Evaluation Report

New Jersey Offshore Wind Solicitation #2

prepared for

The New Jersey Board of Public Utilities

May 25, 2021

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Public Version

Limitation on Liability

This report has been prepared for the New Jersey Board of Public Utilities ("Board") for the sole purpose of evaluating the applications submitted in response to the Board's Offshore Wind Solicitation. Findings contained herein depend on the assumptions identified in our report. While Levitan & Associates, Inc. ("LAI") believes these assumptions to be reasonable, there is no assurance that any specific set of assumptions will actually be encountered. LAI gives no assurances except those explicitly set forth herein.

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GLOSSARY

Short Form Names

Atlantic Shores or ASOW: Atlantic Shores Offshore Wind 1, LLC

Board: New Jersey Board of Public Utilities

EDF: Électricité de France S.A.

EDFR Offshore: EDF-RE Offshore Development, LLC

EDF Renewables: EDF Renewables, Inc.

BC/[redacted]/EC

Shell: Royal Dutch Shell

Shell New Energies US LLC

Ocean Wind 2 or OW2: Ocean Wind II, LLC

Ørsted: Ørsted A/S

Solicitation Guidance Document or SGD: *New Jersey Offshore Wind, Solicitation #2, Solicitation Guidance Document, Application Submission for Proposed Offshore Wind Facilities*

Acronyms and Abbreviations

BC//EC

BAFO	Best and Final Offer
BCR	Benefit-cost ratio
Board	Board of Public Utilities
BOEM	Bureau of Ocean Energy Management
BPU	Board of Public Utilities
BRA	Base Residual Auction
BSTSUC	Buyer share of TSUC
CBA	Cost-benefit analysis
CIR	Capacity Interconnection Right
CO_2	Carbon dioxide
COD	Commercial Operation Date
COP	Construction and Operations Plan
CQ1	Clarifying Questions Set 1
CQ2	Clarifying Questions Set 2
DA	Day Ahead
E&P	Exploration and production
ECO	Education and Community Outreach
EDC	Electric distribution company
EIA	Energy Information Administration
EO92	Executive Order No. 92
EPP	Environmental Protection Plan
FPP	Fisheries Protection Plan
FTE	Full-time equivalent
[redacted]	
GDP	Gross domestic product
GE	General Electric
GWh	Gigawatt hour
HDD	Horizontal directional drilling
HVAC	High voltage alternating current
HVDC	High voltage direct current
ITC	Investment Tax Credit
kV	Kilovolt
kW	Kilowatt
LAI	Levitan & Associates, Inc.
LDA	Local Deliverability Area
LNOC	Levelized net OREC cost

LOPP Levelized OREC Purchase Price
LOI Letter of Intent
MVOW MHI Vestas Offshore Wind
MW Megawatt
MWh Megawatt hour
NABTU North America's Building Trades Union
NJ SHARES New Jersey Shares, Inc.
NJDEP New Jersey Department of Environmental Protection
NJWP New Jersey Wind Port
NO_x Nitrogen oxides
NPV Net present value
NZEB Net zero energy building
OREC Offshore Wind Renewable Energy Certificate
PDA Preliminary Development Agreement
$PM_{2.5}$ Particulate matter ≤2.5 micron
POI Point of interconnection
PTC Production Tax Credit
PVNOC Present value of net OREC cost
PVOPP Present value of OREC Purchase Price

[redacted]
RT Real Time
SAA State Agreement Approach
SAP Site Assessment Plan
SCC Social Cost of Carbon
SIS System Impact Study
SJI South Jersey Industries
[redacted]
SO_2 Sulfur dioxide
SSTSUC Seller share of TSUC
ST Short tons
SWOT Strengths, weaknesses, opportunities, and threats
TP Transition piece
TSD Technical Support Document
TSUC Transmission system upgrade cost
TSUCPA TSUC price adder
WTG Wind turbine generator
[redacted]

EXECUTIVE SUMMARY

Background

On November 19, 2019, Governor Phil Murphy signed Executive Order No. 92 (“EO92”), increasing the State’s offshore wind energy generation goal from 3,500 MW by 2030 to 7,500 MW by 2035. To implement Governor Murphy’s vision of making New Jersey a leading hub of offshore wind development and to meet the State’s aggressive clean energy goals, the Board of Public Utilities (“BPU” or “Board”) initiated this second round of offshore wind procurements by issuing the *New Jersey Offshore Wind, Solicitation #2, Solicitation Guidance Document, Application Submission for Proposed Offshore Wind Facilities* (“Solicitation Guidance Document” or “SGD”) on September 10, 2020, soliciting Applications to secure Offshore Wind Renewable Energy Certificates (“ORECs”) targeting 1,200 MW to 2,400 MW of offshore wind capacity.

Per N.J.A.C. 14:8-6.5(a)(12), if the pricing proposal satisfies the cost-benefit standards set forth in the statute and the Board’s regulations, the Board may approve the Application subject to the Application satisfying other required conditions. Per N.J.A.C. 14:8-6.3(c), the Board may approve, conditionally approve, or deny an application for ORECs. In this solicitation, Board Staff and LAI applied the following weighting criteria in our evaluation of relative merit among rival Applicants and project options: 50% OREC Purchase Price and Ratepayer Impacts; 20% Economic Impacts and Strength of Guarantees for Economic Impacts; 20% Environmental and Fisheries Impacts; and 10% Likelihood of Successful Commercial Operation. The Board may also reflect in its evaluation the additional benefit of having a diversity of selected Applicants, technology alternatives, economic benefits and guarantees as well as other qualitative considerations that help sustain a workably competitive market in future offshore wind procurement rounds.

Submitted Applications

The Application submission deadline was December 10, 2020. The BPU received Applications from two Applicants: Atlantic Shores Offshore Wind 1, LLC (“Atlantic Shores” or “ASOW”) and Ocean Wind II, LLC (“Ocean Wind 2” or “OW2”). Atlantic Shores is a joint venture between EDF-RE Offshore Development, LLC (“EDFR Offshore”), which is indirectly owned by EDF Renewables, Inc. (“EDF Renewables”), and Shell New Energies US LLC (“Shell New Energies”). Ocean Wind 2 is a subsidiary of Ørsted A/S (“Ørsted”). The Projects of each Applicant are mutually exclusive.

Atlantic Shores submitted four Projects *BC/[redacted]/EC* Project capacities are *[redacted]/EC* 1,510 MW (Project C) *BC/[redacted]/EC* Projects C *BC/[redacted]/EC* include an MHI Vestas nacelle assembly facility at the New Jersey Wind Port (“NJWP”), *BC/[redacted]/EC* Projects *BC/[redacted]/EC* C, *BC/[redacted]/EC* include a pilot green hydrogen plant with a *BC/[redacted]/EC* 10 MW capacity for Projects C *BC/[redacted]/EC*

Ocean Wind 2 submitted two Projects (OW2 A and OW2 B), each with a capacity of 1,148 MW. The OW2 Projects are differentiated only by the inclusion of a General Electric (“GE”) nacelle assembly facility at the NJWP in OW2 B.

Table 1. Summary of Key Project Characteristics
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
BOEM Lease Area	OCS-A-0499			OCS-A 0498	
Nameplate Capacity (MW)	[redacted]	1,509.6	[redacted]	1,148.0	
Number of Installation Phases	[redacted]	2	[redacted]	3	
Final Phase Commercial Operation Date	[redacted]	4/[redacted]/28	[redacted]	1/[redacted]/29	
WTG Distance from Shore (miles)	[redacted]	10.5	[redacted]	13.8	
Wind Turbine Model	MHI Vestas V236			GE Haliade-X	
WTG Nameplate (MW)	13.6			14.0	
Number of WTG Units	[redacted]	111	[redacted]	82	
Foundation Technology	Monopile + Transition Piece			Monopile	
Number of Offshore Substations	[redacted]				
Export Cable Technology	[redacted]			HVDC	
Point(s) of Interconnection	[redacted]	Cardiff	[redacted]	Smithburg	
Export Cable Length (miles)	32		[redacted]	>100 [redacted]	
Number of Export Cable Circuits	[redacted]				
Expected WTG Capacity Factor (net of losses)					
Supply Chain Localization in NJ					
Monopile Manufacturing	[redacted]	EEW	[redacted]	EEW	
Nacelle Assembly	[redacted]	Vestas	[redacted]		GE
[redacted]					
Energy Innovation Pilot	[redacted]	Hydrogen Production from Offshore Wind Energy	[redacted]	Electric Drayage Trucks at Port of NY and NJ	

Both ASOW and OW2 intend to source monopiles from a planned EEW Phase 2 manufacturing facility at Paulsboro. However, Atlantic Shores may need to supplement in-State monopile production with externally sourced monopiles from Europe if its Project C *BC/[redacted]/EC* is selected with an OW2 project due to the factory's production capacity.

Evaluation Results

As an initial screening step, LAI first confirmed that all Project submissions from each Applicant have a benefit-cost ratio ("BCR") above 1.0, the required threshold to support an OREC award under the Offshore Wind Economic Development Act. Monetizing avoided emissions, particularly CO_2, results in all Project submissions having a BCR greater than the required threshold.

LAI's evaluation is based on the six criteria set forth in Section 4 of the SGD. LAI performed quantitative analysis of the Applicants' OREC Purchase Prices and ratepayer impacts, including transmission system upgrade costs allocable to New Jersey ratepayers. Additional quantitative analysis was performed regarding the economic impacts and the strength of guarantees for economic impacts. Qualitative analysis of environmental and fisheries impacts and of the likelihood of successful commercial operation was also performed.

LAI first evaluated the individual Projects on a stand-alone basis using the four weighted categories defined in the SGD. Figure 1 illustrates the category scores for each Project. *BC/[redacted]/EC*

Figure 1. Project Scores

BC//EC

[redacted]

Had a somewhat different "yardstick" been used for the derivation of the OREC Purchase Price and Ratepayer Impact category, resultant Project scores would have been more tightly distributed, but the relative ranking would not change, all other things being the same. Hence, quantification of Project scores provides useful data on the overall relative Project merit which consolidates all four categories. Project scores should not be misconstrued as governing the selection process, however.

OREC Purchase Price and Ratepayer Impact

The Applicants' OREC prices are reasonable in relation to other recent projects in New Jersey's Round 1 solicitation and other offshore wind procurements along the Atlantic Seaboard. While only two Applicants participated in the Board's Round 2 solicitation, the results of the procurement appear reasonable. *BC [redacted] /EC* Table 2 reports the respective OREC Purchase Prices and associated LNOCs. The levelized OREC Purchase Price ("LOPP") and LNOC values are inclusive of estimated transmission system upgrade costs ("TSUC"). The nominal LOPP and LNOC values include inflation and are levelized over the 20-year OREC term.

Table 2. OREC Purchase Price Summary
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
First Energy Year	[redacted]	2028	[redacted]	2029	
First Energy Year OREC Purchase Price ($/MWh)	[redacted]	$86.62	[redacted]	$82.71	$84.03
Escalation Rate	[redacted]	2.5%	[redacted]	2.00%	
LOPP w/TSUCPA ($/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Revenue Credits ($/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
LNOC ($/MWh)	[redacted]	$58.81	[redacted]	$40.75	$42.30

The difference between OW2 A and OW2 B is relatively small and is explained by OW2's contingent guarantee covering a potential GE nacelle assembly plant at the NJWP. *BC [redacted] /EC*

In conducting this solicitation, of particular concern is safeguarding ratepayer interests through realization of the value of federal tax incentives attributable to the extension of the Investment Tax Credit ("ITC") after the Applicants submitted their bids in December 2020. LAI is satisfied that the OREC Purchase Prices from both Applicants reflect good ratepayer value regarding the pass through of federal tax benefits. The OREC Purchase Price and Ratepayer Impacts analysis is presented in Section 2.

Economic Impacts and Strength of Guarantees for Economic Impacts

Certain components of OW2's economic benefits and guarantees are significantly less robust than those of ASOW. In contrast, ASOW's Application contained comprehensive technical information covering its economic benefits, including firm in-State spending and jobs guarantees to mitigate various uncertainty factors. Both Applicants have identified opportunities to support environmental justice. Both Applicants also satisfactorily defined innovative pilot programs oriented around the Garden State's long-term decarbonization objectives.

With respect to economic development impacts, *BC [redacted]

[redacted]/EC* Both Applicants offer substantial amounts of funding and grant commitments for economic development initiatives in education, research and innovative technologies, workforce development training, and other community programs.

With respect to the strength of guarantees for economic impacts, OW2 's minimum guaranteed spend through three years after the commercial operation date is somewhat larger than the comparably-sized ASOW B's guaranteed spend. When compared between ASOW and OW2, OW2's minimum guaranteed spend commitment is riskier due to contingencies around use of the NJWP to support a GE nacelle assembly plant. *BC/[redacted]/EC* If OW2 does not meet its minimum spend guarantee, it will make up the difference through additional contributions to a fund for education and workforce development in New Jersey disadvantaged communities. ASOW would first make deficiency contributions to a proposed workforce development fund up to a cap, and any excess deficiency would be compensated by a reduction in OREC pricing.

ASOW does not make a jobs guarantee for the development and construction phases. However, comparing ASOW's direct in-State expenditures to OW2's expected in-State activities and spending during those phases suggests that the number of in-State development and construction phase jobs for ASOW would be smaller than the jobs expected by OW2. ASOW guarantees O&M jobs for the 20-year OREC term while OW2's commitment extends through the first three years after the final Commercial Operation Date ("COD"). *BC [redacted] EC* ASOW imposes a workforce development fund penalty on itself for any jobs deficiency after every fifth year of operation. In contrast, OW2 imposes no penalty. Instead, its jobs guarantee is used to decrease its spend guarantee if the number of jobs is exceeded. If the number of jobs is not met, there is no penalty to OW2. *BC/[redacted]/EC* Nuances about economic development impacts and each Applicant's respective spending and jobs guarantees are discussed in detail in Section 3.

Environmental and Fisheries Impacts

The feasibility and strength of the Environmental Protection Plans ("EPPs") was reviewed in detail by NJ DEP and LAI. ASOW's EPP reasonably characterizes the environmental resources and habitats and includes sufficiently detailed descriptions of potential impacts, based on site-specific data and available published studies. The transmission export cables to the Cardiff *BC/[redacted]/EC* points of interconnection ("POIs") would have total lengths of 32 *BC/[redacted]/EC* miles, respectively, and would be *BC/[redacted]/EC* NJ DEP reports that some residents of Long Beach Island have voiced concerns about the visual impact of the Project, revealing some community opposition at this initial development stage, *BC/[redacted]/EC* In LAI's experience, community opposition to offshore wind projects in the initial development phase is not uncommon, but does not necessarily create permit obstacles or otherwise adversely affect prospects for commercial success. NJ DEP and LAI assess that OW2's EPP reasonably characterizes the environmental resources and habitats and includes generic descriptions of potential impacts and mitigation options, but it is based primarily on desk-top studies and field data obtained through preparation of the Construction and Operations Plan ("COP") for OW1. The transmission export cable to the Smithburg POI on PJM's high voltage backbone system would have a total length of more than 100 miles *BC/[redacted]/EC* The export cable is proposed to be High Voltage Direct Current

("HVDC"), standard technology for long distance marine crossings, which would require fewer separate circuits and cable trenches than HVAC. The length of the offshore segments of the OW2 cable would be longer than any other export cables considered in the New Jersey offshore wind program. From both an operational and economic standpoint, this is not considered a noteworthy risk because long HVDC export cables have established a record of superior performance and availability elsewhere. If, for whatever reason, a transmission outage was to occur that interrupts or reduces the delivery of ORECs, there would be commensurate adjustments in total OREC payments.

ASOW's Fisheries Protection Plan ("FPP") is comprehensive. It covers both recreational and commercial fishing interests. There is, however, a significant density of fishing activity in the lease area. *BC/[redacted]/EC* OW2's FPP is detailed and comprehensive, and demonstrates a good understanding of potential adverse impacts to commercial and recreational fishing over the lease area, which has a lower density of fishing activity compared to ASOW. The analysis of the environmental and fisheries impacts is presented in Section 4.

Likelihood of Successful Commercial Operation

Both Ocean Wind 2 and Atlantic Shores are backed by global energy companies with strong balance sheets. Both have demonstrated willingness to provide parent guarantees, if necessary, to third party debt lenders, as well as the financial tolerance to internalize project risk regarding the array of uncertainty factors associated with project development. Each company has demonstrated the management expertise needed to facilitate successful commercial development. Identification of components and suppliers follows industry standards but does not preclude changes if technology progress merits design modifications. Importantly, such changes will not trigger an OREC price increase but would likely necessitate Board approval of any material change in technology. However, Board approval is based on the technology and logistics submitted for this evaluation. ASOW's joint venture participants have demonstrated a global commitment to offshore wind. Ørsted's record of performance in global offshore markets portends commercial success in New Jersey. *BC/[redacted]/EC*
Both Applicants are highly likely to successfully develop their respective Projects as there are no known environmental permit obstacles that constitute fatal flaws or structural weaknesses on the Applicants' respective balance sheets that would undermine capital formation. OW2's anticipated use of HVDC transmission technology and sub-sea cable length to landfall represent significant permitting challenges, but do not rise to the level of risk that would likely impede timely project commercialization. Each Applicant likely has sufficient influence to reinforce their respective supply chains, as needed, to meet scheduled milestones. The various Project aspects affecting Likelihood of Successful Commercial Operation are addressed in Section 5.

Portfolio Evaluation

For the portfolio analysis, in addition to looking at the individual Project submissions, LAI tested the price, economic benefits, and costs attributable to the potential selection of portfolios that include a Project from each Applicant. However, a portfolio cannot include two projects from either Applicant because their own projects are mutually exclusive. Depending on the Projects included, a portfolio solution has the potential to position New Jersey favorably to achieve greater manufacturing capability to support both New Jersey's and neighboring states' offshore wind procurement goals, while conferring valuable employment and environmental justice benefits.

Along with price and quantity considerations, potential award portfolios that include a Project from each Applicant may be worthwhile to the extent that they (in no particular order): (1) diversify the risk of successful commercial project completion; (2) strengthen New Jersey's likelihood of success as a regional manufacturing center; (3) incorporate alternative construction methods and/or technology; (4) provide economic benefits to communities around different ports and manufacturing facilities; (5) diversify transmission, including usage of multiple POIs; and, (6) heighten competition in future offshore wind procurement rounds.

During the evaluation, Board Staff stated that 2,400 MW does not represent a "hard" cap on a portfolio of offshore wind OREC awards on this solicitation. Therefore, in addition to the individual Projects from each Applicant within the target quantity range, the portfolio analysis also focused on combining Atlantic Shores *BC/[redacted]/EC* Project C with an OW2 Project. These combinations yield portfolios with *BC/[redacted]/EC* 2,658 MW of capacity, about *BC/[redacted]/EC* 111% of the initial 2,400 MW offshore wind procurement target, *BC/[redacted] EC*

All evaluated portfolios have BCRs above the required 1.0 threshold. In relation to a stand-alone award to the project with the highest BCR *BC/[redacted]/EC* the BCR for a portfolio consisting of OW2 A with either ASOW *BC/[redacted]/EC* C is lower, but each BCR remains well above 1.0. Despite the decrease in the BCR, a combination portfolio including either ASOW *BC/[redacted]/EC* C can be justified by the diverse portfolio benefits listed above. In considering the prospect of a portfolio that is greater than the capacity associated with a stand-alone *BC/[redacted]/EC* the change in BCR is helpful in gauging the incremental value of buying more or less offshore wind in Round 2. Notably, the change in the BCR for different Project combinations is not dispositive so long as the threshold criterion is met.

A portfolio comprised of Atlantic Shores Project *BC/[redacted]/EC* C and an OW2 Project will result in increased ratepayer cost relative to either Project individually due to the larger capacity. However, a portfolio consisting of two Projects would present substantial economic, environmental, and strategic benefits at an inflection point for New Jersey as targeted offshore wind resource additions rapidly increase along the Atlantic seaboard. Awarding more capacity now would result in faster progress toward the 7,500 MW goal, including earlier incurrence of rate impacts. Awarding less capacity now may delay the incremental rate impacts, but they would nonetheless be incurred in subsequent procurement rounds. The difference in present value cost burden is not analyzed in this evaluation.

BC [redacted] EC Examination of each portfolio's total score is helpful as a comparison tool, but is not intended to be definitive in determining a Project or Projects for selection. Moreover, small differences in total point scores can be challenging to interpret and therefore represent soft metrics the Board may review in considering how best to proceed.

Figure 2. Scores for Selected Portfolios

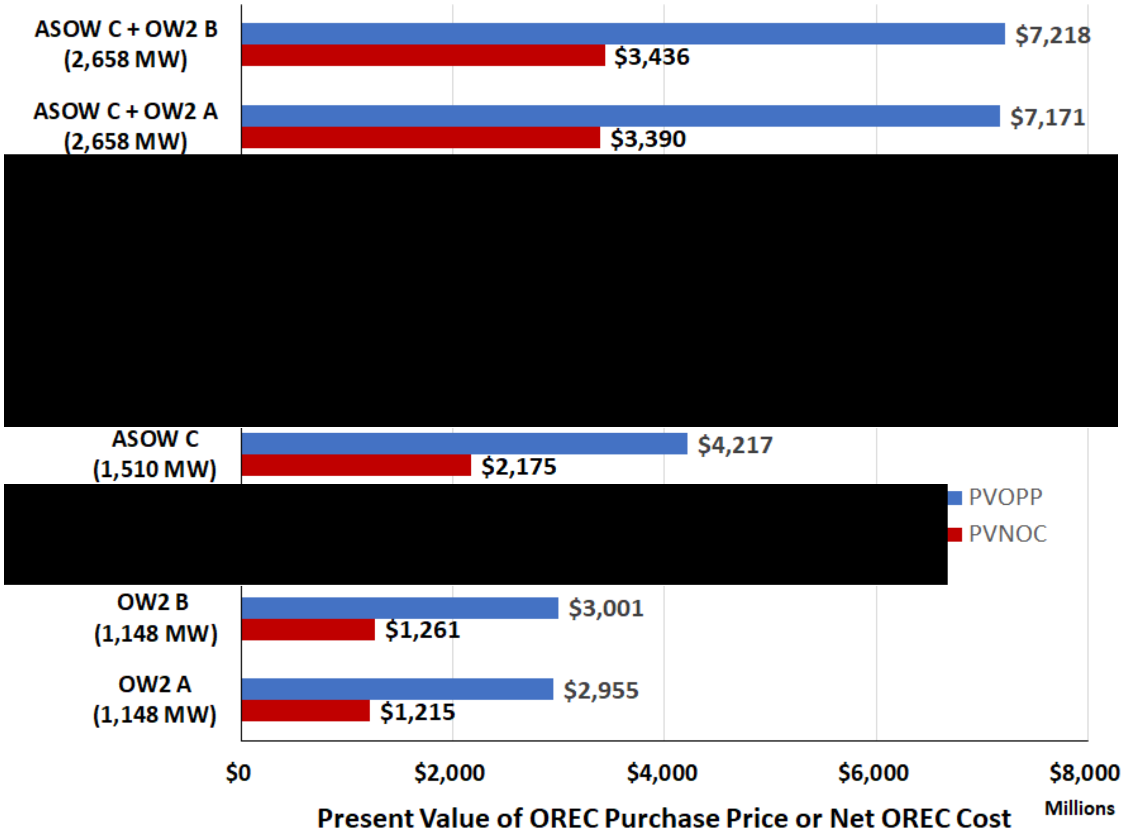
BC//EC

[redacted]

In terms of overall cost, the present value of the 20-year OREC Purchase Price (“PVOPP”) for OW2 A is $2.96 billion, as shown in Figure 3. This represents a present value of net OREC cost (“PVNOC”) of $1.21 billion. Like metrics for OW2 B are insignificantly higher. *BC [redacted] EC* The PVOPP and PVNOC or ASOW C are $4.22 billion and $2.18 billion, respectively. *BC [redacted] /EC* When ASOW C is considered with OW2 A or OW2 B *BC/ [redacted] /EC* like metrics increase to $7.22 billion and $3.44 billion, respectively.

Figure 3. Present Value of Selected Portfolios

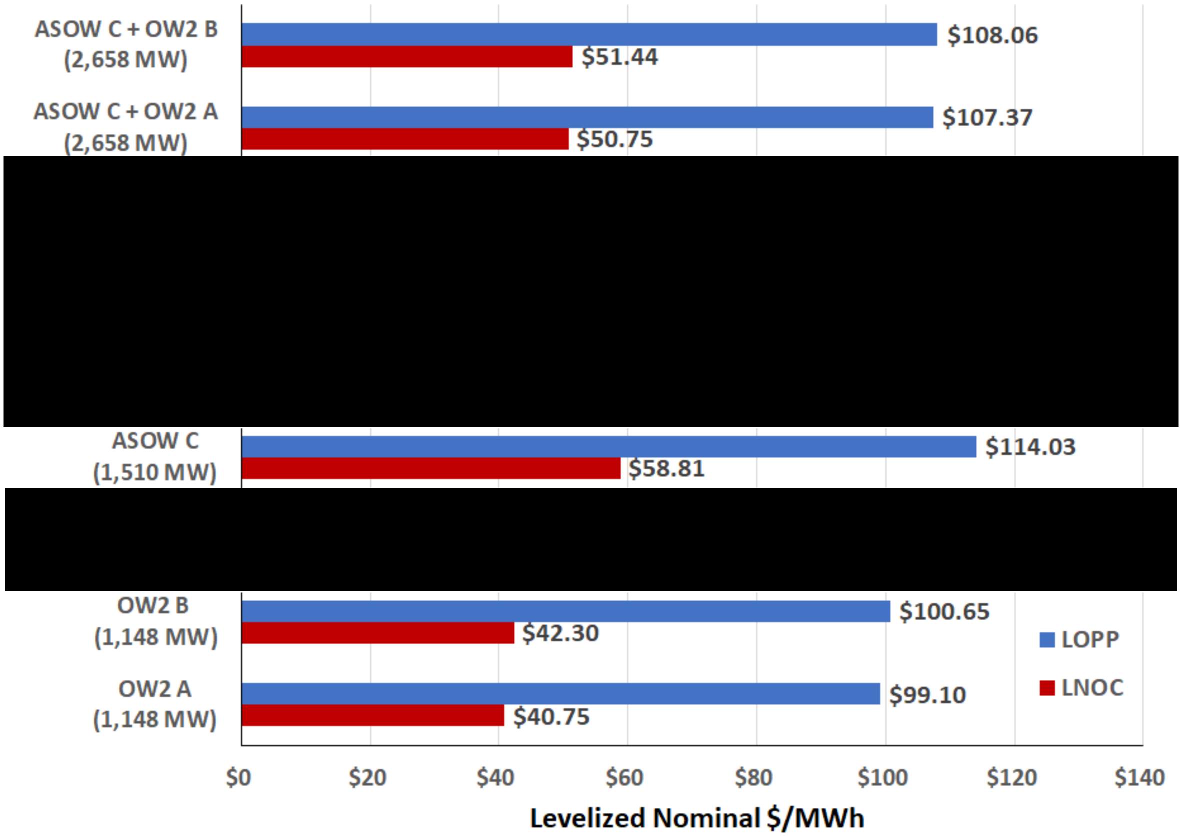
BC//EC



The unit OREC Cost Comparison for individual Projects and selected portfolios are presented in Figure 4. They are expressed on a levelized $/MWh basis (nominal dollars) based on the 20-year OREC term following each Project's commercial operation date. As noted above, for OW2 A the LOPP is $99.10/MWh and the LNOC is $40.75/MWh. Like metrics for OW2 B are insignificantly higher. However, corresponding LOPP and LNOC values for ASOW *BC/[redacted]/EC* C are much higher. *BC [redacted]/EC*

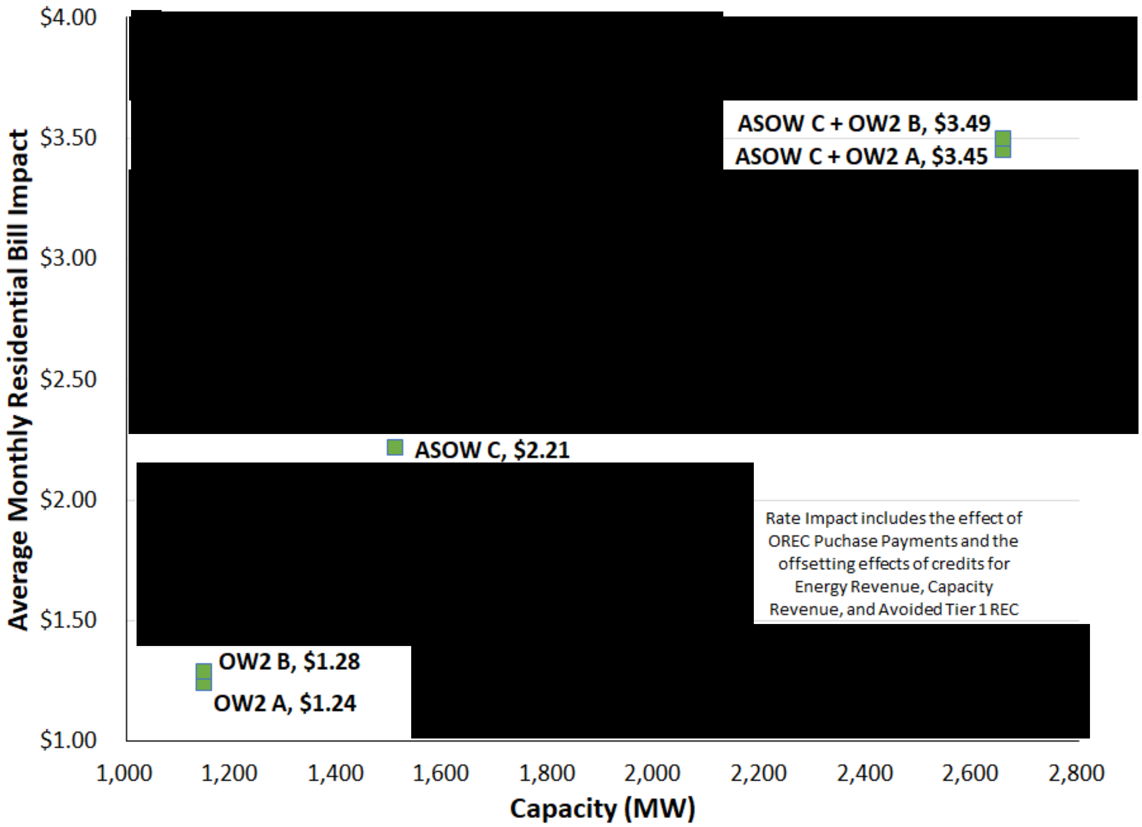
Figure 4. Unitized Cost of Selected Portfolios

BC//EC



The price and ratepayer impacts also represent good value in relation to leading commercial benchmarks, including recent OREC awards in the public domain, New Jersey's Round 1 OREC award to Ocean Wind 1, and the average residential ratepayer impact, adjusted for economic benefits and underlying guarantees. For background, the average residential ratepayer impact in the Round 1 procurement that resulted in the selection of Ocean Wind 1 was $1.46 per month (levelized 2019 $). The average residential rate increase ascribable to the selection of one OREC award to OW2 is $1.24/month or $1.28/ month (levelized 2021 $) for Projects A and B, respectively, about a 15% decline from Round 1. Consistent with the calculation method used in Round 1, the average residential bill impact is levelized over 20 years, expressed in current-year (2021) dollars and reflects the expected value of revenue credits derived from the sale of energy, capacity and avoided Tier 1 REC purchases. The results of this analysis are shown in Figure 5. Ratepayer impact is driven by both portfolio size and OREC price.

Figure 5. NJ Residential Electric Bill Impact for Selected Portfolios
BC//EC



Ratepayer impacts for an award to a single Project of approximately 1,200 MW compare favorably to the Round 1 ratepayer impacts. Higher capacity awards would have greater ratepayer impacts once the Projects are in service in 2027 or 2028. LAI notes that such a comparison is of limited relevance due to the benefits associated with a material increase in capacity, including earlier progress toward Governor Murphy's 7,500 MW goal, as well as different expected economic development benefits and guarantees.

In the portfolio analysis, LAI has not attempted to weigh the relative importance of the six SGD evaluation criteria beyond the weights applied in the Board's evaluation framework. LAI has performed analysis to inform a Board decision. In the final analysis, the Board will determine what constitutes best value for New Jersey.

Strengths, Weaknesses, Opportunities and Threats

Atlantic Shores' strengths include a relatively firm design and firm economic development benefit guarantees. The ASOW Joint Venture partners have less experience than Ørsted in developing larger-scale offshore wind projects, *BC/ [redacted] /EC* ASOW Projects C *BC/ [redacted] /EC* have an existing commercial arrangement for an alliance with MHI Vestas to establish a WTG nacelle assembly facility in New Jersey, preferably at the NJWP. *BC/ [redacted] /EC* An ASOW award will also heighten competition in future procurement rounds. *BC [redacted]

[redacted] EC* ASOW's pilot hydrogen project in South Jersey for Projects *BC/[redacted]/EC* C, *BC/[redacted]/EC* is an added plus.

OW2 has many strengths attributable to Ørsted's global experience developing and operating large-scale offshore wind projects, its strong balance sheet and commitment to on-balance sheet financing, and its comparatively farther distance to shore. OW2's 500 kV POI at Smithburg is a strength, based on the robust transmission system capability on PJM's backbone system. Supporting documentation for the Smithburg POI, the long offshore cable length and lack of route specificity to landfall, and the conditional expenditures guarantee are comparative weaknesses, but do not constitute formidable commercial hindrances. While OW2 B offers the opportunity to further build New Jersey's offshore wind industry with establishment of a GE nacelle assembly facility, its realization is contingent on timely completion of the NJWP as the site for the GE facility and GE's satisfaction with an offered parcel lease. Ørsted's ongoing partnership with EEW represents an opportunity that will help New Jersey position itself to manufacture monopiles for New Jersey offshore wind projects and for projects in other states. The pilot electric vehicle program for heavy-duty trucks used in and around the Port of Newark/Elizabeth is an added plus.

For a portfolio including one Project from each Applicant, a primary threat is a delay in completion of the NJWP. A completion delay would have adverse consequences for the project benefits and costs of both Applicants. *BC/[redacted]/EC* An opportunity of a split award for the portfolios that include one or two nacelle facilities is that the NJWP may become more of a hub for nacelle component manufacturing nearby. A split award has the added strength of diversification of the locations of economic activity, developers, suppliers, and points of interconnection. This added strength of diversification incorporates heightened environmental justice goals as well as innovative pilot programs in synchrony with New Jersey's decarbonization objectives.

1 OVERVIEW OF APPLICATIONS AND PROJECT ALTERNATIVES

On November 19, 2019, Governor Phil Murphy signed EO92, increasing the State's offshore wind energy generation goal from 3,500 MW of capacity by 2030 to 7,500 MW of capacity by 2035.[1] Governor Murphy found that expanding the offshore wind goal will ensure that the State can "meet the State's goals of 50 percent renewable energy by 2030 and 100 percent clean energy by 2050, in addition to creating a significant number of good-paying jobs."[2]

To implement Governor Murphy's vision of making New Jersey a leading hub of offshore wind development and to meet the State's aggressive clean energy goals, the BPU issued the SGD on September 10, 2020, soliciting Applications to secure ORECs targeting 1,200 MW to 2,400 MW of offshore wind capacity.[3,4]

The Application submission deadline was December 10, 2020. The BPU received Applications from two Applicants: Atlantic Shores and Ocean Wind 2.[5] ASOW submitted four Project options and OW2 submitted two Project options, which are summarized at a high level in the following three tables.

[1] https://nj.gov/infobank/eo/056murphy/pdf/EO-92.pdf
[2] EO92, p.3.
[3] https://njoffshorewind.com/solicitation-documents/Final-Solicitation-Guidance-Document-with-attachments.pdf
[4] The Board reserved the right to select less than 1,200 MW or more than 2,400 MW, if circumstances warrant.
[5] ASOW is a joint venture between EDFR Offshore and Shell New Energies. OW2 is sponsored wholly by Ørsted Offshore North America

Table 3. Project Sizes and Production[6]
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
BOEM Lease Area	OCS-A-0499			OCS-A 0498	
Nameplate Capacity (MW)	[redacted]	1,509.6	[redacted]	1,148.0	
Capacity Phase-in by Start Date					
Phase 1 COD	[redacted]	9/[redacted]/27	[redacted]	8/[redacted]/28	
Phase 1 Capacity (MW)	[redacted]	761.6	[redacted]	392.0	
Phase 2 COD	[redacted]	4/[redacted]/28	[redacted]	10/[redacted]/28	
Phase 2 Capacity (MW)	[redacted]	748.0	[redacted]	378.0	
Phase 3 COD	[redacted]	--	[redacted]	1/[redacted]/29	
Phase 3 Capacity (MW)	[redacted]	--	[redacted]	378.0	
Expected Annual Generation (GWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Expected WTG Capacity Factor	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Expected Annual Delivered Energy (GWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Expected WTG Capacity Factor (net of losses)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Annual OREC Allowance (GWh)	[redacted]	6,181	[redacted]	5,034[8]	
OREC Allowance / Expected Delivered Energy	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Expected Total OREC Production (GWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Initial Eligible PJM Capacity Factor[9]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Summer Period Peak Hours Capacity Factor[12]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[6] Unless otherwise noted, values in this table are sourced from the Project Summary tab of each Project's Application Form.
[7] *BC/[redacted]/EC*
[8] BAFO Cover Letter p. 2.
[9] Once operational, a resource's qualified capacity factor is calculated as the average of the previous three years.
[10] ASOW Application p. 137, response to CQ1 #24b.
[11] *BC [redacted] EC*
[12] Values are calculated from 12x24 matrices of expected generation as submitted in the Application Forms.

Table 4. Project Configurations[13]
BC//EC

	Atlantic Shores				Ocean Wind 2		
	[redacted]	C	[redacted]	Ref.[14]	A	B	Ref.[15]
Mean Wind Speed (m/s)	[redacted]			p. 107	[redacted]		p. 3-8
Hub Height for Wind Speed (m)				p. 110			p. 3-8
WTG Hub Height (m)				p. 110			p. 3-5
Average Water Depth (m)				p. 52	26.4		CQ2 #1
WTG Distance from Shore (miles)		10.5	[redacted]	CQ1 #1	13.8		p. 2-23
Wind Turbine Model	MHI Vestas V236-13.6 MW			p. 72	GE Haliade-X		p. 2-1
WTG Nameplate (MW)	13.6			p.72	14.0[17]		p. 2-5
Number of WTG Units	[redacted]	111	[redacted]	p.40	82		p. 2-5
Foundation Technology	Monopile + Transition Piece			p.50	Monopile		p. 2-5
Inter-array Cable Voltage (kV)	66			p. 57	66		p. 2-9
Inter-array Cable Length (miles)	[redacted]			p. 59	[redacted]		p. 2-10
Number of Offshore Substations				p. 68			p. 2-13
POI(s)		Cardiff	[redacted]	p. 317	Smithburg[18]		CQ2 #20
Export Cable Technology	[redacted]			p. 57	HVDC		p. 2-8
Offshore Export Cable Length (miles)		20	[redacted]	p. 59	>100 [redacted]		p. 12-4, Calc.
Onshore Export Cable Length (miles)	[redacted]	12	[redacted]	p. 59	~20 [redacted]		p. 12-6, CQ1 #56
Number of Export Cable Circuits	[redacted]			p. 59	[redacted]		p. 2-9
Export Cable Voltage (kV)				p. 57	320		p. 2-9, p. 12-4
Expected Operational Life (years)	30			p. xii	30		p. ES-3

[13] *BC/[redacted]/EC*
[14] Entries showing only a page number are referencing the ASOW Application narrative.
[15] Entries showing only a page number are referencing the OW2 Application narrative.
[16] MLLW: Mean Lower Low Water
[17] *BC/[redacted]/EC* Application p. 2-5.
[18] In its Application, Ocean Wind 2 stated that the primary POI would be at Deans, with alternative POIs at Smithburg, Sewaren, Meadow Road, and Oceanview (OW2 Application p. 12-3). *BC/[redacted]/EC*
[19] *BC/[redacted] EC*

Table 5. Project Costs[20]
(nominal $)
BC//EC

	Atlantic Shores				Ocean Wind 2[21]		
	[redacted]	C	[redacted]	Ref.	A	B	Ref.
Development Cost ($MM)	[redacted]	[redacted]	[redacted]	App. 4-1	[redacted]	[redacted]	Att. 4.5
Unitized Development Cost ($/kW)	[redacted]	[redacted]	[redacted]	App. 4-1	[redacted]	[redacted]	Calc.
Capital Cost ($MM)	[redacted]	[redacted]	[redacted]	App. 4-1	[redacted]	[redacted]	Att. 4.5
Export Cable Cost ($MM)	[redacted]	[redacted]	[redacted]	App. 4-1	[redacted]	[redacted]	Att. 4.5
Unitized Capital Cost ($/kW)	[redacted]	[redacted]	[redacted]	App. 4-1	[redacted]	[redacted]	Calc.
Operating Cost ($MM)[22]	[redacted]	[redacted]	[redacted]	App. 4-1 & Calc.	[redacted]	[redacted]	Att. 4.5
Decommissioning Cost ($MM)[23]	[redacted]	[redacted]	[redacted]	App. 4-1	[redacted]	[redacted]	Att. 4.5
Total Cost ($MM)	[redacted]	[redacted]	[redacted]	Calc	[redacted]	[redacted]	Calc.
LCOE over OREC Period ($/MWh)	[redacted]	[redacted]	[redacted]	App. 4-1	[redacted]	[redacted]	p. 4-4
Levelized OREC Purchase Price ($/MWh)[24]	[redacted]	[redacted]	[redacted]	Calc.	[redacted]	[redacted]	Calc.
Levelized Net OREC Cost ($/MWh)	[redacted]	$58.81	[redacted]	Calc.	$40.75	$42.30	Calc.

1.1 Atlantic Shores

Effective on August 13, 2019, the Bureau of Ocean Energy Management ("BOEM") assigned the Federal OCS Renewable Energy Lease OCS-A 0499 to Atlantic Shores. The lease area was previously assigned to EDF Renewables Development, Inc., an Atlantic Shores parent company. The lease area boundary that is closest to shore is located approximately 9 miles off the coast of New Jersey, between Atlantic City and Barnegat Light. *BC/[redacted]/EC* Each is based on using MHI Vestas V236-13.6 MW WTGs mounted on monopile foundations with a hub height of 143 meters.[25] 66 kV inter-array cables will connect strings of WTGs to *BC/[redacted]/EC* The offshore WTG layouts of the Atlantic Shores Projects are shown in Figure 6.

20 "Calc." in the reference column indicates that the value was calculated by LAI.
21 *BC/[redacted]/EC*
22 Total operating costs are reported over the Project lifetime. *BC/[redacted]/EC*
23 *BC/[redacted]/EC*
24 Includes Transmission System Upgrade Cost Price Adder (see Section 2.1.1).
25 *BC [redacted]/EC*

Figure 6. WTG Layouts for Atlantic Shores Projects[26]
BC/[redacted]/EC

[redacted]

Depending on the Project, the initial commercial operation date is expected to be September *BC/[redacted]/EC* 2027. *BC/[redacted]/EC* The first phase of Projects C *BC/[redacted]/EC* would have a capacity of 761.6 MW, with a second 748 MW phase entering service in April 2028. *BC/[redacted]

[redacted]/EC* would have a POI at Cardiff. *BC/[redacted]/EC*

[26] ASOW Application p. 40.

