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Recommendations for Bureau of Ocean Energy Management Offshore Wind Leasing Program

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Executive Summary

Using a case history from Maryland's two offshore wind projects, offshore wind permitting and leasing should be halted until several critical issues are addressed.

1) A Benefit Cost Analysis of two Maryland projects show costs are four times higher than benefits as currently proposed with two-thirds of costs related to lost tourism. The two projects may be typical of thirteen other projects now underway on the east coast, and new leases further from shore may be needed to bring costs in line with benefits.
2) Moving leases further offshore should be combined with turbine size limitations tied to the lease distance from shore to ensure turbines are not visible from shore. The lease should be offered with a pre-approved site for bringing power onshore.
3) The U. S. Interior Department Bureau of Ocean Energy Management has been slow to complete much needed research studies to determine the cost of potential lost tourism, and lost commercial fisheries of leased offshore wind projects. Even 1% lost tourism wipes out the $1 billion in direct benefits of the Maryland projects. Maryland project developers will receive $4.3 billion in federal and state subsidies for a $2.1 billion investment. It is likely BOEM has not fully complied with NEPA (see attached).
4) There needs to be a determination if environmental impacts from bird, and bat kills, and damage to migrating marine life are worth the benefits of offshore wind, especially given the current cost advantages of onshore wind and solar at half the price. While some mitigation may be possible, there will be environmental impacts of unknown, and potentially unknowable, magnitude.
5) It is also recommended Benefit Cost Analysis for offshore wind projects not include any potential health benefits of reduced air pollution since these projects are generally competing against onshore wind and solar with similar characteristics.

BOEM needs to develop a Guidance, and refund lease fees already paid if the Guidance negatively impacts an already acquired lease area. The Guidance might include:

"No offshore wind turbine permit shall be issued in established, or known exclusion zones including shipping channels and fairways, radar safety and security zones, migratory avian and marine pathways, marine life hibernation zones, and commercial fishing grounds. Turbine aircraft, and shipping warning lights shall not be visible from shore. All lease offerings shall include a pre-approved landing site for electricity transmission cables, power substations, and land based power transmission lines."

Background

The Energy Act of 2005 encouraged renewable fuels, oil and gas drilling on federal lands onshore and offshore, energy efficiency, and renewable energy, and said this about wind energy:

> "SEC. 931. RENEWABLE ENERGY. (a) IN GENERAL.— (1) OBJECTIVES.—The Secretary shall conduct programs of renewable energy research, development, demonstration, and commercial application, including activities described in this subtitle. Such programs shall take into consideration the following objectives:

(B) WIND ENERGY.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for wind energy, including— (i) low speed wind energy; (ii) offshore wind energy; (iii) testing and verification (including construction and operation of a research and testing facility capable of testing wind turbines)"

''SEC. 388. ALTERNATE ENERGY-RELATED USES ON THE OUTER CONTINENTAL SHELF. (4) REQUIREMENTS.—The Secretary shall ensure that any activity under this subsection is carried out in a manner that provides for— ''(7) COORDINATION AND CONSULTATION WITH AFFECTED STATE AND LOCAL GOVERNMENTS.—The Secretary shall provide for coordination and consultation with the Governor of any State or the executive of any local government that may be affected by a lease, easement, or right-of-way under this subsection. ''

Final regulations for leasing were issued in 2009 (SEC. 388. ALTERNATE ENERGY-RELATED USES ON THE OUTER CONTINENTAL SHELF). The Bureau of Ocean Energy Management (BOEM) was created by Executive Order 3299 by Secretary of the Department of Interior, Ken Salazar on May 20, 2010.

BOEM Renewable Energy Division reports[1] there are currently 15 lease areas on the east coast totaling 1,742,252 acres, anticipating 21 gigawatts of generating capacity. Two leases with 368 megawatts of capacity are being subsidized by Maryland electric customers with a tariff approved by the Maryland Public Service Commission. These two lease areas total 116,039 acres represent 6.7% of the total lease area, and might support 1.4 gigawatt of generating capacity.

BOEM Economic Impact Studies

No current, or planned studies at BOEM calculate specific benefits and costs of economic impacts of offshore wind. That has been left to utility commissions to do as part of the approval process for tariffs for specific project applicants.

BOEM has paid for some studies that offer a basis for determining benefits, and two studies have considered the potential for lost tourism. The first tourism study considers the impacts of existing projects in Europe and concluded there was limited impact on tourism. However, European projects have steadily moved further offshore as wind turbines have gotten larger minimizing the impact on the viewshed. Wind Europe reports[2] projects built over the last four years have used 4 to 6 megawatt (MW) capacity turbines placed an average of 26 miles off the coast. Ocean City Maryland calculations[3] show 8 MW turbines would not be visible at 27 miles, while 12 MW turbines would need to be 33 miles away.

