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Critique of PA Consulting Group Delaware Offshore Wind Benefits Report

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The state of Delaware has signed a Term Sheet[1] and issued permits to US Wind to allow offshore wind power cables to come ashore at Delaware Seashore State Park just south of the Indian River Inlet Bridge. Power cables would then be laid underwater through the inland bays to Millsboro to connect to a substation near the Millsboro Indian River power generating plant. The offshore wind projects receive large subsidies added to Maryland electric bills to ensure needed financing to construct the projects in federal waters. US Wind has promised economic development payments to Maryland, and promised all jobs related to the project will go to Maryland citizens including construction, operations, and maintenance workers.

An analysis[2] comparing the benefits and costs to Delaware of allowing offshore wind power cables to come ashore was conducted by the PA Consulting Group. This document evaluates the accuracy of claims in that Benefit Analysis.

The PA Consulting Group study makes these benefit claims:

- US Wind will pay the state parks division $350,000 a year in lease payments, increasing 3% a year, for total payments of $9.4 million over twenty years.
- US Wind will provide $40 million over twenty years to the state government for use in various community benefit programs with $20 million provided in the first 5 years.
- US Wind will provide up to 150,000 Renewable Energy Credits (RECs) a year for twenty years to Delaware electric utilities at no charge to offset the purchase of RECs from other sources. RECs are produced for each megawatt-hour of power generated by the Marwin, and Momentum Wind projects. The free RECs will only be provided from any excess over the number promised to Maryland. PA Consulting estimated the RECs will be worth $76 million to Delaware electricity customers.
- PA consulting also estimated Delaware electricity customers will see $253 million in lower electric bills over twenty years, with the savings coming in the second decade of operation. Using the Aurora modeling program they estimated power and capacity value reductions on ratepayer bills of up to $186 (or $9/year); $1,609 (or $77/year); and $162,936 (or $7,759/year) for the average residential, commercial, and industrial customer in Delaware. The savings equal about one half of one percent of annual electric bills[3].
- The projects will lower carbon dioxide and air pollution emissions.
- No effort was made to calculate costs of the project for Delaware residents

Emissions reductions

The two offshore wind projects were approved in two different Maryland Public Service Commission dockets using two different consultants[4]. Both consultants stated the offshore wind projects would simply replace onshore wind projects that would have been needed to meet Maryland renewable energy requirements. The second consultant went on to calculate emission savings would actually be higher for the onshore wind projects as there would be less transmission energy losses as the onshore wind projects are closer to electricity demand

centers. So, no emissions reductions can be specifically claimed for the projects, and Delaware meets all federal air pollution standards, standards set to protect human health.

Lease fees to Delaware State Parks, and community payments

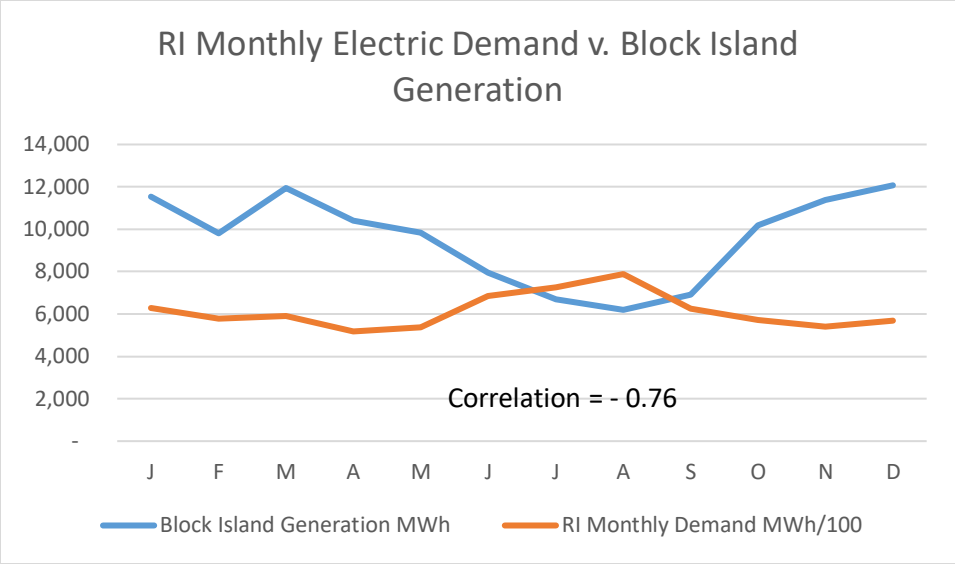
To compare benefit and cost items over time results need to be compared as Net Present Values (NPV) based on a future value discount rate[5]. The typical discount rate used for projects lasting longer than five years is 7%. By reverse calculations we determined PA Consulting used a 3% discount rate. The $9.4 million in nominal lease payments over twenty years has a $3.7 million NPV at 7%, and $4.6 million at 3%. The NPV of the $40 million community benefits package is $9.4 million at a 7% discount rate, and $11.4 million at 3%.