Figure 7. Atlantic Shores Export Cable Route and Port Facilities[27]
BC//EC

[redacted]

The target burial depth for the subsea cables is six feet.[28] Horizontal directional drilling will be used to bring the offshore cable to landfall while minimizing impact to the beach ecosystem.[29] Projects *BC/[redacted]/EC* C, *BC/[redacted]/EC* will include *BC/[redacted]/EC* of extra *BC/[redacted]/EC* conduit capacity at Cardiff. *BC/[redacted]/EC* to minimize future beach crossings.[30] Atlantic Shores has three queue positions at Cardiff (AE2-020, AE2-021, and AE2-022) *BC [redacted]/EC*

Marshalling and staging will be conducted at the NJWP.[32] NJWP will also host an MHI Vestas nacelle assembly facility (for Projects C *BC/[redacted]/EC* Atlantic Shores plans to utilize monopile foundations fabricated at an expansion of EEW's manufacturing facility

[27] ASOW Application p. 47.
[28] ASOW Application pp. 86-87, response to CQ1 #3.
[29] ASOW Application p. 266.
[30] ASOW Application p. 347.
[31] ASOW Application p. 322.
[32] ASOW Application pp. 96, 307. *BC/[redacted]/EC*
[33] ASOW Application pp. 170-171. *BC [redacted] EC*

at Paulsboro.[34] Atlantic City will serve as the operations and maintenance port.[35] For Projects *BC/[redacted]/EC* C, *BC/[redacted]/EC* Atlantic Shores also proposes to implement a pilot electrolyzer plant in collaboration with South Jersey Industries ("SJI") to produce green hydrogen in Cardiff, New Jersey, a production process that will utilize dedicated output from the offshore wind facility to produce hydrogen used by SJI.[36]

1.2 Ocean Wind 2

Ocean Wind 2 will be located in BOEM Lease Area OCS-A 0498. The lease area is currently owned by Ocean Wind, LLC, an affiliate of the Ocean Wind 2. Ocean Wind, LLC is working to assign a portion of the Lease Area, including the area where Ocean Wind 2 will be located, to Ørsted North America Inc., an affiliate of both Ocean Wind, LLC and Ocean Wind 2. If Ocean Wind 2 receives an award in this solicitation, Ørsted North America Inc. will assign the relevant portion of the lease area to Ocean Wind 2.[37] The turbine closest to shore in the Ocean Wind 2 WTG array will be located 13.8 miles off the coast of Atlantic City. Ocean Wind 2's two Projects have the same configuration and are distinguished by the associated economic benefits package. Project B adds a nacelle assembly facility at the NJWP. The Ocean Wind 2 Projects are based on the use of the GE Haliade-X WTG platform. The initial design basis involves eighty-two 14.0 MW WTGs mounted on monopile foundations, *BC/[redacted]/EC* 66 kV inter-array cables will connect strings of WTGs to the offshore substation/converter station. The WTG layout for the Ocean Wind 2 Projects is shown in Figure 8.

[34] ASOW Application p. 50. Atlantic Shores has developed alternate monopile supply arrangements in the case that EEW is not able to deliver the needed capacity or to meet the target schedule. The alternate selected supplier for monopiles is Bladt Industries, with monopiles manufactured in Denmark. *BC/[redacted] EC* ASOW Application pp. 55-57.

[35] ASOW Application p. 97.

[36] ASOW Application pp. 97-102.

[37] OW2 Application p. 1-13. *BC/[redacted] EC*

Figure 8. WTG Layout for Ocean Wind 2 Projects[38]
BC//EC

[redacted]

The Ocean Wind 2 Projects are planned to be constructed in three phases. The first phase has a capacity of 392 MW and an August 2028 COD. The second and third phases each have a capacity of 378 MW, and CODs of October 2028 and January 2029, respectively. The primary POI is at Smithburg, *BC/[redacted]/EC* The export cable routes to the primary *BC/[redacted]/EC* are shown in Figure 9. From the offshore substation, power will be transmitted via HVDC cable at 320 kV to the onshore substation. Ocean Wind 2 has chosen to use HVDC technology for the export cable because of the distance between the offshore and onshore substations – *BC/[redacted]/EC*

[38] OW2 Attachment 2.1 p. 2.

Figure 9. Ocean Wind 2 Export Cable Route[39]

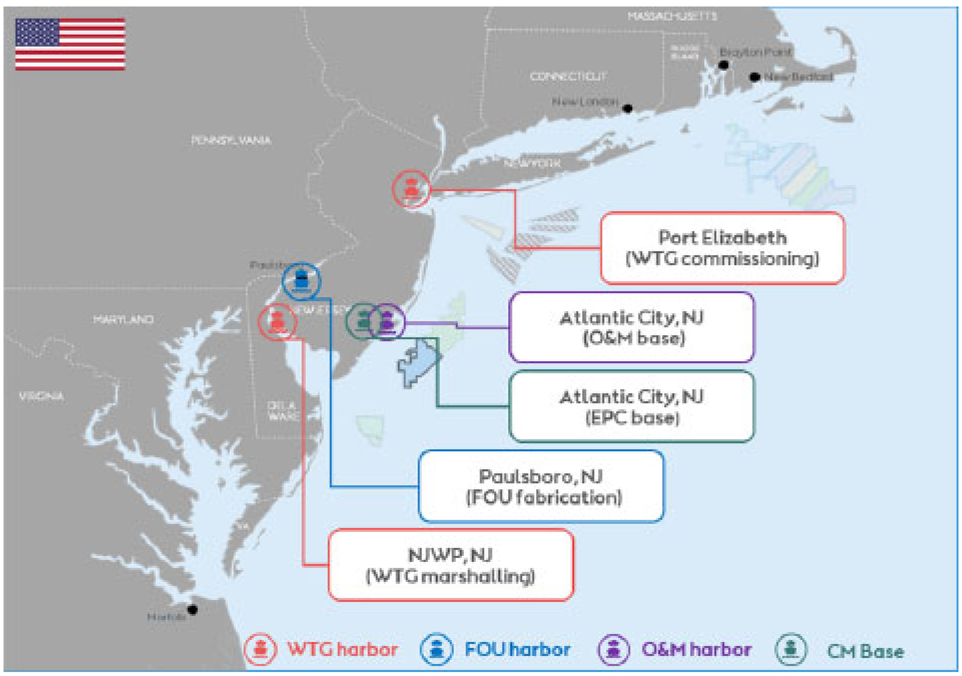
BC//EC

[redacted]

The target burial depth for the subsea cables is approximately five to seven feet.[40] Horizontal directional drilling will be used for the cable landfall.[41] *BC/[redacted]/EC*

OW2 proposes to conduct WTG marshalling out of the NJWP.[43] For Project B only, a GE nacelle assembly facility is also proposed to be constructed at the NJWP.[44] Both Project options involve an expansion of EEW's monopile manufacturing capability at Paulsboro, and increased capacity out of the O&M facility in Atlantic City that will also be utilized for Ocean Wind 1.[45] The locations of these port facilities relative to the lease area are shown in Figure 10. Ocean Wind 2 has also proposed to support the deployment of zero-emission Class 8 freight transport trucks, including the development of an electric truck depot facility at the Port of Newark/Elizabeth.[46]

Figure 10. Ocean Wind 2 Port Facilities[47]



[39] OW2 Attachment to response CQ2 #20.
[40] *BC/[redacted]/EC* (Response to CQ1 #7).
[41] OW2 Application p. 2-48.
[42] OW2 Application p. 12-3. At the Feasibility Study phase, PJM allows an interconnection request to include a secondary (alternate) POI which is studied together with the primary POI. This queue position was originally associated with Deans as a primary point of interconnection and Smithburg as the secondary point of interconnection. OW2 reported at the interview that it would maintain the same queue position *BC/[redacted]/EC* Interview transcript p. 103.
[43] OW2 Application p. 8-12. *BC/[redacted]/EC*
[44] OW2 Application p. 8-9.
[45] OW2 Application p. 2-24.
[46] OW2 Application pp. 8-21 to 8-24.
[47] OW2 Application p. 2-24.

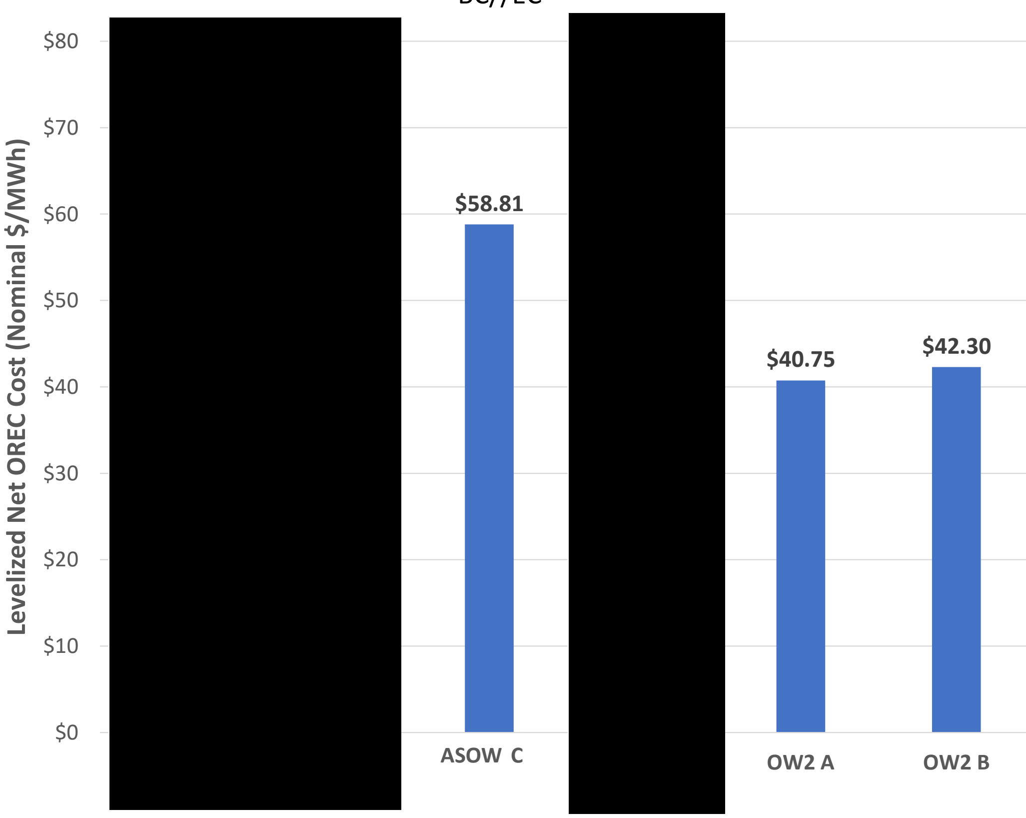
2 OREC PURCHASE PRICE AND RATEPAYER IMPACTS

Highlights

- Project LNOCs, which are the basis for assigning points in this category, are shown in Figure 11. OW2 A has the lowest LNOC and is insignificantly lower than OW2 B. *BC/[redacted]/EC*

Figure 11. Levelized Net OREC Cost

BC//EC



- The OREC Purchase Prices have been adjusted for TSUC uncertainty. While ASOW's TSUC estimates are well-documented, expected transmission costs expressed on a risk-adjusted basis are comparatively high on a unitized basis. In contrast, OW2 has not provided any documentation to support the proposed TSUC under conservative assumptions at the Smithburg POI. On a preliminary basis, the Smithburg POI is likely robust, that is, able to accommodate the injection of 1,148 MW without unpleasant financial surprises years from now.

- The Round 2 solicitation resulted in competitive pressure on both Applicants to bid aggressively for the sake of a Board approved OREC award. OW2 pricing is significantly lower than OW1, also resulting in a significantly lower PVNOC. Average monthly residential ratepayer impacts for OW2 are lower than OW1. Moreover, economic benefits and associated guarantees are significantly greater and more robust than OW1.

The OREC Purchase Price is defined at N.J.A.C. 14:8-6.1 and 6.5(a)(12) as the price in $/MWh paid for a Qualified Offshore Wind Project. The OREC Purchase Price reflects the all-in costs of the Project, *i.e.*, total Project capital and operating costs offset by any State or Federal tax or production credits and any other subsidies or grants. The OREC Purchase Price is paid per MWh for delivered energy. N.J.A.C. 14:8-

6.5(a)(12)(iii) and (vii) require Applicants to submit an OREC Pricing Schedule with a fixed OREC price and expected energy output for each Energy Year of the proposed 20-year term of the Board Order.[48] Applicants were allowed to propose a phased commercial operation schedule. Each phase of a multi-phase project will have a distinct 20-year term based on the phase's Commercial Operation Date. A single price and expected energy output series will apply to each phase. This may result in price and output series longer than 20 years, based on the time between the Commercial Operation Date of the first phase and the Commercial Operation Date of the last phase. The OREC Purchase Price may be the same each year over the 20-year term(s), or it may increase each year subject to a fixed escalation rate equal to or less than 3%.

The OREC purchase price was evaluated in terms of the nominal LOPP and nominal LNOC. The LOPP is derived from the OREC Purchase Price Schedule and expected OREC deliveries and represents the total value of the ORECs. The LNOC is derived from the OREC Purchase Price Schedule, expected OREC deliveries, and revenue credits that reflect the expected value of energy, capacity, and ancillary services in the wholesale market, as well as the avoided cost of Class 1 RECs.[49] The LNOC represents the expected net price paid by New Jersey ratepayers, expressed on a nominal dollar basis, that is, including inflation.

Applicants were required to submit an All-In OREC Purchase Price for each Energy Year, expressed in nominal $/OREC.[50] Applicants were also required to designate parameters to determine the Buyer's share of final PJM TSUC, which is described in more detail in Section 2.1.1 below. The TSUC mechanism provides the Applicant with the opportunity to define the amount of transmission interconnection risk the Applicant is willing to internalize in its OREC Purchase Price versus the amount to be allocated to ratepayers based on the actual TSUC determined by PJM. The OREC purchase price calculations are summarized in Table 6. The LOPP is stated in nominal $/MWh, with the TSUC Price Adder ("TSUCPA") as determined based on LAI's TSUC estimates, which are described in Section 2.1.1. While mindful of the Applicants' TSUC estimates, LAI has relied on its own assessment of system upgrade costs consistent with the PJM transmission system planning process to derive each Applicant's TSUCPA for evaluation purposes. The LNOC is expressed in nominal $/MWh, and includes the effect of the revenue credits, as discussed further in Section 2.2.

[48] LAI evaluated the capacity factor and energy production profiles submitted by each Applicant based on the supporting data submitted and other information that is available to LAI.

[49] LNOC is the level nominal cost per MWh that, when multiplied by the proposed OREC quantities for each Energy Year of the proposed 20-year term, yields a steam of dollar amounts which has the same present value as the series of Energy Year net costs of the same quantities of ORECs. Using the nominal discount rate of 7%, this present value equivalence reflects the OREC Purchase Price Schedule, including the revenue credits attributable to the estimated market value of energy and capacity, as well as the avoided REC costs.

[50] Per N.J.A.C. 14:6-6.1, an Energy Year is the 12-month period from June 1 through May 31 and is to be numbered according to the calendar year in which it ends.

Table 6. OREC Purchase Price Summary[51]
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
First Energy Year	[redacted]	2028	[redacted]	2029	
First Energy Year OREC Purchase Price ($/MWh)	[redacted]	$86.62[54]	[redacted]	$82.71[56]	$84.03[57]
Escalation Rate	[redacted]	2.50%	[redacted]	2.00%	
LOPP ($/MWh)[58]					
Base	[redacted]	$106.18	[redacted]	$96.94	$98.49
TSUCPA	[redacted]				
Total	[redacted]				
Revenue Credits ($/MWh)[59]					
Market Energy Value	[redacted]				
Market Capacity Value	[redacted]				
Avoided Class I REC Cost	[redacted]				
LNOC ($/MWh)	[redacted]	$58.81	[redacted]	$40.75	$42.30

2.1 Levelized OREC Purchase Price

OREC quantities were calculated for each month of each Energy Year from the tables of generation and energy delivery provided in the Application Forms. OREC purchase prices for each month were determined from the First Energy Year OREC Purchase price and the proposed escalation rate. Monthly products of OREC quantity and OREC Purchase Price were aggregated by calendar year. The annual totals were discounted to present value (year-end 2020) using a nominal discount rate of 7.0%. The OREC quantities were similarly aggregated by calendar year and discounted at the same nominal discount rate to year-end 2020. LOPP was calculated as the ratio of the present value of OREC Purchase Price payments to the present value of the corresponding annual OREC quantities.

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[51] First Energy Year, First Energy Year OREC Purchase Price, and Escalation Rate were submitted in the OREC Purchase Price worksheet of the Application Form. Other values in this table were calculated by LAI.

[52] *BC/[redacted] EC*

[53] *BC/[redacted] EC*

[54] *BC/[redacted] EC*

[55] *BC/[redacted]/EC*

[56] *BC [redacted] EC*

[57] *BC/[redacted]/EC*

[58] LOPP, revenue credits, and LNOC values are presented in levelized nominal $/MWh.

[59] Calculated by LAI based on the forecasts presented in Section 2.2.1

2.1.1 Transmission System Upgrade Cost Uncertainty and Reconciliation

The mechanism in the formulas below reflects the apportionment of risk between Buyer and Seller related to higher-than-expected TSUC. The Buyer's share of the TSUC is represented by the TSUCPA, calculated as shown in the following equations:

$$TSUCPA = \frac{ATSUCR}{EAOQ}$$

$$ATSUCR = BSTSUC \times AF(ROR, 20)$$

$$BSTSUC = TSUC - SSTSUC$$

$$\begin{aligned} SSTSUC = &\min(TSUC, Tier1) \times 1.00 \\ &+\min(\max(0, TSUC - Tier1), Tier2 - Tier1) \times SS2 \\ &+\min(\max(0, TSUC - Tier2), Tier3 - Tier2) \times SS3 \end{aligned}$$

where:

TSUCPA = Transmission System Upgrade Cost Price Adder (Nominal $/MWh)
EAOQ = Expected Annual OREC Quantity (MWh/year) (P50 annual profile)
ATSUCR = Annual Transmission Upgrade Cost Recovery (Nominal $/year)
AF(*ROR*, 20) = Annuity factor at Rate of Return of ROR for 20-year term
BSTSUC = Buyer Share of Transmission System Upgrade Cost (Nominal $)
TSUC = Transmission System Upgrade Cost (Nominal $)
SSTSUC = Seller Share of Transmission System Upgrade Cost (Nominal $)
Tier1 = Tier 1 Cost Limit absorbed 100% by Seller (Nominal $)
Tier2 = Tier 2 Cost Limit absorbed by Seller at rate *SS2* (Nominal $)
SS2 = Seller Share of cost in Tier 2 above Tier 1 (fraction)
Tier3 = Tier 3 Cost Limit absorbed by Seller at rate *SS3* (Nominal $)
SS3 = Seller Share of cost in Tier 3 above Tier 2 (fraction)

The OREC Purchase Price includes the Seller Share of TSUC Tiers 1, 2 and 3. TSUC above the Tier 3 limit is fully allocable to Buyer. In addition to the OREC Purchase Price, Applicants were required to provide values for Tier1, Tier2, Tier3, SS2, and SS3. Applicants were free to set these parameters in accord with their own risk preference regarding with the allocation of transmission interconnection costs between Buyer and Seller. These values were used to calculate the TSUCPA representing the Buyer's Share of LAI's estimated TSUC.[60] Applicant-provided inputs to the TSUCPA calculation are summarized in Table 7. The Applicant-provided inputs to the TSUCPA calculation are the starting point, but not necessarily the same as the TSUC inputs used by LAI to derive the TSUCPA used in the evaluation.

[60] Applicants were free to set the SS2 and SS3 values at decreasing fractions solely at their discretion if they are unwilling to absorb all increases to the TSUC, thereby shifting all or a portion of the TSUC risk to Buyer. If Applicants are willing to absorb all increases to TSUC within the submitted OREC Purchase Price schedule, they were free to set the SS2 and SS3 values to 1.

Table 7. Applicant TSUC Inputs[61]
BC//EC

	Atlantic Shores[62]			Ocean Wind 2[63]	
	[redacted]	C	[redacted]	A	B
Tier 1 Cost Limit ($MM)	[redacted]	$239.4	[redacted]	$181.0	$181.0
Tier 2 Cost Limit ($MM)	[redacted]	$266.0	[redacted]	$217.0	$217.0
Tier 2 Seller Share	[redacted]	100.0%	[redacted]	50.00%	50.0%
Tier 3 Cost Limit ($MM)	[redacted]	$533.0	[redacted]	$250.0	$250.0
Tier 3 Seller Share	[redacted]	30.0%	[redacted]	25.0%	25.0%
Required Rate of Return[64]	[redacted]	6.5%	[redacted]	7.0%	7.0%
TSUC Estimate ($MM)					
P50	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
P90	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

LAI determined the TSUC estimates to be used in the OREC Purchase Price evaluation, shown in Table 8, based on the interconnection information provided by the Applicants. For evaluation purposes, the resultant TSUCPA will be added to each Energy Year's OREC Purchase Price.

Table 8. TSUC Calculation Results
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Applicant's P50 TSUC ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SSTSUC ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
BSTSUC ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
TSUCPA (levelized $/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Applicant's P90 TSUC ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SSTSUC ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
BSTSUC ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
TSUCPA (levelized $/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
TSUC for evaluation ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SSTSUC ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
BSTSUC ($MM)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
TSUCPA (levelized $/MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

In conducting this evaluation, we have limited our analysis to the TSUC associated with the proposed individual Projects. We have not considered the potential timing and interaction effects of interconnecting

[61] TSUC Parameters were submitted in the OREC Purchase Price worksheet of the Application Form.
[62] *BC/[redacted]/EC*
[63] *BC [redacted] /EC*
[64] *BC/[redacted]/EC* The specific 6.5% value was provided in the response to CQ2 #43.

one or both Applicant's Projects on the TSUC associated with transmission projects that the Board may later select under the State Agreement Approach ("SAA") presently before PJM.[65,66]

2.1.1.1 Atlantic Shores

BC [redacted] /EC

Atlantic Shores' four Project offers will use a combination of its existing PJM queue positions at Cardiff 230 kV *BC/[redacted]/EC* The PJM queue positions are as follows:*BC/

[redacted]/EC*

The combinations of queue positions are shown in Table 9.

Table 9. Project Combinations of Queue Positions
BC//EC

		Project C	
	[redacted]	[redacted]	[redacted]
Total Project MW	[redacted]	1,509.6	[redacted]
Total Queue MW	[redacted]	[redacted]	[redacted]

All *BC/[redacted]/EC* queue positions have a completed PJM SIS and are now being studied at the Facilities Study phase of the PJM interconnection process. For each queue position PJM estimated SIS costs as shown in Table 10.

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[65] LAI notes, however, that the *BC/[redacted]/EC* points of interconnection proposed by the Applicants (Cardiff, *BC/[redacted]/EC* Smithburg *BC/[redacted]/EC*) are the same as the substations specifically designated by the Board in its Order requesting PJM to utilize the SAA for an open access offshore transmission facility./EC* Docket No. QO20100630 (https://www.nj.gov/bpu/pdf/boardorders/2020/20201118/8D%20-%20ORDER%20Offshore%20Wind%20Transmission.pdf)

[66] If New Jersey implements a SAA, potential economic benefits may materialize from a ratepayer perspective through a reduced TSUCPA that would apply at designated POIs. The likelihood and magnitude of such benefits are outside the scope of this evaluation, however.

[67] ASOW's interconnection plan is described in Section 12 of the Application narrative, beginning on page 311.

Table 10. PJM SIS Costs for Atlantic Shores' Queue Positions
BC//EC

[redacted]		Project C	[redacted]
PJM SIS Costs	PJM SIS Costs	PJM SIS Costs	PJM SIS Costs
[redacted]			

*BC [redacted]

[redacted]

68 *BC/ [redacted] EC*

69 *BC [redacted] /EC*

70 *BC/ [redacted] EC*

71 *BC/ [redacted] /EC*

[redacted] *EC The P50 and P90 TSUC estimates used in Atlantic Shores Application are provided in Table 11.

Table 11. Atlantic Shores P50 and P90 TSUC Estimates
BC//EC

	[redacted]	Project C	[redacted]
P50	[redacted]		
P90			

*BC/ [redacted]

[redacted] /EC* LAI issued clarifying questions and asked Atlantic Shores to:*BC/

[redacted] /EC*

Atlantic Shores responded to the clarifying questions as follows:*BC/

[redacted]

72 *BC/ [redacted] EC*
73 *BC [redacted] EC*
74 Response to CQ1 #46a.
75 Response to CQ1 #47a.
76 Responses to CQ1 #49b and #52b.

[redacted] EC*

LAI was not satisfied with Atlantic Shores responses to the first round of clarifying questions. *BC/[redacted]

[redacted] EC*

To get more clarification from Atlantic Shores, LAI issued a second round of clarifying questions ("CQ2"). In CQ2 LAI asked Atlantic Shores to:*BC/

[redacted] /EC*

Atlantic Shores responded to CQ2 as follows:*BC/

[redacted] EC*

[77] Response to CQ1 #47e.
[78] Response to CQ2 #38b.
[79] Response to CQ2 #38d.
[80] Response to CQ2 #40a.

LAI followed up with Atlantic Shores at their interview and got the following responses:*BC/

[redacted] EC* Per the PJM Tariff, retired units are allowed to keep their CIRs for one year after which they

[81] Interview transcript p. 76. *BC/[redacted]/EC*

[82] Interview transcript p. 84.

[83] Interview transcript p. 85.

have to either sell/transfer them or they are released to the PJM transmission system for the creation of system-wide transmission headroom.[84] *BC/[redacted]

[redacted]

[redacted] EC*

[84] In an order dated November September 11, 2019, in Docket Q018121289, the Board approved Ocean Wind's purchase of the Oyster Creek CIRs. In an order dated March 27, 2020, in the same docket, the Board approved Ocean Wind's purchase of the BL England CIRs.

[85] In its response to CQ2 #38d and in their Supplemental Interview Information (item #3), Atlantic Shores noted that *BC/[redacted]/EC*

[86] ASOW Application Appendices 12-8 through 12-11.

[87] See *BC/[redacted]/EC* in ASOW Appendix 12-8.

[88] See *BC/[redacted]/EC* in ASOW Appendix 12-11.

[89] See Appendix I of ASOW's CQ2 responses.

Table 12. *BC/[redacted]/EC*

BC//EC

[redacted]

BC/[redacted]/EC

Table 13. *BC/[redacted]/EC*

BC//EC

[redacted]

*BC [redacted]

[redacted]

[redacted]/EC*

Table 14. *BC/[redacted]/EC*

BC//EC

[redacted]

*BC [redacted]

[redacted]/EC*

Table 15. *BC/[redacted]/EC*

BC//EC

	[redacted]	Project C	[redacted]
Bid MW	[redacted]	1,509.6	[redacted]
POI MW	[redacted]	[redacted]	[redacted]
PJM SIS Cost	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
Evaluation TSUC	[redacted]	[redacted]	[redacted]

*BC [redacted]

[redacted] /EC*

2.1.1.2 Ocean Wind 2

*BC/ [redacted]

[redacted] EC* The P50 and P90 TSUC estimates are presented in Table 16.

Table 16. Ocean Wind 2's P50 and P90 TSUC Estimates

BC//EC

	TSUC ($ MM)
P50	[redacted]
P90	[redacted]

LAI submitted some clarifying questions to Ocean Wind 2 to better understand their interconnection plan. LAI was satisfied with the responses provided by Ocean Wind 2.

LAI also reviewed other queue positions in the PJM queue *BC/[redacted]/EC* to get a sense of the reasonableness of the TSUC submitted by Ocean Wind 2. *BC/[redacted]/EC*

Table 17. Other PJM Queue Positions at *BC/[redacted]/EC*

BC//EC

Project Name	Queue Position	Capacity (MW)	Study Year	Feasibility Study Upgrade Costs ($)	Status
[redacted]					

BC[redacted]EC

Based on the review of other queue positions *BC/[redacted]/EC* LAI finds the Ocean Wind P50 and P90 TSUC *BC/[redacted]/EC* to be reasonable.

*BC/[redacted]

[90] The PJM study timeline should not be affected because Smithburg 500 kV would already have been studied as a Secondary POI in the Feasibility Study. *BC [redacted]/EC*

[redacted] EC*

Table 18. Ocean Wind 2 BAFO P50 and P90 TSUC for Smithburg 500 kV
*BC//*EC*

P50	P90
[redacted]	[redacted]

*BC [redacted]

[redacted] /EC* Table 19 summarizes LAI's estimated TSUC for use in the evaluation.

[91] LAI used the same approach that Ocean Wind 2 used in its Application to convert real dollars to nominal dollars *BC/[redacted]/EC* The conversion methodology was provided as a spreadsheet by Ocean Wind 2 in their response to CQ1 #64a. *BC/[redacted]/EC* is probably attributable to rounding in the conversion from real dollars to nominal dollars, or the use of updated conversion parameters for the BAFO (inflation rate, expense timing etc.).

[92] As noted earlier, LAI was able to benchmark *BC/[redacted]/EC* TSUC based on prior PJM interconnection requests.

Table 19. LAI's Evaluation TSUC Estimates for Smithburg 500 kV
BC//EC

	TSUC ($)
P50	[redacted]
P90	[redacted]
Evaluation TSUC	[redacted]

BC [redacted] /EC

2.2 Net OREC Cost

LNOC is calculated as the PVNOC divided by the same present value of annual OREC quantities used in the calculation of LOPP.[93] PVNOC is determined as the present value of OREC purchase payments less the present value of the revenue credits associated with the sale of energy and capacity, and the avoided cost of Tier 1 RECs. The basis for estimating these credits is presented below.

2.2.1 Market Price Projections

Quantitative evaluation of the Applications was completed using market price projections for energy, capacity, and RECs developed by LAI.[94] To simulate wholesale electric market dynamics in PJM, LAI used Aurora, a chronological dispatch simulation model licensed by Energy Exemplar. The revenue credits for energy were calculated using the applicable hourly zonal energy prices from the Offshore Wind case and the expected hourly energy quantities used to calculate LOPP. The revenue credits for capacity were calculated based on a proxy value reflective of the value of capacity over the last three years. The avoided costs of RECs were calculated using LAI's proprietary REC price model. The inputs and calculation methods for these projections are described in Appendix A.[95]

2.2.1.1 Energy Price Projection

LAI's projected prices are shown in Figure 12. Figure 13, Figure 14, and Figure 15 provide comparisons of LAI's projected zonal energy prices from Aurora for this solicitation (LAI S#2) to the projected prices developed by LAI and BPU for the first solicitation (LAI S#1 and BPU S#1).[96] Prices are shown in nominal dollars per megawatt hour. The zonal and nodal points of interconnection for each Project are listed in Table 20.

[93] LNOC can also be calculated as LOPP less the levelized unit equivalents of revenue credits for energy, capacity, and avoided Tier 1 REC purchases.
[94] The value of ancillary services is not included in the calculation of revenue credits for purposes of this evaluation. Ancillary services revenue will be credited against the OREC purchase price during the OREC term.
[95] The REC price projection was based on equilibrium market assumptions and therefore does not address the potential impact of large increments of offshore wind added to the resource mix and resultant REC clearing prices in New Jersey over the OREC term.
[96] The "BPU S#1" projection was included in the Solicitation Guidance Document for the first solicitation as guidance for the Applicants, and was based on NYMEX futures and the 2018 Annual Energy Outlook. The "LAI S#1" projection was developed as an independent assessment using Aurora.

Table 20. Project Zonal and Nodal Points of Interconnection

BC//EC

Project	Zone	Node
Atlantic Shores [redacted]	AECO	Cardiff
[redacted]	[redacted]	[redacted]
Ocean Wind 2 [redacted]	JCPL	Smithburg
[redacted]	[redacted]	[redacted]

Figure 12. Energy Price Projections

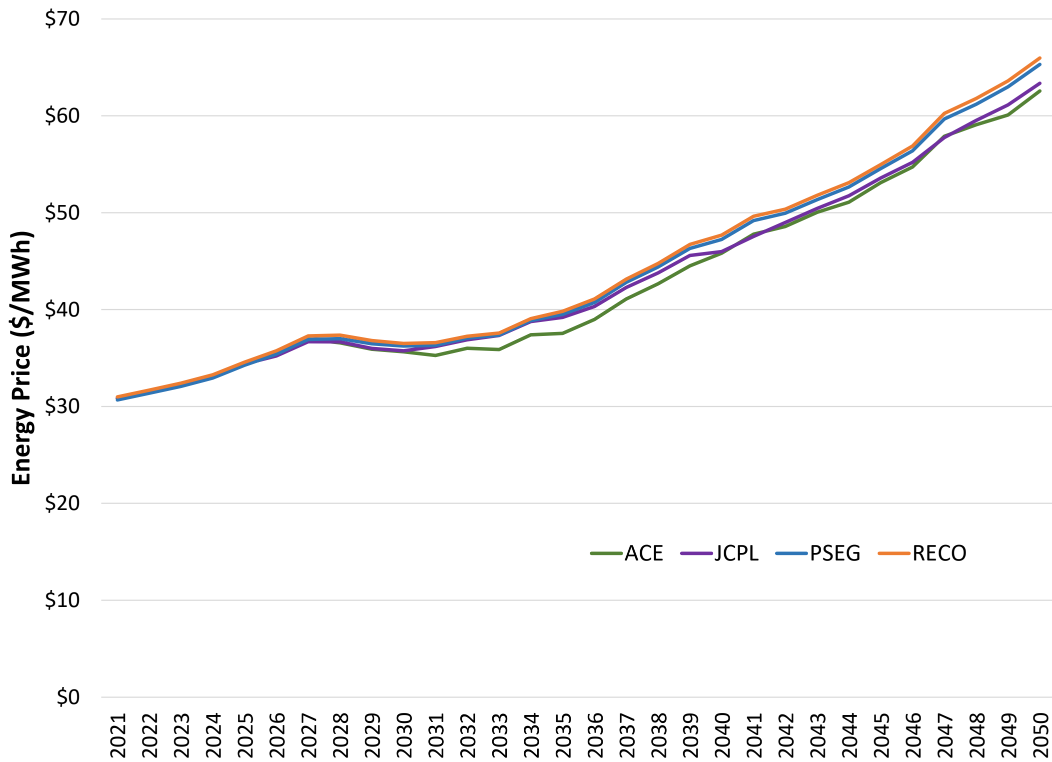


Figure 13. ACE Energy Price Projection Benchmark

Figure 14. PSEG Energy Price Projection Benchmark

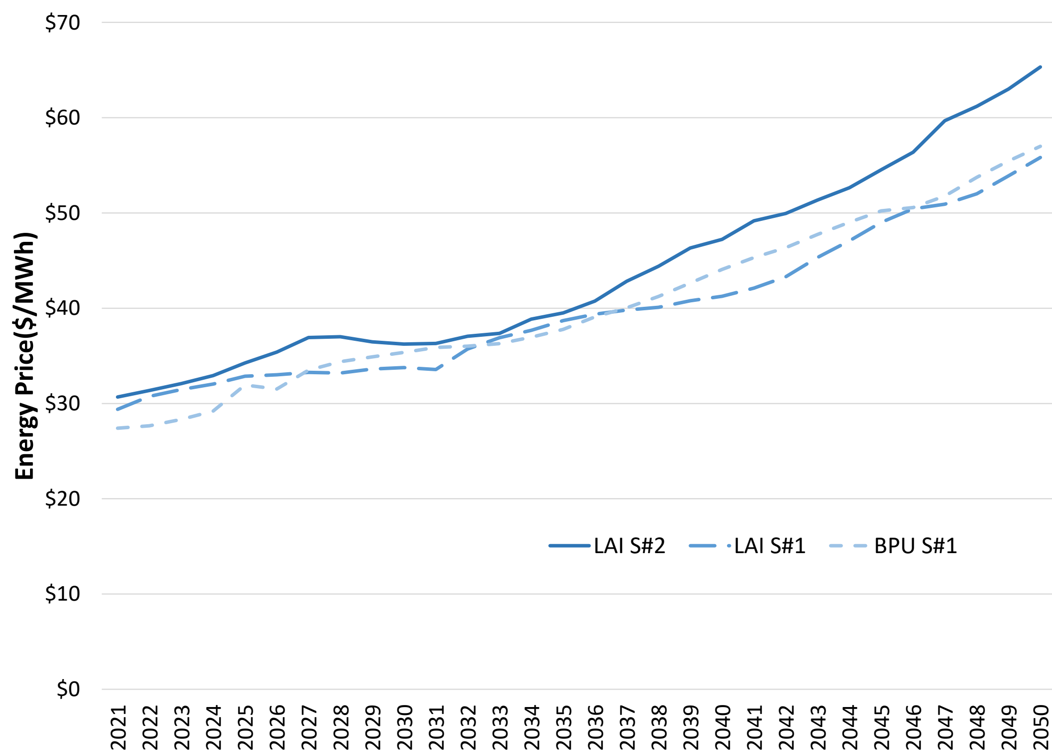


Figure 15. JCPL Energy Price Projection Benchmark

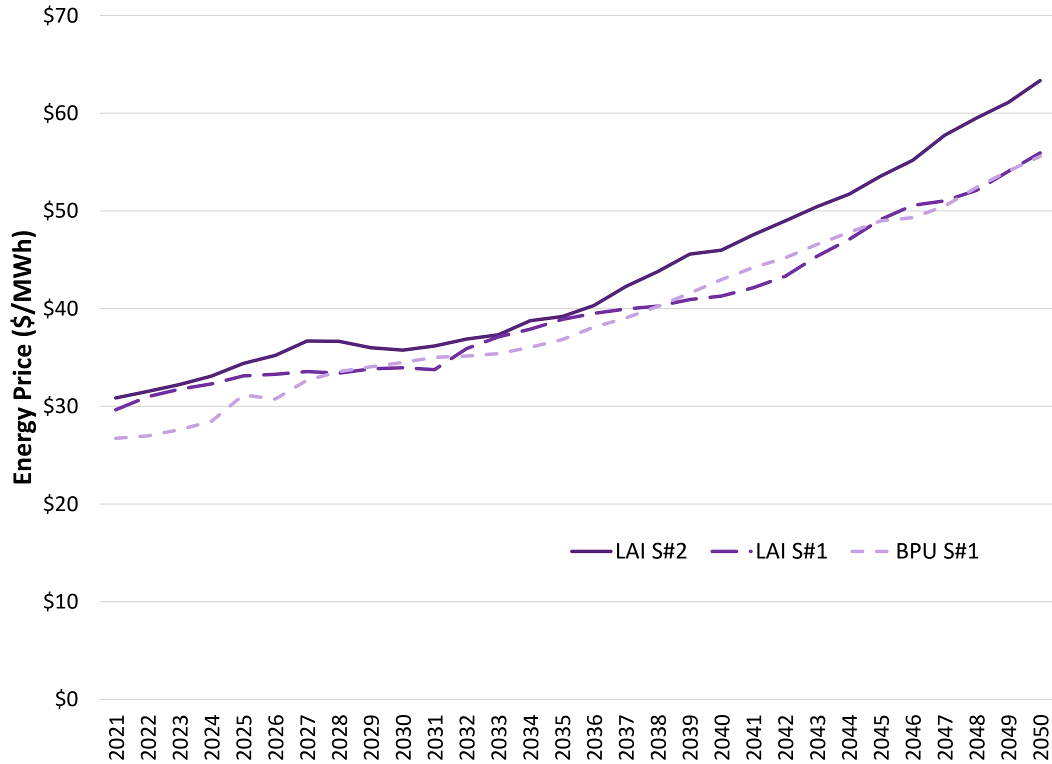
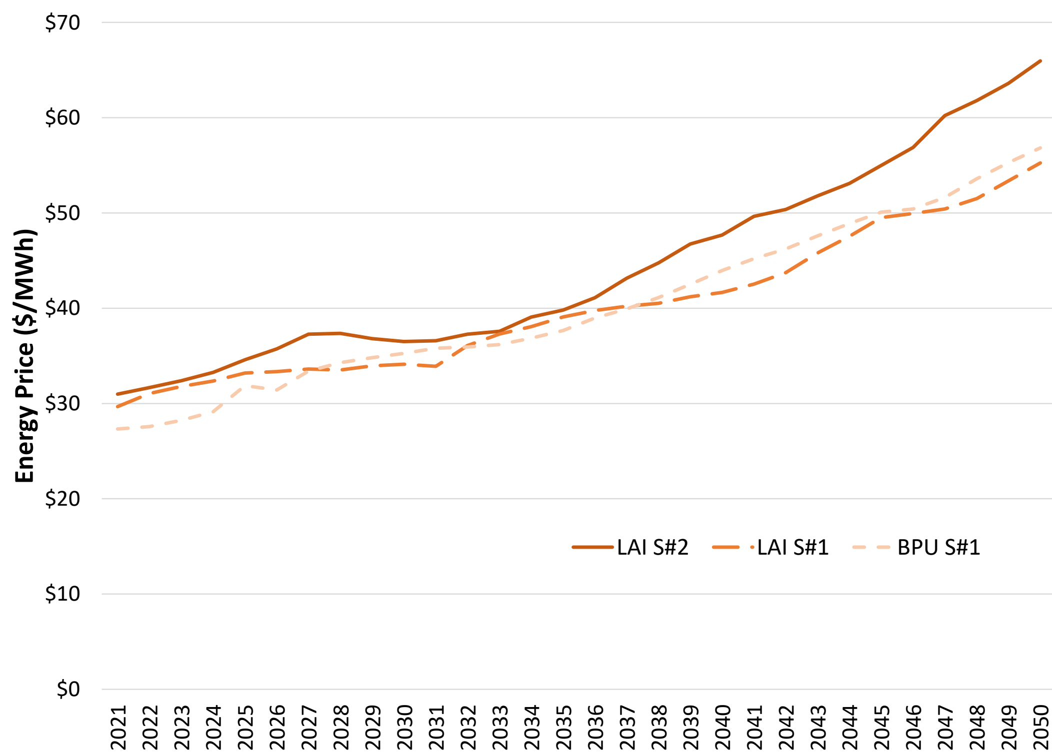


Figure 16. RECO Energy Price Projection Benchmark

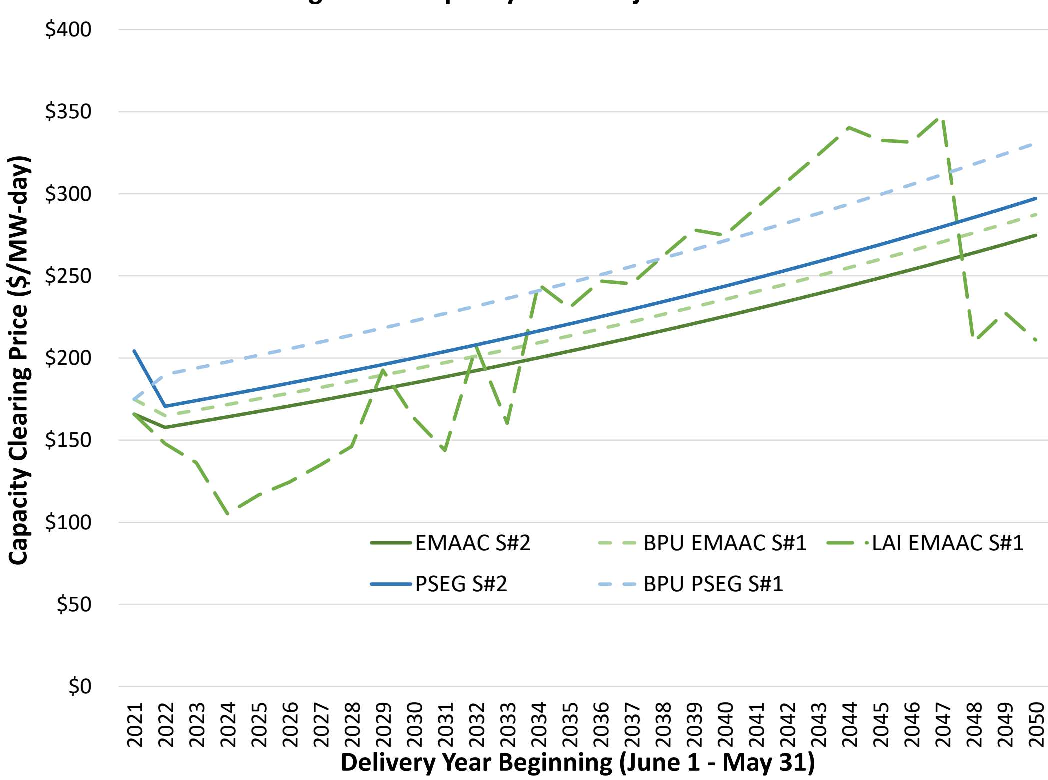


The Aurora simulation model produces energy prices at the zonal level. The OREC contract price credits ratepayers the actual market revenue for energy, capacity, and RECs. Because the project's revenue from energy sales in the PJM Day-Ahead ("DA") and Real-Time ("RT") markets are nodal based, LAI used a statistical model to estimate the expected spread between nodal and zonal prices. Predicted nodal prices for each proposed interconnection point are a function of zonal prices and chronological variables. This statistical model is explained in Appendix A.

