

Offshore wind farms: a sea change



The owners and developers of offshore wind farm projects within the US may be confronted by a host of issues when it comes to siting decisions. Peter J. Comodeca takes a closer look.

One relatively novel issue in the United States is with regard to offshore wind energy development, because of the abundance of available land for wind farms. In fact, only one major off-shore wind farm has been progressed sufficiently towards power generation in the United States, the Cape Wind Project in federal water near Cape Cod. However, other states have approved large offshore wind farms such as Texas and New Jersey. This article will highlight some of the different issues generated by offshore wind farms when compared to land based systems, focusing on salt water environments. However, substantially the same challenges will be confronted by wind farms placed offshore in fresh water locations such as the Great Lakes.

The erection of offshore wind farms introduces different engineering and construction techniques from land based wind farms. Additionally, offshore wind

farms generate nuanced differences with regard to the legal issues of jurisdiction, permitting, siting, environmental, and local concerns. Because of the rarity of offshore wind farms in the United States, both the technical construction and operation issues and the potential legal issues are evolving.

Offshore wind turbines are more expensive and difficult to install at this stage of their development. The predominant reason for this is the adverse environment where the construction is to be performed. Offshore wind turbines are exposed to both wind loads and wave loads which need to be counteracted for efficient operation. Also, offshore turbines are exposed to the corrosive marine environment that not only includes saltwater, but salt spray and the extremes that frequently occur in wave strength and storms over water.

Environmental and aesthetic issues play a role in the construction means and methods implemented to construct offshore wind turbines. Cable should be selected with the least damaging electromagnetic emissions to avoid adverse impact on marine species. Turbine siting should also be sensitive to seasonal fluctuations of marine life related to reproductive or migratory patterns. These considerations are in addition to the standard concerns over the impact on migratory birds and the affect on scenic vistas.

Seabed type is a feature that would affect construction techniques for offshore wind turbines. Undersea cables are required to interconnect multiple offshore wind turbines and then to connect offshore wind farms to the power grid or to the power consumer on land. The cables are either embedded beneath the surface of the sea bottom where possible or, where rock is present, the cables may need to be laid and fastened to the surface of the rock. This affects means and methods and scheduling issues in the construction contracts.

Water depth and prevailing currents play roles in determining the appropriate foundation for wind turbine towers. The selected foundation type will then determine the construction techniques used for offshore wind turbine erection.

Another issue that has to concern offshore wind farm developers is obtaining the appropriate permits for connecting the output from the offshore power generation to the land based power grid. The placement of high voltage transmission

lines is a task that can be expected to generate local opposition with the accompanying delay and cost increases associated with resolving the problem. Also, assuming all local opposition is overcome, the costs associated with the installation of high voltage transmission lines will be a factor determining how close an offshore wind farm will be to centers of electricity consumption.

Once the constructability issues are addressed, other issues need to be addressed in order to increase the likelihood of economic and successful construction once all legal steps are accomplished. These issues include selection of the appropriate rotor blades, consideration of transportation needs for power and turbine parts, the location and processes for assembling turbines, and the final commissioning of the turbine blade to determine if it meets the intended performance criteria. All of these considerations must be done with an eye toward putting into operation a product with suitable reliability and minimal maintenance costs.

Depending upon the jurisdiction into which an offshore wind farm is placed, there may also be tax benefits available to the project developers and operators. Tax issues should be explored to determine applicability and to maximize availability since some tax benefits may operate to displace other available tax benefits. Federal tax benefits generally include production tax credits and Clean Renewable Energy Bonds for commercial wind farm projects. A federal investment tax credit is also available for small wind turbines built for small business, farm, or home use. State tax benefits vary by state and may even vary by county or city within a state depending on project site. State tax incentives are intended to offset ownership, construction, and operation costs. It is important to emphasize that state tax benefits are not uniform and that state benefits provided to wind farm projects may even be subject to federal tax. The possible state tax benefits available by jurisdiction include property tax exemptions, sales tax exemptions, income tax credits, tax rebates, and accelerated or preferential tax deductions. Obviously, offshore wind farm developers need to examine the tax packages of those jurisdictions adjacent to bodies of water suitable for offshore wind turbine power generation.

The predominant offshore wind farm issue that has reached the courts is that

of site permitting, same as for land based wind farms. Cases to date have focused on determining jurisdictional issues between the federal and state government and how the jurisdictional issues fall into existing regulatory processes. See, *Alliance to Protect Nantucket Sound v. United States Department of the Army Corps of Engineers*, 398 F.3d 105 (1st Cir. 2005) (case limited to granting a permit for construction of a pre-wind farm offshore temporary data tower); *Alliance to Protect Nantucket Sound, Inc. v. Energy Facility Siting Board*, 858 N.E. 2d 294 (Mass. 2006) (case focuses on necessary coordination between inconsistent federal and state permitting procedures).

The above cases all arose from the Cape Wind Project in federal water near Cape Cod. Parallel to the Cape Wind litigation was the federal government's generation of its Final Environmental Impact Statement on the Cape Wind Project in January 2009, after seven and one-half years of environmental review. The analysis addressed the suitability of the offshore project location from an environmental and economic perspective by evaluating alternative sites, job creation, other projected economic benefits of the project, impact on regional energy prices, impact on local electric transmission costs, contribution towards achieving state mandated alternate energy generation requirements, and impact on navigation, fishing, and tourism. The Cape Wind Project has served as a partial learning curve for major United States offshore wind farm projects. It can only be hoped that the time consumed by litigation and environmental impact assessment on future projects will be reduced as offshore wind farm development increases.

The novelty of offshore wind farms in the United States has resulted in issues of first impression for courts and government agencies. As these issues are addressed, and as offshore wind farms become more prevalent and acceptable to satisfy the energy needs of the United States, it can be expected that projects will come online at a quicker pace and the offshore wind energy community can concentrate more on the other unique issues related to offshore wind farms, such as contract contents, equipment and warranties, licensing, lease or purchase of ships and work platforms, and operation and maintenance. Each of those unique issues continues to evolve and each will require attention in contracting for the development, construction, and operation of offshore wind farms. ▀