A second tourism study, completed by the University of Delaware[4] concludes, "At BOEM-relevant distances, the negatives are largely washed out by trip gain and curiosity trips". The study showed visualizations of wind turbines at various distances, and surveyed reactions from beach tourists. However, this statement is misleading. Trip losses at BOEM relevant

distances (12.5 to 20 miles) range between 5% to 10% while trip gains range between 2.2% and 3.3%, clearly not a "wash", especially considering curiosity trips are one-time while losses are essentially permanent. The study was based on 579' apex height turbines. Turbines are now as high as 853' (12MW) which is the equivalent of moving the study turbines five miles closer raising trip losses to 6% to 17% compared to trip gains of 2.2% to 3.3%.

BOEM did not consider a similar survey conducted by North Carolina State University[5] that found up to 54% of tourists would not return to a beach with wind turbines visible at any distance. The NC State study worked with beach home rental companies, and surveyed only people who had recently rented a house on, or near the beach. They used both daytime and night time visualizations of red shipping and aircraft warning lights that invoked stronger negative reactions. In contrast, the UD study surveyed people who had visited a beach area. The survey included 35% of people who had not participated in beach activity who would not be affected by the turbines thus diluting the survey results, and did not report the impact of night time views.

Some commentators suggest beach tourism would not suffer if all beaches eventually had visible wind turbines. The UD survey included a question on whether those who would not return to a beach with turbines visible would go to another beach, or do a completely different activity. Adjusting for the taller 12 MW turbines, 8% of visitors would chose a non-beach activity. Subtracting 3% in trip gains from tourists who would enjoy the turbines, beach tourism might drop 5% even if all beaches had turbines.

There are also no economic impact analysis of damages to commercial fisheries, migratory marine life, such as whales, or from bird, or bat kills.

Benefit Cost Analysis

The Maryland Public Service Commission (PSC) hired consultant Levitan & Associates to complete a Benefit Cost Analysis (BCA) of the 268 MW U.S. Wind project sited off Ocean City, MD, and the 120 MW Orsted 'Skipjack" project off Delaware's beach communities. The initial BCA showed costs in 2016 dollars, and benefits in 2015 dollars. The final negotiated tariff was considerably lower than the proposed tariff used in the consultant's initial BCA. Correcting for those two issues in the consultant's report[6] the BCA is shown in Table 1.

Table 1: US Wind & Skipjack Offshore Wind Projects Final Cost to Benefit Maryland PSC

Estimate of Net Ratepayer Cost	Millions $2015
Gross Offshore Wind Renewable Energy Credit Cost	$ 3,276.3
Energy Credit	($ 1,096.7)
Capacity Credit	($ 112.6)
Energy Price Effect	($ 16,8)
Capacity Price Effect	($ 26.7)
REC Price Effect	($ 10.3)
Net Ratepayer Cost	**$ 2,013.2**
Estimate of In-State Economic Benefit	
Direct Expenditures	$ 1,034.8
Indirect & Induced Expenditures	$ 799.8
Tax	$ 153.6
Net Benefit	**$ 1,988.2**

During the tariff debate the Maryland Office of the People's Council noted the cost estimate did not include indirect and induced costs from higher electric prices, while benefit of direct expenditures from the wind projects did include indirect and induced values. The U.S Bureau of Economic Analysis Regional Impact Multiplier System (RIMS) multiplier for indirect electricity price impacts is 0.2983[7].

The consultant's report also did not consider the economic impact of lost tourism. The Net Present Value of Delaware and Maryland's combined $5 billion a year tourism business from just a 5% reduction over the twenty year wind project contract would be about $5.5 billion. Correcting Table 1 for these two issues shows costs of the two offshore wind projects using 12 MW turbines would be four times higher than the benefits. Even with a 1% loss in tourism, cost of $3.7 billion would exceed benefits of $2 billion almost two to one.

Table 2: US Wind & Skipjack Offshore Wind Projects, corrected BCA, NPV deflator 4%

Estimated Costs	Millions $2015
Net Direct Ratepayer Cost	$2,013.2
Indirect Ratepayer Cost	$600.5
5% loss in DE & MD Tourism	$5,535.8
Total Cost	**$8,149.5**
Estimated Benefits	
Direct Expenditures	$1,034.8
Indirect & Induced Expenditures	$799.8
Taxes	$153.6
Total Benefits	**$1,988.2**

The Skipjack and U.S. Wind projects face other challenges. Power from offshore projects must come ashore somewhere. The U.S. Wind project intended to come through the Indian River Inlet in Delaware, and travel up the river to the Indian River Power plant. The Army Corp of Engineers has nixed that route as a navigational hazard.

The Skipjack project was to come into Ocean City, MD. However, the City is concerned about the potential for lost tourism and is refusing to allow the power onshore unless the project moves over the horizon. Orsted is trying to make a deal to bring power ashore at a Delaware state park in exchange for an $18 million payment for park upgrades. Delaware citizens are vigorously opposing using one of the last pristine parks in the state as an industrial site that could wind up hosting transmission lines from both windfarms, a multi-acre substation, and possibly a major transmission line upgrade along the Coastal Zone.

Over 500 citizens turned out at a public hearing to oppose using the park for on-shoring electricity, and 1,000 have sent in written comments. The opinion seems to be the first priority of the State Park Department is to preserve parks in as natural state as possible, and that includes preserving a natural view. It is not the State Park's responsibility to be the party of last resort to bail out a foreign wind project developer. This is a Maryland project, Maryland must solve the problem of where to land an electric transmission cable. Similar on-shoring battles are occurring at other wind projects.