2.2.1.2 Capacity Price Projection

LAI's projected capacity prices for the relevant New Jersey capacity Local Deliverability Areas ("LDAs") are shown in Figure 17 alongside the projected prices from the Solicitation #1 BPU Guidance Document and the capacity price projection produced by LAI using Aurora.[97] As stated in the SGD, the capacity proxy prices are based on the average of the previous three BRA resource clearing prices. The resource clearing price for the 2022/23 delivery year is the three-year average price, which is then escalated at a 2% annual inflation rate each year thereafter. PSEG capacity prices are higher than those in the other New Jersey LDAs as the PSEG LDA has recently been constrained and cleared higher than the EMAAC LDA in which it is nested. Capacity prices used in this solicitation were projected using only resource clearing prices from the Base Residual Auction ("BRA") and did not incorporate adjustments from incremental auctions.

Figure 17. Capacity Price Projection[98,99]



[97] The PSEG North LDA is not shown separately because it is not assumed to separate from PSEG.

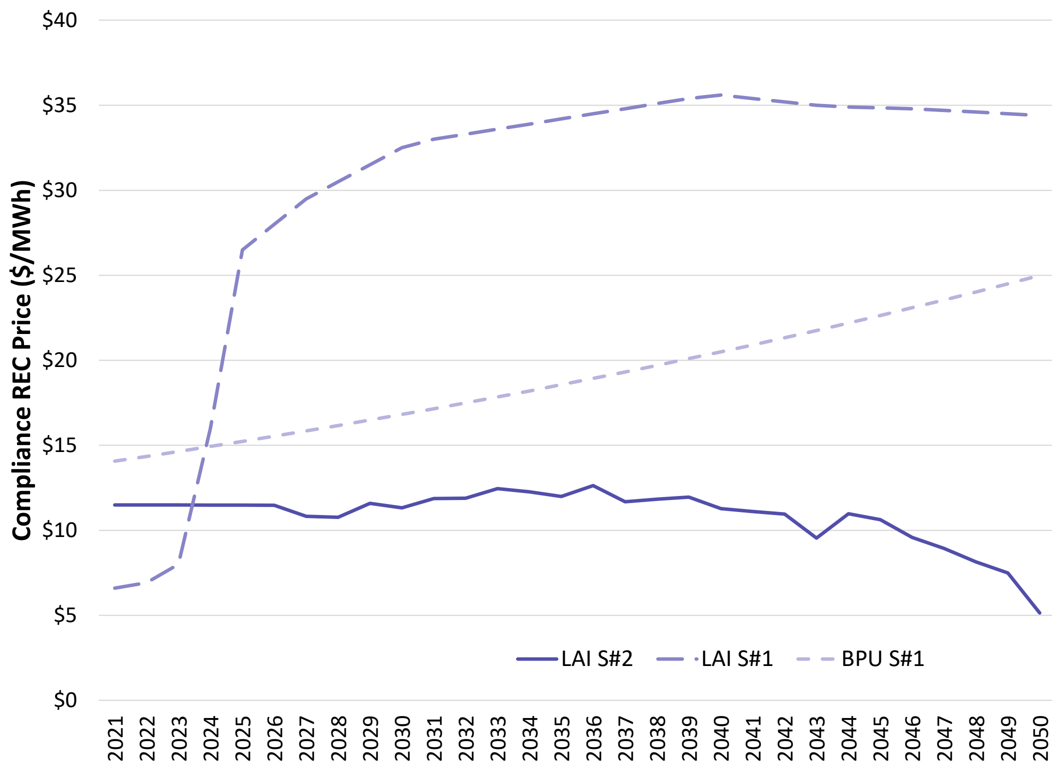
[98] LAI did not project a capacity price for PSEG separate from EMAAC in the first solicitation.

[99] LAI's EMAAC forecast in the first solicitation used Aurora modeling of supply and demand fundamentals rather than escalating a historical average as a proxy.

2.2.1.3 New Jersey Class I REC Price Projection

LAI's projected New Jersey Class I REC Price projection is shown in Figure 18 alongside projected prices from LAI and the BPU Guidance Document from Solicitation #1. Contributing factors to the decrease in the REC price projection in this solicitation included updated economic and financial parameters, including the lower capital cost for REC eligible technologies, the lower federal corporate income tax rate, and the extension of the federal Production Tax Credit ("PTC"). A detailed description of the LAI's REC price model is provided in Appendix A.

Figure 18. New Jersey Class I REC Price Projection Benchmark



2.2.2 Present Value of Net OREC Cost

Annual and present values for total OREC Payments and market credits were calculated for each option. The present values are summarized in Table 21. The same present value measures are also shown in Figure 19.

Table 21. Present Value of Net OREC Cost
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
PV of OREC Quantity (GWh)	[redacted]				
PV of OREC Payments ($MM)					
Base OREC Purchase Price	[redacted]				
TSUCPA					
Total Payments					
PV of Market Credits ($MM)					
Energy	[redacted]				
Capacity					
Avoided Tier 1 RECs					
Total Credits					
PV of Net OREC Cost ($MM)					

Figure 19. Present Value of Net OREC Cost
BC//EC

[redacted]

2.2.3 Levelized Net OREC Cost

LNOC can be presented either in levelized nominal dollars or in levelized real (constant date value) dollars. The nominal levelized convention comports with the intended administration of OREC pricing as fixed nominal prices, which, by definition, include inflation, by energy year. To promote standardization between Applicants, the real levelized convention represents a fair basis for comparison of Projects with different expected OREC term start dates or operational capacity schedules. The real LNOC is often used by state entities to report the expected OREC Cost in current day dollars over the OREC term for a project that will not start commercial operation for several years.

In general terms, the LNOC is equal to the Project's OREC Purchase Price adjusted for the TSUCPA and the value of capacity, energy, and RECs. The specific algebraic form is presented in Appendix B.

Nominal dollar LNOC results for each Project are shown in Table 22 and Figure 20.

Table 22. Levelized Net OREC Cost
(Nominal $/MWh)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Levelized OREC Payments					
Base OREC Purchase Price	[redacted]	$106.18	[redacted]	[redacted]	$98.49
TSUCPA	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Payments (LOPP)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Levelized Market Credits	[redacted]				
Energy	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Capacity	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Avoided Tier 1 RECs	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Credits	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Levelized Net OREC Cost	[redacted]	$58.81	[redacted]	$40.75	$42.30

Figure 20. Levelized Net OREC Cost
BC//EC

[redacted]

2.3 Ratepayer Impacts

Ratepayer impacts, as a function of the Net OREC Cost and other factors, were also assessed for each Project. PVNOC is an estimate of the costs which will be borne by ratepayers to allow New Jersey electric distribution companies ("EDCs") to recover the cost of the ORECs and the TSUCPA. Ratepayer impacts for each Project are based on the PVNOC and a PV-adjusted total New Jersey EDC retail load.[100]

To account for the time differences between a Project's monthly delivery periods within its 20-year term(s) and the 2021 retail rate impact, the present value of the projected New Jersey retail load quantities was calculated using the real discount rate. This allows for the determination of a real (constant

[100] This calculation does not include any adjustments for indirect benefits associated with wholesale price effects in the energy, capacity, or REC markets. Likewise, it does not include adjustments for the avoidance of greenhouse gas (GHG) emissions or for the creation of economic activity benefits.

base year) dollar levelized retail rate impact per MWh of retail load.[101] Retail load for each year is based on the U.S. Energy Information Agency ("EIA") projections used in the Aurora simulation modeling.

The Net OREC cost will affect retail rates in two ways. First, the gross OREC cost and the energy and capacity revenue credits will be included as a non-bypassable component of the EDC delivery charges to all classes of customers. This pass-through is computed as a similar rate for all customer classes. Second, the credit for avoided Class I REC purchases will be passed through to customers via the supply charge, whether supply is provided directly by the EDCs or through competitive retail supplier. The levelized retail rate impact in 2021 $/kWh, shown in Table 23, is calculated as the PVNOC divided by the present value of retail load quantity.[102]

EIA data covering the 2019 calendar year was used to estimate average monthly usages and total bills for residential, commercial, and industrial/transportation customers in New Jersey.[103] All four NJ EDCs were aggregated for this purpose. The monthly cost impact of an OREC purchase on the typical monthly bill for each rate type was calculated as the product of the levelized retail rate impact (2021 $/kWh) and the appropriate average monthly usage in kWh. The percentage change in the typical monthly bill was calculated as the ratio of the monthly cost impact divided by the baseline average monthly bill.

Table 23. Retail Rate Impacts
(Levelized 2021 $)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Average rate impact ($/MWh)	[redacted]	$3.341	[redacted]	$1.867	$1.938
Residential					
Average per month ($)	[redacted]	$2.21	[redacted]	$1.24	$1.28
% of Average Bill	[redacted]	2.02%	[redacted]	1.13%	1.17%
Commercial					
Average per month ($)	[redacted]	$20.18	[redacted]	$11.27	$11.73
% of Average Bill	[redacted]	2.62%	[redacted]	1.47%	1.52%
Industrial/Transportation					
Average per month ($)	[redacted]	$172.25	[redacted]	$96.26	$99.91
% of Average Bill	[redacted]	3.18%	[redacted]	1.78%	1.84%

[101] Formula for present value of retail load quantity:

$$PVERLQ = \sum_{i=2021}^{2047} WLQ_i \times RLLF \times EDCF/(1 - RDR)^{(i-2021)}$$

WLQ_i is the New Jersey Wholesale Load for year i from simulation model (MWh)
RLLF is the Retail Load Loss Factor for New Jersey load
EDCF is the fraction of New Jersey retail load served by EDCs
RDR is the Real Discount Rate = (1 + *NDR*) / (I + *INF*) – 1
NDR is the Nominal Discount Rate (7.00%)
INF is the Inflation Rate (2.00%)

[102] An adjustment from MWh to kWh is made.

[103] https://www.eia.gov/electricity/data.php

2.4 Comparison to First New Jersey Solicitation and Other States

In Table 24, the Applicants' proposed LOPPs are compared to the results of the first New Jersey solicitation and to the results of selected solicitations that have been published by state authorities in Maryland, New York, Massachusetts, Rhode Island, and Connecticut.[104]

Table 24. Levelized Pricing Comparison

BC//EC

Year of Selection	State	Project	Capacity (MW)	Commercial Operation Year[105]	LOPP (Nominal $/MWh)
2016	MD	Skipjack Wind	120	2023	$184.52[106]
		U.S. Wind	248	2021	$179.56[107]
2017	NY	South Fork Wind	130	2022	$186.07[108]
2018	MA	Vineyard Wind 1	400	2022	$98.68[109]
		Vineyard Wind 2	400	2023	$88.17[109]
	RI	Revolution Wind (RI)	400	2024	$107.08[110]
	CT	Revolution Wind (CT1)	200	2024	$108.15[110]
2019	CT	Revolution Wind (CT2)	104	2024	$107.08[110]
	NJ	Ocean Wind 1	1,104	2024	$116.75[111]
	NY	Empire Wind 1	816	2024	$118.64[112]
		Sunrise Wind	880	2024	$110.37[112]
2020	MA	Mayflower Wind	804	2025	$88.13[113]
2020	MA	Mayflower Wind	804	2025	$88.13[114]
2021	NJ	[redacted]			
		ASOW C	1,510	2027	$106.18 (Base)
		[redacted]			
		OW2 B	1,148	2028	$98.49 (Base)

[104] Block Island Wind Farm, Bluewater Wind, Cape Wind, and Fishermen's Energy have not been included in this comparison because they are not considered representative of the current offshore wind market. As of May 25, 2021, NYSERDA has not announced the prices for the awards to Equinor Wind for Empire Wind 2 (1,260 MW) and Beacon Wind (1,230 MW).

[105] As announced at time of award. For the Applications in the current solicitation, the years represent the first phase where there are multiple phases.

[106] Calculated from annual prices published in MD PSC Case No. 9431, Skipjack Offshore Wind Energy, LLC - Letter accepting approval on Order No. 88192, May 24, 2017 (https://webapp.psc.state.md.us/newIntranet/Casenum/NewIndex3_VOpenFile.cfm?filepath=//Coldfusion/Casenum/9400-9499/9431/Item_122\SkipjackLetterofAcceptance.PDF).

[107] Calculated from annual prices published in MD PSC Case No. 9431, U.S. Wind, Inc. - Notice of Acceptance of Conditions, May 25, 2017 (https://webapp.psc.state.md.us/newIntranet/Casenum/NewIndex3_VOpenFile.cfm?FilePath=//Coldfusion/Casenum/9400-9499/9431/123.pdf).

[108] Estimated by LAI based on limited public information available about the award.

[109] Calculated from MA DPU Docket Nos. 18-76, 18-77, and 18-78, Vineyard Wind PPAs filed on August 1, 2018. LAI added in the expected value of capacity based on the 2017 RGGI Model Rule Price Scenario to facilitate price comparison.
[110] RI PUC, Docket No. 4929, Direct Testimony of Jeffrey Grybowski on behalf of DWW Rev I LLC, April 5, 2019, p. 6. LAI added in the expected value of capacity based on the 2017 RGGI Model Rule Price Scenario to facilitate price comparison.
[111] Calculated from annual prices published in the BPU's Order in Docket No. QO18121289 (https://www.bpu.state.nj.us/bpu/pdf/boardorders/2019/20190621/6-21-19-8D.pdf).
[112] Calculated from annual prices published in NYSERDA's *Launching New York's Offshore Wind Industry: Phase 1 Report* (https://www.nyserda.ny.gov/-/media/Files/Programs/offshore-wind/osw-phase-1-procurement-report.pdf).
[113] Calculated from Order in MA DPU Docket Nos. 20-16, 20-17, and 20-18, Mayflower Wind PPAs, filed on February 10, 2020. LAI added in the expected value of capacity based on the 2017 RGGI Model Rule Price Scenario to facilitate price comparison.
[114] Calculated from Order in MA DPU Docket Nos. 20-16, 20-17, and 20-18, Mayflower Wind PPAs, filed on February 10, 2020. LAI added in the expected value of capacity based on the 2017 RGGI Model Rule Price Scenario to facilitate price comparison.

3 ECONOMIC IMPACTS AND STRENGTH OF GUARANTEES FOR ECONOMIC IMPACTS

Highlights

- Project unitized economic benefits, which are the basis for assigning points in this category, are shown in Figure 21 *BC [redacted] EC*

Figure 21. Unitized Levelized Economic Impacts
BC//EC

[redacted]

- OW2 A and B are expected to result in 1,923 and 2,024 full-time equivalent ("FTE") job years, respectively, during the development and construction phases, and 52 FTE positions annually during the operation phase. *BC/[redacted]/EC*

- The Applicants have made financial commitments to support construction of a monopile manufacturing facility in Paulsboro and *BC/[redacted]/EC* wind turbine generator assembly *BC/[redacted]/EC* facilities at the NJWP. Both Applicants would build O&M facilities in New Jersey and make substantial contributions for economic development related initiatives and grants. *BC [redacted]

[redacted]/EC* Both Applicants intend to engage with union labor for project construction.

- Both Applicants have provided financial commitments to invest in pilot energy technology programs. ASOW is committed to investment in an electrolyzer plant in South Jersey for hydrogen production. With an Application revision that could be requested by the BPU, ASOW would consider accelerating commercial development of the plant to enable demonstration of safe manufacturing and use of hydrogen in lieu of conventional methane. OW2 proposes to fund a pilot heavy truck electrification project at the Port of Newark/Elizabeth, which would help displace diesel emissions in conventional trucks.

- Both Applicants indicate support for assisting environmental justice communities in multiple ways. Both Applicants commit to providing grants and funds for workforce training, educational, innovation, and other programs, including contributions to the NJ WIND Institute, with a focus on benefits to residents of environmental justice and low-income communities. The OW2 truck electrification project would result in cleaner air in adjacent environmental justice communities. If the electric truck project is not practical, OW2 would alternatively allocate the funds for environmental justice purposes. Both Applicants would develop O&M facilities in Atlantic City, a low-income community, and would work with supply-chain firms to locate their activities in environmental justice and low-income communities.

- OW2 offered conditional in-State direct expenditures guarantees for its Projects through three years after COD, *BC/[redacted]/EC* However, OW2's minimum guaranteed spend commitment is riskier due to NJWP-related conditions.

- ASOW offered firm O&M jobs guarantees over the 20-year OREC term, while OW2 did not provide a jobs guarantee backed by financial penalties for any shortfall. *BC/[redacted]/EC* Although ASOW does not make a jobs guarantee for the development and construction phases, the details of its expected in-State activities and spending during those phases suggest that the number of in-State jobs would be much less than the jobs commitments by OW2. *BC/[redacted]/EC*

N.J.A.C. 14:8-6.5(a)(11)(i) requires the cost-benefit analysis for the Project to include a "detailed input-output analysis of the impact of the Project on income, employment, wages, indirect business taxes, and output in the State with particular emphasis on in-State manufacturing employment." N.J.A.C. 14:8-6.5(a)(11)(xiii) requires job totals to be reported as "full-time equivalent ("FTE") positions assuming 1,820 hours per FTE-year." The rules at N.J.A.C. 14:8-6.5(a)(11)(ix) specify that the evaluation consider the direct, indirect, and induced economic effects. These effects are reported below for the development, construction, operation, and decommissioning phases of each Project.

More specifically, Applicants were required to provide values for their expected direct economic impacts in terms of New Jersey expenditures and jobs during the development, construction, operation, and decommissioning phases of the Project, including planned in-State spending that will support environmental justice communities and other local economic development initiatives. Applicants were requested to guarantee all or a portion of the expected in-State direct expenditures and jobs attributable to investment commitments in New Jersey's infrastructure and related local spending during the development, construction, operation, and decommissioning phases.[115] Failure to meet the guaranteed levels of economic impacts will require the Seller to reimburse New Jersey for any shortfalls according to the Applicant's proposed compensation mechanism. This guaranteed portion of the economic impacts was given a higher weighting in the evaluation. Total expected direct impacts stated in the Application Form were evaluated by LAI for credibility, likelihood, and consistency. Near-term economic impacts were given more weight than later impacts, based on use of the 7% nominal discount rate, as stated in the Solicitation Guidance Document. Applicants were also required to include detailed input data on direct expenditures and jobs by type of activity and its industry classification.

Guidance in the SGD indicated that only economic benefits incremental to those claimed in New Jersey's first offshore wind solicitation may be included in economic benefits claimed for this solicitation #2. No explicit guidance was provided in the SGD regarding the earliest date for inclusion of in-State expenditures and jobs. From an award decision perspective, only going-forward economic benefits after the award date are relevant. Although both Applicants included some past expenditures, the amounts were too small to warrant adjustments to exclude those early development expenditures.

To facilitate objectivity and standardization, LAI independently modeled the Applicants' expected direct spending and jobs with certain adjustments in the IMPLAN economic input-output model to derive consistent estimates of GDP and jobs benefits between Applications. A description and key assumptions of IMPLAN and the modeling procedures used are presented in Appendix C.

Four types of data adjustments were made to promote consistency between Applicants for modeling evaluation and reporting purposes:

- Expenditures for construction of supply chain factories were transferred from an Applicant's development or construction category to form a factory construction category, separate from offshore wind facility construction activities.
- Expenditures for land purchase, leasing, and easements were excluded because they represent an exchange of money for existing land use rights rather than production of new goods or services.
- Taxes and fees were excluded because they represent transfer payments rather than production of new goods or services.
- Available direct jobs information provided by the Applicants were used as IMPLAN inputs for construction and operation activities.[116]

[115] The Application Form included a specific template for how Applicants should enter their expected and guaranteed minimum in-State expenditures and job creation by phase.

[116] Although requested to provide direct jobs input data for their input-output model in the Application Form's Bill-of-Goods sheet, neither Applicant provided this information.

Based on valuation weighting preferences stated in the SGD, LAI and Board Staff have specified a set of valuation weights for the six categories shown in Table 25.[117] The weighting factors were specified prior to submission of the Applications based on the product of two assumptions.

- By type of effect, indirect effects were weighted at 50% of direct effects, and induced effects at 40% of direct effects, to account for model limitations in the estimation of these diffuse local economy respending multiplier effects on production and consumption activities. The reason for these discount factors is to account for the static equilibrium assumptions and data limitations of the economic input-output model to estimate these backward linkage effects of direct local expenditures more conservatively and accurately.[118]
- By strength of each Applicant's claims, expected non-guaranteed effects were assumed to be worth 75% of guaranteed effects.

Table 25. Discount-weighting Factors by Economic Effects Category and Guarantee

BC//EC

Economic Effects Category	Source	Weighting Factor
Guaranteed direct economic effects	Submitted by Applicant	[redacted]
Expected, but not guaranteed direct economic effects	Submitted by Applicant, adjusted by LAI for consistency and use of supplemental Applicant jobs data	
Indirect economic effects associated with the guaranteed direct economic effects	Uniformly calculated by LAI with its model and consistent data assumptions	
Indirect economic effects associated with the expected, but not guaranteed direct economic effects		
Induced economic effects associated with the guaranteed direct economic effects		
Induced economic effects associated with the expected, but not guaranteed direct economic effects		

While N.J.A.C. 14:8-6.5(a)(11) indicates that several economic effects criteria are to be modeled and reported by the Applicant, including income, wages, output, indirect business taxes, and jobs, for the purposes of economic benefits scoring and cost-benefit analysis, the value-added or gross domestic product ("GDP") measure was used because it represents the net in-State income and is the most

[117] "In the evaluation of Economic Impacts and Strength of Guarantees for Economic Impacts, guaranteed employment impacts and in-State spending will be given more weight than planned, but not guaranteed, employment and spending. Non-guaranteed direct employment and spending will be given more weight than indirect and induced economic impacts" (Solicitation Guidance Document, p. 31).

[118] A static equilibrium economic model assumes that all adjustments towards a new equilibrium state occur instantaneously. There is no concept of time dynamics or partial adjustment to an initial change or shock to the system in a static equilibrium model. In contrast, a dynamic equilibrium model includes partial, lagged adjustments over multiple future time periods.

important single metric of economic development.[119] For economic benefits scoring evaluation, total GDP effects for each Project were calculated on an expected annual delivered energy unitized (levelized) real (2020 $) value basis ($/MWh).[120] For inclusion of economic development benefits in the cost-benefit analysis, the present value of total GDP effects for each Project were used.

3.1 EEW Phase 2 Factory Development

Both Applicants propose to use a new monopile fabrication facility that would be developed by EEW as a Phase 2 facility at the Paulsboro site. Both Applicants assume that construction of EEW's Phase 1 monopile finishing facility to support the OW1 project will be completed in time to not delay the proposed schedule for the Phase 2 monopile fabrication facility. *BC/[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]

[119] In contrast, output refers to the sales of sectors or industries that would be supplying the Project with materials (such as turbines, steel and cement for support structures, wire for transmission cables), and services (such as construction and installation services, as well as engineering, legal, finance, and other professional services). This is a less useful summary metric for State economic effects because it includes the value of purchases of goods and services from outside the State in addition to the value-added in-State. Wages and indirect business taxes are paid out of value-added, so inclusion of either of those two metrics with gross domestic product would double-count those effects in the overall economic benefits measure.
[120] Real values instead of nominal values were used for economic benefits scoring primarily because the lifetime profiles of direct expenditures and jobs vary significantly by lifecycle phase.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] EC*

Table 26. *BC/[redacted]/EC*

BC//EC

[redacted]

*BC/[redacted]

[redacted]

121 *BC/[redacted] EC*

122 *BC/[redacted]/EC*

123 *BC/[redacted]/EC*

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] EC*

3.1.1 Atlantic Shores

*BC [redacted]

[124] *BC/ [redacted] EC*

[125] *BC/ [redacted] /EC*

[redacted]

[redacted]

[redacted]/EC*

Table 27. ASOW *BC/[redacted]/EC*

BC//EC

[redacted]

*BC [redacted]

[redacted]/EC*

3.1.2 Ocean Wind 2

OW2 has a Preliminary Development Agreement ("PDA") 2 with EEW, effective January 26, 2021. *BC/[redacted]

[redacted]

[126] *BC [redacted]/EC*

[redacted]/EC*

Table 28. *BC/[redacted]/EC*

BC//EC

[redacted]

- *BC [redacted] EC*

Table 29. *BC/[redacted]/EC*

BC//EC

[redacted]

- *BC/[redacted]

[redacted] EC*

[127] *BC [redacted]/EC*

[128] *BC/[redacted]/EC*

3.2 Other Economic Development Plan Activities

3.2.1 Workforce and Community Development Initiatives

Both Applicants propose significant expenditures on workforce and community development initiatives. A summary of each Applicant's proposed initiatives is provided below in Table 30. The Applicants' total funding of initiatives and allocation of funding across three broad categories – support for new energy technologies, education and research, and community economic assistance – are similar.

The Applicants each propose to provide support to some of the same organizations. Both Applicants would contribute funding to the New Jersey WIND Institute and partner with Rowan College, Rutgers University, or Rowan University. Specifics of the proposed initiatives for each Applicant are summarized in the following two subsections.

Table 30. Workforce and Community Development Initiatives
(millions of nominal $)
BC//EC

	Atlantic Shores			Ocean Wind 2[129]	
	[redacted]	C	[redacted]	A	B
Innovative Technologies					
SJI Hydrogen Plant	[redacted]	16	[redacted]		
Zeem trucks / Environmental Justice				11	
Education and Research					
Wildlife Monitoring Fund				12	
New Jersey WIND Institute[130]	[redacted]	10.16	[redacted]	2	
Pro-NJ Grantor Trust 2				8	
Rutgers University EcoComplex[131]	[redacted]	2.01	[redacted]		
Workforce Development Fund Seed[132]	[redacted]	4	[redacted]		
Education and Community Center	0.7				
Rowan College/University[133]	0.4			Unspecified	
Rutgers Future Scholars	0.336				
Boys and Girls Club STEAM	0.32				
Community Economic Assistance					
Electric bill assistance				0.2	
Electric car chargers	0.17				
Barnegat Bay Partnership[134]	0.15				
Chambers of Commerce	0.017				
Total	[redacted]	**34.263**	[redacted]	**33.2**	**33.2**

3.2.1.1 Atlantic Shores Initiatives

BC [redacted] /EC Atlantic Shores would commit $160,000 to serve as Lead Sponsor for all WIND Institute events. Additionally, for Projects *BC/[redacted]/EC* C, *BC/[redacted]/EC* Atlantic Shores would commit $10 million for workforce training and innovation activities of the WIND Institute.[135]

[129] Ocean Wind 2 provided little information on its proposed expenditures timing. *BC [redacted] /EC*
[130] *BC/ [redacted] EC*
[131] *BC/ [redacted] EC*
[132] This seed money into Atlantic Shores' training fund would be paid regardless of whether there is an economic benefit shortfall. Additional contributions totaling up to *BC/[redacted]/EC* $36 million (Project C) *BC/[redacted]/EC* would be made if there is a shortfall.
[133] Atlantic Shores' proposed Rowan College/University expenditure occurs in 2021-2028.
[134] *BC/[redacted]/EC*
[135] The alignment of this commitment with the structure of the WIND Institute has not been assessed.

Atlantic Shores also proposes to partner with SJI to construct a hydrogen demonstration plant, partner with Rutgers University to expand its EcoComplex, contribute seed funding to Atlantic Shores' workforce development fund, and invest in several smaller initiatives.

The goal of the hydrogen demonstration plant is to increase the use of hydrogen as a fuel source by using an electrolyzer to produce green hydrogen for blending into natural gas. Atlantic Shores would commit *BC/[redacted]/EC* $16 million for a 10 MW electrolyzer for Projects C *BC/[redacted]/EC*

All Atlantic Shores projects would also include $400,000 to fund student scholarships in workforce training programs at Rowan College.

The level of proposed Rutgers EcoComplex funding varies depending on the project selected. All Atlantic Shores projects include a $10,000 commitment to sponsor and lead a series of introduction to offshore wind seminars. Projects *BC/[redacted]/EC* C, *BC/[redacted]/EC* also include $1 million to sponsor 5+ minority or women business enterprise offshore wind companies and $1 million to fund the purchase and construction of offshore wind-specific testing equipment. *BC [redacted]/EC*

As part of its economic benefit shortfall compensation mechanism, Atlantic Shores proposes to set up a workforce development fund to invest in New Jersey workforce training to build skills and capabilities necessary for the offshore wind industry. Atlantic Shores would seed *BC/[redacted]/EC* into this fund, depending on the Project, regardless of whether there is a shortfall in economic benefit. If there is a shortfall, Atlantic Shores would commit up to *BC/[redacted]/EC* of additional funding, depending on the project and amount of the shortfall.

Atlantic Shores has also proposed several smaller initiatives that are included with all projects:

- At least $700,000 would be spent over the first ten years of the lease to establish an Education and Community Outreach ("ECO") Center in partnership with Stockton University in Atlantic City.
- $336,000 would be used to provide summer programming in offshore wind for high school students through the Rutgers University Future Scholars program, which provides college preparation and a tuition-free pathway to college for first-generation students from low-income backgrounds.
- $320,000 would be used to support the Boys & Girls Club of Atlantic City's STEAM (science, technology, engineering, arts, and mathematics) programming.
- Up to $170,000 would be allocated to support expanding vehicle electrification in Atlantic City by purchasing electric car chargers.
- $150,000 would be used to expand communication and educational grants through the Barnegat Bay Partnership.
- $17,055 would be used to join regional or demographic-focused chambers of commerce and host "Meet and Greets" for members.

3.2.1.2 Ocean Wind 2 Other Initiatives

Ocean Wind 2 proposes $2 million in funding for the New Jersey WIND Institute for its projects.

Ocean Wind 2 proposes to partner with Zeem Solutions, Inc. on an electric truck initiative, contribute to the Regional Wildlife Monitoring Fund and the Pro-NJ Grantor Trust 2, and contribute funding to assist those unable to pay their electricity or gas bills. These commitments would not differ between Projects A and B.

Ocean Wind 2 proposes to support Zeem, a provider of e-mobility logistics solutions for small, medium, and large fleet operators across the U.S., to secure up to 50 Class 8 trucks and develop an electric truck depot facility at the Port of Newark/Elizabeth. An executed MOU contemplates a three-phased approach to financial support for the vehicles to ensure that performance and utilization levels remain high. The total financial support for this initiative would be capped at $11 million. If this pilot project cannot be realized or is ultimately deemed poor value to ratepayers, Ocean Wind 2 would reallocate the unspent portion of these funds "to deliver immediate benefits to Environmental Justice communities."[136]

Proposed commitments of $12 million to the Regional Wildlife Monitoring Fund and $8 million to the to-be-established NJ Grantor Trust 2 are also included. The Regional Wildlife Monitoring Fund would support a robust research and monitoring program that, in tandem with data collected as part of surveys and studies needed to secure state and federal permits, would provide a comprehensive picture of the offshore, nearshore, and coastal environment in New Jersey. Section 9.3.1 of Ocean Wind 2's Application contains a detailed description of the proposed initiatives to be addressed by this fund. The key tenets of the Pro-NJ Grantor Trust 2 include supporting education and training of the workforce as it transitions to increasingly support offshore wind and clean energy at large, supporting environmental justice initiatives and empowering minority business enterprise, women business enterprise, veteran-owned or small business entry into the offshore wind industry. The fund would be run by trustees appointed by the project to advise grant decisions.

Ocean Wind 2 proposes to partner with Rowan University to investigate options for the integration of energy storage technologies in conjunction with offshore wind power plants in the New Jersey electric grid, but does not specify what, if any, funding would be provided.

Ocean Wind 2 would contribute $200,000 to bolster Ocean Wind 1's work with Ørsted Cares. This is a grant program in collaboration with New Jersey Shares, Inc. ("NJ SHARES") that is designed to assist electric and gas utility customers who are in an emergent situation or facing imminent service termination and need immediate utility bill payment assistance.

3.2.2 Economic Development Plan Phases

Both Applicants have provided information on their efforts to localize manufacturing of the wind turbine generators, engage with union labor for project construction and localize project operation and maintenance facilities. The following subsections contain summaries of each Applicant's current progress and plans in each of these areas.

[136] OW2 Application, p. 8-24. Neither the locations of the Environmental Justice communities to be benefited nor the types of immediate benefits to be provided absent the Zeem initiative were specifically described. However, if the Zeem initiative is realized, the low-income communities adjacent to the Port of Newark/Elizabeth would be most benefitted by reduced air pollution from drayage trucks operating in and near the port.

3.2.2.1 Wind Turbine Generator Manufacturing Facilities

If the WTG facilities proposed by the Applicants are established, the intent of the respective OEM partners is for the facilities to provide long-term jobs and other offshore wind supply chain economic benefits to New Jersey. Most of the benefits would be in Salem County, if the WTG facilities are located, as planned, at the NJWP.

Atlantic Shores proposes establishment of an MHI Vestas nacelle assembly facility *BC/[redacted]/EC* in the NJWP. The nacelle assembly facility is included with Projects C *BC/[redacted]/EC* and, in addition to NJWP site development and leasing, would bring $16.5-24 million[137] in in-State investment for buildings and tooling and create 50-70 direct jobs during assembly of Atlantic Shores' nacelles.[138] The components for the module would be shipped from MHI Vestas' global supply chain (including potential local sourcing wherever applicable) and assembled, quality checked, and tested at the site before installation in the final nacelle. The facility would be designed to manufacture 50 nacelles per year and store them on site.[139]

BC/[redacted]/EC

For its Project B, Ocean Wind 2 has reached an agreement to partner with GE to jointly fund a nacelle assembly facility at the NJWP. Modern WTG nacelles adopt a modularized manufacturing process where modules and sub-assemblies are sourced from GE's global supply chain. It is envisaged that these essential components will be transported to the New Jersey facility, where they will be incorporated into the finished nacelle. In time, it is GE's intention to explore the possibility of building a domestic supply chain to enable components or subassemblies to be sourced from local suppliers. Due to its specific requirements, this facility could only be located at the NJWP, according to OW2. As a result of the uncertainty of the tenant selection process for land at the NJWP, the Applicant conditionally guarantees a nacelle facility as subject to GE securing a lease at the NJWP. If Project B is chosen, Ocean Wind 2 would provide $70 million of funding for GE to construct and commission the facility in time for the Project's production run.[142] The cumulative direct statewide economic impact associated with this nacelle facility would be 146 direct jobs created and a $20 million direct impact on GDP.[143] If constructed, it is expected

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[137] This does not include an additional $10 million in-State spend that is assumed for site preparation work not included in MHI Vestas' scope estimates but likely to be spent to meet specific requirements for the facility. Long-term lease costs at the NJWP would also be additional in-State spend. ASOW Application, Section 8.4.

[138] ASOW Application, Section 8.4 (page 167 of 436).

[139] ASOW Application, Section 8.4.1.2.

[140] *BC [redacted] EC*

[141] ASOW Application, Section 8.4 (page 168 of 436).

[142] OW2 Application, Section 8.2.3.

[143] OW2 Application, Section 8.3.5.

that this facility would serve the U.S. market for many years, extending the economic impact and jobs created beyond those associated with the Ocean Wind 2 project.

3.2.2.2 Union Engagement for Project Construction

Atlantic Shores has executed an MOU with the key New Jersey trade unions that will be involved in offshore wind. The MOU contains provisions that Atlantic Shores and the appropriate union parties will cooperate and collaborate to promote green economic growth and environmental sustainability while increasing the participation of a unionized workforce in offshore windfarm construction. The Applicant has begun initial discussions about training and is seeking ways to utilize both New Jersey and national union training facilities. This work will also include supporting Helmets to Hardhats, which connects retiring active-duty military service members, veterans, National Guard and Reservists with skilled training and quality career opportunities in the construction industry.[144]

In October 2020, Ørsted signed an agreement with North America's Building Trades Unions ("NABTU") for the build-out of its current and future portfolio of projects. The partnership will create a national agreement designed to transition U.S. union construction workers into the offshore wind industry. Through the partnership with NABTU, and in collaboration with local union leaders and Ørsted's Tier 1 suppliers, Ørsted will develop specific programming for identified work scopes so that workers are prepared when construction starts. The Applicant will build on the experience gained through the construction of Ocean Wind 1, particularly in the unique offshore environment, to expand union work opportunities for Ocean Wind 2.[145]

3.2.2.3 Operation and Maintenance Facilities

Atlantic Shores would establish an O&M center in Atlantic City that would provide between *BC/[redacted]/EC* (depending on project size) permanent jobs in technical service, project planning, data analysis, turbine preventative maintenance and repair, cable and foundation monitoring and substation maintenance, as well as create economic activity for a wide range of subcontractors including shipyards, spare part producers and vessel and harbor services. It is expected that these jobs would be filled by New Jersey residents, with the existing local maritime and fishing industry supporting vessel needs. The O&M facility would be built using local labor on an underutilized parcel in the city.[146]

Ocean Wind 2 would expand its base in Atlantic City for Ocean Wind 1 into a multi-project facility for O&M, becoming a focal point for long-term job creation within offshore wind in the state. The Applicant expects to spend $48 million in-State and create 208 FTE-years before and during the first three years of project operations. This would be an average of 41 FTEs per year, including a two-year ramp-up period before COD. For operation years *BC/[redacted]/EC* the Applicant expects to spend an additional $370 million and create *BC/[redacted]/EC* FTE-years (average of 46 FTEs per year). Many of the jobs required for the Project's O&M are technical and require specialized skills and expertise, so the Applicant will seek close cooperation with local training providers to ensure that skills and competencies can be sourced locally to create an enduring economic boost for Atlantic City and the state overall.[147]

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[144] ASOW Application, Section 8.2.5.
[145] OW2 Application, Section 8.5.2.
[146] ASOW Application, Section 8.4.1.4.
[147] OW2 Application, Section 8.4.1.

3.2.2.4 Decommissioning

After a 30-years or longer operational life, both Applicants would undertake decommissioning and removal of all offshore equipment and materials. Atlantic Shores assumes that by the time of decommissioning, a specialist industrial recycling firm will be established in New Jersey, which would cut up steel sections and extract copper and other valuable materials from the cables and turbine equipment.[148] *BC [redacted] EC* Ocean Wind 2 included a much more detailed set of in-State decommissioning activities that are basically the reverse of its installation activities.

3.3 Guaranteed Direct Economic Development Effects

Compared to the first offshore wind solicitation, the guaranteed in-State spending and jobs packages offered in this solicitation are *BC/[redacted]/EC* These outcomes likely reflect the increased maturity of the developing offshore wind industry in New Jersey. Several reasons may account for the improved quality of direct economic guarantees:

- The nearly two years between the first-round and this second-round solicitation's submission dates has provided more time for hardening proposed project supply chain plans, logistics plans, and relations with New Jersey business, labor, and educational constituencies.
- The previous award to Ørsted for Ocean Wind 1 apparently provided EEW with sufficient inducement to begin development of its Phase 1 monopile finishing facility in Paulsboro. Based on that commitment by EEW, both Applicants in this solicitation have included firm spending commitments related to EEW's proposed Phase 2 monopile fabrication facility.

3.3.1 Comparative Evaluation

Table 31 compares the six Project offers by the type of spending and/or jobs guarantees for key functional drivers related to the scope and magnitude of in-State expenditures and employment. The ASOW offers consist of a firm NJ spending guarantee from 2019 until final COD and a 20-year firm O&M jobs guarantee over the OREC term. OW2 has in-State spending and jobs guarantees from the OREC award date until three years after final COD. The OW2 guarantees combine development and construction activities with O&M activities, while ASOW has separate guarantees for the pre- and post-COD periods. The OW2 jobs guarantee is only used to decrease its spending guarantee if actual jobs exceed guaranteed jobs, and there is no penalty for not meeting the jobs guarantee.

*BC [redacted]

[148] ASOW Application, Section 15.

[redacted]

[redacted] EC* ASOW's Project C size and scope are similar to OW2 Project B, with ASOW proposing that MHI Vestas would construct a nacelle assembly facility at the NJWP, while OW2 proposes that GE would build a nacelle assembly facility at the NJWP. *BC [redacted] /EC*

The logistics plans of both Applicants include leasing of areas at the future NJWP for WTG marshalling. OW2 makes its spending and jobs guarantees contingent on timely completion of the NJWP and obtaining a reasonable cost lease, while ASOW's spending guarantee for that activity is firm. OW2's Project B also makes construction of a nacelle assembly facility and in-State supply of nacelles contingent on GE obtaining a reasonable cost lease at the NJWP, while ASOW's spending guarantee is firm regardless of whether the MHI Vestas nacelle assembly *BC/[redacted]/EC* facilities are built and supply WTG components for Projects C *BC/[redacted]/EC* OW2 proposes that its spending guarantee for network upgrades will vary up or down, based on the final TSUC relative to the upgrade cost estimate in OW2's spending guarantee.[149]

Table 31. In-State Spending and Jobs Key Drivers and Commitment Type

BC//EC

	Atlantic Shores Offshore Wind		Ocean Wind 2		
	[redacted]	C	[redacted]	A	B
Nameplate capacity (MW)	[redacted]	1,509.6	[redacted]	[redacted]	1,148.0
Grants and funding of economic benefits	[redacted]	Firm	[redacted]	[redacted]	Firm
Foundation fabrication facility and supply	[redacted]	Firm	[redacted]	[redacted]	Firm
[redacted]	[redacted]	Firm	[redacted]	[redacted]	Firm
WTG marshalling	[redacted]	Firm	[redacted]	[redacted]	2 Conditions
Nacelle assembly facility and supply	[redacted]	Firm	[redacted]	[redacted]	2 Conditions
[redacted]	[redacted]	--	[redacted]	[redacted]	--
Onshore and offshore construction	[redacted]	Firm	[redacted]	[redacted]	Firm
Network upgrades	[redacted]	Firm	[redacted]	[redacted]	Variable
Operations and maintenance	[redacted]	Firm	[redacted]	[redacted]	Firm

ASOW proposes two independent NJ economic benefits guarantees while OW2 proposes a single, more complex guarantee structure. ASOW offers an in-State spending commitment that guarantees 100% of its estimated in-State spending from 2019 through COD, *BC/[redacted]/EC* ASOW suggests that the firm spending guarantee ensures that many in-State jobs will be created during the development and construction phases. Hence, ASOW does not include a guarantee for the number of jobs prior to COD. For the operations phase, ASOW

149 *BC/[redacted]/EC*

proposes only a jobs guarantee based on 100% of its estimated number of in-State FTE positions in operations and maintenance over the entire OREC term.

