/pdf/sound_bklet.pdf) (Accessed July 2008).
- Jones, M., P. Ramuhalli, and M. Watkins. 2010. Characterization of acoustic noise propagation from offshore wind turbines – white paper. Pacific Northwest National Laboratory, Richland, WA. Unpublished.
- Kennedy, L. 2013. Visual Observations for Birds, Turtles, and Marine Mammals at the University of Maine Test Site near Castine, Maine. Prepared by Lubird Kennedy Environmental Services for the University of Maine’s Advanced Structures and Composites Center. June-July, 2013.
- Kennedy, L. 2012. Visual Observations for Birds, Turtles, and Marine Mammals at the University of Maine Test Site near Castine, Maine. Prepared by Lubird Kennedy Environmental Services for the University of Maine’s Advanced Structures and Composites Center. September, 2012.
- Kunz, T.H., E. Arnett, W. Erickson, A. Hoar, G. Johnson, R. Larkin, M.D. Strickland, R. Thresher and M. Tuttle. 2007. Ecological impacts of wind energy development on bats: questions, research needs, and hypotheses. *Front Ecol Environ* 5 (6): 315-324. [Online] URL: <http://www.bu.edu/cecb/files/2009/12/kunzbats-wind07.pdf>.
- National Marine Fisheries Service (NMFS). 2013. Letter from J. Bullard, NMFS to L. Margason, DOE dated February 20, 2013.
- National Oceanic and Atmospheric Administration (NOAA). 2012. Guide to Essential Fish Habitat Designations in the Northeastern United States. [Online] URL: <http://www.nero.noaa.gov/hcd/index2a.htm>. (Accessed October 2012).
- Renewegy. 2012. Archive for the ‘Renewegy Blog’ Category. [Online] URL: <http://renewegy.com/category/blog/> (Accessed October 2012).
- U.S. Coast Guard (USCG). 2013. Letter from B.S. Gilda, USCG, to J. Clement, U.S. Army Corps of Engineers, dated June 28, 2013.
- U.S. Fish and Wildlife Service (USFWS). 2013. Letter from Laury Zicari, USFWS to L. Margason, DOE, dated August 6, 2013.