The Maryland PSC opened the offshore wind docket for comments on changing from 4 MW and 6 MW capacity wind turbines to 12 MW. The PSC could reconsider the projects. This makes sense as Orsted just won Massachusetts approval for an offshore wind tariff at a 28 % lower price compared to the Skipjack project. The Vineyard Wind project has a $98/megawatt-hour (MWh) levelized price[8], compared to $137/MWh for the levelized price for the Skipjack project using similar accounting terms. Both projects are to start up in 2022. The Vineyard project will use 9.5 MW turbines, and the Skipjack and U.S. Wind projects are now both planning to use 12 MW turbines.

Fixing the Maryland Projects

Finding a win-win solution is not as difficult as may first appear. Should Delaware refuse the use of the state park for an onshore cable location, and the Maryland PSC re-opens the docket, the wind projects essentially start over. A start over could involve going back to the Bureau of Ocean Energy Management for a lease starting at least 33 miles out so the turbines would not be visible from the shore, and a lower price. Ocean City has offered to allow transmission cables if the turbines are not visible. No visible turbines means no threat to Delaware and Maryland tourism. The lower price lowers the cost side of the BCA.

According to the U.S. Department of Energy, "2018 Offshore Wind Technologies Market Report"[9], the Vineyard Wind project will be in about 140 feet of water, a similar depth if the Maryland project was moved to 33 miles off the coast. There is no reason the Skipjack project

price couldn't match the Vineyard Wind price. No tourism threat, and a lower price results in an estimated BCA of about $1.9 billion in cost, and $2 billion in benefits as shown in Table 3.

Table 3: US Wind & Skipjack Offshore Wind Projects, lower Price and no visible turbines

Estimated Costs	Millions $2015
Net Direct Ratepayer Cost	$1,449
Indirect Ratepayer Cost	$425
5% loss in DE & MD Tourism	$0
Total Cost	**$1,874**
Estimated Benefits	
Direct Expenditures	$1,034.8
Indirect & Induced Expenditures	$799.8
Taxes	$153.6
Total Benefits	**$1,988.2**

An analysis by the Technical University of Denmark[10] suggests project costs are highly dependent on water depth, with distance from shore having a minor impact. A Wind Europe report[2] shows the trend of moving further offshore as turbine size grows. In the last four years 4 MW to 6 MW capacity turbines have prevailed, and average installation distance to shore has been 26 miles, thus greatly reducing visibility of the turbines from shore.

Lessons for the National BOEM Program

Offshore wind projects up and down the east coast face similar problems with potential economic impacts of lost tourism, and difficulty finding a place to bring power onshore. BOEM can reduce these concerns by moving leases further offshore, combined with turbine size limitations tied to the lease distance from shore, and by adding a pre-approved site for bringing power onshore.

Further, BOEM needs to complete research studies to determine the cost of the potential lost tourism, and lost commercial fisheries of leased offshore wind projects using the BEA RIMS multipliers. There needs to be a determination if environmental impacts from bird an bat kills, and damage to migrating marine life are worth the benefits of offshore wind, especially given the current cost advantages of onshore wind and solar at half the price. It is also recommended BCA for offshore wind projects not include any potential health benefits of reduced air pollution since these projects are generally competing against onshore wind and solar with similar characteristics.

Notes:

1) U.S. Bureau of Ocean Energy Management, Renewable Energy Division, Fact Sheet, https://www.boem.gov/BOEM-Fact-Sheet
2) Wind Europe, "Offshore Wind in Europe – Key Trends and Statistics 2017", February 2018, https://windeurope.org/wp-content/uploads/files/about-wind/statistics/WindEurope-Annual-Offshore-Statistics-2017.pdf
3) Ocean City, Maryland engineering office report, https://oceancitymd.gov/oc/oc-supports-green-unseen-wind-farms/
4) U.S. Bureau of Ocean Energy Management, University of Delaware, "Atlantic Offshore Wind Energy Development: Values and Implications for Recreation and Tourism", March 2018, Authors: George Parsons and Jeremy Firestone, https://www.boem.gov/espis/5/5662.pdf
5) North Carolina State University, "The Amenity Costs of Offshore Wind Farms: Evidence from A Choice Experiment", March 216, Lutzyer ET. al., https://cenrep.ncsu.edu/cenrep/wp-content/uploads/2016/03/LPT_Offshore-Wind.pdf
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7) U.S. Bureau of Economic Analysis Regional Impact Multiplier System, composite multiplier for indirect impact of tourism dollars is 1.4351, for jobs 1.340257, for utilities 1.2983
8) National Renewable Energy Laboratory, "The Vineyard Wind Power Purchase Agreement: Insights for Estimating Costs of U.S. Offshore Wind Projects", Philipp Beiter, Paul Spitsen, Walter Musial, and Eric Lantz, February, 2019, https://www.nrel.gov/docs/fy19osti/72981.pdf
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