In contrast, OW2 makes a single guarantee that includes both spending and jobs components that cover 90% of its spending and jobs estimates during the post-award development and construction period and the first three years of operations after final COD. OW2 proposes that if it creates more jobs than its jobs guarantee component requires, it will reduce the in-State spending guarantee obligation at the rate of $82/hour.

To facilitate comparison between the Applicants' economic benefits guarantees with as much uniformity as possible, the spending and jobs guarantees are summarized separately in Table 32 for spending and Table 33 for jobs, although they are interrelated in the OW2 guarantee structure. Some calculated values are also included in the two tables to provide additional comparability.

Table 32. Expected and Guaranteed In-State Spending by Applicant and Project
BC//EC

	Atlantic Shores Offshore Wind[150]			Ocean Wind 2[151]	
	[redacted]	C	[redacted]	A	B
Currency Unit	Nominal $			Real 2020 $	
Commitment Period	2019 to phase COD with *pro rata* spend tracking for each phase			Award date to final COD + 3 years	
Expected Spend					
Development and Construction					
Conditions	None			Network upgrade cost deviation; NJWP timely completion; Reasonable NJWP lease terms	
Expected Spend ($MM)	[redacted]	848	[redacted]	~1,193 (~[redacted])	~1,327 (~[redacted])
Operations					
Conditions	None			None	
Expected Spend ($MM)				48	48
Total					
To final COD ($MM)	[redacted]	848	[redacted]		
To final COD+3y ($MM)				~1,241 (~[redacted])	~1,375 (~[redacted])
Spend Guarantee					
Type of Guarantee	**Firm**			**Conditional**	
Deficiency Cure Rate	[redacted]	100%	[redacted]	90%	90%
Guaranteed Spend ($MM)	[redacted]	**848**	[redacted]	**~1,117 (~[redacted])**	**~1,237 (~[redacted])**
Deficiency Consequences	Additional contribution to a workforce development fund for any shortfall up to ($MM): [redacted]	36	[redacted] Reduce OREC price for any additional shortfall over remainder of OREC term	Additional contribution to Pro-NJ Grantor Trust 2. Any spend shortfall is reduced by a credit for any in-State jobs greater than guaranteed jobs at $82/hr	

Both Applicants commit to providing grants and funds for several types of workforce training, educational, innovation, and other programs, as well as contributions to the NJ WIND Institute, in their expenditures covered by their respective spending guarantees. ASOW also includes funding for a small hydrogen plant in its Projects *BC/[redacted]/EC* C, *BC/[redacted]/EC* in its project spend guarantee.

The spend values in Table 32 for ASOW and OW2 are not fully directly comparable due to differences in their proposals. On one hand, the ASOW values would be smaller if they had also been provided in real 2020 dollars instead of nominal dollars spent from 2019 through 2028. On the other hand, the ASOW values would be slightly larger if the commitment period had included in-State operations expenditures

[150] ASOW's spend guarantee is for materials and services through COD (ASOW Application, p. 161). Guaranteed expenditures and maximum deficiency contribution to workforce development fund are provided in Application, Table 8-6. *BC/[redacted]/EC*

[151] OW2's total expected spend values provided in Application Table 8.1 and expected spend for O&M until COD + 3 years provided in Table 8.9. Guaranteed expenditures are provided in Table 8.14. Lower values in parentheses are for when the conditions are not met. The tilde symbol represents final TSUC cost variation.

for three years after final COD. *BC/[redacted]/EC*

Key conclusions in comparing Applicants' spending guarantees:

1. OW2 proposes more contributions to various organizations and program activities than ASOW. *BC [redacted]/EC* The ASOW commitment to an unnamed workforce development fund appears to be at the early conceptual stage, but there would be sufficient time to implement the program and strategy after an award.

2. Both Applicants have stated that their expenditure guarantees include recent development expenditures. Although for comparative evaluation in Project selection, only going forward expenditures after the award date matter from the perspective of NJ residents and ratepayers, the size of sunk expenditures that would be claimed by each Applicant are similar and relatively small. Thus, the January 1, 2019 start date in ASOW's guarantee and the mid-2021 start date in OW2's guarantee are not a material issue.

3. *BC [redacted] EC* However, OW2's minimum guaranteed spend commitment is "softer" in that its proposed guarantee mechanism would credit the minimum spend obligation by $82/hour or $149,200 per FTE-year for any FTEs created beyond its jobs guarantee.

4. OW2's guaranteed spend for its larger expected in-State economic impacts scope Project B will be identical to its Project A guarantee if the three NJWP conditions are not met. *BC/[redacted]/EC*

5. The spend deficiency cure mechanism proposed by ASOW is marginally riskier than OW2's in that beyond a deficiency threshold for adding more funds to its proposed workforce development fund, any excess deficiency would be compensated by a reduction in OREC pricing. The reason the OREC pricing adjustment mechanism is slightly riskier is that it would be based on a projection of future expected production per its one-time reset mechanism.[152]

The guaranteed in-State jobs commitments by the Applicants are more disparate than their in-State spending guarantees due to much different time periods for their respective jobs commitments and the lack of a penalty mechanism by OW2 for a guaranteed jobs shortfall. ASOW's jobs guarantee covers all 20 years of the OREC term while OW2's time span is identical to that of its spending commitment, from award date to three years after final COD. *BC/[redacted]

[152] If actual future delivered energy exceeds the forecast, ratepayers would receive extra deficiency compensation. If, on the other hand, actual future delivered energy is less than the forecast, ratepayers would not receive the full PV of the calculated deficiency value. In effect, some volume risk is passed through to ratepayers.

[redacted] EC* To facilitate comparison, the bracketed values in Table 33 are operations period FTE values calculated from OW2's post-COD period.

Table 33. Expected and Guaranteed In-State Jobs by Applicant and Project
BC//EC

	Atlantic Shores Offshore Wind			Ocean Wind 2[154]	
	[redacted]	C	[redacted]	A	B
Jobs Scope and Commitment Period	O&M jobs, verified every five years during OREC 20-year term			All jobs, from award date to final COD + 3 years	
Expected Jobs					
Development and Construction					
Conditions	None			NJWP timely completion and reasonable NJWP lease costs	
Employment (FTE-years)	Not available			2,137 ([redacted])	2,327 ([redacted])
Operations					
Conditions	None			None[155]	
Duration (years)[156]	[redacted]	20	[redacted]	5	5
Annual Jobs (FTEs/year)[157]	[redacted]	88	[redacted]	[52]	[52]
Jobs Guarantee					
Type of Guarantee	**Firm**			**Conditional**	
Deficiency Cure Rate	[redacted]	100%	[redacted]	90%	90%
Guaranteed Pre-O&M Jobs (FTE-years)	[redacted]	0	[redacted]	1,923 ([redacted])	2,094 ([redacted])
Guaranteed O&M Jobs (FTE-years)	[redacted]	1,760	[redacted]		
Guaranteed Annual Average O&M Jobs (FTEs/year)	[redacted]	88	[redacted]		
Deficiency Consequence	Additional contribution to workforce development fund for any guaranteed shortfall, credited at $50,000/FTE-yr in the COD year and escalated thereafter at 2.5% per annum			None	

Key conclusions in comparing the Applicants' jobs guarantees:

153 *BC [redacted] EC*

154 OW2 values in parentheses are the values when the conditions are not met.

155 *BC/ [redacted] /EC*

156 The ASOW guarantee period is for 20 years after final COD, while the OW2 five-year period includes two years before final COD and the first three years after COD.

157 OW2 values in brackets assume one-fourth of the stated 208 FTEs for a five-year period, which includes ramping the operations workforce during the last two years prior to final COD as the equivalent annual post-COD FTEs.

1. ASOW does not make a jobs guarantee for the development and construction phases. However, the details of its expected in-State activities and spending during those phases suggest that the number of in-State jobs would be somewhat fewer than the jobs commitments by OW2, based on approximate proportionality to their respective in-State spending commitments in Table 32.[158]
2. *BC [redacted] /EC* Three reasons that account for much of the difference are (1) ASOW guarantees 100% of its expected jobs while OW2 guarantees 90%, (2) OW2 would have higher O&M labor productivity by expanding the same Atlantic City O&M base as for OW1, so incremental labor needs are smaller than for ASOW's initial project, and (3) OW2 ramps up its O&M jobs over the three COD phases of OW2.
3. ASOW imposes a penalty on itself of $50,000/FTE-year for any guaranteed jobs deficiency, while OW2 imposes no penalty, under its assumption that its spending guarantee supersedes its jobs guarantee. Effectively, OW2 would not suffer any negative consequence for a shortfall below its stated jobs guarantee level. OW2's jobs guarantee is illusory in this regard.
4. OW2's guaranteed jobs for its Project B will be identical to its Project A guarantee if the three NJWP conditions are not met. *BC/[redacted] EC*
5. *BC [redacted] EC*

3.3.2 Atlantic Shores

ASOW stated that confidence in its economic development plan is the reason why it is offering a 100% unconditional guarantee on its in-State spending and jobs commitments.

To back the pre-COD direct spending guarantee, ASOW proposes a two-tier compensation mechanism for any deficiencies in its verified actual performance:

1. The first compensation mechanism is to cover any shortfall with additional contributions to a workforce development fund, such that the fund would be capped at *BC/[redacted]/EC* $40 million, or *BC/[redacted]/EC* for Projects *BC/[redacted]/EC* respectively. The additional contribution values shown in Table 32 are 90% of the workforce development fund cap values because ASOW commits to making initial "seed" contributions of 10% of the cap values in its grants and funding commitments. Thus, the incremental contribution to compensate for a deficiency would be limited to the remaining 90% of the maximum potential contribution to the workforce development fund.

[158] The lack of a specific pre-COD jobs commitment by ASOW may in part reflect that it is dependent on third-party EPC contractors for some in-State supply chain and logistics activities, while OW2 relies on Ørsted for self-provision of EPC services and/or that Ørsted has been able to harden its supply chain procurements for OW1, which would likely be leveraged for OW2.

2. Above the workforce development fund caps, ASOW would return to NJ ratepayers "dollar for dollar" a reduction in the OREC price. The true-up OREC price discount per MWh would be calculated by dividing the remaining guarantee shortfall by the expected production of the wind farm project over the remainder of the OREC term.

Calculation of the verified direct spend would be done by an independent consultant selected by ASOW and approved by the BPU. The independent consultant and Atlantic Shores will agree on the calculation method and "will evaluate actual local content spend from 2019 to COD + 1 year pertaining to the selected Project" (p. 162). *BC/[redacted]

[redacted]

[redacted]/EC*

ASOW also makes an operations period jobs guarantee that spans the entire 20-year OREC term. Jobs covered include technicians, non-technicians, and indirect staff. An independent consultant selected by ASOW and approved by the BPU will verify the direct jobs FTEs every five years. Any shortfall would be made up by an additional contribution to the workforce development fund at an initial rate of $50,000/FTE-year of O&M jobs shortfall. *BC/[redacted] EC* ASOW agreed in CQ2 #13b to escalate the $50,000/FTE penalty rate, starting at COD, at a nominal annual rate of 2.5% to account for increases in worker training costs. *BC/[redacted] EC*

3.3.3 Ocean Wind 2

OW2 proposes a single combined in-State spend and jobs guarantee. The expected in-State spend and jobs commitments are stated in its Table 8.12 for Project A and Table 8.13 for Project B's incremental commitments related to in-State nacelle assembly.

For each in-State direct economic activity listed in the two tables, OW2 characterizes its type of commitment as firm, variable, or conditional. The two activities labeled as "variable" commitments, network upgrades and operations, need elaboration here:

- For network upgrades, OW2 proposes to adjust up or down the stated expected in-State spend in proportion to OW2's total expected spend to final TSUC cost.[159]
- *BC/[redacted] EC*

Timely completion of the NJWP is a necessary condition and obtaining a timely lease at the NJWP at "commercially reasonable terms" by OW2 for WTG marshalling in both projects, and by GE for the nacelle facility in Project B are contingent conditions. Each Project's planned schedule will determine the limit of "timely" and OW2 will have "sole discretion" of those conditions precedent on behalf of GE for its lease. *BC/[redacted] EC* For the expected project budget items of WTG marshalling, nacelle facility construction, and nacelle assembly services, if the NJWP completion and lease conditions are not met, then the expected in-State spend and jobs values for these three items fall to zero. OW2 states that it will reconfirm the local economic content commitments for these three items when the NJEDA concludes the tenant selection process, expected Q1 of 2022. Backup or contingency plans are discussed in Section 2, Project Description.

OW2 proposes to allow for budgeting uncertainties by guaranteeing 90% of the expected spend and jobs commitments. To consolidate into a single combined guarantee, OW2 proposes to monetize any guaranteed jobs exceedence at (real 2020) $82/hour, based on average compensation for five union trades in Salem County, where the NJWP will be located and much of the NJ work performed.[160] OW2 would select an independent expert to verify direct in-State spend and jobs within six months after final COD plus three years. OW2 does not propose any penalty for a shortfall in meeting its jobs guarantee.

Any expenditure shortfall compensation would be made as additional funding of an equal amount to the Pro-NJ Grantor Trust 2 for the purpose of supporting workforce development in disadvantaged communities in NJ, in addition to other foci of the Trust.

The guarantee mechanism proposed by OW2 allows for cross-subsidization between the in-State spend and jobs guarantees, as illustrated in the Application's Table 8.16 matrix of guarantees and compensation,

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[159] OW2 does not include any in-State jobs for network upgrades, so no jobs commitment adjustment is specified.
[160] At the NJ standard of 1,820 hours per FTE-year, the jobs value is equivalent to $149,240 per FTE-year.

replicated here in Table 34 due to its importance in understanding the strength and flexibility of the guarantee mechanism for an outcome in which either the expenditure guarantee or the employment guarantee is not met:

- If the in-State spend guarantee is met or exceeded, then no compensation is needed for any shortfall in guaranteed jobs (upper right quadrant).
- If the in-State spend guarantee is not met, then the compensation needed is reduced by the equivalent value of any exceedance in guaranteed jobs (lower left quadrant).
- If neither the in-State expenditure guarantee or the in-State employment guarantee is met, then the compensation needed is equal to the shortfall in "actual" in-State expenditure (lower right quadrant).

Thus, despite stating an employment guarantee, OW2 would not pay financial compensation for not meeting the guaranteed number of in-State FTE job-years. Its employment guarantee only serves as a threshold towards reducing the expenditure guarantee based on an excess in actual FTEs minus guaranteed FTEs, times the product of $82/hour and 1,820 hours/FTE-year. This asymmetric structure is the reason why OW2 states that the focus of the mechanism is on in-State spend, which takes precedence over the jobs guarantee component of the combined guarantee.

Table 34. Ocean Wind 2 Matrix of Guarantees and Compensation

<table>
<tr><th></th><th>In-State Direct Employment Guarantee Met or Exceeded</th><th>In-State Direct Employment Guarantee Not Met</th></tr>
<tr><td>In-State Expenditure Guarantee Met or Exceeded</td><td>No compensation needed</td><td>Applicant assumes that indirect and induced jobs exceed the in-State direct employment guarantee.

No compensation needed</td></tr>
<tr><td rowspan="2">In-State Expenditure Guarantee Not Met</td><td>If equivalent in-State expenditure ≥ in-State expenditure guarantee,

No compensation needed</td><td rowspan="2">Applicant assumes that indirect and induced jobs exceed the in-State direct employment guarantee.

Compensation needed = guaranteed in-State expenditure – actual in-State expenditure</td></tr>
<tr><td>If equivalent in-State expenditure < in-State expenditure guarantee,

Compensation needed = guaranteed in-State expenditure – equivalent in-State expenditure</td></tr>
</table>

3.4 LAI Evaluation of Expected In-State Economic Development Effects

This section compares economic development effects over the project lifecycle with results from the IMPLAN model, applied with several data and model procedure adjustments from the Applicants' proposals to achieve consistency in the evaluation. LAI used the IMPLAN 2019 New Jersey state database because the more recent 2020 databases reflect temporary changes in economic patterns resulting from the COVID-19 mitigation measures affecting the economy.

Results of the evaluation are summarized in sets of six tables for (1) modeled, (2) discount-weighted, and (3) present value of discount-weighted effects, presented separately for total values and for project capacity-unitized values. Each table has the same format, showing the effects by lifecycle phase and overall, and by direct, indirect, induced, and total economic spending and respending (or multiplier) effects. The first set of six tables summarizes the in-State GDP ("value-added" in IMPLAN) effects (or changes). The GDP effects metric encompass the employment effects because labor compensation is included in the economic value-added by production of goods and services. The numbers of jobs added (in FTE-years) is also a key economic benefits metric by focusing on the breadth and distribution of new employment opportunities. The second set of six tables summarizes in-State job creation effects.

Results of the IMPLAN analysis for lifecycle phase and total expected in-State GDP effects are summarized in Table 35. The ASOW Projects appear to result in more in-State GDP growth than for the OW2 Projects. For ASOW, the 30-year operations phase produces the largest contribution to GDP, while for OW2, the construction phase leads in GDP expansion. Some of this difference may be attributable to operations economies of scale for OW2, by expanding the operations base and sharing resources with OW1.

The static model bias discount weights for indirect and induced economic flows and the discount weight for the non-guaranteed portion of direct expenditures by project phase are then applied to calculate the discount-weighted expected GDP effects presented in Table 36. In addition to the discount weights specified in Table 25, the discount-weighted GDP effects are weighted by the following guarantee share assumption, based on each Applicant's guarantee mechanism for its project direct expenditures. All or 100% of ASOW expected direct expenditures before final COD and 90% of OW2 expected direct expenditures through three years after final COD are presumed to be guaranteed, although OW2 allows for jobs creation beyond its guaranteed number to reduce its guaranteed expenditures. The reason for extrapolating the end of their expenditure guarantees is that the independent verification of in-State expenditures must be completed before the end of the OREC term or operating life.

Finally, using the same present value date and real intertemporal discount rate parameters as elsewhere in this report, the PV of the discount-weighted lifetime expected GDP effects are shown in Table 37.

Table 35. Modeled Lifetime Expected NJ GDP Effects
(Million 2020 $)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Development					
Direct	[redacted]	50	[redacted]	20	20
Indirect		33		12	12
Induced		31		7	7
Total		114		39	39
EEW Factory					
Direct	[redacted]	43	[redacted]	38	38
Indirect		21		22	22
Induced		27		25	25
Total		91		85	85
WTG Facility					
Direct	[redacted]	12	[redacted]		6
Indirect		6			13
Induced		8			7
Total		27			25
Construction					
Direct	[redacted]	307	[redacted]	356	370
Indirect		145		207	220
Induced		147		169	178
Total		599		731	768
Operations					
Direct	[redacted]	581	[redacted]	210	210
Indirect		231		77	77
Induced		327		98	98
Total		1,139		386	386
Decommissioning					
Direct	[redacted]	46	[redacted]	13	13
Indirect		34		6	6
Induced		26		7	7
Total		106		26	26
Lifetime					
Direct	[redacted]	1,038	[redacted]	637	657
Indirect		471		324	349
Induced		566		306	322
Total		2,075		1,267	1,329

Table 36. Discount-weighted Lifetime Expected NJ GDP Effects
(Million 2020 $)
BC//EC

	Atlantic Shores		Ocean Wind 2		
	[redacted]	C	[redacted]	A	B
Development					
Direct	[redacted]	50	[redacted]	19	19
Indirect	[redacted]	17	[redacted]	6	6
Induced	[redacted]	12	[redacted]	3	3
Total	[redacted]	79	[redacted]	28	28
EEW Factory					
Direct	[redacted]	43	[redacted]	37	37
Indirect	[redacted]	11	[redacted]	11	11
Induced	[redacted]	11	[redacted]	10	10
Total	[redacted]	64	[redacted]	58	58
WTG Facility					
Direct	[redacted]	12	[redacted]		5
Indirect	[redacted]	3	[redacted]		6
Induced	[redacted]	3	[redacted]		3
Total	[redacted]	19	[redacted]		14
Construction					
Direct	[redacted]	307	[redacted]	347	361
Indirect	[redacted]	72	[redacted]	101	107
Induced	[redacted]	59	[redacted]	66	69
Total	[redacted]	438	[redacted]	514	537
Operations					
Direct	[redacted]	581	[redacted]	205	205
Indirect	[redacted]	115	[redacted]	38	38
Induced	[redacted]	131	[redacted]	38	38
Total	[redacted]	827	[redacted]	281	281
Decommissioning					
Direct	[redacted]	35	[redacted]	10	10
Indirect	[redacted]	13	[redacted]	2	2
Induced	[redacted]	8	[redacted]	2	2
Total	[redacted]	55	[redacted]	14	14
Lifetime					
Direct	[redacted]	1,027	[redacted]	618	638
Indirect	[redacted]	231	[redacted]	157	170
Induced	[redacted]	224	[redacted]	119	125
Total	[redacted]	1,482	[redacted]	894	933

Table 37. PV of Discount-weighted Lifetime Expected NJ GDP Effects
(Million 2020 $)
BC//EC

	Atlantic Shores		Ocean Wind 2		
	[redacted]	C	[redacted]	A	B
Development					
Direct	[redacted]	40	[redacted]	16	16
Indirect		13		5	5
Induced		10		2	2
Total		63		23	23
EEW Factory					
Direct	[redacted]	34	[redacted]	28	28
Indirect		8		8	8
Induced		9		7	7
Total		50		43	43
WTG Facility					
Direct	[redacted]	10	[redacted]		4
Indirect		2			5
Induced		2			2
Total		15			11
Construction					
Direct	[redacted]	230	[redacted]	247	257
Indirect		54		72	76
Induced		44		47	50
Total		329		366	383
Operations					
Direct	[redacted]	295	[redacted]	133	133
Indirect		60		25	25
Induced		66		25	25
Total		422		182	182
Decommissioning					
Direct	[redacted]	6	[redacted]	1	1
Indirect		2		0	0
Induced		1		0	0
Total		9		2	2
Lifetime					
Direct	[redacted]	614	[redacted]	425	439
Indirect		141		110	119
Induced		133		82	86
Total		888		616	644

Table 38 shows how the projects compare per unit of offshore wind capacity for the PV of discount-weighted expected NJ GDP effects. This table also aggregates all the non-operations GDP effects. The results are interesting because the larger projects are coupled with more supply chain investments in WTG assembly *BC/[redacted]/EC* while having offsetting scale economies. The net change in GDP effects per MW of capacity are mixed due to these offsetting influences.

Table 38. PV of Discount-weighted Lifetime Expected NJ GDP Effects per Unit Capacity
(2020 $1,000 per MW)
BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Non-Operations					
Direct	[redacted]	211	[redacted]	255	267
Indirect	[redacted]	53	[redacted]	74	82
Induced	[redacted]	44	[redacted]	49	53
Total	[redacted]	309	[redacted]	378	402
Operations					
Direct	[redacted]	196	[redacted]	116	116
Indirect	[redacted]	40	[redacted]	21	21
Induced	[redacted]	44	[redacted]	22	22
Total	[redacted]	279	[redacted]	159	159
Lifetime					
Direct	[redacted]	407	[redacted]	370	382
Indirect	[redacted]	93	[redacted]	95	103
Induced	[redacted]	88	[redacted]	71	75
Total	[redacted]	588	[redacted]	537	561

Results of the IMPLAN analysis for lifecycle phase and total expected State employment effects are summarized in Table 39. The ASOW projects appear to result in more in-State employment than for the OW2 projects. For ASOW, the 30-year operations phase produces the most jobs, while for OW2, the construction phase leads in jobs creation. Some of this difference may be attributable to operations labor economies of scale for OW2, by expanding the operations base and sharing resources with OW1.

The discount weights for model bias in estimated indirect and induced economic flows and the discount weight for the non-guaranteed portion of direct expenditures by Project phase are then applied to calculate the discount-weighted expected employment effects presented in Table 40. The results in Table 40 are deemed to be more realistic estimates of expected jobs effects. In addition to the discount weights specified in Table 25 above, the discount-weighted job effects are weighted by the following guarantee share assumptions, based on each Applicant's guarantee mechanism for its Project direct expenditures. ASOW fully guaranteed its expected operations jobs over the 20-year OREC term, so 0% of its non-operation jobs and 100% of its operation jobs for 30 years are guaranteed FTE-years for evaluation. OW2 guaranteed 90% of its expected in-State jobs through three years beyond final COD. LAI assumed that 90% of its expected operation period jobs over the following 27 years are equivalent to guaranteed jobs for the purpose of discounted FTEs evaluation purposes because about the same number of in-State operations jobs would be sustained over the entire operational life. None of the decommissioning jobs for the Applicants were guaranteed. The reason for extrapolating the COD plus three years end of OW2's jobs guarantee is that the independent verification of in-State expenditures must be completed before the end of the OREC term or operating life. While OW2 would not pay a penalty for creating too few jobs, its jobs FTEs must be independently verified for the sake of adjusting downward its guaranteed expenditures by the amount of any over-performance in its guaranteed jobs threshold.

Finally, the PV of discount-weighted lifetime expected employment effects are shown in Table 41.

Table 39. Modeled Lifetime Expected NJ Employment Effects
(Jobs FTE-years)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Development					
Direct	[redacted]	264	[redacted]	118	118
Indirect	[redacted]	362	[redacted]	129	129
Induced	[redacted]	326	[redacted]	77	77
Total	[redacted]	952	[redacted]	323	323
EEW Factory					
Direct	[redacted]	606	[redacted]	526	526
Indirect	[redacted]	156	[redacted]	163	163
Induced	[redacted]	250	[redacted]	227	227
Total	[redacted]	1,011	[redacted]	916	916
WTG Facility					
Direct	[redacted]	55	[redacted]		90
Indirect	[redacted]	52	[redacted]		107
Induced	[redacted]	83	[redacted]		73
Total	[redacted]	190	[redacted]		269
Construction					
Direct	[redacted]	3,151	[redacted]	2,874	2,974
Indirect	[redacted]	1,371	[redacted]	2,054	2,159
Induced	[redacted]	1,543	[redacted]	1,768	1,868
Total	[redacted]	6,065	[redacted]	6,695	7,001
Operations					
Direct	[redacted]	2,700	[redacted]	1,577	1,577
Indirect	[redacted]	2,416	[redacted]	780	780
Induced	[redacted]	3,427	[redacted]	1,030	1,030
Total	[redacted]	8,543	[redacted]	3,387	3,387
Decommissioning					
Direct	[redacted]	446	[redacted]	104	104
Indirect	[redacted]	344	[redacted]	58	58
Induced	[redacted]	270	[redacted]	73	73
Total	[redacted]	1,060	[redacted]	236	236
Lifetime					
Direct	[redacted]	7,222	[redacted]	5,199	5,389
Indirect	[redacted]	4,702	[redacted]	3,183	3,395
Induced	[redacted]	5,899	[redacted]	3,176	3,349
Total	[redacted]	17,822	[redacted]	11,558	12,133

Table 40. Discount-weighted Lifetime Expected NJ Employment Effects
(Jobs FTE-years)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Development					
Direct	[redacted]	198	[redacted]	89	89
Indirect	[redacted]	136	[redacted]	48	48
Induced	[redacted]	98	[redacted]	23	23
Total	[redacted]	432	[redacted]	160	160
EEW Factory					
Direct	[redacted]	454	[redacted]	395	395
Indirect	[redacted]	59	[redacted]	61	61
Induced	[redacted]	75	[redacted]	68	68
Total	[redacted]	588	[redacted]	524	524
WTG Facility					
Direct	[redacted]	41	[redacted]		67
Indirect	[redacted]	20	[redacted]		40
Induced	[redacted]	25	[redacted]		22
Total	[redacted]	86	[redacted]		129
Construction					
Direct	[redacted]	2,363	[redacted]	2,155	2,230
Indirect	[redacted]	514	[redacted]	770	810
Induced	[redacted]	463	[redacted]	530	560
Total	[redacted]	3,340	[redacted]	3,456	3,600
Operations					
Direct	[redacted]	2,700	[redacted]	1,183	1,183
Indirect	[redacted]	1,208	[redacted]	292	292
Induced	[redacted]	1,371	[redacted]	309	309
Total	[redacted]	5,279	[redacted]	1,784	1,784
Decommissioning					
Direct	[redacted]	334	[redacted]	78	78
Indirect	[redacted]	129	[redacted]	22	22
Induced	[redacted]	81	[redacted]	22	22
Total	[redacted]	544	[redacted]	122	122
Lifetime					
Direct	[redacted]	6,091	[redacted]	3,899	4,042
Indirect	[redacted]	2,065	[redacted]	1,194	1,273
Induced	[redacted]	2,112	[redacted]	953	1,005
Total	[redacted]	10,269	[redacted]	6,046	6,320

Table 41. PV of Discount-weighted Lifetime Expected NJ Employment Effects
(Jobs FTE-years)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Development					
Direct	[redacted]	160	[redacted]	71	71
Indirect	[redacted]	110	[redacted]	39	39
Induced	[redacted]	79	[redacted]	19	19
Total	[redacted]	348	[redacted]	129	129
EEW Factory					
Direct	[redacted]	358	[redacted]	296	296
Indirect	[redacted]	46	[redacted]	46	46
Induced	[redacted]	59	[redacted]	51	51
Total	[redacted]	463	[redacted]	393	393
WTG Facility					
Direct	[redacted]	33	[redacted]		51
Indirect	[redacted]	15	[redacted]		30
Induced	[redacted]	20	[redacted]		16
Total	[redacted]	68	[redacted]		97
Construction					
Direct	[redacted]	1,773	[redacted]	1,536	1,589
Indirect	[redacted]	386	[redacted]	549	577
Induced	[redacted]	347	[redacted]	378	399
Total	[redacted]	2,507	[redacted]	2,462	2,565
Operations					
Direct	[redacted]	1,414	[redacted]	772	772
Indirect	[redacted]	627	[redacted]	192	192
Induced	[redacted]	696	[redacted]	202	202
Total	[redacted]	2,737	[redacted]	1,166	1,166
Decommissioning					
Direct	[redacted]	54	[redacted]	12	12
Indirect	[redacted]	21	[redacted]	3	3
Induced	[redacted]	13	[redacted]	3	3
Total	[redacted]	87	[redacted]	19	19
Lifetime					
Direct	[redacted]	3,790	[redacted]	2,687	2,791
Indirect	[redacted]	1,205	[redacted]	828	887
Induced	[redacted]	1,214	[redacted]	653	691
Total	[redacted]	6,210	[redacted]	4,169	4,369

As for the GDP per unit capacity values, the capacity-unitized PV of lifetime employment effects in Table 42 shows that roughly half of all PV of discounted FTE-years are long-term positions created at the start of operations, and that scale economies of labor requirements are not fully offset by the addition of supply chain investments for the larger ASOW projects.

Table 42. PV of Discount-weighted Lifetime Expected NJ Employment Effects
(Jobs FTE-years per MW)
BC//EC

	Atlantic Shores		Ocean Wind 2		
	[redacted]	C	[redacted]	A	B
Non-Operations					
Direct	[redacted]	1.6	[redacted]	1.7	1.8
Indirect		0.4		0.6	0.6
Induced		0.3		0.4	0.4
Total		2.3		2.6	2.8
Operations					
Direct	[redacted]	0.9	[redacted]	0.7	0.7
Indirect		0.4		0.2	0.2
Induced		0.5		0.2	0.2
Total		1.8		1.0	1.0
Lifetime					
Direct	[redacted]	2.5	[redacted]	2.3	2.4
Indirect		0.8		0.7	0.8
Induced		0.8		0.6	0.6
Total		4.1		3.6	3.8

3.5 Applicant-Provided IMPLAN Inputs and Results

Both Applicants provided inputs that they used to conduct IMPLAN modeling of their Projects' economic development benefits. Although the Application Form's Bill-of-Goods tables had requested IMPLAN inputs for in-State direct expenditures, in-State direct jobs (FTE-years) and in-State direct labor compensation, the Applicants only used in-State direct expenditures in their respective IMPLAN analyses. This deficiency means that IMPLAN's default, average labor time and labor cost data for each IMPLAN sector that was included in the production activity were used, which tends to over-estimate the number of jobs associated with expenditures. This in-State expenditures and jobs information is summarized below in Table 43 and Table 44, respectively. Blank cells indicate a value that is not applicable to a project and "NP" indicates a value that was not provided by an Applicant.

3.5.1 Estimated In-State Direct Spending

In each of Atlantic Shores' Projects, the Operation phase is the largest, containing roughly half of all expected in-State direct spending. Both Ocean Wind 2 projects have identical direct spending except for the addition of spending for WTG facility construction in Project B. For Ocean Wind 2, construction is the most expensive project phase, accounting for nearly half of all direct spending. *BC/[redacted]/EC* Many non-disclosed differences in the Applicants' sourcing of materials and services account for disparities between their in-State expenditures. One reason for more operation spending by ASOW is that its project would be the first phase of BOEM site development, while OW2 is able to realize economies of scale in its O&M costs. One reason why OW2 estimates more in-State construction spending is that it plans to procure relatively more construction services from NJ sources.

ASOW provided total direct expenditures for operations for two 15-year periods while OW2 provided an annual average budget. In Table 43, LAI expanded the OW2 annual O&M expenditures to include 30 years of post-COD operation, for consistency with the operation period budgeted by ASOW.

Table 43. Applicant-Provided Expected In-State Direct Spending
(2020 $ millions)
BC//EC

	Atlantic Shores[161]			**Ocean Wind 2[162]**	
	[redacted]	**C**	[redacted]	**A**	**B**
Development	[redacted]			49	49
EEW Factory	[redacted]				
WTG Facility	[redacted]				[redacted]
Construction	[redacted]				
Operation	[redacted]	1,192	[redacted]		
Decommissioning	[redacted]	120	[redacted]		
Lifetime	[redacted]	2,334	[redacted]		

While total direct spending by project is commensurate with project size for both Applicants, each distributed this spending differently across the project phases as shown below in Figure 22. *BC/[redacted] EC* Total spending, however, is consistent and reasonable for all projects based on the different capacities proposed.

[161] ASOW Application Form, Bills-of-Goods worksheet.
[162] OW2 Application Form, Bills-of-Goods worksheet.

Figure 22. Applicant-Provided Expected Allocation Shares of In-State Direct Spending
BC/[redacted]/EC

3.5.2 Estimated Direct Jobs Created

The Applicants provided only sparse data on estimated direct jobs created as shown in Table 44. Atlantic Shores provided direct jobs by position for the operating and maintenance phase. *BC/[redacted]/EC* MHI Vestas also provided a letter of support which gives jobs values for the nacelle and *BC/blade finishing/EC* facilities for the applicable Projects.[164]

Ocean Wind 2 has provided estimated in-State direct job creation for the development, construction, and part of the operation phase.[165]

[163] ASOW Application, Table 14-2.
[164] ASOW Application, Appendix 2-16. A range of 50-70 direct jobs is given for the nacelle assembly facility. LAI assumed Project C would be at the low end of this range *BC/[redacted]/EC*
[165] OW2 Application, Tables 8.12 and 8.13.

Table 44. Applicant-Provided Expected Direct Jobs
(FTE-years)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Development	[redacted]	NP	[redacted]	118	118
EEW Factory	[redacted]	NP	[redacted]	500	500
WTG Facility	[redacted]	50	[redacted]		190
Construction	[redacted]	NP	[redacted]	1,311	1,311
Operation[166]	[redacted]	2,700	[redacted]	208 (partial)	208 (partial)
Decommissioning	[redacted]	NP	[redacted]	NP	NP
Lifetime	[redacted]	NP	[redacted]	NP	NP

3.5.3 Applicant-Provided IMPLAN Results

Atlantic Shores presented results of its IMPLAN modeling in Section 16 of its Application. Section 8 of its Application also presents results on employment effects and increased in-State activity. *BC/[redacted]/EC* Direct employment effects make up nearly half of Total employment effects. The SGD instructed Applicants to calculate discounted values using a 7% nominal discount rate. In this table, value added is equivalent to the impact on GDP. *BC/[redacted]/EC* Table 47 summarizes Total (Direct, Indirect, and Induced) GDP impact by Project phase. *BC [redacted] EC*

Table 45. Lifetime Direct, Indirect and Induced Employment Impacts for Atlantic Shores Projects[167]
(FTE-years)
BC//EC

Type of Effects	[redacted]	Project C	[redacted]
Direct	[redacted]	18,550	[redacted]
Indirect	[redacted]	9,843	[redacted]
Induced	[redacted]	12,350	[redacted]
Total	[redacted]	40,744	[redacted]

[166] Atlantic Shores operation jobs for 30 years and Ocean Wind 2 operation jobs for five years, including two years before final COD.
[167] ASOW Application, Table 8-3.

Table 46. Atlantic Shores Lifetime Increased In-State Activity by Project[168]
($ million)
BC//EC

	[redacted]	Project C	[redacted]
Total spend (nominal)	[redacted]	2,334	[redacted]
Total spend (discounted)	[redacted]	1,057	[redacted]
Output (discounted)	[redacted]	3,796	[redacted]
Value-added (discounted)	[redacted]	1,869	[redacted]
Labor income (discounted)	[redacted]	1,369	[redacted]

Table 47. Atlantic Shores Total (Direct, Indirect, Induced) GDP Effects by Project and Phase[169]
(2020 $ million discounted at 7% from year of activity)
BC//EC

Phase	[redacted]	Project C	[redacted]
DEVEX	[redacted]	[redacted]	[redacted]
CAPEX	[redacted]	[redacted]	[redacted]
OPEX1	[redacted]	[redacted]	[redacted]
OPEX2	[redacted]	[redacted]	[redacted]
DECOM	[redacted]	[redacted]	[redacted]
Total	[redacted]	[redacted]	[redacted]

Ocean Wind 2 presented similar information in Sections 8 and 16 of its Application. The most relevant information from these results is summarized below in Table 48. The discounted GDP effects for Project A and Project B are $958 and $1,045 million 2020 dollars, respectively. The incremental economic effect associated with EEW Phase 2, as modeled by IMPLAN, is 683 direct and 1,645 total FTE-years created and direct and total GDP effects of $57.7 and $159.4 million 2020 dollars, respectively.[170] EEW management estimates 500 direct FTE-years. These effects are associated with the incremental construction expenditure to realize the Phase 2 facility and do not include the economic effects of the continued operation of the facility over time. Project B also includes the GE nacelle assembly facility. The cumulative economic effects of the Project's nacelle assembly scope, as modeled by IMPLAN, are 146 direct and 371 total FTE-years created and direct and total GDP increases of $20.0 and $44.8 million 2020 dollars, respectively.[171] GE estimates 100-150 FTEs.

[168] ASOW Application, Table 8-5.
[169] ASOW Application, Tables 16-6, 16-7, 16-8 and 16-9. The total row values differ slightly from the sum of the five project phases, likely due to rounding.
[170] OW2 Application, Table 8.2.
[171] OW2 Application, Table 8.8.

Table 48. Ocean Wind 2 Lifetime Economic Effects of In-State Spending by Project[172]
BC//EC

	Project A		Project B	
	Employment (FTEs)	GDP Impact (2020 $ million)	Employment (FTEs)	GDP Impact (2020 $ million)
Direct	6,501	767	7,105	827
Indirect	3,244	349	3,457	375
Induced	4,279	425	4,597	456
Total	14,023	1,540	15,159	1,657
Total PV (discounted at 7%)		958		1,045

3.5.4 Comparison of Applicant-Provided IMPLAN Results

Comparisons of the estimated employment and GDP effects from each Applicant's IMPLAN results are provided in Table 49 and Table 50, respectively.

For each Project of both Applicants, the Direct employment effect is just under half of the Total employment effect. The Indirect employment effect is less than the Induced employment effect. Even after accounting for differences in Project size, the Atlantic Shores employment effect is not commensurate with that of Ocean Wind 2. *BC/[redacted]/EC* In LAI's judgment, Atlantic Shores estimated jobs effects are unreasonably high.

Table 49. Applicant-Provided IMPLAN Employment Effects
(FTE-years)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Direct	[redacted]	18,550	[redacted]	6,501	7,105
Indirect	[redacted]	9,843	[redacted]	3,244	3,457
Induced	[redacted]	12,350	[redacted]	4,279	4,597
Total	[redacted]	40,744	[redacted]	14,023	15,159

Only the Total GDP effect was provided by both Applicants. The values are reasonably commensurate after considering Project size. For Ocean Wind 2, the Direct GDP impact is almost half the Total GDP effect. As with the employment impacts, the Indirect effect is less than the Induced effect.

[172] OW2 Application, Tables 16.2 and 16.3.

Table 50. Applicant-Provided IMPLAN GDP Effects
(2020 $ million)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Direct	[redacted]	NP	[redacted]	767	827
Indirect	[redacted]	NP	[redacted]	349	375
Induced	[redacted]	NP	[redacted]	425	456
Total	[redacted]	1,869	[redacted]	1,540	1,657

4 ENVIRONMENTAL AND FISHERIES IMPACTS

Highlights

- Project raw scores based on qualitative assessment, which are the basis for assigning points in this category, are shown in Figure 25. *BC [redacted]/EC*

Figure 23. Total Raw Environmental and Fisheries Impacts Scores

BC//EC

[redacted]

- ASOW's EPP reasonably characterizes the environmental resources and habitats. The ASOW EPP includes sufficiently detailed descriptions of potential impacts based on site-specific data and available published studies. Among many other things, DEP reports that some residents of Long Beach Island have voiced concerns about the visual impact of the project, suggesting that there may be some community opposition, *BC/[redacted]/EC*

- OW2's EPP reasonably characterizes the environmental resources and habitats and includes generic descriptions of potential impacts and mitigation options, but it is based primarily on desk-top studies and field data obtained through preparation of the COP for OW1. The export cable to Smithburg, which would have a total length of about *BC/[redacted]/EC* is proposed to be HVDC, which would require fewer separate circuits and cable trenches than HVAC. The length of the offshore segments of the cables would be significantly longer than any other export cables considered in the New Jersey offshore wind program.