Free RECs

The NPV of the free RECs is $26.7 million at a 7% discount rate, $32.4 million at 3%. PA Consulting used a 44% capacity factor for annual offshore wind generation. That level of generation has been demonstrated by five turbines off Block Island, RI, and two turbines off the Virginia coast. US Wind estimated a 44% capacity factor for the larger Momentum Wind project, and 42% for the Marwin project in its guarantees to the Maryland PSC.

If the Marwin project has a 44% capacity factor there may be 43,500 extra RECs (8760 hours X 248 MW capacity X 0.02). However, neither project is likely to generate power 44% of the time. Our regional grid manager, PJM, in its "Effective load carrying capability report"[6] estimates offshore wind capacity at 37%. In addition, the graph below shows the four year average monthly generation of power at the Block Island offshore wind project. The most power is generated during the spring and fall when power demand is at its lowest. As more offshore wind projects are built the electric grid will simply not be able to accept all the power produced in the spring and fall forcing generation curtailment.

The 2020 Connecticut Integrated Resource Plan[7] shows curtailment reaching as high as 10% to 20% of generation in figure 5.3 as more projects are built. Also, a report from Europe, "Gone With the Wind? Wind Farm-Induced Wakes and Regulatory Gaps"[8], shows the impact of the wake effect of wind turbines on downwind turbines in the same project can reduce power output by up to 5% to 10%, and one large project can decrease power at a downwind project by up to 20%. Quite simply, it is unlikely there will be any excess RECs to give to Delaware, so US Wind may need to purchase RECs on the open market. Delmarva Power has not been able to purchase enough Recs to meet their annual requirement for the last two years. US Wind may not be able to deliver the free Recs that have been promised.



Savings from lower power and capacity costs

The NPV from estimated $253 million savings from lower electricity and capacity cost is $134 million with a 7% discount factor, and $188 million with 3%. So, for example, the $9/year savings on residential electric bills falls to $6/year with a 7% discount rate. More importantly, PA Consultants modeling showed only a 0.5% savings, but the error bar in the modeling could be as high as 2.5% meaning the cost savings is not statistically significant and should be reported as such. The Aurora program sums the results from many runs. The more runs the smaller the error bar. PA Consultants did not state which run setting they chose. The consultant stated the savings would be in the second decade of operation, but didn't state if there would be offsetting higher electric rates in the first decade.

PA Consultants also failed to include any estimate of the cost to run inefficient backup generation often needed to deal with drops in power production by intermittent source such as offshore wind. It is likely those costs could wipe out the projected savings. US EIA Detailed State Data[9] shows onshore wind development moved to 2% a year growth in share of power demand in Texas in 2016 from 1% after investing $7 billion in taxpayer money to expand transmission lines to the windy Texas panhandle. Between 2016 and 2022 wind's share of power produced in Texas rose from about 11% to over 25%. However, power prices jumped 22.4% in Texas compared to 21.6% nationally suggesting added wind power may have increased, not decreased prices. There are so many pricing variables it is difficult to discern any single cause. The PA Consultant statement offshore wind will save power cost is not credible.