- ASOW's FPP is comprehensive. It covers both recreational and commercial fishing interests. There is, however, a significant density of fishing activity in the lease area. *BC/[redacted]/EC*
- OW2's FPP is detailed and comprehensive, and demonstrates a good understanding of potential adverse impacts to commercial and recreational fishing over the lease area, which has a lower density of fishing activity.
- The Social Cost of Carbon ("SCC") was used based on the 2016 US Interagency Working Group value to monetize net emission impacts. Health effects associated with direct NO_x, SO_2, and $PM_{2.5}$ emissions were also monetized. *BC [redacted] EC*

4.1 Regional Air Quality Impacts

As part of the cost-benefit analysis, the rules at N.J.A.C. 14:8-6.5(a)(11)(xiv)(1) and (3) require Applicants to document the environmental impacts of the Project, from pre-construction through decommissioning. Air impacts include "emissions of combustion by-products," and "direct emissions impacts of the Project, including carbon dioxide, sulfur dioxide, [and] particulate emissions." N.J.A.C. 14:8-6.5(a)(8) also requires Applicants to provide "[t]he anticipated carbon dioxide emissions impact of the Project." In accordance with N.J.A.C 14:8-6.5(a)(11)(xiv), Applicants were required to provide analyses of the anticipated environmental benefits and impacts associated with each Project. Applicants also provided annual values of direct emissions of CO_2, NO_x, SO_2, and $PM_{2.5}$ during the development, construction, operation, and decommissioning of the Project. Avoided emissions displaced from fossil-fired generation by offshore wind were also submitted, along with the monetization of net emissions impacts.

For purposes of the evaluation, emissions were quantified in two categories: (1) emissions directly related to operation of equipment (marine vessels, on-road trucks, non-road equipment such as excavators, stationary generators, worker transportation, and other machinery) during construction, operation, and decommissioning of the Project; and (2) the emissions avoided through the displacement of fossil-fueled generation ascribable to the operation of the Project. Emissions from vessels, vehicles and machinery represent a very small offset to the avoided stack emissions from fossil generation and may not be fully incremental, that is, vessels, vehicles, and other equipment used for construction could be used otherwise on other construction Projects in the region.

4.1.1 Direct Emissions

The Applicants were required to provide supporting information for the estimates of category 1 emissions from vessels, vehicles and machinery that describes how they were calculated. The quality and completeness of the emissions estimate is included as a metric in the qualitative assessment of environmental impacts as discussed in Section 4.1.4. Unadjusted, annual category 1 emissions as provided by each Applicant were used in the cost-benefit analysis. Values in short tons ("ST") per year are summarized in Table 51 and further discussed in Section 4.1.4. *BC [redacted]

[redacted]/EC*[173]

Table 51. Average Annual Direct Emissions by Proposed Project by Phase
(ST/yr)
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Development					
CO_2	[redacted]				
NO_x					
SO_2					
$PM_{2.5}$					
Construction					
CO_2	[redacted]				
NO_x					
SO_2					
$PM_{2.5}$					
Operation					
CO_2	[redacted]				
NO_x					
SO_2					
$PM_{2.5}$					
Decommissioning					
CO_2	[redacted]				
NO_x					
SO_2					
$PM_{2.5}$					

4.1.2 Avoided Emissions

Each Applicant was also required to provide a forecast of the annual emissions from fossil generation that would be avoided by operation of the Project. Each Applicant used a different method and assumptions to estimate avoided emissions, and therefore the results are not reasonably comparable. Therefore, to compare the category 2 avoided emissions across Projects on a consistent basis, LAI independently estimated the avoided emissions ascribable to each Project using a "but for" test. Applying the Aurora model as described in Appendix A, LAI modeled the regional electric system as an Offshore Wind case and a No New Offshore Wind Case:

173 *BC [redacted] EC*

- The Offshore Wind case included the full New Jersey planned buildout of 7,500 MW of offshore wind capacity by 2035.
- The No New Offshore Wind case included only the 1,100 MW Ocean Wind 1 Project that was selected in the first solicitation. It does not include any offsetting development of RPS-eligible resources such as land-based wind or solar.

LAI calculated the annual differences in CO_2 between the Offshore Wind case and the No New Offshore Wind case across the model footprint, which covered PJM, NYISO, and ISO-NE. Monthly differences in emissions of NO_x, SO_2, and $PM_{2.5}$ were calculated over the MAAC portion of PJM in order to account for in-State and upwind sources that contribute to air quality and health outcomes in New Jersey.[174] The avoided emissions were assigned *pro rata* to each proposed Project by multiplying the expected MWh by a unitized annual emission factor for each pollutant, expressed as avoided tons per MWh of offshore wind. Emission factors were computed annually for CO_2 and monthly for NO_x, SO_2 and $PM_{2.5}$. The same emissions factors were applied to all Projects. The modeled annual average avoided emissions ascribable to each proposed Project, assuming a project life of 30 years, are summarized in Table 52.

Table 52. Average Annual Avoided Emissions by Proposed Project

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Average Annual					
Delivered Energy (MWh)	[redacted]				
Avoided Emissions (ST)					
Study Area CO_2	[redacted]	2,968,006	[redacted]	2,560,522	2,560,522
MAAC NO_x		732.9		629.3	629.3
MAAC SO_2		203.3		180.4	180.4
MAAC $PM_{2.5}$		84.5		72.4	72.4
Avoidance Rate per MWh					
Study Area CO_2 (ST)	[redacted]				
MAAC NO_x (lb)					
MAAC SO_2 (lb)					
MAAC $PM_{2.5}$ (lb)					

4.1.3 Monetization of Net Emissions Impacts

As an input to the cost-benefit analysis in Section 6, LAI derived annual monetized values of net emission impacts.

Avoided CO_2 emissions were monetized by applying the social cost of carbon ("SCC") from the US Government's Interagency Working Group, which monetizes damages associated with an incremental increase in carbon emissions in a given year.[175] The average case estimated using a 3% discount rate was used and converted to dollars per short ton.

[174] Monthly values allow separate calculation of avoided emissions for ozone season versus non-ozone season.

[175] "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," Interagency Working Group on Social Cost of Greenhouse Gases, United States

Health effects associated with direct $PM_{2.5}$ emissions and for NO_x and SO_2 as precursors to $PM_{2.5}$ were monetized using EPA's Technical Support Document ("TSD") *Estimating the Benefit per Ton of Reducing $PM_{2.5}$ Precursors from 17 Sectors* for NO_x, SO_2, and direct $PM_{2.5}$.[176] The TSD presented dollar values in terms of mortality and morbidity per short ton of avoided NO_x, SO_2, and direct $PM_{2.5}$ for different industrial sectors, for the years 2016, 2020, 2025, and 2030.[177] LAI used the $/short ton values cited in the TSD and extrapolated them beyond 2030 for this analysis.

For CO_2, NO_x, and SO_2 the generation-weighted average market emission allowance costs used in the Aurora simulations were netted against the $/short ton social cost associated with avoided emissions from fossil generation to calculate the net externality values per ton.[178] The per ton externality value was multiplied by the annual change in emissions derived from the Aurora model to derive the annual net benefit ascribable to the avoided emissions. Finally, for each Project, the annual monetized cost for category 1 emissions using the TSD values and the Applicants' annual values was subtracted from the annual net benefit ascribable to avoided emissions. The present value of the net benefit for each Project is illustrated in Figure 24. Results on a per MWh unitized basis are illustrated in Figure 25.

Government, August 2016. https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon-technical-documentation. This document was recently updated and issued in February 2021 as "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990" (https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf). The SCC values were escalated to 2020$ but otherwise unchanged from the 2016 issuance.

[176] U.S. EPA, "Technical Support Document Estimating the Benefit per Ton of Reducing PM2.5 Precursors from 17 Sectors," February 2018. https://www.epa.gov/sites/production/files/2018-02/documents/sourceapportionmentbpttsd_2018.pdf. This metastudy provides values from two different data sources. For consistency with Round 1, values from Krewski et al were applied.

[177] For category 1 emissions from vessels, vehicles and machinery during construction, operation, and decommissioning, LAI used the TSD values for "aircraft, locomotives and marine vessels" as a proxy for all direct emissions sources. For category 2 avoided emissions, LAI used the TSD values for "electricity generating units."

[178] Since there is no emission allowance program for $PM_{2.5}$, the value for $PM_{2.5}$ emissions did not need to be adjusted to compute the externality cost.

Figure 24. Present Value of Net Emissions Benefit

BC//EC

[redacted]

Figure 25. Levelized Net Emissions Benefit
BC//EC

[redacted]

Because the same emissions factors were applied to all Projects, on a MWh-unitized basis the avoided emissions for all Projects are very similar. The direct (category 1) emissions are a small offset to the emissions benefit, but the impact of OW2's relatively higher values of direct emissions during development, construction and decommissioning is apparent in Figure 25. Net avoided emissions is therefore not used as a differentiator in the comparison between Applications or ranking of Projects. The absolute magnitude of avoided emissions among Projects is directly related to the expected annual output – larger Projects displace more fossil generation over the evaluation period. The present value of the net avoided emissions is an input to the benefit-cost ratio of individual Projects in Section 5.8 and for the portfolio analysis in Section 8.

4.1.4 Emissions Accounting

Applicants were required to include data related to direct emissions (category 1) produced from vehicles, vessels, and machinery during construction, operation, and decommissioning of the Project as part of the Application Form. Projects were assigned a rating from Table 53 based on:

- Completeness of the data provided, the level of detail, and the extent of documentation supporting the assumptions used to develop the estimated emissions;

- Applications that specify use of low-emissions equipment or propose any other measures to reduce emissions during construction, operation, or decommissioning, if any, will be rated more favorably than Applications that do not make such representations.

Color-coding can be raised one level (e.g., Yellow to Green) for Projects that propose a feasible method for mitigating emissions during construction, operation, or decommissioning.

As illustrated in Table 51, direct emissions from vessels, vehicles and equipment during project operations are reasonably consistent between projects of similar installed capacities proposed by both ASOW and OS2. Direct emissions during other project phases are not consistent between the two bidders. Emissions estimated by ASOW during development, construction, and decommissioning are significantly lower than the estimates provided by OW2.

Table 53. Emissions Accounting Evaluation Criteria

Green	Application provides detailed and complete information on the assumptions and methods used to compute the category 1 emissions and bases the evaluation on Project-specific conditions.
Yellow	Application lacks sufficient information on the assumptions and methods used to compute category 1 emissions, and/or uses generic rather than site-specific information.
Orange	Application provides no backup information or documentation.
Red	Application provides information that is patently inconsistent with proposed Project plan.

Table 54 summarizes the ratings assigned to each Project in this category.

Table 54. Emissions Accounting Ratings
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Emissions Accounting	**Green**: Emissions accounting is detailed and includes supporting data and assumptions			**Green:** Emissions accounting is detailed and includes supporting data and assumptions	

4.1.4.1 Atlantic Shores

In its application, Atlantic Shores provided a detailed, well-documented analysis of annual emissions during construction, operations, and decommissioning for each Project. Emissions were calculated from fuel usage, based on frequency, duration, loading, and/or travel distance for different types of vessels and engines during each type of activity. Estimated annual emissions of relevant priority pollutants (NO_x, SO_2, and $PM_{2.5}$) and greenhouse gases (CO_2 equivalent) were differentiated based on activity (development, construction, operation, decommissioning). The analysis included both offshore and onshore sources and activities.

Atlantic Shores is scored Green for its accounting of category 1 emissions because the analysis is detailed and includes supporting data and assumptions.

Atlantic Shores also provided an estimate of the emissions from the fleet of fossil-fired generation within New Jersey that would be avoided by the operation of the Atlantic Shores project, based on historical plant operating data from the EPA Air Markets Program database. Because LAI considered a larger footprint in its analysis the avoided emissions reported by ASOW for New Jersey alone are consistently lower. As noted previously, for consistency LAI's analysis of avoided emissions was used in the cost-benefit analysis rather than the Applicant's.

4.1.4.2 Ocean Wind 2

Ocean Wind 2 provided a tabulation of annual category 1 emissions of NO_x, SO_2, $PM_{2.5}$ and CO_2 during development, construction, operations, and decommissioning of the Project. The Application states that these direct emissions are largely from ocean-faring vessels used to construct and maintain the Project over its lifetime.[179] Emissions were not broken out by source, and no backup documentation supporting the analysis was provided in the Application or in response to the first round of CQs. OW2 subsequently provided the documentation as part of its post-interview supplemental information. The documentation revealed that the direct emissions for OW2 were estimated by scaling the detailed emissions tabulations prepared for the OW1 analysis based on project size and duration of construction.

OW2 is scored Green for its accounting of category 1 emissions because the analysis is detailed and includes supporting data and assumptions.

OW2 also provided an estimate of the emissions from fossil-fired generation in New Jersey that would be avoided by the operation of the OW2 Project. The quantity of avoided emissions expressed in tons was estimated using marginal emission rates from EPA's eGRID database. *BC/[redacted] EC* OW2's avoided CO_2 estimate is lower than LAI's values. OW2's avoided NO_x, SO_2 and $PM_{2.5}$ emissions estimates are higher than LAI's values. The Applicant's forecast of avoided emissions was not used in the cost-benefit analysis.

4.2 Environmental and Fisheries Protection and Permitting Plans

NJDEP and LAI reviewed the EPPs, FPPs, and permitting plans submitted by each Applicant. Overall ratings were determined for each Project based on NJDEP's and LAI's review and scoring.

4.2.1 Feasibility and Strength of Environmental Protection Plan

The EPPs submitted by Applicants were evaluated to assess the level of detail contained in each Applicant's identification of potential environmental impacts and the extent and feasibility of proposed mitigation associated with Project construction and operation, including the installation of the turbine foundations, installation of array and export cables, and construction of the onshore cable and substation. Identification and description of anticipated stressors, receptors, effects, and mitigation during construction, operations, and decommissioning of the proposed Project were evaluated. Offshore resources and receptors include avian and bat species, marine mammals, sea turtles, benthic populations, fish, submerged aquatic vegetation, threatened and endangered species, sea-bed disruption, and water quality. Onshore resources and receptors may include terrestrial mammals, amphibians, reptiles, birds, bats, threatened and endangered species, preserved land, and wetlands. Depending on the onshore cable route, not all of these receptors may be present. Cultural resources include visual impacts and aesthetics, tourism, sand borrow areas, archaeological sites (wrecks), solid waste management, and shipping

[179] OW2 Application p. 9-22.

[180] OW2 Attachment 16.1 p. 21.

channels. The rating levels in this category are defined as shown in Table 55. Subject matter experts from New Jersey DEP contributed to the review of the EPPs submitted by the Applicants.

Table 55. Feasibility and Strength of Environmental Protection Plan Evaluation Criteria

Green	Characterization of biological resources and receptors includes detailed descriptions of species, geographic range, general habitat, temporal changes, listed species, mortality, and relies on up-to-date source data. Applicant incorporates NJDEP Ecological Baseline and other applicable studies. Discussion of effects includes specific direct physical impacts, indirect physical impacts, behavioral impacts, and cumulative impacts to biological receptors, water quality, and sediments. Applicant identifies field studies completed, underway, or planned. EPP outlines feasible modification of Project design and/or innovative measures to avoid, minimize, or mitigate environmental impacts.
Yellow	Characterization of biological receptors, impacts, proposed mitigation, and/or plans for additional field studies lacks some detail, is not site-specific, and/or relies primarily on desk-top studies. EPP describes feasible measures to avoid, minimize, or mitigate environmental impacts.
Orange	Characterization of biological receptors, impacts, proposed mitigation, and/or plans for additional field studies lacks considerable detail and/or is based entirely on desk-top studies. EPP lacks detail on measures to avoid, minimize, or mitigate environmental impacts.
Red	EPP fails to characterize biological receptors, is not based on studies, does not address mitigation measures, or proposes mitigation measures that do not appear to be feasible.

Table 56 summarizes the ratings assigned to each Project in this category.

Table 56. Feasibility and Strength of Environmental Protection Plan Ratings
BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Feasibility and Strength of EPP	**Green:** The EPP reasonably characterizes the environmental resources and habitats and includes sufficiently detailed descriptions of potential impacts, based on site-specific data and available published studies.			**Yellow:** The EPP relies primarily on data collected for OW1 and does not address site-specific issues.	

4.2.1.1 Atlantic Shores

Since Atlantic Shores submitted its Application in New Jersey's first offshore wind solicitation, it reports that it has commissioned extensive field studies to further develop and support its Application in this second solicitation. Atlantic Shores reports that it has spent approximately $30 million in technical studies to build upon the New Jersey Ecological Baseline Studies, including avian and bat surveys, Essential Fish Habitat surveys, benthic grab sampling, and marine mammal and sea turtle studies.[181] These studies will inform the COP submitted to BOEM and support permitting.

Atlantic Shores has been meeting with DEP on a regular basis as it has advanced development of its project. The export cable routes and on-shore rights of way have been refined based on input from the

[181] ASOW Application pp. 196-197.

DEP. As shown in the maps provided in Appendix C, D and E of the first set of CQ responses, the export cable routes have been laid out to avoid mapped artificial reefs, marine protected areas, and seagrass beds.

The proposed landfall for the export cables to the Cardiff POI is Atlantic City. *BC/[redacted]

[redacted]/EC* At both landfall locations, horizontal directional drilling ("HDD") will be used to avoid disturbing the shoreline habitat.

The onshore cable routes to both Cardiff *BC/[redacted]/EC* are almost entirely within public roads and utility rights of way, *BC/[redacted] EC*

The distance from the closest turbine to shore is *BC/[redacted]/EC* For Projects *BC/[redacted]/EC* C, the distances are *BC/[redacted]/EC* 10.5 miles, respectively.[182] LAI understands that the only legal framework that may apply to regulating distance from shore is through potential visual impact to historic districts, determined by consultation with the State Historic Preservation Office and required under Section 106 of the National Historic Preservation Act during the BOEM COP review. ASOW is conducting a Historic Resources Visual Effects Assessment and "expects that Project related effects on [historic structures]...can and will be successfully avoided or mitigated."[183] Results of this Assessment are not yet available. However, DEP reports that some residents of Long Beach Island have voiced concerns about the visual impact of the proposed Atlantic Shores Project, suggesting that there may be some community opposition, *BC/[redacted]/EC*

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[182] Response to CQ1 #1.
[183] ASOW Application p. 232.

Atlantic Shores proposes to use monopile foundations, *BC/[redacted]/EC* Installation of monopile foundations requires lifting or floating the structures into position and then driving the piles into the seabed. ASOW states that equipment operating procedures such as "soft starts" to gradually increase sound levels will be implemented (Application p. 267). Atlantic Shores proposes to test the use of "blue piling" and other sound attenuation technologies to minimize acoustic impacts to marine mammals, sea turtles, and fisheries (Application p. 214). Blue piling utilizes hydraulic pressure rather than pile driving to sink the monopile foundations. This is not yet a proven technology. Atlantic Shores may also deploy a bubble curtain to insulate the work area and mitigate acoustic impacts.[185]

The EPP reasonably characterizes the environmental resources and habitats and includes sufficiently detailed descriptions of potential impacts, based on site-specific data and available published studies. Based on the completeness and responsiveness of the EPP, Atlantic Shores is assigned a Green.

4.2.1.2 Ocean Wind 2

Ocean Wind 2's EPP is based largely on information obtained as part of the development of the Ocean Wind 1 project and preparation of the Ocean Wind 1 COP.[186] Because Ocean Wind 2 is at the early stage of development, it has not yet undertaken any field data collection or investigation specific to the Ocean Wind 2 project, and quantification of Project impacts has not been completed. Identification of potential impacts during different phases of the project, identification of habitats and biological receptors, and proposed mitigation methods are not based on site- or project-specific information. OW2 commits to using best management practices and states that, "[a]ppropriate mitigation measures will be developed after the proper investigatory process and upon appropriate engagement with the relevant stakeholder groups and the communities of New Jersey".[187]

The proposed turbine grid array for Ocean Wind 2 is an extension of the Ocean Wind 1 grid layout *BC/[redacted] EC* OW2 proposes to use monopile foundations, and will use a noise dampening technology *BC/[redacted]/EC* to mitigate acoustic impacts. OW2 is also in the process of developing a low-noise alternative to pile-driving. *BC/[redacted] EC*

Indicative export cable routes for HVDC cables to two potential interconnection points on the 500 kV transmission system, Deans and Smithburg, are shown in Figure 9 on page 21. The cable to Smithburg, which is now designated as the primary POI as discussed in Section 2.1.1.2, would come ashore at Asbury

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[184] *BC/[redacted]/EC*
[185] ASOW Application p. 267.
[186] OW2 Application p. 9-9.
[187] OW2 Application p. 9-9.
[188] OW2 Application p. 2-23.
[189] OW2 Application p. 2-32.
[190] OW2 Interview Transcript, pp. 85-86.

Park, and have a total length of about *BC/[redacted]/EC* miles. The export cable is proposed to be HVDC, which would require fewer separate circuits and cable trenches than HVAC. The length of the offshore segments of the cables would be significantly longer than any other export cables considered in the NJ offshore wind program. State permit agencies will need to consider tradeoffs between longer cable routes with more offshore disturbance versus the advantages of interconnecting on the 500 kV AC transmission backbone at a POI that is comparatively robust.

The export cable route, landfall, and POI for OW2 have not been finalized. *BC/[redacted]/EC* OW2 proposes to use trenchless technology, i.e., HDD, to avoid impacts to sensitive habitats such as the coastal habitat and wetlands, and will restore or replace disturbed wetlands. No project- or site-specific plans have yet been developed.

The EPP reasonably characterizes the environmental resources and habitats and includes generic descriptions of potential impacts and mitigation options, but it is based primarily on desk-top studies and field data obtained through preparation of the COP for OW1. Locations of Project features are indicative only, so site-specific impacts and mitigation strategies are not identified. OW2 is assigned a Yellow for this criterion.

4.2.2 Feasibility and Strength of Fisheries Protection Plan

Applicants were required to provide an FPP that demonstrates a complete understanding of the potential impact of the Project on commercial and recreational fishing and provides a feasible plan to mitigate such impacts. The rating levels in this category are defined as shown in Table 57.

[191] Attachment to response to CQ2 #20.

[192] OW2 Application Attachment 9.1, Figures 2.2-11 and 2.2-12

Table 57. Feasibility and Strength of Fisheries Protection Plan Evaluation Criteria

Green	The FPP is detailed and comprehensive, demonstrates a superior understanding of potential adverse impacts to commercial and recreational fishing specific to the proposed location of the proposed Project based on recent and appropriate data, and provides a comprehensive, thoughtful and feasible mitigation plan based on robust stakeholder engagement. FPP describes an approach to continued commercial and recreational stakeholder engagement and incorporation of that feedback into the final mitigation plans.
Yellow	The FPP demonstrates a reasonable understanding of potential adverse impacts to commercial and recreational fishing and provides a feasible mitigation plan. FPP describes approach to continued commercial or recreational stakeholder engagement, but not both, and incorporation of that feedback into the final mitigation plans.
Orange	The FPP demonstrates a fair understanding of potential adverse impacts to commercial and recreational fishing, provides mitigations that would only be minimally effective or may be impractical to implement. FPP describes an approach to continued stakeholder engagement, but is not specific about which stakeholders will be involved, and/or does not explain how stakeholder feedback will be incorporated into the final mitigation plan.
Red	The FPP demonstrates an incomplete understanding of potential adverse impacts to commercial and recreational fishing. The mitigation plan is incomplete or of questionable value. The plan does not allow for ongoing stakeholder engagement and/or does not allow for stakeholder feedback to be incorporated into the final mitigation plan.

Table 58 summarizes the ratings assigned to each Project in this category.

Table 58. Feasibility and Strength of Fisheries Protection Plan Ratings
BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Feasibility and Strength of FPP	**Yellow:** FPP is detailed, comprehensive, and covers both recreational and commercial fishing interests, however there is significant density of fishing activity in the lease area.		**Orange:** Score is differentiated based on [redacted]	**Green:** The FPP is detailed and comprehensive, and demonstrates a good understanding of potential adverse impacts to commercial and recreational fishing over the lease area, which has a lower density of fishing activity.	

4.2.2.1 Atlantic Shores

The FPP provides a good summary of the finfish and invertebrate resources within the lease area, based on project-specific habitat surveys that build upon the DEP Ecological Baseline Studies and other publicly available fisheries data. The extent and duration of potential impacts to sensitive marine habitats and fisheries resources during construction and operation are reasonably characterized. As discussed for the EPP, the FPP also addresses project-specific design modifications and mitigation to minimize disturbance of the seabed, benthic habitats, shellfish, and finfish. ASOW's FPP includes a strong stakeholder engagement program, including both an active commercial and recreational fishing liaison.

Atlantic Shores reports that most of the marine traffic within the lease area is commercial fishing vessels. Based on ASOW's study of vessel transits, large passenger vessels, cargo vessels, tankers, tugs, and barges tend to travel around the outskirts of the lease area.[193]

Surf clam and ocean quahog dredging is the primary fishing activity in the lease area.[194] Although surf clam dredging occurs throughout the lease area, the northern portion has been more productive in recent years.[195] The turbine layouts for Projects *BC/[redacted]/EC* C *BC/[redacted]/EC* are located in the southern portion of the lease area, *BC/[redacted]/EC* The proposed turbine grid is oriented along a E/NE (80 degree) axis, based on consultation with the surf clam industry and the USCG, to accommodate the primary direction of vessel traffic.[196] Grid spacing is proposed to be 1 x 0.6 NM. Atlantic Shores states they are committed to ensuring a safe and navigable project area that is compatible with continued fishing activities and navigation.[197] However, fishing industry representatives have communicated to DEP that one nautical mile grid spacing is not adequate for safe fishing operations and navigation. *BC/[redacted] EC*

Atlantic Shores has committed to a cable burial depth of 6 feet below the mudline to minimize the risk of cable snags.[199] The FPP provides for compensation for any loss or damage to fishing gear or vessels ascribable to entanglement on project structures or cables.[200] Atlantic Shores does not propose an industry compensation program that would compensate operators for lost catch.[201]

Atlantic Shores is scored Yellow for Projects *BC/[redacted]/EC* C, and Orange *BC/[redacted]/EC* Although ASOW's FPP is detailed, comprehensive, and covers both recreational and commercial fishing interests, the score reflects the higher degree of potential adverse impact arising from the significant density of fishing activity in the ASOW lease area and ASOW not fully addressing the concerns expressed by fishermen.

4.2.2.2 Ocean Wind 2

As noted for the EPP, OW2's FPP is primarily based on data collection and fisheries outreach undertaken for Ocean Wind 1. OW2 has not yet developed a Project-specific Fisheries Outreach Plan. However, the OW1 research and industry engagement appears to broadly cover the entire lease area and areas outside of the lease area as well. The FPP includes extensive and detailed information on the New Jersey

193 ASOW Application p. 38.
194 ASOW Application p. 267.
195 ASOW Application p. 268.
196 ASOW Application p. 39.
197 ASOW Application p. 276.
198 ASOW Interview Transcript, pp. 95-97.
199 ASOW Application p. 274.
200 ASOW Application p. 258.
201 A fisheries compensation program is not currently a requirement for offshore wind projects. The DEP has been working with stakeholders to develop a program, which may be rolled out next year.

commercial and recreational fishing industry, commercially important finfish and shellfish species, quantity and value of catches of different commercial species, and various state and federally protected marine areas.

The turbine grid orientation and spacing is proposed to be a continuation of the 1x0.8nm grid layout that is being proposed for the Ocean Wind 1 project. OW2 acknowledges that the turbine layout is essential for safe navigation and fishing (see p. 2-23), but the FPP is silent on the basis for selection of the grid spacing. Figures 10.4 through 10.10 illustrate the fishing density of the commercially important species of finfish and shellfish. The data indicate that quahog and surf clam dredging activity has historically (2012 - 2016) been significantly less dense within the OW2 lease area relative to the Atlantic Shores lease area and other surrounding areas. During the interview, OW2 reported that based on outreach to stakeholders, OW2 understands that the main issue for the fishing community is transit through the lease area to fishing grounds further offshore and to New Bedford, MA, to unload their catch, and that there is relatively little fishing within the lease area.[202] The export cable routes traverse regions of higher shellfishing activity. Since the marine environment is dynamic, shellfish habitats and areas of fishing density may migrate over time, however. OW2 reports in its response to CQ2 #17, that it will undertake a Navigational Safety Risk Assessment as part of the COP development.

The target cable burial depth for export and array cables is provided as a range: 1.5 to 2 meters. OW2 intends to perform a cable burial risk assessment to determine burial depths, but it will not be initiated until 2Q2021. The long distance traversed by the export cables will necessitate crossing multiple existing telecom cables, which may increase the risk of interference with shellfishing activities. This is not addressed in the FPP, but will need to be addressed in a future COP.

The FPP is detailed and comprehensive, and demonstrates a good understanding of potential adverse impacts to commercial and recreational fishing over the lease area. Ocean Wind 2 scores a Green for this factor, reflecting the lower potential for adverse impact due to the lower density of fishing activity in the lease area and the completeness of the FPP.

4.2.3 Completeness of Permitting Plan and Reasonableness of Timelines and Milestones

Applicants were required to provide a complete list of all required Federal, State, and local permits and authorizations, identifying the activity requiring the permit and the jurisdictional agency. Permitting Plans were evaluated to assess the Applicant's understanding of all Federal, State, and local permits and authorizations that would be required to develop and operate the Project. Applicants were required to provide a permitting timeline that indicates the milestones for submitting each permit and the anticipated timeframe for agency approval, and that is consistent with the overall development schedule. Copies of all submitted permit applications and any issued approvals and permits, submitted per N.J.A.C. 14:8-6.5(a)(10) were reviewed in support of evaluating these metrics where necessary. The rating levels in this category are defined as shown in Table 59.

[202] OW2 Interview Transcript, p. 81.

Table 59. Completeness of Permitting Plan and Reasonableness of Timelines and Milestones Evaluation Criteria

Green	Permit plan and timeline demonstrate a thorough understanding of the required Federal, State, and local permits and authorizations, and identify the jurisdictional agency and activity requiring the permit or authorization. The timeline for obtaining permits is consistent with the overall development milestones and allows for reasonable delays and contingencies.
Yellow	Applicant's plan for obtaining the required Federal, State, and local permits and authorizations identifies the jurisdictional agency and activity requiring the permit or authorization. Applicant's milestone schedule does not allow for potential delays or contingencies.
Orange	Applicant's permit plan is incomplete or not sufficiently detailed and/or timeline is overly optimistic and may jeopardize the expected commercial operation date.
Red	Applicant's permit plan is generic and indicates a lack of understanding of Federal, State, and/or local requirements and/or timeline is inconsistent with the overall development schedule.

Table 60 summarizes the ratings assigned to each Project in this category.

Table 60. Completeness of Permitting Plan and Reasonableness of Timelines and Milestones Ratings
BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Permitting Plan and Timelines	**Green:** Applicant has provided a satisfactorily complete list of required federal, state, and local permits.			**Green:** Applicant has provided a satisfactorily complete list of required federal, state, and local permits.	

4.2.3.1 *Atlantic Shores*

Atlantic Shores has provided a satisfactorily complete list of required federal, state, and local permits. DEP reports that one minor permit may be missing from the permit plan, but this is not a significant defect.

Atlantic Shores scores Green for this factor.

4.2.3.2 *Ocean Wind 2*

Ocean Wind 2 has provided a satisfactorily complete list of required federal, state, and local permits. DEP reports that one minor permit may be missing from the permit plan, but this is not a significant defect.

Ocean Wind 2 scores Green for this factor.

4.2.4 Permit Status and Potential Obstacles to Obtaining Permits

Each Application was reviewed to evaluate the overall status and inherent risks of the Permitting Plan. Projects which have already secured key initial permits received higher ratings. The proposed turbine arrays, export cable routes and landfall locations, onshore rights of way and substation locations were reviewed to analyze whether the Applicant would be likely to encounter significant obstacles in obtaining certain permits, potentially jeopardizing development milestones, and/or causing additional mitigation / compliance costs. The rating levels in this category are defined as shown in Table 61.

Table 61. Permit Status and Potential Obstacles to Obtaining Permits Evaluation Criteria

Green	Applicant has prepared a Site Assessment Plan or a Construction and Operations Plan and/or applied for one or more permits that are required to begin Project development. It is reasonably expected that there will not be significant obstacles in obtaining permits in time to meet the expected commercial operation date, as long as complete applications are submitted with adequate time for review, and any additional mitigation or compliance costs are not expected to be significant.
Yellow	Applicant has begun preparation of one or more permit applications required to begin Project development. Some permitting risks are identified but can be addressed with feasible modifications to the Project and/or additional mitigation or compliance costs that will not jeopardize Project viability or the proposed commercial operation date.
Orange	Applicant has not initiated any permits or approvals. Permitting risks appear to be significant and there is a risk of significant delay in the expected commercial operation date, but the project is still considered viable.
Red	Project contains significant permitting risks that cannot be remedied without jeopardizing the viability of the Project.

Table 62 summarizes the ratings assigned to each Project in this category.

Table 62. Permit Status and Potential Obstacles to Obtaining Permits Ratings
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Permit Status and Obstacles	**Green:** No specific obstacles to permitting have been identified, SAP and COP have been submitted.		**Yellow:** Potential risk of permitting delay due to local opposition.	**Orange:** Site-specific permitting has not been initiated.	

4.2.4.1 Atlantic Shores

Atlantic Shores received its Site Assessment Survey Plan approval from BOEM in September 2019, and has obtained other federal approvals to conduct field surveys.[203] Atlantic Shores submitted its Site Assessment Plan ("SAP") to BOEM in December 2019 and will need to receive approval in order to begin geotechnical and geophysical surveys and to deploy a second metocean buoy in 2021.[204] Atlantic Shores submitted a COP for the southern portion of the lease area covering the location for Projects *BC/[redacted]/EC* C *BC/[redacted]/EC* on March *BC/[redacted]/EC* 2021, and anticipates submitting a COP for the northern portion of the lease area *BC/[redacted]/EC* Submission of the COP initiates review of other federal permits.

The Cardiff onshore cable route and onshore substation occurs within the Pinelands Commission jurisdictional boundary.[206] The right of way crosses areas designated as "Regional Growth Area" and

[203] ASOW Application, p. 384.
[204] ASOW Application, p. 299.
[205] ASOW Application, p. 299-300.
[206] ASOW Application, p. 371.

"Rural Development Area", so it is expected that the proposed development would be determined to be consistent with the Pinelands Comprehensive Management Plan.[207]

As noted under Section 4.2.1.1, the proximity of the closest turbines of *BC/[redacted]/EC* to shore has triggered some local community concerns about visual impacts. Local community opposition may create potential obstacles or delays.

Atlantic Shores Projects *BC/[redacted]/EC* C are scored Green because no specific obstacles to permitting have been identified and the SAP and COP have been submitted to BOEM. *BC/[redacted]/EC* scored Yellow due to *BC/[redacted]/EC* and potential for obstacles or delays due to local opposition related to visual impacts.

4.2.4.2 Ocean Wind 2

Ørsted has been focusing on advancing Ocean Wind 1 and has not initiated site-specific permitting for Ocean Wind 2. Ørsted expects to leverage its experience from Ocean Wind 1 to facilitate permitting for Ocean Wind 2,[208] but has not identified any strategy for securing permits for Ocean Wind 2, in particular, the offshore export cable route or the on-shore right-of-way.

The SAP, which was approved by BOEM on May 17, 2018, covers site activities over the entire Ørsted lease area, including Ocean Wind 2. A COP has been submitted and deemed sufficient to begin environmental review for Ocean Wind 1,[209] but a COP has not yet been submitted for Ocean Wind 2. Ørsted expects to submit the COP for OW2 in Q3 2022, *BC/[redacted]/EC*

Ocean Wind 2 scores Orange for this factor since it has not initiated any project-specific permitting, and groundwork for Ocean Wind 1 does not address the specific conditions surrounding the Ocean Wind 2 turbine array or the proposed offshore and on-shore cable route.

4.2.5 POI Future-Proofing

Applicants were required to provide a description of design elements in their Projects that will accommodate future expansion of offshore wind delivery capability and avoid or minimize incremental environmental impact. If the Project does not include design elements, a rationale for exclusion must be provided. The objective is not to encourage or require Applicants to overbuild export cable transmission capacity, but to "future-proof" the Project in order to avoid or minimize the area of seafloor or shoreline disturbance, the number of cable landfalls, or the footprint of the onshore right-of-way or interconnection facilities.

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[207] State of New Jersey, Pinelands Commission, Pinelands Interactive Map, https://www.nj.gov/pinelands/home/maps/interactivemap/
[208] OW2 Application, p. 13-8.
[209] BOEM, "Notice of Intent To Prepare an Environmental Impact Statement for Ocean Wind, LLC's Proposed Wind Energy Facility Offshore New Jersey" March 30, 2021, https://www.federalregister.gov/documents/2021/03/30/2021-06520/notice-of-intent-to-prepare-an-environmental-impact-statement-for-ocean-wind-llcs-proposed-wind
[210] OW2 Application, p. 11-2.

Table 63. POI Future-Proofing Evaluation Criteria

Green	Applicant proposes future-proof design elements that are highly likely to avoid or minimize future environmental impacts.
Yellow	Applicant proposes future-proof design elements that may avoid or minimize future environmental impacts.
Orange	Applicant does not propose any future-proof design elements but includes a reasonable rationale for not including such elements.
Red	Applicant does not address POI future-proofing and does not include a reasonable rationale for not including such elements, or proposes future-proof design elements that may increase environmental impacts.

Table 64 summarizes the ratings assigned to each Project in this category.

Table 64. POI Future-Proofing Ratings

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
POI Future-Proofing	**Green:** Future-proof design elements are proposed and highly likely to reduce future environmental impacts.			**Orange:** Future-proof design elements are not proposed in order to avoid potentially stranded assets.	

4.2.5.1 Atlantic Shores

Atlantic Shores proposes to install extra conduits in the onshore portion of the rights-of-way to Cardiff *BC [redacted] EC* It would avoid future onshore civil work, including digging and trenching, from the transition vault at the beach landing to the point of interconnection, *BC/[redacted]/EC*

Atlantic Shores also intends to expand its baseline studies over the entire lease area to avoid the environmental impact (and, presumably cost) of a future field mobilization.[212]

Atlantic Shores scores a Green for this factor because the proposed design elements are highly likely to reduce future environmental impacts. LAI notes, however, that if installation of the extra conduits creates incremental environmental impact without being necessary for the completion of the project at hand, then the expanded civil work may not be readily permitted. *BC/[redacted] EC* The assigned score assumes based on this context that the proposed future-proofing will not create significant incremental impact.

[211] ASOW Application, p. 346.

[212] ASOW Application, p. 253.

[213] ASOW Interview Transcript, pp. 115-118.

4.2.5.2 Ocean Wind 2

OW2 acknowledges that it sees value in “strategic deployment of shared facilities and continues to explore opportunities for these to be delivered in a commercially competitive manner.” However, OW2 does not propose any specific design elements to avoid or minimize future environmental impacts because “inclusion of elements to support future expansion, while desirable, would result in unnecessary ratepayer costs for potentially stranded assets.”[214]

Ocean Wind 2 is scored Orange for this factor since the Application does not include any future-proof design element but provides a reasonable rationale for not including such an element.

4.3 Summary of Qualitative Scoring

Each Project is assigned a score from zero to three for each metric based on the color-coding described above. Those raw scores are then multiplied by the weighting factor assigned to each of the qualitative metrics, as shown in Table 65.

Table 65. Environmental and Fisheries Impacts Weighting Factors and Total Scores

BC//EC

Metric	Weighting Factor	Atlantic Shores			Ocean Wind 2	
		[redacted]	C	[redacted]	A	B
Feasibility and strength of EPP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Feasibility and strength of FPP	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Completeness of Permitting Plan and reasonableness of timelines and milestones	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Permit status and potential obstacles to obtaining permits	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
POI future-proofing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Emissions accounting	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total Weighted Score		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[214] OW2 Application, p. 9-24.

5 LIKELIHOOD OF SUCCESSFUL COMMERCIAL OPERATION

Highlights

- Project raw scores based on qualitative assessment, which are the basis for assigning points in this category, are shown in Figure 25. *BC [redacted] EC*

Figure 26. Total Raw Likelihood of Successful Commercial Operation Scores
BC//EC

[redacted]

- Both Ocean Wind 2 and Atlantic Shores are backed by global energy companies with strong balance sheets. Each company has demonstrated the management expertise needed to facilitate successful commercial development, although ASOW does have less corporate offshore wind experience. Preliminary identification of GE and MHI Vestas as the WTG suppliers and foundation design follow industry standards, with the caveat that Ørsted does not have experience with the specific foundation type proposed by OW2, but do not preclude changes if technology progress merits design modifications in the years ahead. Importantly, such changes will not trigger an OREC price increase.

- Certain components of the Projects' scores are differentiated based on development status, scheduling and environmental considerations. These identified differentiating factors do not rise to the level of risk that could impede project commercialization.

- Both Applicants are highly likely to successfully develop their respective Projects as there are no known obstacles that constitute fatal flaws. Energizing their respective supply chains to support rapid advancement in light of Governor Murphy's accelerated carbon reduction goals should strengthen each Applicant's ability to meet scheduled milestones.

5.1 Project Design

N.J.A.C. 14:8-6.5(a)(2)(i)(2) requires a demonstration by Applicants that "the wind technology is viable, cost competitive, and suitable for use in New Jersey's offshore environment under varying and expected meteorological and climate conditions…" In support of this requirement, Applicants were required to provide a description of each of the major types of equipment that is planned to be installed as part of the Project, including specifications, warranties, commercial operating history and the ability of the equipment to work in New Jersey's offshore and near shore climates. Major types of equipment include wind turbine generators, foundations, offshore substations, and inter-array and export cables.

5.1.1 Wind Turbine Generator Suitability

Table 66. Wind Turbine Generator Suitability Evaluation Criteria

Green	The proposed WTG is commercially available or can reasonably be expected to become commercially available prior to commencement of Project construction, and similar equipment by the same supplier has been used successfully in one or more areas similar to New Jersey's offshore environment.
Yellow	The proposed WTG can reasonably be expected to become commercially available during Project construction without significant anticipated delays in commercial operation, and Applicant has provided specifications, warranties and/or characteristics for the proposed WTG that indicate its ability to work successfully in New Jersey's offshore environment.
Orange	There is some risk that there will be a delay in availability of the proposed WTG that significantly affects the Project commercial operation date, or the Applicant has provided specifications, warranties and/or characteristics for the proposed WTG indicating that it may not work successfully in New Jersey's offshore environment.
Red	Applicant has not provided information to support the use of the proposed WTG in New Jersey's offshore environment, or the proposed manufacturer has not previously supplied similar WTGs.

Table 67 summarizes the ratings assigned to each Project in this category.

Table 67. Wind Turbine Generator Suitability Ratings

BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
WTG Suitability	**Green**: WTG certification timeline is consistent with Project development schedule, and similar equipment from the same supplier has been used successfully in other locations.			Green: The design basis WTG is reasonably expected to become commercially available prior to the start of construction	

5.1.1.1 Atlantic Shores

According to ASOW, the V236-13.6 MW turbine from MHI Vestas is *BC/[redacted] EC* ASOW provided a certification commitment letter from DNV-GL stating that the "aim is to complete the Type Certification Rotor Nacelle Assembly in Q3 2023" (Appendix 2-17). ASOW further states that they will "ensure that the new model is certified specifically for the Project site conditions and for the entire operating lifetime before the start of fabrication" (Application p. 77). *BC/ [redacted] EC*

ASOW is rated Green for this criterion because the WTG certification timeline is consistent with the Project development schedule and similar equipment from the same supplier has been used successfully in other locations.

5.1.1.2 Ocean Wind 2

The GE Haliade-X 12 MW turbine achieved final type certification in November 2020.[216] Ocean Wind 2 has not provided documentation of the certification plan or timeline, but reports that the 14 MW turbine will be ready for the Dogger Bank C project in the UK.[217] For that project, WTG installation is set to begin in 2025, *BC/ [redacted] EC* The Haliade-X platform has not yet been deployed, but comparable equipment "is currently successfully off the cost of Rhode Island in Ørsted's Block island Wind Farm" and also in the North Sea (Application p. 2-20). The platform is being designed to meet a certification standard that it can operate in an offshore marine environment and survive loads and hurricanes.[220] *BC [redacted] /EC* the timeline for the 14 MW design basis WTG is consistent with the Project schedule.

OW2 is rated Green for this criterion because the design basis WTG is reasonably expected to become commercially available prior to the start of construction.

[215] ASOW Application, pp. 77-78.
[216] OW2 Application, p. 2-7.
[217] https://doggerbank.com/press-releases/ges-haliade-x-14mw-turbine-to-debut-at-dogger-bank-c/
[218] OW2 Application, p. 11-4.
[219] OW2 Application, p. 2-7.
[220] OW2 Application, p. 2-20.

5.1.2 Foundation Suitability

Table 68. Foundation Suitability Evaluation Criteria

Green	The proposed foundation has an established history of use in locations similar to the offshore environment of New Jersey.
Yellow	Applicant has provided specifications, warranties and/or characteristics for the proposed foundation that indicate its ability to work successfully in New Jersey's offshore environment.
Orange	Applicant has provided specifications, warranties and/or characteristics for the proposed foundation indicating that it may work successfully in New Jersey's offshore environment.
Red	Applicant has not provided information to support the use of the proposed foundation in New Jersey's offshore environment.

Table 69 summarizes the ratings assigned to each Project in this category.

Table 69. Foundation Suitability Ratings

BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Foundation Suitability	Green: Primary (monopile) [redacted] have previously been used in locations similar to the offshore environment of New Jersey.			Yellow: Monopile technology has previously been used in locations similar to the offshore environment of New Jersey, [redacted]	

5.1.2.1 Atlantic Shores

Atlantic Shores' primary project design involves the use of monopile foundations with transition pieces ("TPs"). *BC/[redacted]/EC* Monopiles are the most widely used type of foundation for offshore wind farms, with more than 7,000 foundations installed worldwide, representing over 34 GW of capacity (Application p. 53).[221] Monopiles are especially suitable for water depths of 40 meters or less, which is consistent with the water depth in the lease area, and the soft soil that is generally prevalent on the seabed off the coast of New Jersey.

BC [redacted] EC

[221] The "2018 Offshore Wind Technologies Market Report" published by the U.S. DOE Office of Energy and Efficiency and Renewable Energy reports that monopiles represent 73.5% of the offshore wind market as of year end 2018. https://www.energy.gov/sites/prod/files/2019/09/f66/2018%20Offshore%20Wind%20Technologies%20Market%20Report.pdf, p. 45.

ASOW is scored Green for this criterion because it proposes to use technology that has been widely used in locations similar to the offshore environment of New Jersey.

5.1.2.2 Ocean Wind 2

Based on preliminary site data, Ocean Wind 2 also proposes to use monopile foundations, *BC/[redacted]/EC* OW2 states that Ørsted has been responsible for installing approximately 1,500 monopile foundations, and that the design ensure "suitability with the local marine and ocean environment" (Application p. 2-20). OW2 has also stated, however, that it plans to use a relatively new technology, the TP-less monopile.[222] *BC/[redacted]/EC* OW2 identified two non-Ørsted projects in the Netherlands where a total of 120 foundations of this type have been installed. *BC/[redacted] EC*

OW2 is scored Yellow for this criterion because it proposes to use a new technology with which the Applicant has limited experience.

5.1.3 Inter-array and Export Cables Suitability

Table 70. Inter-array and Export Cables Suitability Evaluation Criteria

Green	The proposed undersea cables have an established history of use in locations similar to the offshore environment of New Jersey.
Yellow	Applicant has provided specifications, warranties and/or characteristics for the proposed undersea cables that indicate their ability to work successfully in New Jersey's offshore environment.
Orange	Applicant has provided specifications, warranties and/or characteristics for the proposed undersea cables indicating that they may work successfully in New Jersey's offshore environment.
Red	Applicant has not provided information to support the use of the proposed undersea cables in New Jersey's offshore environment.

Table 71 summarizes the ratings assigned to each Project in this category.

Table 71. Inter-array and Export Cables Suitability Ratings
BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Cables Suitability	**Green:** Proposed technology is standard for offshore wind farms.			**Green:** Proposed technology is standard for offshore wind farms.	

5.1.3.1 Atlantic Shores

ASOW is planning to utilize a *BC/[redacted]/EC* cable system for the Cardiff interconnection, *BC/[redacted]/EC* The inter-array cables will operate at 66 kV. *BC/[redacted]

[222] Response to CQ1 #2.

[redacted]/EC*

ASOW is scored Green for this criterion because the proposed technology is standard for offshore wind farms and has previously been used in locations substantially similar to the offshore waters of New Jersey.

5.1.3.2 Ocean Wind 2

BC [redacted]/EC

OW2 is scored Green for this criterion because the proposed technology is standard for offshore wind farms and has previously been used in locations substantially similar to the offshore waters of New Jersey.

5.1.4 Offshore Substations Suitability

Table 72. Offshore Substations Suitability Evaluation Criteria

Green	The proposed equipment has an established history of use in locations similar to the offshore environment of New Jersey.
Yellow	Applicant has provided specifications, warranties and/or characteristics for the proposed equipment that indicate its ability to work successfully in New Jersey's offshore environment.
Orange	Applicant has provided specifications, warranties and/or characteristics for the proposed equipment indicating that they may work successfully in New Jersey's offshore environment.
Red	Applicant has not provided information to support the use of the proposed equipment in New Jersey's offshore environment.

Table 73 summarizes the ratings assigned to each Project in this category.

Table 73. Offshore Substations Suitability Ratings

BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Offshore Substations Suitability	**Green:** Proposed technology is in use for global offshore applications.			**Green:** Proposed technology is in use for global offshore applications.	

5.1.4.1 Atlantic Shores

*BC [redacted]

[223] ASOW Application, p. 59.

[224] OW2 Application, p. 2-17

[225] OW2 Application, pp. 2-5 and 2-10.

[226] *BC/[redacted]/EC* (ASOW Application p. 68).

[redacted] EC* ASOW states that the equipment to be installed in the offshore substations "is currently being used in most North American utilities' substations" (Application p. 71). Depending on the specific ASOW Project, the specifications for offshore substation size or cable voltage may be incrementally larger than technology currently in use for offshore wind, but not to a degree that represents technology risk. The selected offshore substation supplier, Rosetti Marino has "extensive offshore experience in the offshore market" (Application p. 71).[227]

ASOW is scored Green for this criterion because the proposed technology is currently in use for global offshore applications.

5.1.4.2 Ocean Wind 2

Ocean Wind 2's offshore substation will consist of a topside structure and foundation substructure. *BC [redacted] /EC* OW2 reports that the equipment is being used successfully in the North Sea, and also that comparable equipment is being used at the Block Island Wind Farm.

OW2 is scored Green for this criterion because the proposed technology is currently in use for global offshore applications.

5.1.5 Storage and Innovative Technologies

Applicants were encouraged to utilize new and innovative technologies, including storage, that contribute to reducing the demand for peak electric generation, improve the reliable operation of the electric system, reduce the emissions of greenhouse gases from electric generation, and/or minimize environmental and/or fisheries impacts.

Table 74. Storage and Innovative Technologies Evaluation Criteria[229]

Green	Applicant proposes to utilize storage or innovative technology that will contribute to reducing peak demand, increase system reliability, and/or reduce emissions of greenhouse gases
Yellow	Applicant proposes to utilize storage or innovative technology that may contribute to reducing peak demand, increase system reliability, and/or reduce emissions of greenhouse gases.
Red	Applicant does not propose the use of storage or innovative technologies, or proposes the use of storage or innovative technologies that may increase peak demand, impair system reliability, or increase emissions of greenhouse gases.

[227] ASOW notes that currently "offshore substations are constructed and in operation in sizes up to 1,000 MW/ *BC [redacted] EC* (ASOW Application p. 71).
[228] OW2 Application, pp. 2-13 to 2-14.
[229] There is no Orange rating for this criterion.

Table 75 summarizes the ratings assigned to each Project in this category.

Table 75. Storage and Innovative Technologies Ratings

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	**C**	[redacted]	**A**	**B**
Storage and Innovative Technologies	**Green:** The proposed pilot hydrogen demonstration project will reduce greenhouse gas emissions in New Jersey including potential decarbonization of the gas grid.			**Green:** The truck electrification project will reduce greenhouse gas emissions in New Jersey.	

5.1.5.1 Atlantic Shores

Atlantic Shores' innovation plan consists of two elements: developing a hydrogen demonstration plant, and collaborating with academia to explore commercial pathways for battery storage and hydrogen. The hydrogen demonstration plant would be sized at *BC/[redacted]/EC* 10 MW for Projects C *BC/[redacted]/EC* The electrolyzer will convert generation from the offshore wind facility into green hydrogen by using the renewable electricity to make hydrogen from water. The hydrogen generated by the electrolyzer will then be blended with natural gas in SJI's gas distribution system and used to fuel residential, commercial, and industrial customers. The pilot project will support SJI's efforts to reduce greenhouse gas emissions.

BC [redacted]/EC

ASOW is scored Green for this criterion because the proposed pilot hydrogen demonstration project will reduce greenhouse gas emissions in New Jersey including potential decarbonization of the gas grid.

5.1.5.2 Ocean Wind 2

*BC/Ocean Wind 2's innovation plan consists of two primary components: powering electric drayage trucks at the Port of New York and New Jersey using offshore wind, and researching options for the integration of energy storage technologies in conjunction with offshore wind power plants in the New Jersey electricity grid. The truck electrification project is designed to deliver emissions reductions and air quality improvements in one of New Jersey's most overburdened communities. Ocean Wind 2 will provide financial support to Zeem "to support the deployment of zero-emission Class 8 freight transport such that the operating cost matches that of more mature fossil-fuel technology" (Application p. 8-22). The project will include up to fifty Class 8 trucks and development of an electric truck depot facility. The depot and trucks are intended to be configured with vehicle-to-grid capabilities to provide energy storage to the PJM grid.

OW2 notes that it has not included storage in the Project because "significant technical challenges still prevent the deployment of storage at the scale needed" (Application p. 8-24) *BC [redacted]/EC*

OW2 is scored Green for this criterion because the truck electrification project will reduce greenhouse gas emissions in New Jersey.

5.2 Transmission

5.2.1 Interconnection Plan

The Project's PJM interconnection request, study schedule and the schedule for construction of the required transmission system upgrades are also an important consideration in determining the Likelihood of Successful Commercial Operation, per N.J.A.C. 14:8-6.5(a)(14) *et seq*. All Applicants were required to submit a proposed Project schedule and milestones that includes the necessary transmission interconnection studies and approvals. The schedule for transmission interconnection studies is influenced by the transmission POI and the required transmission system upgrades.

Table 76. Interconnection Plan Evaluation Criteria

Green	The proposed Project schedules are detailed, complete, and include feasible timelines, providing reasonable assurance that the Project will meet the proposed in-service date. Applicant provides a clear and reasonable justification for selection of the POI that considers cable distance, scope of transmission system upgrade requirements, ability to work synergistically with the future offshore transmission grid, environmental impacts, and impacts on PJM current and future load pocket and transmission constraints, and compares these factors favorably to other potential POIs.
Yellow	The proposed Project schedules include sufficient detail to demonstrate the feasibility of achieving the Proposed in-service date. Applicant provides a justification for selection of the POI that considers cable distance, scope of transmission system upgrade requirements, ability to work synergistically with the future offshore transmission grid, and impacts on PJM current and future load pocket and transmission constraints, and compares these factors to other potential POIs.
Orange	The proposed Project schedule is complete and aligned with the proposed in-service date, but the level of detail provided is not sufficient to demonstrate the feasibility of the proposed in-service date. Applicant provides information regarding the POI including cable distance, scope of transmission system upgrade requirements, ability to work synergistically with the future offshore transmission grid, and impacts on PJM current and future load pocket and transmission constraints, but does not compare these factors to other potential POIs.
Red	The proposed Project schedule indicates significant risk of delay. Applicant does not explain why the selected POI was chosen.

Table 77 summarizes the ratings assigned to each Project in this category.

Table 77. Interconnection Plan Ratings

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Interconnection Plan	**Green:** [redacted] would result in timely completion. Relative benefits of POIs are stated. Environmental impacts and mitigation measures are addressed.	**Yellow:** [redacted] would result in timely completion, but [redacted] would not. Relative benefits of POIs are stated. Environmental impacts and mitigation measures are addressed.		Orange: The basis for the construction duration of the system upgrades is not provided. Cable length presents environmental challenges. The landfall and onshore cable routes have not been finalized, therefore permitting challenges cannot be assessed.	

5.2.1.1 Atlantic Shores

The Feasibility Study and System Impact Study have been completed for each of the queue positions *BC/[redacted] EC*

230 *BC/[redacted] /EC*

Table 78. Interconnection Work Completion Dates Relative to Project CODs
BC//EC

[redacted]

Environmental considerations related to the export cable are described in Section 4.2.1.1. *BC [redacted] EC* The offshore cable routes avoid artificial reefs, and HDD will be used to avoid shoreline disturbances.

ASOW supports the selection of the Cardiff POI by noting that it is 12 miles from the cable landfall location and can be accessed primarily by existing transportation rights-of-way. The substation was upgraded after Hurricane Sandy and is one of the largest substations in South Jersey. *BC/[redacted]/EC* ASOW notes that multiple POIs had initially been selected for study, and that list was refined to the proposed *BC/[redacted]/EC* POIs in part because they are "*BC/[redacted]/EC* the electrically strongest locations on the 230 kV system of New Jersey's Atlantic coast" (Application p. 333).

Based on studies conducted by a third-party consultant, ASOW "is expected to reduce the need to import power from western supply sources to serve the New Jersey load centers and neighboring load zones in

[231] *BC/[redacted]/EC*
[232] *BC/[redacted]/EC*
[233] *BC/[redacted] EC*
[234] *BC/[redacted]/EC*
[235] *BC/[redacted]/EC*

eastern PJM and thereby reduce congestion on some of the constrained lines in the region" (Application p. 334).

ASOW *BC/[redacted]/EC* scored Green for this criterion because *BC/[redacted]/EC* would allow for timely completion of the interconnection work. Projects C *BC/[redacted]/EC* scored Yellow for this criterion because *BC/[redacted]/EC* would allow for timely completion of the interconnection work. The rationale for selecting the POIs is provided, and environmental impacts and mitigation measures are addressed for all Projects.

5.2.1.2 Ocean Wind 2

Ocean Wind 2 filed an interconnection request with PJM in *BC/[redacted]/EC* Feasibility Study results are expected from PJM in *BC/[redacted]/EC* The System Impact Study will be completed by PJM around *BC/[redacted]/EC* The Facilities Study is expected to be completed in 2024, with the Interconnection Service Agreement also executed in 2024. The OW2 summary project schedule (Application p. 11-5) indicates that the system upgrades and interconnection facilities will be completed in *BC/[redacted]/EC* which represents an approximately *BC/[redacted]/EC* buffer beyond the completion date for grid improvement works shown in the project construction schedule (Attachment 11.1). *BC [redacted]/EC*

As discussed in Section 2.1.1.2, OW2 changed its primary POI during the evaluation window from Deans to Smithburg. OW2 has indicated that it plans to officially change the primary POI with PJM after the Feasibility Study for Deans 500 kV is completed. PJM will then study Smithburg 500 kV as the primary POI in the System Impact Study. OW2 stated in the Application that the Project's final POI will be definitively established only after the Project has been selected by the Board, all site control and permits have been achieved, and actual upgrade costs have been determined by PJM.[236]

OW2 stated in its Application that Deans was selected as the initial primary POI *BC/[redacted]/EC* Smithburg was selected as the secondary POI as "a mitigation of any challenges with the proposed cable route to Deans" (Application p. 12-6). OW2 describes Smithburg as a strong interconnection point because it is connected to Deans 500 kV, Larrabee 230 kV, and Oceanview 230 kV. OW2 explained it had chosen to change to Smithburg as the primary POI in order to *BC [redacted] EC*

As discussed in Section 4.2.1.2, the length of the export cable, *BC/[redacted]/EC* would be significantly longer than any other export cables considered in the NJ offshore wind program. The cable route and landfall have not been finalized. *BC/[redacted]

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[236] OW2 Application, pp. 12-2 to 12-3.
[237] OW2 Application, p. 12-5.
[238] Response to CQ2 #20.

[redacted]/EC* OW2 proposes to use trenchless technology, i.e., HDD, to avoid impacts to sensitive habitats such as the coastal habitat and wetlands, and will restore or replace disturbed wetlands.

BC [redacted] EC

OW2 is scored Orange for this category because the basis for the construction duration of the system upgrades is not provided. Cable length presents environmental challenges. In addition to uncertainty about the POI, the landfall and onshore cable routes have not been finalized, therefore permitting challenges cannot be assessed.

5.2.2 Site Control of Onshore Locations

Land Acquisition Plans were evaluated to assess the Applicant's ability to secure all property and rights of way to construct the land-based interconnection facilities consistent with the Project development milestones.

Table 79. Site Control of Onshore Locations Evaluation Criteria

Green	Applicant (a) identified all properties and rights of way needed for the onshore substations and land-based portions of cable rights of way, (b) obtained site control through ownership rights, lease, or an irrevocable option to purchase or lease for substation locations and for rights of way through non-public roadways or thoroughfares, (c) delineated the route for rights of way through public roadways or thoroughfares, and (d) addressed whether there are any constraints or limitations with siting an energy facility at that location or locations.
Yellow	Applicant identified the general locations of properties and rights of way needed for the onshore substations and land-based portions of rights of way and provided a feasible plan for finalizing the route and properties, and for obtaining site control.
Orange	The proposed locations of onshore rights of way and substations are incomplete and/or Applicant did not provide a plan for finalizing the route and properties and for obtaining site control.
Red	The proposed locations of onshore rights of way and substations are not provided, or there are known obstacles to securing the sites needed.

Table 80 summarizes the ratings assigned to each Project in this category.

Table 80. Site Control of Onshore Locations Ratings

BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Onshore Site Control	**Yellow**: Applicant identified the properties and rights of way needed for the onshore substations and ROW and provided a feasible plan for finalizing the route and properties, and for obtaining site control.			**Orange**: Applicant has not determined the specific cable landfall or onshore cable ROW.	

239 OW2 Application Attachment 9.1, Figures 2.2-11 and 2.2-12

240 OW2 Application p. 12-12.

5.2.2.1 Atlantic Shores

Atlantic Shores has identified the specific parcels that are required for the onshore components of the Project's interconnection to Cardiff *BC/[redacted]/EC* including beach landings, rights-of-way, onshore substations, and points of interconnection.[241] *BC/[redacted] EC* Maps have been provided for the onshore cable routes, including identification of environmental considerations.[243]/EC*

ASOW is scored Yellow for this criterion because it has identified the properties and rights of way needed for the onshore substations and ROW and provided a feasible plan for finalizing the route and properties, and for obtaining site control.

5.2.2.2 Ocean Wind 2

Ocean Wind 2 has not confirmed the cable landfall locations. It states that it has identified potential property for the onshore substations for each of the potential POIs and likely cable landfalls and terrestrial cable routes, but has not included information regarding the parcels in the Application. OW2 also states that it is continuing to undertake *BC/[redacted]/EC* (Application p. 12-17). A plan for securing land ownership and leases is provided in the Application.

OW2 is scored Orange for this criterion because it has not determined the specific cable landfall or onshore cable ROW.

5.3 Ports and Infrastructure Development

Each Applicant's prospects for timely commercial success through port restoration, development, and staging for construction were evaluated separately for the construction and operations phases. Underlying each rating are considerations regarding level of effort expended by the Applicant to address port and infrastructure development. LAI considered what steps have already been taken or accomplished toward achievement. This consideration included recognition of steps, measures, and financial commitments the Applicant is prepared to take that are deemed to be incremental to any prior steps, measures, and financial commitments that have been recognized by the Board in the previous solicitation.

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[241] ASOW Appendix 12-1

[242] ASOW Application, p. 332.

[243] ASOW Application, pp. 330-331; CQ1 response Appendix D and Appendix E.

5.3.1 Construction Phase Ports and Infrastructure Development

Table 81. Construction Phase Ports and Infrastructure Development Evaluation Criteria

Green	Applicant proposes to use a port that already has planned offshore wind infrastructure development during the construction phase and has accomplished certain initial milestones, for example, signed an MOU for use of the port and the schedule for port development is consistent with the overall project schedule, with reasonable allowances for delays. If the Applicant would otherwise qualify for a Yellow rating because it proposes a port that does not already have planned offshore wind infrastructure development, but has supplemented its plans with a backup option in the event that the primary port falls through, it may be eligible for a Green rating.
Yellow	Applicant proposes to use a port that does not already have planned offshore wind infrastructure development during the construction phase and has accomplished certain initial milestones, for example, signed an LOI or MOU for use of the port and the schedule for port development is consistent with the overall project schedule, with reasonable allowances for delays. If the Applicant would otherwise qualify for a Green rating but the port development schedule does not make reasonable allowances for delays, it may still qualify for a Yellow, if sufficient support for the schedule is provided. If the Applicant would otherwise qualify for an Orange because it proposes a port that it has not yet initiated a relationship with, but has supplemented its plans with a backup option in the event that the primary port falls through, it may be eligible for a Yellow rating.
Orange	Applicant proposes to use one or more specific ports during the construction phase but has not initiated a relationship with the port(s). Applicant has demonstrated the suitability of the space(s) for the proposed use and identified any existing uses or conflicts. If the Applicant would otherwise qualify for a Green or Yellow rating, but the port development schedule is inconsistent with the overall project schedule, or does not make reasonable allowances for delays and does not justify this exclusion, it will be reduced to an Orange rating.
Red	Applicant does not propose to use any specific ports during the construction phase.

Table 82 summarizes the ratings assigned to each Project in this category.

Table 82. Construction Phase Ports and Infrastructure Development Ratings
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Construction Phase Ports and Infrastructure	**Green**: Applicant has an arrangement in place with EEW at Paulsboro and has established a relationship with NJEDA at NJWP. A backup plan is in place in the event that NJWP is not available.	**Yellow:** It is unclear whether the backup plan covers the nacelle assembly facility.	**Orange:** [redacted]	**Green:** Applicant has an arrangement in place with EEW at Paulsboro and has established a relationship with NJEDA at NJWP. A backup plan is in place in the event that NJWP is not available.	**Yellow:** It is unclear whether the backup plan covers the nacelle assembly facility.

5.3.1.1 Atlantic Shores

Atlantic Shores proposes to conduct construction activity at Paulsboro and the NJWP, both of which already have planned offshore wind infrastructure development. ASOW has signed a letter of intent with EEW to purchase foundations produced at the Paulsboro facility *BC/[redacted]/EC* and the Project's foundations are scheduled to be the first produced out of the EEW Phase 2 facility.[244] *BC/[redacted]/EC*

NJWP is expected to be used for marshalling, *BC/[redacted]/EC* and final assembly, nacelle assembly (Projects C *BC/[redacted]/EC* ASOW has identified the parcels they propose to use and reports that they have "established a strong relationship" with NJ EDA (Application p. xi). A formal agreement with NJEDA will not be set up until after an award in this solicitation is announced. ASOW has aligned its project schedule with the current expected schedule for NJWP development, *BC/[redacted]

[redacted]/EC*

ASOW *BC/[redacted]/EC* scored Green for this criterion because ASOW has an arrangement in place with EEW at Paulsboro and has established a relationship with NJEDA at NJWP. A backup plan is in place in the event that NJWP is not available. ASOW Project C is scored Yellow because it is unclear

[244] See Section 3.1 for information regarding ASOW's agreement with EEW.
[245] ASOW Application, p. 300
[246] ASOW interview transcript, p. 30.

whether the backup plan includes the nacelle assembly facility. ASOW *BC/[redacted]/EC* scored Orange because *BC [redacted]/EC*

5.3.1.2 Ocean Wind 2

Monopile foundations are expected to be manufactured and loaded out from the proposed EEW facility in Paulsboro. OW2 has executed a Pre-Development Agreement with EEW, and the schedule is aligned with the project's overall construction schedule. OW2 is planning for WTG assembly and load-out to happen out of the NJWP, but this is conditional upon NJEDA's successful realization of the facility and OW2 securing a tenancy in accord with the Project's schedule. If OW2 is not able to use the NJWP for WTG assembly, it will conduct this activity out of *BC/[redacted]/EC* For Project B, GE would build a nacelle assembly facility at the NJWP, also conditional on obtaining a timely lease with terms and conditions acceptable to GE. OW2 has not reported a backup plan for the nacelle assembly facility if NJWP is not available. Port Elizabeth is intended to be used for *BC [redacted] EC* The Project's O&M facility at Atlantic City (see Section 5.3.2.2) will be used as the construction base as well.

OW2 Project A is scored Green for this criterion because OW2 has an arrangement in place with EEW at Paulsboro and has established a relationship NJEDA at NJWP. A backup plan is in place in the event that NJWP is not available. OW2 Project B is scored Yellow because it is unclear whether the backup plan includes the nacelle assembly facility.

5.3.2 Operations Phase O&M Facilities and Related Logistics

Table 83. Operations Phase O&M Facilities and Related Logistics Evaluation Criteria

Green	Applicant proposes to use a port that already has planned offshore wind infrastructure development during the operations phase and has accomplished certain initial milestones, for example, signed an MOU for use of the port and the schedule for port development is consistent with the overall project schedule, with reasonable allowances for delays. If the Applicant would otherwise qualify for a Yellow rating because it proposes a port that does not already have planned offshore wind infrastructure development, but has supplemented its plans with a backup option in the event that the primary port falls through, it may be eligible for a Green rating.
Yellow	Applicant proposes to use a port that does not already have planned offshore wind infrastructure development during the operations phase and has accomplished certain initial milestones, for example, signed an LOI or MOU for use of the port and the schedule for port development is consistent with the overall project schedule, with reasonable allowances for delays. If the Applicant would otherwise qualify for a Green rating but the port development schedule does not make reasonable allowances for delays, it may still qualify for a Yellow rating, if sufficient support for the schedule is provided. If the Applicant would otherwise qualify for an Orange rating because it proposes a port that it has not yet initiated a relationship with, but has supplemented its plans with a backup option in the event that the primary port falls through, it may be eligible for a Yellow rating.
Orange	Applicant proposes to use one or more specific ports during the operations phase but has not initiated a relationship with the port(s). Applicant has demonstrated the suitability of the space(s) for the proposed use and identified any existing uses or conflicts. If the Applicant would otherwise qualify for a Green or Yellow rating, but the port development schedule is inconsistent with the overall project schedule, or does not make reasonable allowances for delays and does not justify this exclusion, it will be reduced to an Orange rating.
Red	Applicant does not propose to use any specific ports during the operations phase.

Table 84 summarizes the ratings assigned to each Project in this category.

Table 84. Operations Phase O&M Facilities and Related Logistics Ratings

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Operations Phase O&M Facilities and Logistics	**Yellow:** Applicant has identified an appropriate port for its O&M base, [redacted] The schedule aligns with the overall project schedule.			**Green**: Applicant has identified an appropriate port for its O&M base and has secured rights to the site. The schedule aligns with the overall project schedule	

5.3.2.1 Atlantic Shores

*BC/Atlantic Shores proposes to base its O&M activities at the Atlantic City port, which already has planned offshore wind development.[247] *BC/[redacted]

[247] ASOW Application, p. 396.

[redacted]/EC* The O&M base will include quayside infrastructure to support CTV operations, a warehouse for spare parts and equipment, windfarm remote monitoring, space and equipment for marine vessel coordination, waste management, offices, meeting rooms, a break room for meals, and changing rooms. The facility will be designed to be a net-zero energy building ("NZEB"), incorporating features such as energy efficient office and warehouse design with passive heating and cooling, efficient HVAC, LED lighting, and a solar PV plant. Atlantic Shores does not provide a specific timeline for O&M facility development and construction, but given the current development status and site needs, port development is not an area of concern from a schedule perspective.

ASOW has been scored Yellow for this criterion because it has identified a site that meets the requirements for Green, *BC/[redacted]/EC*

5.3.2.2 Ocean Wind 2

Ørsted has signed two Option to Purchase Agreements for parcels in Atlantic City that will be used as the O&M facility for Ocean Wind 1. OW2 proposes to expand this facility to also support OW2, including an "extension of the planned Ocean Wind 1 office and warehouse facilities, as well as crew transfer vessel berthing facilities" (Application p. 2-24). A redevelopment plan was submitted to the Atlantic City Planning Board in August 2020.[249] The use of this land is subject to Exxon's remediation of the site following its former use as a petroleum and fuel storage depot and tank farm.[250] OW2 has not provided a specific timeline for construction of the O&M base, but the scope of development indicates that this will not be a source of risk to the overall Project schedule, particularly given its planned use to support OW1.[251]

OW2 has been scored Green for this criterion because it has identified and secured site control, in the form of Option to Purchase Agreements, for the proposed location of the O&M base.

5.4 Experience

5.4.1 Developer Offshore Wind Experience

The evaluation of corporate offshore wind experience was based on the number and size of offshore wind projects developed by the Applicant, as well as the roles for which the Applicant has been responsible. While the number and size of the Applicant's projects are relatively easy to confirm, the roles for which the Applicant has been responsible are not as easy to confirm. Relevant offshore experience with oil and natural gas exploration and production ("E&P") is a secondary positive factor considering the strong similarities in environmental permitting, design, engineering, construction techniques, and operating environment. These priorities are reflected in the rating definitions shown in Table 85.

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[248] ASOW Application, p. 397.
[249] OW2 Application, pp. ES-8, 14-3.
[250] OW2 Application, p. 13-5.
[251] *BC [redacted]/EC*

Table 85. Developer Offshore Wind Experience Evaluation Criteria

Green	Applicant has significant offshore wind experience that is consistent with the proposed role(s) for this solicitation.
Yellow	Applicant has limited offshore wind experience but significant offshore oil & gas experience that is consistent with the proposed role(s) for this solicitation.
Orange	Applicant has limited offshore experience of any kind.
Red	Applicant has no offshore experience of any kind.

Table 86 summarizes the ratings assigned to each Project in this category.

Table 86. Developer Offshore Wind Experience Ratings
BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Developer Offshore Wind Experience	**Yellow:** ASOW's parent companies have limited experience in offshore wind development and operation. Most prior offshore experience is related to oil and gas E&P operations.			**Green**: OW2's parent company has a clear record of performance success in the global offshore wind market.	

5.4.1.1 Atlantic Shores

ASOW's shareholder EDFR Offshore is indirectly owned by EDF Renewables, which is in turn owned by EDF Renouvelables S.A. EDF Renewables and its affiliates make up the EDF Renewables Group. ASOW's shareholder Shell New Energies is owned by Royal Dutch Shell. These parent organizations have experience in operating almost 15 GW of renewable power projects. Roughly one-half of this amount, about 7 GW are offshore wind projects installed, under construction, or in development.

The EDF Renewables Group has 729 MW of offshore wind projects in operation, including the 325-MW Thornton Bank (aka C-Power), the 62-MW Teesside, the 40-MW Blyth, and the 302-MW Dongtai IV. The EDF Renewables Group additionally has 1,630 MW of offshore wind projects under construction in China and Europe, including the 500-MW Fécamp project in France, and 2,274 MW of projects in development in Europe, including the 1,200 Codling project in Ireland. The EDF Renewables Group has had and plans to have a variety of roles for these projects, including development, planning, financing, construction, and O&M. EDF Renewables additionally has a substantial onshore wind and solar portfolio in the U.S., including solar projects in New Jersey.

The Shell Group has a 108 MW offshore project in operation (NordZee Wind), a 731.5 MW project under construction (Borssele 3&4) and 1,563 MW of projects in development, including the 804-MW Mayflower project in the U.S. (its largest project to-date) and the 759-MW Hollandse Kust North project in Europe. The Shell Group plans to have roles including development, planning, financing, construction, and O&M for these projects. The Shell Group additionally has onshore wind experience in the U.S., including eight operating projects. For many decades the Shell Group developed significant expertise in the offshore oil and gas industry.

ASOW is scored Yellow for this criterion because its parent companies have limited experience in offshore wind development and operation. Most prior offshore experience is related to oil and gas E&P operations.

5.4.1.2 Ocean Wind 2

Ørsted has 25 years of global experience developing offshore wind. It has constructed 26 projects representing 6.8 GW, approximately 29% of total global offshore wind. Ørsted has an additional 3.1 GW under construction and 4.9 GW in development.[252] *BC/[redacted]/EC* Ørsted also reports that it has conducted the first and only major offshore wind farm decommissioning.[254]

Ørsted's current U.S. portfolio includes the projects listed in Table 87.

Table 87. Ørsted Offshore Wind projects in the U.S.[255]

Project	Capacity (MW)	State	Status (COD)
Block Island Wind Farm	30	Rhode Island	Operating (2016)
Revolution Wind	704	Connecticut / Rhode Island	Development (2024)
South Fork Wind	130	New York	Development (2022
Skipjack Wind Farm	120	Maryland	Development (2023)
Coastal Virginia Offshore Wind	12	Virginia	Operating (2020)
Ocean Wind	1,100	New Jersey	Development (2024)
Sunrise Wind 1	880	New York	Development (2024)

OW2 is scored Green for this criterion because its parent company has a clear record of performance success in the global offshore wind market.

5.4.2 Key Personnel Offshore Wind Experience

Per N.J.A.C. 14:8-6.5(a)(1), Applicants were required to submit information on key personnel, specifically regarding offshore wind project development experience.[256] The evaluation of personnel offshore wind experience was based on experience in the offshore wind industry, supplemented by onshore wind and offshore oil and gas experience. In relation to offshore wind development, offshore oil and gas E&P experience is relevant but has been assigned less weight as described in the rating definitions in Table 88.

Table 88. Key Personnel Offshore Wind Experience Evaluation Criteria

Green	Project team has significant offshore wind experience in the roles they will fill for the proposed project.
Yellow	Project team has limited offshore wind experience but significant offshore oil & gas experience in substantially similar roles to what they will be responsible for in the proposed project.
Orange	Project team has limited offshore experience of any kind.
Red	Project team has no offshore experience of any kind.

[252] OW2 Application, p. 1-11.
[253] OW2 Application, p. 1-8.
[254] OW2 Attachment, p. 1-12.
[255] OW2 Application Attachment 1.2.
[256] Per N.J.A.C. 14:8-6.1, a key employee is "any individual employed by the applicant in a supervisory capacity or empowered to make discretionary decisions with respect to the project."

Table 89 summarizes the ratings assigned to each Project in this category.

Table 89. Key Personnel Offshore Wind Experience Ratings
BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Key Personnel Offshore Wind Experience	**Green:** Identified Key Employees have significant experience in the development of offshore wind.			**Green:** Identified Key Employees have significant experience in the development of offshore wind, and other employees have significant experience with offshore wind projects that are in operation.	

5.4.2.1 Atlantic Shores

Atlantic Shores reported that their hiring strategy has been focused on "securing team members with experience in delivering projects of similar size and scope, in offshore wind, onshore wind and offshore oil and gas" (Application p. 17). Atlantic Shores identified eight individuals as key employees. LAI reviewed the qualifications for these individuals who are expected to have critical roles in project development and construction based on the information provided in the Application, including their resumes.

- Joris Veldhoven, President and Commercial and Finance Director, previously led a Shell New Energies supply chain team supporting large-scale project development from project initiation to operations, including for five Shell onshore wind farms in the U.S. His resume indicates that he was also involved in all Shell offshore wind deals and bids in the period from 2017 to 2019.
- Jennifer Daniels. Vice President and Development Director has been "actively supporting the development of US offshore wind projects since 2008" (Application p. 20). While working previously for TetraTech, she managed environmental teams supporting Bay State Wind, the Block Island Wind Farm, and the Coastal Virginia Offshore Wind Project.
- Rain Byars, Vice President and Technical Director, has "experience in technically managing 4.6 GW of offshore wind projects globally during design, manufacturing, and construction phases, including leading the verification of the first offshore windfarm in the US, the Block Island Wind Farm" (Application p. 20).
- Doug Copeland, Development Manager, has prior experience in leading development efforts for onshore and offshore wind, solar, and energy storage projects on behalf of EDF Renewables.
- Paul Phifer, Permitting Manager, worked in environmental conservation and permitting for the US government prior to joining Atlantic Shores. His responsibilities included overseeing permitting projects related to onshore and offshore wind energy, and he has experience in assessing and permitting large-scale infrastructure projects from the regulator's side that will inform Atlantic Shores' efforts in that area.
- Antoine Cognard, Delivery Manager, "spearheaded the planning, construction, and commissioning of EDF Renewables' 1.3 GW Canadian and Northeast US portfolio, including the Blackspring Ridge (300 MW) wind farm in Alberta" (Application p. 22).
- Michael Garrity, New Jersey Permitting and Development, has previous experience in the siting, permitting, and licensing of electrical substations and transmission facilities in the Atlantic City Electric service territory. He also has prior experience as a Principal Environmental Specialist with NJDEP where he was responsible for reviewing and rendering decisions on large-scale coastal projects in New Jersey.

- Julia Petit, Secretary and General Counsel, has previous experience in renewable energy project finance on behalf of independent power producers and sponsors developing utility scale wind and solar energy projects. While working for EDF Renewables, she has provided legal support for the acquisition, development, construction, financing and/or operation of over 800 MW of onshore wind projects and over 1 GW of solar projects.

ASOW is scored Green for this criterion because the Key Employees have significant experience in the development of offshore wind.

5.4.2.2 Ocean Wind 2

Ocean Wind 2's Project team has "substantial experience in offshore wind project development, including origination, permitting, interconnection, engineering, financing, procurement, construction, and operations" (Application p. 1-3). OW2 has identified six key employees. LAI reviewed the qualifications for these individuals who are expected to have critical roles in project development and construction based on the information provided in the Application, including their resumes.

- Marc Reimer, Project Development Director, *BC/ [redacted] EC*
- Christian Bjøl, Bid Development Manager, *BC [redacted] EC*
- Maddi Urbish, Head of Government Affairs and Policy for New Jersey, joined Ørsted in March 2021.[257] She was previously a senior associate at River Crossing Strategy Group working in the areas of New Jersey state politics and policies, environmental protection, and stakeholder engagement. She also has prior experience working for New Jersey Audubon.[258]
- Simon Chignell, Program Commercial Manager, *BC/ [redacted] /EC*
- Anthony Vachez, Technical Program Manager, *BC/ [redacted] EC*
- Pilar Patterson, Permitting Manager, *BC [redacted] /EC*

*BC [redacted]

[257] Maddi Urbish was introduced as a new member of the team at the interview, replacing Sunny Gupta.
[258] Source: Press Release: Ørsted Names Madeline Urbish as Head of Government Affairs and Policy in New Jersey, https://us.orsted.com/news-archive/2021/03/orsted-names-madeline-urbish-as-head-of-government-affairs-and-policy-in-new-jersey.

[redacted]/EC*

OW2 is scored Green for this criterion because the Key Employees have significant experience in the development of offshore wind, and other employees have significant experience with offshore wind projects that are in operation.

5.5 Suppliers and Labor

5.5.1 Supplier Arrangements

Applications were evaluated to determine whether they include a reasonable plan to procure the primary equipment and components, including the WTGs, foundations, and undersea cables, in a timeframe necessary to meet the targeted schedule. Documentation of commitments from the manufacturer or supplier of each component was required as part of the Application. The rating definitions listed in Table 90 are based on the commitments included in the Application. Each Project received a rating based on the lowest rating among all three components.[259]

Table 90. Supplier Arrangements Evaluation Criteria

Green	Letter of intent, MOU or declaration from the manufacturer/supplier stating their ability to manufacture and deliver all components within the targeted schedule is provided for the WTGs, foundations, and undersea cables. Applicant has an established relationship with at least one of the manufacturers.
Yellow	Letter of intent or similar statement from a manufacturer/supplier with an established history of providing the components to similar projects was submitted for the WTGs, foundations and undersea cables, but at least one does not include specific reference to the scope of supply or targeted schedule.
Orange	At least one letter of intent or similar statement was submitted from a manufacturer/supplier that does not have an established history of providing the components to similar projects.
Red	Supply plan does not include a letter of intent or similar statement from a manufacturer/supplier for the WTGs, foundations, or undersea cables.

Table 91 summarizes the ratings assigned to each Project in this category.

[259] For example, if the WTGs and foundations receive a Green rating, and the undersea cables receive a Yellow rating, the Project will receive a Yellow rating for this metric.

Table 91. Supplier Arrangements Ratings
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Supplier Arrangements	**Green:** Provided supporting documentation from the WTG, foundation, and cable suppliers, each of which references being able to meet the targeted schedule. ASOW has an established relationship with at least one of the suppliers.			**Green:** Provided supporting documentation from the WTG, foundation, and cable suppliers, each of which references being able to meet the targeted schedule. OW2 has an established relationship with at least one of the suppliers.	

5.5.1.1 Atlantic Shores

Atlantic Shores has identified suppliers for each of the major project components, but notes that its supplier selection will continue to be refined, and that these suppliers are not yet final. *BC/[redacted]/EC* ASOW notes that "selection of a supplier for the purpose of [the] Application is not binding upon Atlantic Shores" (Application p. 49). *BC [redacted] EC*

Atlantic Shores submitted a letter of intent from MHI Vestas Offshore Wind ("MVOW") for the provision of V236-13.6 MW WTGs to the project (Appendix 2-16). The letter includes a statement that the WTG is expected to be IEC Type Verified by *BC/[redacted]/EC* and that MVOW is technically and financially able to deliver all components within the targeted schedule. *BC/[redacted] EC* ASOW reports that "Vestas also has excellent relationships with Atlantic Shores' parent companies; EDF Renewables, for example, has installed *BC/[redacted]/EC* of Vestas turbines globally, including *BC/[redacted]/EC* MW in Canada and *BC/[redacted]/EC* in the US alone" (Application p.75).

Atlantic Shores provided a letter of intent from EEW American Offshore Structures Inc. to provide monopile foundations for up to 1,204 MW of capacity from EEW's facility to be located at the Port of Paulsboro (Appendix 2-5). Atlantic Shores has indicated in their Application and CQ1 responses that if Project C *BC/[redacted]/EC* is selected they expect to be able to negotiate an agreement with EEW to provide monopile foundations out of the Paulsboro Phase 2 facility for the full Project. However, in the event that Atlantic Shores is not able to reach agreement with EEW to provide monopiles for the full scope of Project C *BC/[redacted]/EC* additional monopiles may be imported from EEW's factory in Germany or by Bladt Industries, an alternative foundation supplier.[260] Monopiles supplied by Bladt would be

260 *BC/[redacted] EC*

manufactured in Denmark. ASOW has provided a letter of support from Bladt Industries (Appendix 2-7). *BC [redacted] EC*

Atlantic Shores has identified LS Cable Systems America, Inc. as the supplier of the export cables, and B.V. Twentsche Kabelfabriek as the supplier of the inter-array cables. Letters of support from these suppliers that reference being able to meet the targeted schedule are provided in Appendix 2-10 and 2-11, respectively.