The consultant for the second round of Maryland Public Service Commission docket[4] for the Momentum Wind project stated the project should not be approved if a PJM regional transmission grid congestion issue near York, PA wasn't fixed. The Pennsylvania utility commission was considering a $250 to $450 million upgrade, but denied the project. US Wind is

not paying to fix the congestion problem so electric customers in several states, including Delaware, will eventually pay for the upgrade, and these costs were not considered in the analysis.

Transmission upgrades

US Wind also claims the $200 million they will invest in building transmission lines to move power ashore will offer general upgrades to the local transmission systems. Over the last several years transmission and distribution line upgrades not related to the US Wind project have been completed. The fact is the US Wind investment is only needed to bring their own power ashore to connect to the regional grid. If the project isn't built their transmission upgrades are not needed, and offer little added benefit to Delaware.

The cost of lost tourism

PA Consultants only describe potential benefits. Potential costs include lost commercial fishing, increased vessel collisions, and poorly studied environmental impacts. The most likely cost may come from lost tourism and lower property values. The US Bureau of Ocean Energy Management (BOEM) reports Environmental Impact Statements (EIS) showing potential negative visual impacts[10]. In multiple EIS documents BOEM reports ocean views will change from pristine to developed with views dominated by turbines.

BOEM goes on to claim in the Final EIS minimal economic impact on tourism. BOEM compares the project impacts to a "No Action" base study. However, in the base study BOEM assumes other turbines will be built even if they deny the US Wind project so there would be no additional economic impacts on lost tourism from the US Wind project. As of now wind developer Ørsted has canceled their projects just north of the US Wind project along with the southernmost project in New Jersey. The closest turbines would off Atlantic City, and Virginia Beach with no impact on local tourism. A demand to drop the assumption of other turbines being built, and to calculate the economic impact of lost tourism is one of the subjects in lawsuits filed against BOEM.

BOEM used a University of Delaware survey[11] of beach goers to calculate potential lost tourism because of the daytime visual blight of turbines on ocean views. The survey showed visualizations of 579' tall turbines and asked whether people would return to the beach with turbines present. The closer the turbines were to the beach the more people responded they would not return. Since US Wind plans to use turbines between 938' and 1050' tall the survey results shown in figure 7 need to be adjusted for the greater visibility which suggest a net 24% of visitors may not return.

A similar survey of recent renters in the Outer Banks[12] showed 38% would not return based on daytime views, but 54% wouldn't return based on nighttime views of blinking lights. The UD study showed nighttime visualizations but didn't report the results. US Wind is often quoted as planning to use an Aircraft Detection Lighting System that would only turn lights on

when aircraft are detected by radar. However, US Wind added a clause the system would only be used if it was commercially and technically feasible[13], which it is not as the system has been rarely used. Without a solid US Wind commitment we should assume the system will not be used.

A 2021 Delaware tourism report[14] shows $2.7 billion in tourist spending at the beach, so a 24% loss equals $640 million in lost tourism, sixteen times the current value of PA Consultants benefit estimate. That could mean over 5,000 lost jobs, $200 million in lost wages, and over $65 million in lost taxes according to the tourism report. The UD study also stated property values would fall, but no dollar values were given. A new University of Connecticut study[15] shows when onshore wind turbines are highly visible property values fall 11% the first year after construction, A Zillow search of recent home sales in our beach towns averaged over $1 million, so lost property values could exceed $100,000 per home.

The NPV of the Term Sheet over twenty years is wiped out by just 1 to 2% lost tourism in just the first year. These are Maryland approved projects that are a very big losing proposition for Delaware, and especially Sussex County. Our state government should not have issued permits to bring power ashore in Delaware.

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