ASOW has provided supporting documentation from the proposed WTG, foundation, and cable suppliers, each of which references being able to meet the targeted schedule.

5.5.1.2 Ocean Wind 2

BC [redacted] EC OW2 has entered into an agreement with GE that provides an option for the Haliade-X 14 MW, and provided a letter of support to supply WTGs consistent with the project schedule. *BC/[redacted]/EC*

OW2 has executed a PDA with EEW to provide monopile foundations for the Project. The PDA includes a schedule that is consistent with the offshore wind facility's construction schedule. *BC/[redacted]/EC*

OW2 has provided letters of support from several potential cable manufacturers, including Hellenic Cables, LS Cable and System, Nexans, Prysmian Group, and Siemens Energy. Only the LS Cable and System, Nexans, and Prysmian Group specifically reference timely delivery to meet the schedule.

OW2 has provided supporting documentation from proposed suppliers of WTGs, foundations, and cables referencing the ability to meet the proposed schedule.

5.5.2 EPC Contractor and Union Engagement

Applications were evaluated to determine whether they include a reasonable plan to engage construction and operations personnel.

Table 92. EPC Contractor and Union Engagement Evaluation Criteria

Green	EPC contractor is identified and a definite plan to engage organized labor is provided.
Yellow	EPC contractor is identified and a preliminary plan to engage organized labor is provided.
Orange	Applicant describes its process for selecting an EPC contractor and provides a preliminary plan to engage organized labor.
Red	Applicant does not describe a process for selecting an EPC contractor or does not provide a plan to engage organized labor.

Table 93 summarizes the ratings assigned to each Project in this category.

Table 93. EPC Contractor and Union Engagement Ratings

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
EPC Contractor and Union Engagement	Green: Identified EPC contractor and provided a plan for union engagement.			Green: Identified EPC contractor and provided a plan for union engagement.	

5.5.2.1 Atlantic Shores

Atlantic Shores has identified *BC/[redacted]/EC* the offshore installation EPC contractor, subject to final supplier determinations as described in Section 5.5.1.1. *BC/[redacted]/EC* is identified as the contractor for the onshore export cable civil works. *BC/[redacted]/EC*

ASOW has executed an MOU with five New Jersey trade unions that will be involved in offshore wind, *BC [redacted] EC* The MOU "contains provisions that Atlantic Shores and the appropriate union parties will cooperate and collaborate to promote green economic growth and environmental sustainability while increasing the participation of a unionized workforce in offshore windfarm construction" (Application p. 161).

ASOW is scored Green for this criterion because it has identified the EPC contractor and provided a definite plan for union engagement.

5.5.2.2 Ocean Wind 2

Ocean Wind 2 will reply on Ørsted's EPC organization to acquire the necessary equipment for staging and deployment of major Project components and to install the Project.[261] The coordination and management of the offshore construction work will be performed under the Ørsted Project Director with dedicated construction site staffing.

Because the EPC contractor function will be internal, Ocean Wind 2 "will be able to manage and direct its work with unions over the life of the Project" (Application p. 8-17). OW2 reports that Ørsted's team has signed an agreement with NABTU for the buildout of Ørsted's current and future portfolio of U.S. offshore wind projects.[262]

OW2 is scored Green for this criterion because it has identified the EPC contractor and provided a definite plan for union engagement.

5.5.3 Training Programs and University Partnerships

Applications were evaluated to determine whether they include a reasonable plan to develop construction and operations personnel.

[261] OW2 Application, p. 2-30.
[262] OW2 Application, p. 8-5.

Table 94. Training Programs and University Partnerships Evaluation Criteria

Green	Definite plan for engagement with training programs and/or university partnerships is provided and partners are identified.
Yellow	Plan is described on a preliminary basis and Applicant has begun discussion with partners.
Orange	Plan is described on a preliminary basis.
Red	No plan mentioned.

Table 95 summarizes the ratings assigned to each Project in this category.

Table 95. Training Programs and University Partnerships Ratings
BC//EC

	Atlantic Shores			**Ocean Wind 2**	
	[redacted]	**C**	[redacted]	**A**	**B**
Training Programs and University Partnerships	Green: ASOW has identified specific partners and funding commitments.			Green: OW2 has identified specific partners and funding commitments.	

5.5.3.1 Atlantic Shores

For Projects *BC/[redacted]/EC* C, *BC/[redacted]/EC* Atlantic Shores will commit $10 million and long-term engagement to establish and support the New Jersey WIND Institute. ASOW has also partnered with Rowan College at Burlington County's Workforce Development Institute to provide $400,000 in scholarships for students enrolling in four programs: the Energy Industry Fundamentals Program, the Supply Chain, Transportation, Logistics, and Distribution Program, the Manufacturing Machinist Program, and the Industrial Maintenance Program Atlantic Shores has developed agreements with the Rutgers Future Scholars Program and the Atlantic City Boys and Girls Club to fund programming around pre-college workforce training initiatives.

ASOW is scored Green for this criterion because it has identified specific partners and funding commitments.

5.5.3.2 Ocean Wind 2

Ocean Wind 2 will support the WIND Institute with $2 million in funding from the Project. Ørsted will also work with NABTU to develop an apprentice training program. OW2 reports that it has also decided to allocate $1.5 million from the Pro-New Jersey Grantor Trust 2 to a 10-year scholarship opportunity program in collaboration with the New Jersey Institute of Technology.

OW2 is scored Green for this criterion because it has identified specific partners and funding commitments.

5.6 Financial Strength and Financing Plan

5.6.1 Ownership and Financial Strength

Ownership defines the Projects' owners during development, accounting for 100% ownership interest in the Project entity.[263] Ratings were assigned as defined in Table 96 based on the owner's commitment to pursue development and construction under the Board's commercial structure whereby the Project receives payment only for generation delivered to the POI. This take-if-tendered structure leaves all production and transmission delivery risk with seller, thereby requiring the Project's owners to commit capital and expertise to address development, construction, and operational risk. Financial strength reflects the financial capability of the Project's owners to raise all required funds for the Project without subjecting the owner(s) to financial stress, subject to satisfaction that the Applicant's balance sheet strength is adequate to support the requisite financial guarantees to third-party financing. Thus, it is a function of the parent company size (revenues and assets), profitability (net income), funding capability (cash, cash equivalents, and market valuation), and ability to raise debt (debt-to-capitalization and credit rating). The financial strength of the Applicant was assessed in the broader context of the parent company's debt to equity ratio, long term credit rating, and market valuation, among other relevant financial metrics.

Table 96. Ownership and Financial Strength Evaluation Criteria

Green	Financial entities responsible for capital formation for the project have made significant corporate commitments to the Project and are profitable with large and strong balance sheets.
Yellow	The financial entities have made restricted corporate commitments to the Project or have financial challenges and limited balance sheet strength.
Orange	The financial entities have made weak commitments to the Project or have serious financial weaknesses, such as a material ratings reduction or credit impairment.
Red	Ownership is incompletely defined, or the entities have provided inadequate financial information or have not explained how credit will be restored to investment quality.

Table 97 summarizes the ratings assigned to each Project in this category.

Table 97. Ownership and Financial Strength Ratings

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	**C**	[redacted]	**A**	**B**
Ownership and Financial Strength	Green: Atlantic Shores should be able to finance its Project based on the financial strength of its ultimate parent companies, and receipt of a binding Order from the Board.			Green: Ørsted has a solid history of financing offshore wind projects and should be able to finance Ocean Wind 2 based on its financial strength and receipt of a binding Order from the Board.	

5.6.1.1 Atlantic Shores

The Atlantic Shores application was submitted by Atlantic Shores Offshore Wind Project 1, LLC, a special purpose entity comprised of a single member, Atlantic Shores Offshore Wind LLC. Atlantic Shores Offshore

[263] Later investors, *e.g.*, tax equity, may acquire equity interests.

Wind LLC is a JV between EDF-RE Offshore Development, LLC and Shell New Energies (collectively "the Parents").

EDFR Offshore is an indirect 100% subsidiary of EDF Renewables , a 100% subsidiary of EDF Renouvelables SA, which itself is an indirect 100% subsidiary of Électricité de France S.A. ("EDF"), a global energy company with nuclear, renewable, and other generation assets. EDF Renewables, Inc. has a strong presence in North America with ownership, O&M, and third-party O&M services. As of September 30, 2020, the Government of France owned 83.7% of EDF, institutional shareholders 12.8%, individual shareholders 2.1%, employees 1.3%, and treasury shares were under 0.1%. LAI notes that partial ownership by a foreign sovereign does not weaken EDF's financing capability and it may enhance it.

Shell New Energies is an indirect 100% subsidiary of Royal Dutch Shell ("Shell"), a global oil & gas exploration, development, production, refining, and marketing company with a growing portfolio of renewable energy projects. Shell is a 50% owner in one operating offshore wind project and has interests in a few other offshore wind projects and numerous onshore wind projects. Shell's largest shareholders are institutional investors.

BC [redacted] /EC

Atlantic Shores provided 2019 EOY financial statements for Atlantic Shores, EDF Renewables, and Shell Oil Company (a 100% indirectly-owned subsidiary of Shell). *BC [redacted] /EC*

EDF Renewables had negative net income of $(82.2) million, total assets of $5.7 billion, and a 94%/6% debt/equity ratio as of year-end 2019. Such thin capitalization is normal for project development. LAI reviewed EDF's 2019 financial statement. EDF had positive net income of income of €5.2 billion, total assets of €303.3 billion, and a high 78%-22% debt/equity ratio. EDF has investment-grade long-term credit ratings of A3 (with negative outlook) by Moody's, BBB+ by S&P, and A- by Fitch. EDF continues to experience financial difficulties from the ongoing nuclear repair and completion work at the Flamanville 3 (one unit delayed until 2022) and Hinkley Point C (two units delayed until 2026). Two similar nuclear units at Taishan China commenced commercial operation in December 2018 and September 2019.

Shell Oil Company had negative net income of $(208) million, total assets of $92.8 billion, and a 40%/60% debt/equity ratio as of year-end 2019. In order to get a better picture of Shell New Energies' ultimate source of financing, LAI reviewed the 2019 financial statement of Shell. Shell had net income of $25.5 billion, total assets of $404.3 billion, and close to a 42%-58% debt/equity ratio as of year-end 2019. Shell has investment-grade long-term credit ratings of AA- (with negative outlook) from S&P and Aa2 (with negative outlook) from Moody's.

Atlantic Shores is scored Green for this criterion because it should be able to finance its project based on the financial strength of its ultimate parent companies, and receipt of a binding Order from the Board.

5.6.1.2 Ocean Wind 2

The Ocean Wind 2 application was submitted by Ocean Wind II, LLC, a direct 100% subsidiary of Ørsted Offshore North America, Inc. and an indirect 100% subsidiary of Ørsted, the ultimate parent. Ørsted was created when DONG Energy divested its oil and gas assets in 2017 to focus on renewable energy. Ørsted continues to be a leading global developer of offshore wind projects. Ørsted is 50.1% owned by the Government of Denmark and 5% owned by SEAS-NVE (Denmark's second-largest cooperatively-owned energy company).[264] LAI notes that partial ownership by a foreign sovereign does not weaken EDF's financing capability and it may enhance it.

According to Ocean Wind 2's Application, Ørsted has successfully financed and has equity interests in 24 offshore wind partnerships around the world. One of them is the Block Island Wind Farm, which was financed by Deepwater Wind and later acquired by Ørsted. Construction has not commenced on Ørsted's other U.S. offshore wind projects, which have not yet been financed. Ocean Wind 2 highlighted Hornsea 1, a 1,218 MW offshore wind project 120 km (about 75 miles) off the English coast that Ørsted completed in early 2020. "Hornsea 1 is the largest single-project financing to date in the global renewable energy sector, which was structured and led by Ørsted" (Application p. 5-3).

Ørsted provided hyperlinks to its 2019 and 2018 annual reports. Ørsted had net income of DKK 7.2 billion ($1.2 billion), total assets of DKK 192.9 billion ($31.4 billion), and 42%/58% debt/equity ratio as of year-end 2019.[265] Ørsted has investment-grade long-term credit ratings of BBB+ from S&P, Baa1 from Moody's, and BBB+ from Fitch, all with stable outlooks.

OW2 is scored Green for this criterion because Ørsted has a solid history of financing offshore wind projects and should be able to finance Ocean Wind 2 based on its financial strength and receipt of a binding Order from the Board.

5.6.2 Financing Plan

The Applicant's financing plans, required by rules at N.J.A.C. 14:8-6.5(a)(4)(iv), were evaluated based on the reasonableness and completeness of each plan proposed by the Project's owners. Offshore wind projects can and have been financed on-balance sheet, *i.e.*, with project debt and equity funding provided by the parent, or at the project level with third-party construction debt, tax equity, and permanent operating period debt (also referred to as back-leverage). In either case, LAI determined whether the Applicant fully considered the potential availability of the ITC for Projects that meet IRS qualification requirements to offset federal income taxes or to facilitate a tax equity investment.

Table 98. Financing Plan Evaluation Criteria

Green	Realistic financing plan clearly specifies the source of equity / debt funds and addresses the potential of qualifying for the ITC, if available.
Yellow	Financing plan fails to fully specify funding sources or address qualifying for ITC, if available.
Orange	Financing plan is unrealistic.
Red	Financing plan is incomplete or does not demonstrate access to global debt and equity markets in light of credit impairment.

[264] In addition to its cooperative power activities, SEAS-NVE purchased Ørsted's Danish power distribution, residential customer, and City Light businesses in late 2019.

[265] These values utilize a DKK to US$ exchange rate of 0.16 and may not exactly match the values in the Ocean Wind 2 Application.

Table 99 summarizes the ratings assigned to each Project in this category.

Table 99. Financing Plan Ratings
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Financing Plan	**Green:** The plan to finance Atlantic Shores utilizing the balance sheets of EDF and Shell is reasonable and should be achievable.			**Green:** Ocean Wind 2's plan to utilize its balance sheet and pre-structured partnership arrangement to finance the Project is reasonable and should be achievable.	

5.6.2.1 Atlantic Shores

According to Section 5.2 of the Application, the parent companies intend to finance Atlantic Shores on-balance sheet based on their considerable financial size and strength. *BC/[redacted]/EC* The Application did not specifically address securing funding through the New Jersey Economic Development Authority or utilizing New Jersey's Offshore Wind Economic Development Tax Credit Program.

*BC/[redacted]

[redacted]

[redacted]

266 *BC/[redacted] EC*

[redacted] /EC* In addition to project equity to be provided by the parent companies, letters of support from six international banks expressing interest in financing the project were provided in Appendices 5-2 through 5-7, including *BC/ [redacted] /EC*

ASOW is scored Green for this criterion because its plan to finance Atlantic Shores utilizing the balance sheets of EDF and Shell is reasonable and should be achievable.

5.6.2.2 Ocean Wind 2

Ørsted intends to finance Ocean Wind 2 using a structure it has utilized for virtually all previous projects. Ørsted will fund 100% of the construction costs from its parent company balance sheet and arrange to sell a 50% equity interest in the completed project via a pre-structured partnership arrangement just prior to commercial operation. *BC/ [redacted] /EC*

Ørsted retains financing flexibility to take advantage of changing market conditions. For example, Ørsted has issued green hybrid capital securities and green senior bonds totaling about $2.5 billion. Based on the information provided in the Application, Ørsted has demonstrated its ability to finance construction of Ocean Wind 2.

Ørsted did not provide letters of support from potential equity investors or lenders because it intends to provide the necessary construction period capital. Moreover, it is self-guaranteeing Ocean Wind 2's financing. External financing is not anticipated to enable successful project development and construction. Ørsted did not address financing Ocean Wind 2 through the New Jersey Economic Development Authority. If Ørsted pursues alternative financing options with outside investors, it may hire external advisors. No names of financial or legal advisors were provided.

Ocean Wind 2 committed to "working with the NJBPU on determining the best approach to passing the net benefit (i.e., the gross benefit arising from such newly implemented Tax Incentive less all costs and negative impacts on the Project's economics" following the reinstatement of the ITC for offshore wind (Application p. 6-1). *BC/ [redacted] /EC*

OW2 addressed New Jersey's Offshore Wind Economic Development Tax Credit Program that can grant tax credits for offshore wind developers who (i) invest at least $50 million and (ii) employ at least 300 new, full-time employees. Ocean Wind 2 does not anticipate fulfilling the employment requirement.

OW2 is scored green for this criterion because its plan to utilize its balance sheet and pre-structured partnership arrangement to finance the Project is reasonable and should be achievable.

5.7 Default Risk

While the metrics in the above sections contribute to an overall assessment of default risk, this metric specifically addresses potential Project default risks, if any, that have not been assessed in other metrics.

Table 100. Other Project Default Risk Factors Evaluation Criteria

Green	No risk factors identified.
Yellow	Mitigable risk factors identified.
Orange	Potentially unmitigable risk factors identified.
Red	Unmitigable risk factors identified.

Table 101 summarizes the ratings assigned to each Project in this category. No default risks have been identified for either Project beyond those discussed in the prior categories.

Table 101. Other Project Default Risk Factors Ratings

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Default Risk	**Green:** No additional default risk factors identified.			**Green:** No additional default risk factors identified.	

5.8 Summary of Qualitative Scoring

A weighting factor is assigned to each of the qualitative metrics, as shown in Table 65.

Table 102. Likelihood of Successful Commercial Operation Weighting Factors and Total Scores
BC//EC

Category	Metric	Weighting Factor	Atlantic Shores			Ocean Wind 2	
			[redacted]	C	[redacted]	A	B
Project Design	Wind turbine generator suitability	[redacted]					
	Foundation suitability						
	Inter-array and export cables suitability						
	Offshore substations suitability						
	Storage and innovative technologies						
Transmission	Interconnection plan						
	Site control (onshore locations)						
Ports and Infrastructure Development	Construction phase ports and infrastructure development						
	Operations phase O&M facilities and related logistics						
Experience	Developer offshore wind experience						
	Key personnel offshore wind experience						
Suppliers and Labor	Supplier arrangements						
	EPC contractor and union engagement						
	Training programs and university partnerships						
Financing and Cost Accounting	Ownership and financial strength						
	Financing plan						
Default Risk	Other Project default risk factors						
	Total		[redacted]				

6 COST-BENEFIT ANALYSIS

The cost-benefit analysis ("CBA") represents a consolidation of the quantitative economic components of the evaluation, including OREC Purchase Price, ratepayer impact offsets, in-State economic development effects, and environmental impacts.[267] Each Applicant submitted a CBA as part of the Application as required by N.J.A.C. 14:8-6.5(a)(11). LAI conducted an independent CBA to ensure that Projects are compared on a consistent basis. Content provided by the Applicants helped inform LAI's independent CBA. LAI's values differ significantly, however. The calculations described in this section were conducted based on LAI's independent CBA method and data. The individual components that were included in LAI's CBA are shown in Table 103.

Table 103. CBA Components

Category	Component
OREC Costs	OREC Purchase Price TSUC Price Adder
Ratepayer Impact Offsets	Value of energy revenue credit Value of capacity revenue credit Value of ancillary services revenue credit Value of avoided REC purchases Value of change in retail electric rates[268]
Environmental Impacts	Value of net avoided CO_2 emissions Value of net avoided NO_x emissions Value of net avoided SO_2 emissions Value of net avoided $PM_{2.5}$ emissions Ecosystem Enhancement Value[269]
Economic Impacts	Value of development phase spending Value of construction phase spending Value of operation phase spending

OREC Costs include all costs associated with OREC purchases over the 20-year OREC term and Buyer's share of TSUC.

[267] Local secondary economic impacts refer here to the direct, indirect, and induced economic effects in New Jersey resulting from project expenditures that benefit New Jersey workers, businesses, government, and community economic and environmental justice organizations. Secondary effects only have additional economic value to the extent that local labor and business establishment resources would otherwise be under-employed or under-utilized. Secondary economic impacts may also include economic justice or equity distributional considerations.

[268] The relationship between retail electric rates and impact on the diverse economic sectors in New Jersey is subject to much uncertainty. Considering this uncertainty, the change in the retail electric rates component is assigned zero value in the CBA.

[269] The term "Ecosystem Enhancement Value" is used to represent impacts and benefits to environmental media and resources other than air emissions. Ecosystem resources are "natural capital" which provide long-term benefits to society in terms of both goods (i.e., timber, fish, and minerals) and services (i.e., flood control, carbon storage, and ecotourism). Published in 2007, NJDEP studied the economic values of the State's diverse natural resources. For purposes of offshore wind evaluation in this second procurement round, NJDEP and LAI agreed that it is not feasible to rely on this study to derive the Ecosystem Enhancement Value. This component therefore has a value of zero in the CBA.

Ratepayer impact offsets will include the Applicant's expected revenues from the sale of energy, capacity, and any ancillary services that are credited to ratepayers, as well as the avoided cost of New Jersey Class I RECs over the 20-year OREC term. These calculations are described in Section 2. As described in Appendix A, the Aurora simulation model was used to forecast wholesale energy prices assuming the full 7,500 MW offshore wind buildout by 2035 in the Offshore Wind case.

The calculation of local secondary economic impacts is described in Section 2.4. Only the aggregate, macro quantitative effects resulting from the IMPLAN regional economic model are included in the CBA. Economic justice considerations are deferred to the post-scoring decision-making. Apart from harbor and ports-related expenditures in New Jersey that will be included in the model-based projection of local economic impacts contribution to the CBA score, other policy-based preferences for Applicants proposing to develop or utilize New Jersey harbor and port facilities during the construction and operation phases may be considered during the post-scoring decision-making.

The calculation of environmental impacts is described in Section 4.1. Only the quantitative component, which represents the monetization of net avoided emissions, is included in the CBA. N.J.A.C. 14:8-6.5(a)(11)(xiv) requires that the CBA include "an analysis of the anticipated environmental benefits and environmental impacts" and that "the comparative environmental impacts shall be monetized, to the extent possible." A "but-for" test performed in Aurora includes the 1,100 MW Ocean Wind 1 project in the No New Offshore Wind case. This but-for test is the basis for the estimation of emissions displaced by incremental offshore wind.

Net benefits in the CBA were calculated as the present value of the net OREC costs over the 20-year OREC term using LAI's market price forecasts, local secondary economic impacts, and emissions impacts over a 30-year operation period.[270]

$$Net\ Benefits = (Ratepayer\ Impact\ Offsets - OREC\ Costs) + Economic\ Impacts\ + Environmental\ Impacts$$

The benefit-cost ratio is calculated as the sum of ratepayer impact offsets over the 20-year OREC term, economic impacts over a 30-year operation period, and environmental impacts over a 30-year operation period. The sum of these benefits is divided by the OREC costs over the 20-year OREC term. The present value of all costs and benefits was used in computing the ratio.

$$Benefit\text{–}Cost\ Ratio = \frac{Ratepayer\ Impact\ Offsets + Economic\ Impacts + Environmental\ Impacts}{OREC\ Costs}$$

Because the CBA is a consolidation of the other evaluation criteria, it does not contribute to the ranking of Projects, which is discussed in Section 7. In order to be selected as a Qualified Offshore Wind Project, a Project must have a benefit-cost ratio greater than one, representing a positive net benefit.

Table 104 summarizes the expected benefits and costs of each of the Project options as sole awards. These values include certain LAI adjustments to foster consistency between Applicants as described in the previous sections. With one exception, they do not further discount any of the expected benefits for the credibility or firmness of the information provided by the Applicant. The exception pertains to economic development benefits.

[270] A standard 30-year expected operational life is used for all Projects for purposes of the CBA.

For economic development benefits, the values represent expected New Jersey GDP growth effects, discounted for the strength of the guarantees on expected direct in-State expenditures and for the uncertainty and upward bias of the prediction of indirect and induced GDP growth effects. For example, ASOW provides firm guarantees on 100% of its expected in-State expenditures prior to COD and 100% of its expected permanent jobs during the first 20 years of operation, while OW2 has a conditional guarantee related to NJWP parcel leasing for a variable portion of its expected in-State expenditures from the OREC award date through the first three years of operation, and no cost penalty for failure to meet its direct jobs guarantee. All Projects demonstrate positive net benefits and are thus eligible for selection.

Table 104. Expected Cost-Benefit Analysis Comparison

(NPV MM 2020 $)

BC//EC

Applicant	Project	Ratepayer Benefits	Environmental Benefits	Economic Benefits	OREC Costs	Net Benefits	*B/C Ratio*
ASOW	[redacted]						
ASOW							
ASOW	C	[redacted]					*1.246*
ASOW	[redacted]						
OW2	A	[redacted]					*1.375*
OW2	B						*1.363*

The relative contributions of each component are illustrated in Figure 27. *BC/[redacted]/*EC would still have positive net benefits even if no weight is given to the economic benefits.

Figure 27. Project Benefit-to-Cost Ratios
BC//EC

[redacted]

7 PROJECT RANKING

Projects were awarded points (up to the listed maximum) within each of the four scored categories based on the analysis described in the previous sections:

- OREC Purchase Price and Ratepayer Impacts (Section 2): 50 points
    - Quantitative LNOC analysis
- Economic Impacts and Strength of Guarantees for Economic Impacts (Section 3): 20 points
    - Quantitative economic benefits analysis
- Environmental and Fisheries Impacts (Section 4): 20 points
    - Qualitative review of environmental and fisheries considerations
- Likelihood of Successful Commercial Operation (Section 5): 10 points
    - Qualitative review of project design and development considerations

The points awarded to each Project were summed across the four categories and ranked in descending order.

7.1 OREC Purchase Price and Ratepayer Impacts

In this category, the Project with the lowest LNOC was awarded 50 points. Projects with higher LNOCs received points based on a linear scaling between the lowest LNOC and *BC/[redacted]/EC* which represents the value receiving zero points.[271] LNOCs and category points are shown in Table 105 and the scores are illustrated in Figure 28.

This category has the largest point spread between the highest- and lowest-scoring Projects. This is in part explained by the specific "yardstick" used to allocate points to Projects. Had a different "yardstick" been used for the assignment of points, the resultant Project scores would have been more tightly distributed, but the relative ranking would not change.

Table 105. OREC Purchase Price and Ratepayer Impacts Scores

BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
LNOC (Nominal $/MWh)	[redacted]	$58.81	[redacted]	$40.75	$42.30
Points	[redacted]				

[271] This linear scaling approach was designed to introduce a spread among the price scores, while not penalizing higher-priced projects in the event of LNOC compression.

Figure 28. OREC Purchase Price and Ratepayer Impacts Scores
BC//EC

[redacted]

7.2 Economic Impacts and Strength of Guarantees for Economic Impacts

In this category, the Project with the highest unitized economic impacts was awarded 20 points. Projects with lower unitized economic impacts received points based on a linear scaling between the highest unitized economic impacts and zero. Levelized economic impacts and category points are shown in Table 106 and the scores are illustrated in Figure 29.

Table 106. Economic Impacts and Strength of Guarantees for Economic Impacts Scores
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Levelized Economic Impacts (2020 $/MWh)	[redacted]				
Points					

Figure 29. Economic Impacts and Strength of Guarantees Scores
BC//EC

[redacted]

7.3 Environmental and Fisheries Impacts

In this category, the Project with the highest raw score for environmental and fisheries impacts based on the qualitative metrics was awarded 20 points. Projects with lower raw scores received points based on a linear scaling between the highest raw score and zero. Raw scores and category points are shown in Table 107 and the scores are illustrated in Figure 30.

Table 107. Environmental and Fisheries Impacts Scores
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	C	[redacted]	A	B
Raw Score	[redacted]				
Points					

Figure 30. Environmental and Fisheries Impacts Scores
BC//EC

[redacted]

7.4 Likelihood of Successful Commercial Operation

In this category, the Project with the highest raw score for likelihood of successful commercial operation based on the qualitative metrics was awarded 10 points. Projects with lower raw scores received points based on a linear scaling between the highest raw score and zero. Raw scores and category points are shown in Table 108 and the scores are illustrated in Figure 31.

Table 108. Likelihood of Successful Commercial Operation Scores
BC//EC

	Atlantic Shores			Ocean Wind 2	
	[redacted]	**C**	[redacted]	**A**	**B**
Raw Score	[redacted]				
Points					

Figure 31. Likelihood of Successful Commercial Operation Scores

BC//EC

[redacted]

7.5 Consolidated Scores

The total points awarded to each Project are shown in Figure 32. Quantification of Project scores provides useful data on the overall relative Project merit reflecting the four categories that have been explicitly weighted in the evaluation of all Projects. While the Project scores should not be misconstrued as governing the selection process, they do signify overall comparative merit in regard to price, economic benefits, environmental and fisheries impacts, and the likelihood of commercial success.

Based on the metrics for assigning points that were described in the previous sections, *BC/[redacted]

[redacted]/EC*

Figure 32. Project Scores
BC//EC

[redacted]

8 PORTFOLIO EVALUATION

Following Project ranking, summary statistics were calculated for combinations of Projects. As noted in Section 6, all submitted Projects have a benefit-cost ratio greater than one and are therefore eligible for inclusion in the portfolio evaluation. In performing the portfolio evaluation, individual Projects were also included for comparison. Potential awards can include a Project from either Applicant or Projects from both Applicants. Two projects from one Applicant are precluded. *BC/[redacted]EC*

8.1 Cost-Benefit Analysis

Summary portfolio attributes that contribute to the portfolio cost-benefit analysis are the same components discussed in Section 6 for individual Projects, including total ratepayer impacts, total economic benefits, and total avoided emissions. These summary statistics are summarized for the eight two-Project portfolios in Table 109. Each portfolio has positive net benefits and is therefore eligible for selection.

A complication in constructing split-award portfolios that include one Project from each Applicant is that both Applicants claim economic benefits for development of a foundation fabrication facility that would serve the needs of each Applicant's awarded Project. *BC/[redacted]/EC*

Table 109. Expected Portfolio Cost-Benefit Analysis Comparison
(NPV MM 2020 $)
BC//EC

ASOW Project	OW2 Project	Capacity (MW)	Ratepayer Benefits	Environmental Benefits	Economic Benefits	OREC Costs	Net Benefits	*B/C Ratio*
[redacted]								
C	A	[redacted]						*1.292*
[redacted]								
C	B	[redacted]						*1.288*
[redacted]								

Figure 33 shows the benefits and costs of the potential one-Project and two-Project portfolios, sorted left to right by increasing capacity. The total height of the bars, indicated by the yellow circles, represents the total benefits associated with each portfolio. The red dashed line represents the total costs associated

[272] While this range is broader than the target 1,200 to 2,400 MW range for the solicitation, the Board has the discretion to select more or less than the target quantity. Results are therefore presented for all possible combinations for comparison, with a focus on the target range.

with each portfolio. In all cases, as noted above, the total benefits are greater than the total costs, with both benefits and costs generally increasing with capacity. Net benefits, shown by the dashed purple line closest to the x-axis, also generally increase with capacity, *BC [redacted] /EC* The magnitude of the net benefit, the purple dashed line, relative to the direct cost borne by ratepayers, the red-dashed line, is a useful metric regarding ratepayer capital at-risk.

Figure 33. Portfolio Benefit and Cost Present Value

BC//EC

[redacted]

Figure 34 shows the benefit-cost ratios for the two-Project portfolios relative to the individual Projects, again sorted by total capacity. For each two-Project portfolio, the benefit-cost ratio is between the ratios for the corresponding single Projects. For example, *BC/[redacted]/EC*

Figure 34. Portfolio Benefit-Cost Ratios

BC//EC

[redacted]

Figure 35 shows the incremental present value of the component benefits and costs associated with portfolios relative to *BC/[redacted]/EC* For purposes of this figure, the two-Project portfolios include *BC/[redacted]/EC*

Figure 35. Incremental Benefits and Costs of Portfolios Relative to *BC/[redacted]/EC*

BC//EC

[redacted]

8.2 Preliminary Portfolio Evaluation with Aggregate Project Scores

Using the same valuation weights as for the individual Project scoring, LAI evaluated the same set of numerical criteria and attributes for each eligible two-Project portfolio. This was done by using simple linear aggregation rules of additivity or proportionality, depending on the criterion. The OREC Purchase Price and Ratepayer Impacts scores are based on the delivered energy-weighted average of the LNOCs for the component Projects. The Economic Impacts and Strength of Guarantees for Economic Impacts are the total levelized economic impacts, adjusted to avoid double-counting where appropriate, as discussed in Section 8.1, unitized on a per MWh basis. Environmental and fisheries impacts and likelihood of successful commercial operation for the two-Project portfolio values are the capacity-weighted average of the attribute points for the individual component Projects. These aggregation rules are designed to maintain the same relative weights across the criteria for a portfolio as for an individual Project. For one-Project portfolios, the Project and portfolio scores are identical.

To have project and portfolio scores adhere closely to the 50:20:20:10 criteria weights across the four categories, each criterion's metric was converted into a score. The scoring metric expressed in either dollars or points is based on each Project's or portfolio's value relative to the best realized value across all projects and portfolios using the same methodology described in Section 7. Essentially, this applies the same multi-objective optimization model approach that was used for individual Project scoring to portfolio evaluation. The scores for all individual Projects and two-Project portfolios that have a BCR greater than one are shown in Figure 36, again sorted left-to-right by increasing capacity.*BC/[redacted]/EC*

Figure 36. Portfolio Scores
BC//EC

[redacted]

Figure 37 illustrates the scores relative to capacity. The green line shows the scoring frontier, connecting the highest scores at each capacity level.

Figure 37. Project and Portfolio Scores Relative to Capacity
BC//EC

[redacted]

Figure 38 and Figure 39 similarly show the efficient frontiers for PVNOC (total expected net spending) and LNOC (expected net spending per OREC), respectively, relative to total capacity. For these charts, lower prices are preferred, so the efficiency frontier is represented by the lowest values – as compared to Figure 37 where the highest scores are preferred. These figures represent only information relevant to the OREC Purchase Price and Ratepayer Impacts category. They do not incorporate other considerations central to the evaluation regarding economic benefits, environmental impacts, or likelihood of successful commercial operation.

Figure 38. PVNOC Relative to Capacity
BC//EC

[redacted]

Figure 39. LNOC Relative to Capacity
BC//EC

[redacted]

Further comparisons of the OREC Purchase Price and Ratepayer Impacts among the portfolios are shown in the following series of figures. Figure 40 and Figure 41 show PVOPP vs. PVNOC and LOPP vs. LNOC, respectively, for the portfolios in increasing capacity order. In these figures, the blue bars represent the total spend and per-OREC spend based on the Applicants' pricing plus the TSUCPA. The red bars represent the total spend and per-OREC spend after reducing the value of the blue bar to account for LAI's estimated revenue offsets for energy, capacity, and avoided REC costs.

Figure 40. Total Spend Comparison by Portfolio

BC//EC

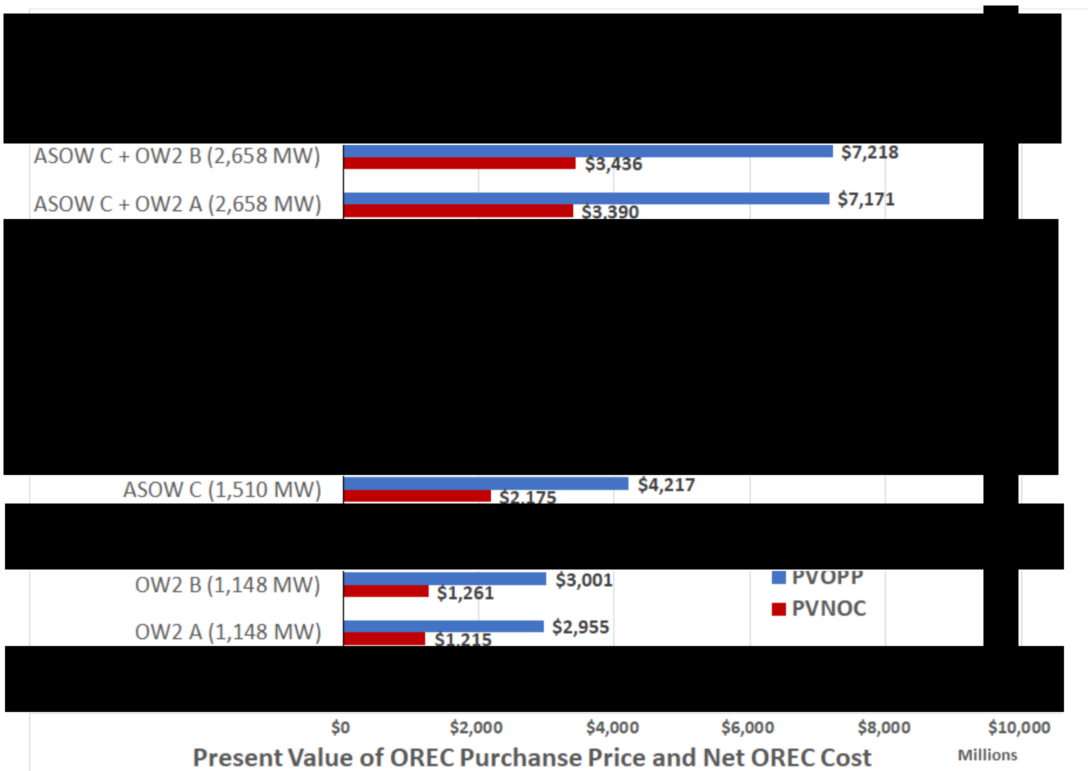


Figure 41. Unit OREC Cost Comparison by Portfolio
BC//EC

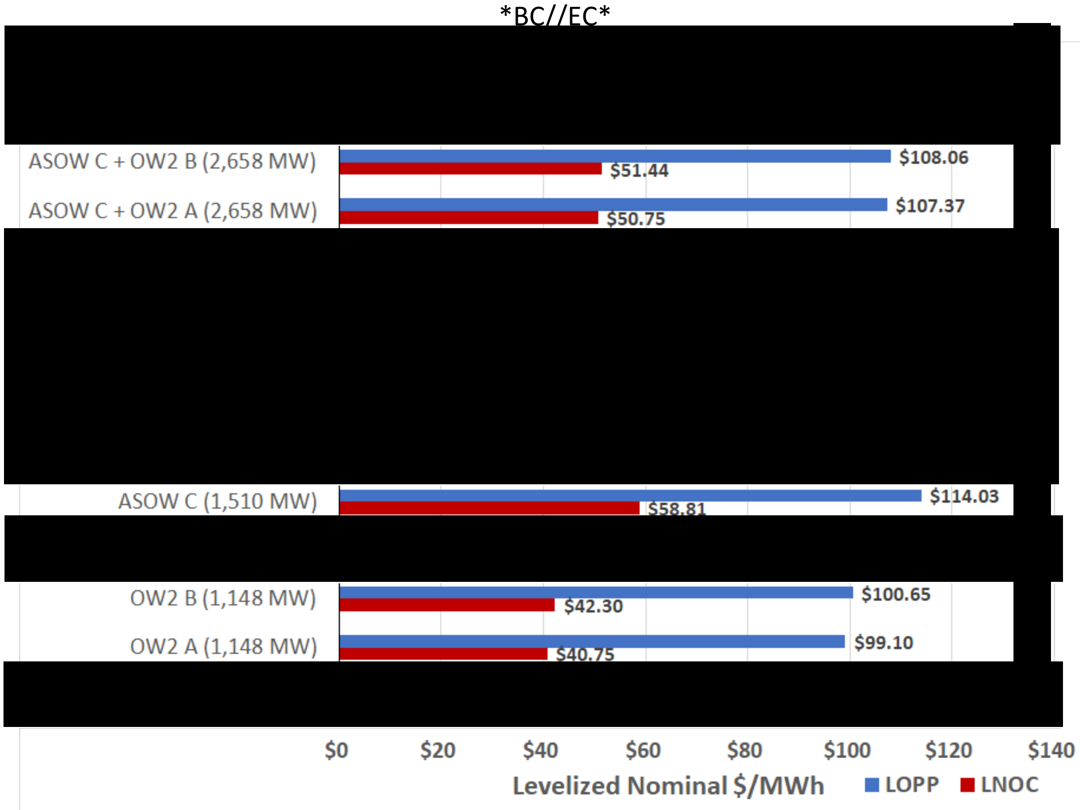


Figure 42 and Figure 43 show the same data sets calibrated relative to *BC/[redacted]/EC* the highest scoring option. Positive values represent portfolios with higher costs than *BC/[redacted]/EC* and negative values represent portfolios with lower costs than *BC/[redacted]/EC* The blue bars again show the Applicants' pricing, and the red bars reflect the Applicants' pricing less revenue offsets. The unit OREC cost comparison is levelized over the 20-year OREC term in nominal dollars.

Figure 42. Total Spend Comparison by Portfolio Relative to *BC/[redacted]/EC*

BC//EC

[redacted]

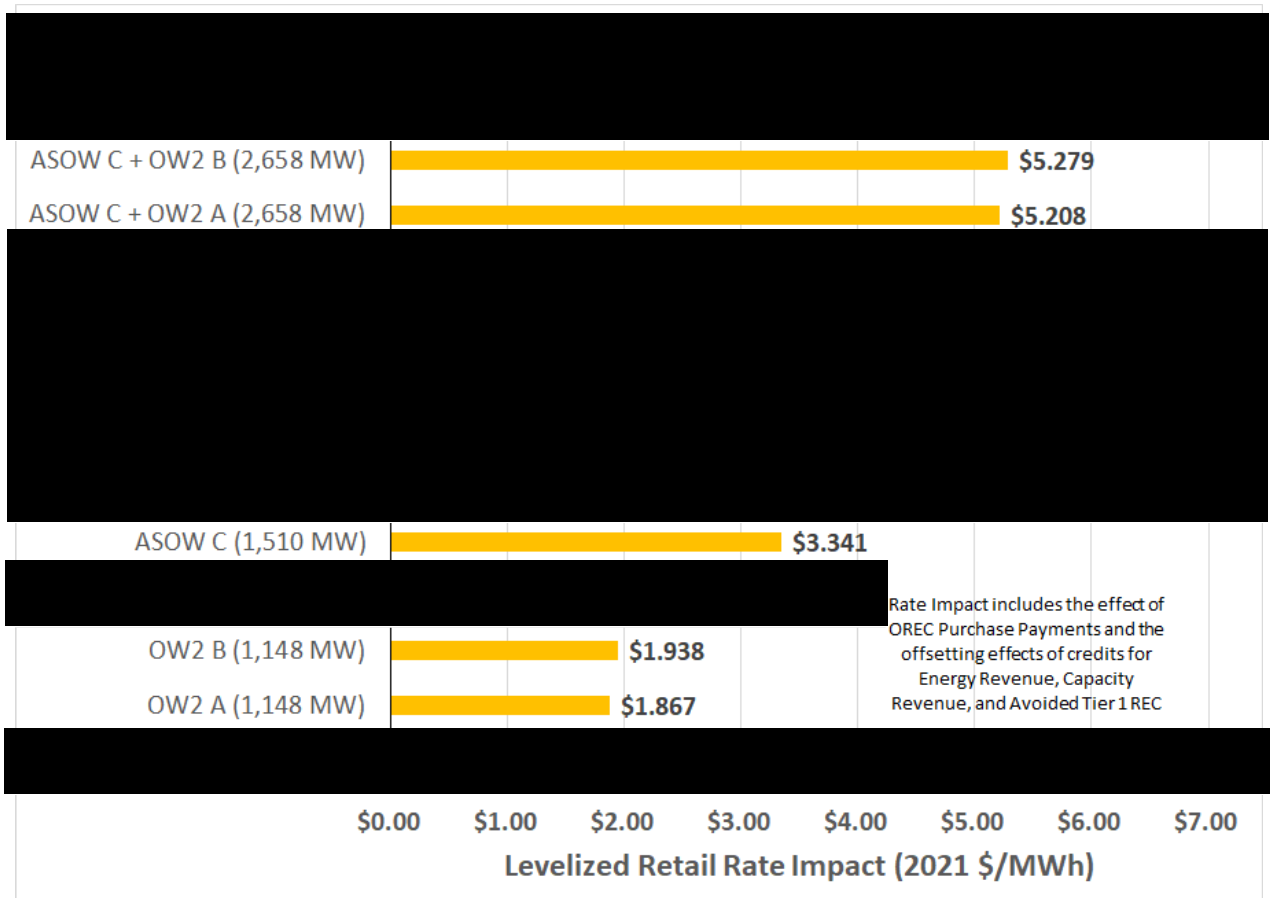
Figure 43. Unit OREC Cost Comparison by Portfolio Relative to *BC/[redacted]/EC*

BC//EC

[redacted]

The retail rate impacts associated with each portfolio are shown in Figure 44. Retail rate impact is directly proportional to PVNOC. It is driven primarily by portfolio capacity, and to a lesser extent by OREC price.

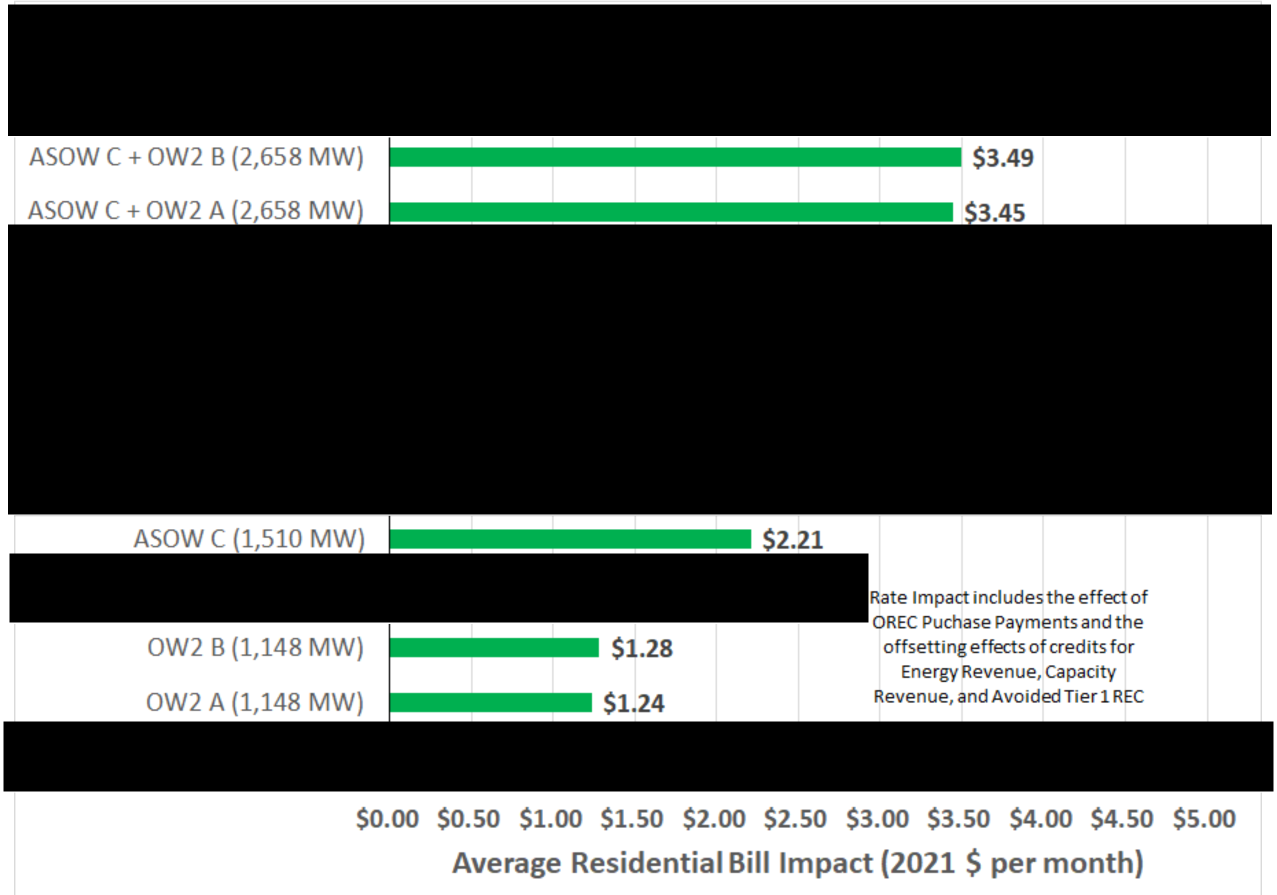
Figure 44. Retail Rate Impact by Portfolio – All NJ EDC Load
BC//EC



The impact on a typical residential electric customer monthly bill is based on an average usage of 662 kWh per month and is also proportional to PVNOC. This is shown for each portfolio in Figure 45.

Figure 45. NJ Residential Electric Bill Impact by Portfolio

BC//EC



8.3 Final Portfolio Evaluation with Additional Diversification Criteria

Portfolio diversification considerations were not part of the quantitative scoring and ranking procedures described above. Therefore, portfolio diversity and composition considerations are addressed in qualitative terms.

Potential award portfolios that include Projects from each Applicant are worthwhile to the extent that they: (1) diversify the risk of successful commercial project completion; (2) strengthen New Jersey's likelihood of success as a regional manufacturing center supporting the nascent offshore wind industry along the Atlantic seaboard; (3) incorporate alternative construction methods and/or technology selection (4) provide economic benefits to more communities around different ports and manufacturing facilities; (5) diversify the injection of offshore wind energy at different POIs; and, (6) heighten the prospect of more robust wholesale competition in subsequent procurement rounds. LAI has not attempted to weigh the relative importance of these six criteria. Each criterion is deemed important in the examination of portfolio evaluation. Moreover, a decision to select one project from each Applicant need not be considered in a favorable light for each of six criteria.

While not explicitly part of the final portfolio evaluation that recognizes the additional six criteria, LAI is aware of the nexus between the size of a potential award and New Jersey's effort through the PJM RTEP process to implement an SAA that fosters the creation of a coordinated transmission solution. A coordinated transmission solution may combine an ocean grid solution with a power corridor to PJM's 500 kV backbone transmission system to support New Jersey's Round 3 through 6 offshore wind solicitations. If the Board were to determine that the potential award portfolio would likely derail the Board's interest in SAA implementation, then the Board may choose to instead award less capacity. If, on the other hand, the potential award portfolio is deemed either neutral or favorable in regard to SAA implementation then the Board may not have any misgivings in its support of a split award.

The scope and rationales for these criteria are outlined in the following sections.

8.3.1 Economic Development Diversification

Diversification of economic development benefits is considered the top priority category for three reasons. First, multiple communities, businesses, and labor occupations will desire a share of the benefits. Second, environmental justice requires commitments to communities and economic interests that have been under-developed or under-served in New Jersey. Third, in addition to the contribution of the development and utilization of harbor and ports infrastructure towards diversification of economic development benefits and economic justice, there are considerations regarding longer-term leveraging and utilization of New Jersey's ports infrastructure. Mid-Atlantic and Northeast coastal states have intensified efforts to become regional manufacturing hubs, thereby supporting strategic positioning of New Jersey's expansive port infrastructure to facilitate the increased penetration of offshore wind to meet coastal states' accelerated decarbonization goals.

Both ASOW and OW2 are proposing to utilize monopile foundations manufactured in Paulsboro. Both developers are also proposing to stage construction out of the NJWP and manage operations out of Atlantic City. NJWP site utilization logistics to accommodate simultaneous stage construction have not been adequately addressed, however. Provided steady progress is made by New Jersey entities to support the timely development of the NJWP, LAI believes that the economic development benefits associated with utilization of the NJWP should be achievable on a timely basis to support the Project schedules.

8.3.2 Technology Diversification

Diversification of generation technologies and performance can help future-proof the transmission grid while also improving environmental mitigation related to the offshore transmission segment from individual collector arrays to landfall. The future-proof grid will be smart (digital) and based on a mix of technologies for generation, transmission and controlled end uses. The scope of this solicitation is limited to offshore wind generation technology paired with radial export cables. Hence, future-proofing attributes of portfolios in this procurement round will likely consist of efficient utilization of the limited number of POIs without compromising the Board's interest in a SAA under PJM's RTEP.

Both Applicants are proposing to utilize monopile foundations, ASOW with a TP and OW2 without a TP. The Applicants propose to use WTGs from different manufacturers, ASOW from MHI Vestas and OW2 from GE. While the lease areas are both offshore of New Jersey, they are spatially distinct and non-contiguous, and plan to utilize different POIs. ASOW proposes to interconnect at Cardiff, *BC/[redacted]/EC* while OW2 proposes to interconnect at Smithburg. Neither Applicant has proposed the use of energy storage.

8.3.3 Applicant Diversification

Diversity in selected Applicants has been considered in the evaluation. The Board may wish to retain the flexibility to award two Projects with different technical aspects, for example, different turbine manufacturers, or different foundation types even though the selection of a second Project has a lower total score. The benefits of Applicant diversity may be considered relative to potential negative decremental BCRs associated with buying more offshore wind now versus later. How best to assess the benefits of selecting two Applicants to meet the Board's Round 2 offshore wind solicitation target range with the additional considerations pertaining to the diversity of technical aspects and economic benefits remains subject to the Board's discretion.

8.4 Strengths, Weaknesses, Opportunities, and Threats

LAI has considered the strengths, weaknesses, opportunities, and threats ("SWOT") for the Projects and portfolios. While Project scores are informative, they are not dispositive. Hence the SWOT analysis is designed to facilitate the Board's basis for decision-making by summarizing the qualitative factors that supplement quantitative scores.

The SWOT framework is presented in a 2-by-2 matrix that locates each category in a quadrant according to two dimensions, positive or negative expected outcomes, and internal or external uncertainties:

- *Strengths* represent the positive features pertaining to the Applicant's experience and likelihood of commercial success. Strengths represent features over which the Applicant exhibits a high degree of control.
- *Weaknesses* represent negative economic and environmental attributes that hinder the Applicant's prospects of commercial success. Weaknesses represent features over which the Applicant exhibits a moderate or low degree of control.
- *Opportunities* represent positive features regarding technology, environmental mitigation, environmental justice, and prospects for economic growth attributable to offshore wind development in New Jersey. Opportunities represent potential upside benefits to New Jersey that are controllable in part or in full by the Applicant.
- *Threats* represent hazards that can block or delay the Board's realization of the solicitation goal or otherwise diminish the anticipated economic "benefit of the bargain." Therefore, strategic considerations associated with the selection of one or more Projects that have the potential to weaken prospects for success are categorized as threats. Threats are largely outside the control of the Applicant.

Positive strengths and opportunities are shaded green and light green, respectively, depending on whether uncertainties or risks are internal or external. Weaknesses are shaded yellow because specific project weaknesses may be mitigated or remedied post award through engineering design, environmental mitigation measures, or completion of permitting and supplier agreements. Threats are red because the negative aspects are outside the direct control of both the Applicant and the State of New Jersey.

Portfolio options that fall within the Board's procurement target range of 1,200 MW to 2,400 MW are considered here. Because the Board has the discretion to select a portfolio that exceeds 2,400 MW, we have also presented the distinct SWOT attributes for a portfolio of 2,658 MW, about 11% higher than the 2,400 MW upper procurement target. We also include the slightly smaller award option of an 1,148 MW OW2 Project. *BC/[redacted]

[redacted] EC*

A SWOT matrix for Atlantic Shores *BC/[redacted]/EC* C, *BC/[redacted]/EC* as sole awards is presented in Figure 46. Strengths include a relatively firm design plan and firm economic development benefits guarantees. The major weakness is that Atlantic Shores has comparatively limited experience in developing and operating offshore wind projects. Any Project award would likely provide ASOW with the development experience and add-on economies to bid more competitively in future procurements. Projects C *BC/[redacted]/EC* include a path for an alliance with MHI Vestas to establish a WTG nacelle assembly at the NJWP or, if need be, elsewhere in New Jersey. *BC [redacted] /EC*

Figure 46. SWOT for Atlantic Shores *BC/[redacted]/EC*

BC//EC

[redacted]

The Ocean Wind 2 SWOT analysis is shown in Figure 47 for both Projects. The 500 kV POI at Smithburg is considered a strength based on the robust transmission system capability on the 500 kV AC backbone system *BC [redacted] EC* Remaining technical design uncertainties include lack of final cable route and landfall plan, *BC/[redacted]/EC* and the plan to use a foundation design without a transition piece. While OW2's Project B offers the opportunity to further build NJ's offshore wind industry with establishment of a GE nacelle assembly facility, its realization is contingent on timely completion of the NJWP as the site for the GE facility and GE's satisfaction regarding lease terms.

Figure 47. SWOT for Ocean Wind 2 Projects A and B
BC//EC

[redacted]

For split awards with a Project from each Applicant, some additional SWOT attributes beyond those of the pair of individual Projects arise in the portfolio of two projects. *BC [redacted]

[redacted] /EC*

Figure 48. Incremental SWOT for *BC/ [redacted] /EC*

BC//EC

[redacted]

The SWOT assessment for portfolios that combine ASOW C with either of the OW2 Projects is summarized in Figure 49. These larger MW portfolios may increase the likelihood that EEW would establish the Phase 2 facility by having the opportunity to immediately produce more monopiles. However, even with the earliest possible Phase 2 plant completion date and a longer work week, ASOW may need to supplement monopiles produced at Paulsboro with the remainder produced outside New Jersey. A larger MW portfolio than the BPU's upper end of its initial target procurement range poses a threat of ratepayer resistance to procuring more than the minimum procurement goal of 1,200 MW as well as more than the initial target upper goal of 2,400 MW. While there is always uncertainty surrounding the relative merit of buying more offshore wind now versus later, New Jersey's ability to position the Garden State favorably as a regional manufacturing hub is well-served by accelerating New Jersey's decarbonization objectives. Other benefits supporting the decision to award a portfolio that is greater 2,400 MW enter into the decision calculus. Moreover, as other mid-Atlantic and Northeast states raise and accelerate their respective offshore wind procurement targets LAI believes there is a significant chance of upward, not sustained downward, OREC Purchase Prices in subsequent offshore wind procurement rounds.

For ASOW C combined with OW2 B, the plan would be establishment of nacelle assembly operations by both MHI Vestas and GE. While realizing both facilities would provide possibly more competitive WTG pricing to future offshore wind project developers, *BC/[redacted]/EC* An opportunity of a split award for the portfolios that include one or two nacelle facilities is that the NJWP may become more of a hub for nacelle component manufacturing nearby. A split award has the added strength of diversification of the locations of economic activity, developers, suppliers, and points of interconnection. This added strength of diversification incorporates heightened environmental justice goals as well as innovative pilot programs in synchrony with New Jersey's decarbonization objectives.

Figure 49. Incremental SWOT for Atlantic Shores Project C and Ocean Wind 2 Project A or B

BC//EC

[redacted]

APPENDIX A: LAI COMMODITY PRICE FORECASTING MODELS AND KEY ASSUMPTIONS AND DATA

Input Assumptions

LAI utilizes Aurora, a chronological dispatch simulation model licensed from Energy Exemplar, to forecast power market outcomes, including energy prices, capacity prices, power plant emissions, and natural gas requirements for electric generation. LAI utilized energy and emissions output from Aurora in its evaluation of Solicitation #2. LAI used the default database provided by Energy Exemplar as a foundation, augmenting it with extensive customization based on public data sources, proprietary calculations, and LAI's professional judgment based on experience in PJM and neighboring RTOs.

According to the statute, selected OSW projects will be funded through the OREC mechanism for 20 years. To cover the 20-year contract term, LAI ran Aurora from 2021 through 2050.

LAI prepared two Aurora simulation projections in support of BPU's economic and environmental goals:

- The base scenario included the full 7,500 MW of New Jersey's OSW goal, constructed in six tranches consistent with the Offshore Wind Strategic Plan.[273] Offshore wind projects were injected into New Jersey zones consistent with substation locations identified in the Board's State Agreement Approach study request.[274] This forecast was used to estimate net OREC cost and ratepayer impacts under expected (baseline) market conditions by providing prices for energy products to compare against bid prices. REC prices were forecasted using the output of the AURORA model together with LAI's proprietary model of the all-in net cost of land-based wind energy located in the RTO West portion of PJM.
- To estimate the avoided emissions in New Jersey, a "but-for" case was configured as an excursion of the base scenario. The excursion assumption was that no OSW is built in New Jersey after the contracted Ocean Wind project. The purpose of this case was solely to estimate the CO_2, NO_X, SO_2, and $PM_{2.5}$ emissions avoided within New Jersey by the procurement of OSW. No replacement energy was procured to meet New Jersey RPS in the No Additional OSW case. We compared plant emissions (CO_2, SO_2, NO_X, $PM_{2.5}$) from the 7,500 MW OSW case to the No Additional OSW case to determine the tons of avoided emissions for each year of the study period.

The assumptions utilized represent "known and knowable" expectations for New Jersey and other states' energy policies. LAI did not model an assumed energy future that meets states' long-term decarbonization targets, as the approaches that various states will take and their abilities to meet targets and standards are uncertain. LAI did model specific policy measures and goals that states have announced, such as procurement targets for large-scale clean energy technologies and settled state procurements. For New Jersey, this approach reflected policy assumptions from the "Reference 2" case shown in the Energy Master Plan and Integrated Energy Plan,[275] which includes the following measures in addition to offshore wind development:

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[273] https://www.nj.gov/bpu/pdf/Final_NJ_OWSP_9-9-20.pdf See figure 1-8. The Solicitation 6 solicitation quantity was reduced to 1,400 MW in order to match the 7,500 MW goal.
[274] Page 7, November 18, 2020 BPU Order Docket No. QO20100630.
https://publicaccess.bpu.state.nj.us/DocumentHandler.ashx?document_id=1230026
Solicitation 2 was assumed to interconnect via a radial line to Larrabee; subsequent solicitations would be part of a network which would inject into Cardiff, Smithburg, and Deans substations.
[275] IEP Public Webinar, page 36.

- 2 GW of storage by 2030
- 330k Electric Vehicles (EVs) on the road by 2025
- 50% Class 1 RPS by 2030
- Improvements in Energy Efficiency (EE)
- 400 MW per year of Behind-the-Meter (BTM) Solar PV through 2030

Study Region

Aurora was utilized in a zonal configuration with the study region modeled to include PJM, NYISO, and ISO-NE. Boundary flows to other regions (including MISO, TVA, IESO, and Quebec) were modeled based on an average weekly profile for each month using three years of historical flow data (168 hours by 12 months, 2017-2019). Imports into New York from Ontario were throttled down to reflect the impending refurbishment schedule of IESO's nuclear units.

The three ISOs were further divided into zones to capture the key transmission constraints within each. LAI modeled all load zones within MAAC and aggregated the western portion of the PJM footprint into a "Rest of RTO" zone. NYISO was divided into seven load zones (A through K, with some aggregation upstate). ISO-NE was divided into the 13 sub-areas identified in the Regional System Plan ("RSP").

Transfer Limits

Inter-zonal transmission transfer limits were defined using several publicly available data sources:

- PJM BRA Planning Parameters
- NYISO Reliability Needs Assessment
- NYSRC Installed Capacity Requirement ("ICR") Report
- ISO-NE Forward Capacity Market ("FCM") Tie Benefits Study
- ISO-NE CONE and ORTP Analysis
- ISO-NE Economic Studies

In cases where data were not available or data sources conflict, the analysis relied on the default settings provided by Energy Exemplar, as well as professional judgment, to determine appropriate limits. Energy Exemplar performs a nodal power flow simulation that informs the zonal transmission limits in the default database.

Demand Forecast

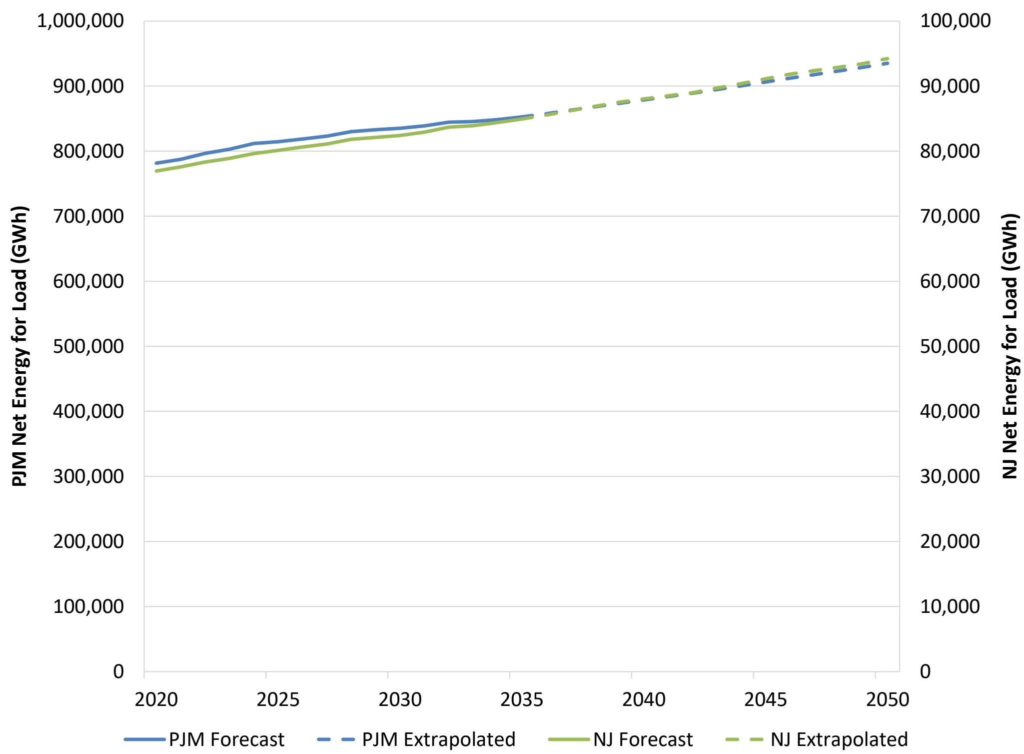
LAI relied on RTO planning documents such as PJM's Load Forecast Report, NYISO's Gold Book, and ISO-NE's Capacity, Energy, Loads, and Transmission ("CELT") Report as the basis for peak and annual energy forecasts. RTO forecasts that include EE were utilized. BTM solar, which is also forecasted in planning documents, is defined as a supply-side resource to allow reflecting the changes to hourly shape of net load that solar creates, as solar generation have the same hourly shape as energy demand.

PJM's 2020 Load Forecast Report data included monthly metered and peak load values by zone through 2035. LAI extrapolated the load forecast for the rest of the study period by reconstituting the net energy for load through adding back in BTM solar generation. LAI then extrapolated those values forward assuming exponential growth consistent with the Combined Annual Growth Rate ("CAGR") over the forecast period. BTM solar generation was assumed to grow at a constant MWh rate per the last year's forecasted growth rate. Figure A1 shows the forecasted energy load in PJM and New Jersey net of BTM

PV and EE. Figure A2 shows the forecasted net summer peak net of BTM PV and EE for PJM and New Jersey.

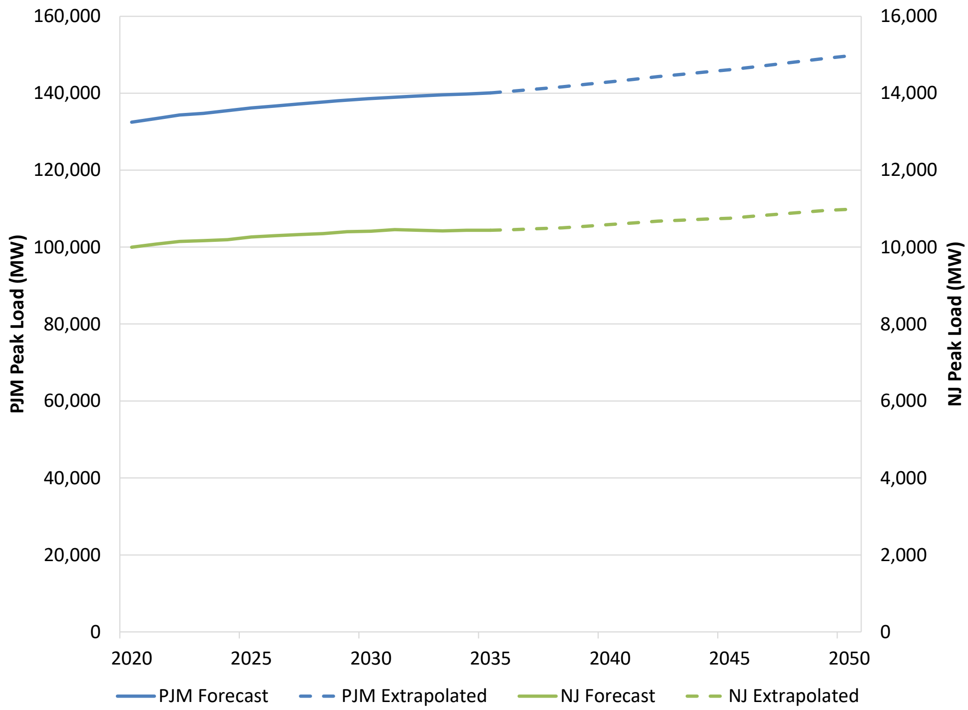
The 2020 Load Forecast Report also included Plug-in Electric Vehicles ("PEVs"). LAI adjusted the PEV forecast to reflect the 330,000 vehicles by 2025 goals set by New Jersey as part of the Multi-State ZEV Task Force. LAI also adjusted New Jersey summer peak and energy load forecasts to reflect targets set in the 2019 Energy Efficiency Potential in New Jersey study.[276] The study provided statewide annual energy and peak savings targets through 2024 meant to comply with the Clean Energy Act. These targets are consistent with the BPU's June 10, 2020 Order directing utilities to achieve savings equivalent to 2.15% of electricity usage. We assumed these savings persist throughout the study period.

Figure A1. Forecasted Net Energy for Load



276 https://www.njleg.state.nj.us/OPI/Reports_to_the_Legislature/energyefficiencystudy5.24.19.pdf

Figure A2. PJM Non-Coincident Net Summer Peak Forecast



NYISO's 2020 Load Forecast Report ("Gold Book") had four load scenarios that forecasted load through 2050. LAI used the Baseline Forecast, which represents a middle path for various load modifying activities such as EE, BTM solar, and new sources of demand through electrification.

ISO-NE's 2020 CELT report forecasted load through 2029. LAI extrapolated gross load (prior to netting out EE and BTM PV) per the CAGR of the forecast period and extrapolates EE and PDR based on a constant MWh growth rate per the last forecasted year's values. The 2020 CELT forecast of gross load included EVs and Air Source Heat Pumps ("ASHPs").

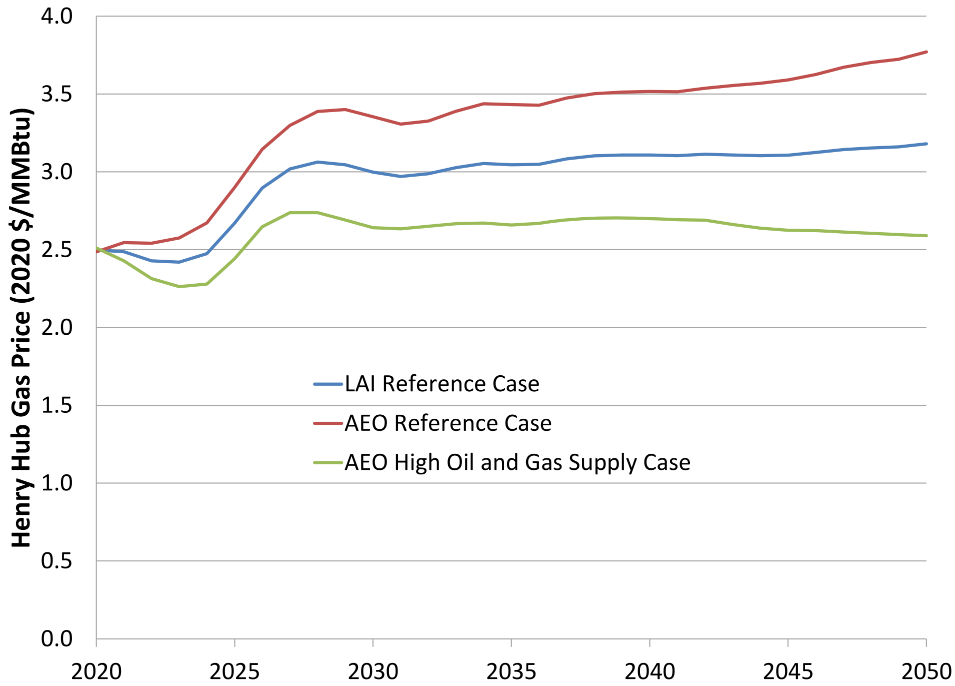
Fuel Price Forecast

Fuel prices, as delivered to generators, were forecasted for natural gas, oil products, and coal. Nuclear generators are price takers and do not have much dispatch flexibility. We therefore ignored nuclear fuel prices and assume that nuclear plants run fully loaded aside from scheduled refueling.

Natural Gas Price Forecast

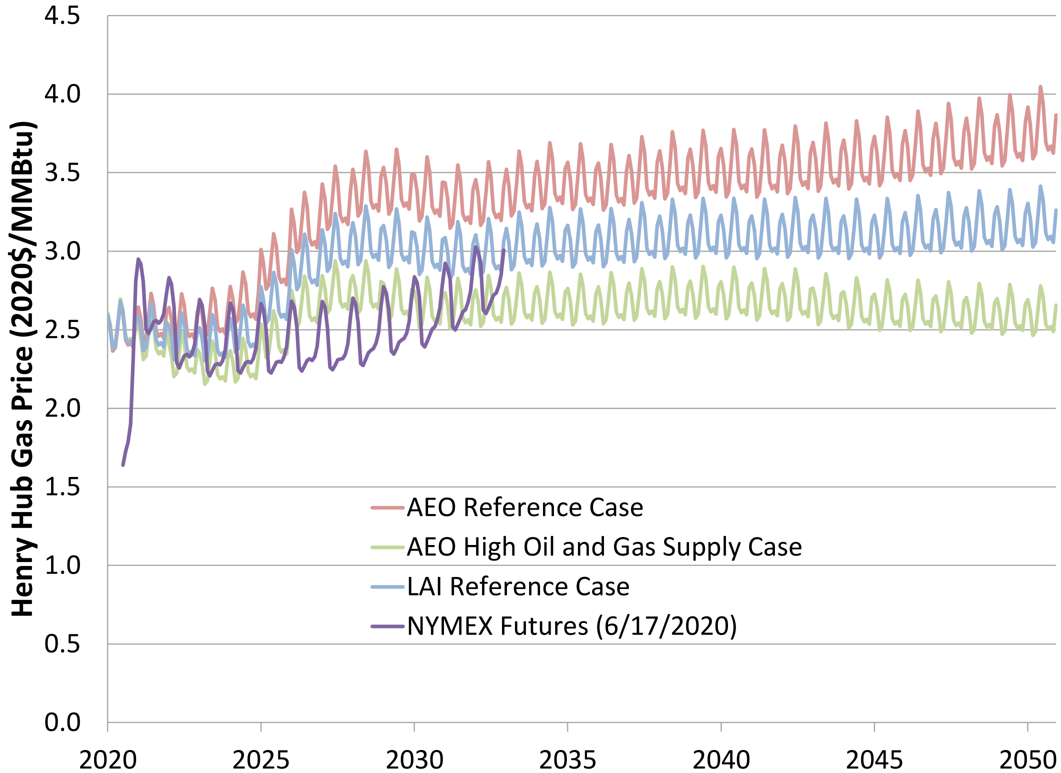
The Henry Hub commodity price projection from EIA's 2020 Annual Energy Outlook ("AEO") was used as the starting point for the forecast of delivered natural gas prices. Historically, the AEO Reference Case has overestimated the trajectory of natural gas prices. We therefore used a simple average of the AEO Reference Case and the AEO High Oil and Gas Supply Case, as illustrated in Figure A3, consistent with the Solicitation #1 forecast calculation. Based on the average monthly profile of historic Henry Hub prices observed over the last ten years, monthly shaping of natural gas prices into-the-pipe in Louisiana was applied to the annual prices over the study period.

Figure A3: Annual Average Natural Gas Commodity Price Projections



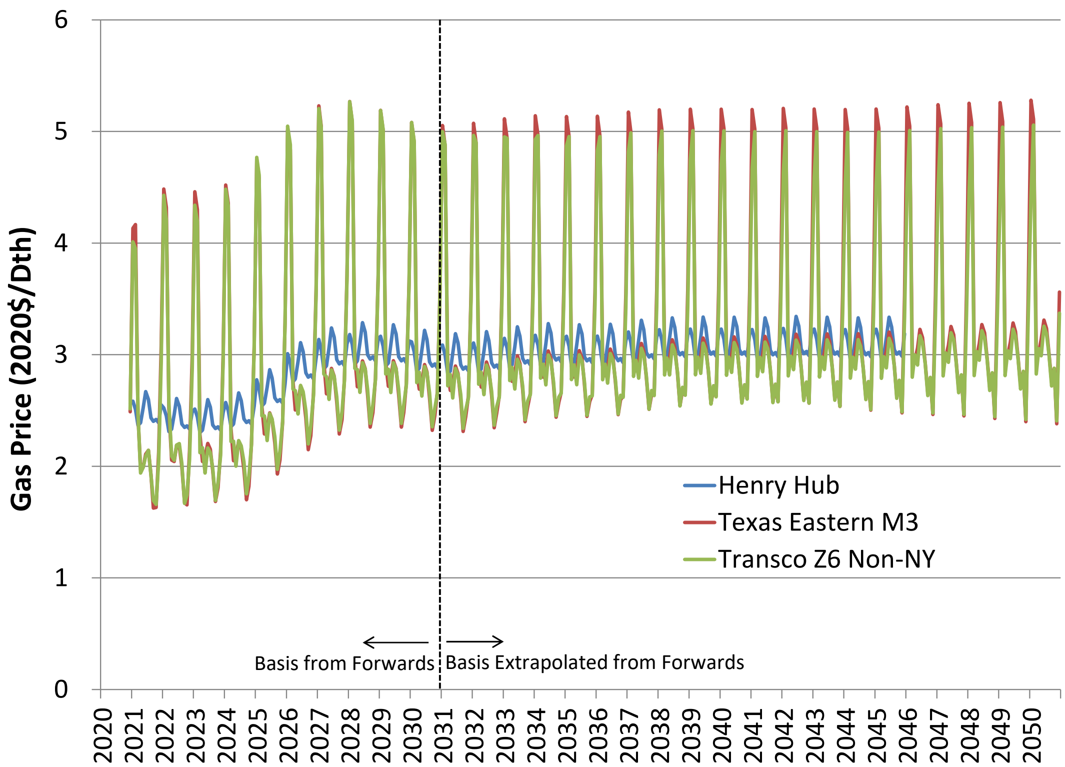
Use of the average of the AEO Reference and High Oil and Gas Supply Cases is supported by a comparison to Henry Hub futures prices. Figure A4 overlays the June 17, 2020 New York Mercantile Exchange (NYMEX) settled prices against the 2020 AEO Henry Hub forecasts after monthly shaping was applied. The AEO Reference Case is consistently higher than the market perspective represented by NYMEX.

Figure A4: Natural Gas Commodity Price Projection Comparisons



To reflect the value of gas delivered across the study region, basis adjustments for pricing points of relevance were made to the cost of natural gas into-the-pipe at the Henry Hub. Regional basis and the resultant delivered natural gas prices were based on the latest available OTC Global Holdings natural gas forward prices. This forward pricing data is available for a ten-year forecast period. The forecast to 2050 was therefore extrapolated based on the available pricing data. Delivered gas prices to New Jersey, including Texas Eastern M3 and Transco Z6 Non-New York, are shown in Figure A5.

Figure A5: Monthly Delivered Gas Prices in New Jersey



Other Fuel Price Forecasts

Delivered oil products prices were forecasted based on the 2020 AEO, consistent with the Henry Hub forecast.

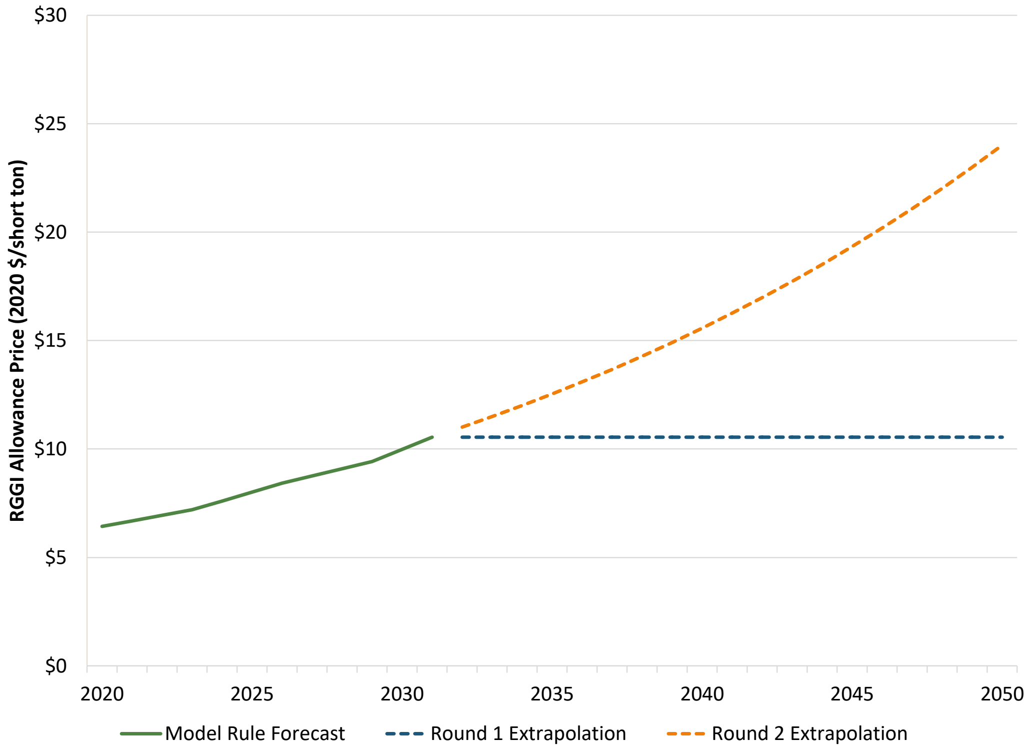
Coal prices were forecasted using the 2020 AEO prices for delivered coal to electric generators as a commodity price. These prices were then adjusted on a unit and state level to reflect local price adders based on basin sourcing and transportation costs. These adders are developed by Energy Exemplar and are primarily based on a review of EIA-923 fuel receipts data.

Carbon Allowance Price

For CO_2 allowance prices, the carbon allowance price projection relied on final RGGI Model Rule Policy Scenario forecast prices that were prepared on behalf of the 2017 RGGI Program Review conducted by the RGGI Stakeholder Group. LAI assumed that Virginia would join RGGI by the beginning of 2021.[277] In Solicitation #1, LAI assumed that following the end of the current program period, the RGGI real price stays constant. LAI changed the extrapolation assumption for Solicitation #2 to grow the RGGI real price annually throughout the study period by applying the CAGR from the program period to each year beyond it. LAI assumed carbon emissions allowance prices of $0/ton for resources located outside of the RGGI states.

[277] The RGGI Model Rule forecast did not include New Jersey or Virginia. We assume that the inclusion of New Jersey and Virginia will increase the cap accordingly, and therefore will have no direct impact on the allowance prices.

Figure A6. RGGI Allowance Price Forecast



Firm Resource Additions

LAI assumed that any resource cleared in a capacity auction such as the PJM BRA or ISO-NE FCM will be built and was therefore included as scheduled addition in Aurora. LAI has found that about 6 GW of new combined cycle projects in PJM have commenced construction despite the uncertainty surrounding the BRA.[278]

In NYISO there is no three-year forward capacity auction. We assumed that the Berrians East Replacement Project will be built as it has accepted an interconnection cost allocation and executed its interconnection agreement.

Scheduled Renewable and Clean Energy Resource Additions

For renewable resources, our forecast generally assumed that projects with signed Interconnection Service Agreements in PJM or ISO-NE or accepted interconnection cost allocations in NYISO will be built.[279]

The projections also included all renewable and clean energy projects, including OSW, that have approved contracts and/or which have been selected for long-term contract under a state-mandated procurement:

- US Wind and Skipjack OSW projects, with a combined 368 MW of capacity, will deliver into EMAAC (DPL). Anticipated in-service dates are in late 2024 and late 2023, respectively. These contracts have been approved by the Maryland PSC.

[278] Identified projects are Guernsey, Indeck Niles Energy Center, Jackson Generation, Hannibal Port Power Project, and South Field. All the projects are in the western half of the RTO.
[279] Some exceptions were made for suspended, withdrawn, and indefinitely delayed projects.

- The 130 MW Deepwater Wind's South Fork OSW project will deliver into NY Zone K, with an anticipated in-service date of 2023. The Long Island Power Authority approved the PPA.
- The Vineyard Wind 800 MW OSW project is assumed to have an in-service date of October 2023. Vineyard Wind will deliver into SEMA (Barnstable, MA).
- Deepwater's 700 MW Revolution Wind project was selected by NGrid Rhode Island (400 MW), the CT Clean Energy RFP (200 MW), and the CT Zero Carbon RFP (100 MW). Revolution Wind will deliver into the Rhode Island Zone and is expected to be placed in service in late 2023.
- The 1,200 MW New England Clean Energy Connect project, selected by the Massachusetts EDCs under the 83D procurement and submitted to the MA DPU for PPA approval. LAI assumes a 2023 in-service date, with scheduled annual energy delivery profile similar to that of HQ imports on the Phase II HVDC tie.
- The 880 MW Sunrise Wind and 816 MW Equinor Empire Wind projects were selected in NYSERDA's first offshore wind procurement. Both projects are assumed to be in service in late 2024.[280]
- The New Jersey BPU awarded Ørsted a contract for its 1,100 MW Ocean Wind project. Ocean Wind is expected to be operational in 2024 and assumed to deliver into the Atlantic City Electric zone.
- In October 2019, the Massachusetts EDCs selected the Mayflower Wind 804 MW project This project is expected to be operational in 2025/2026 and is assumed to deliver into SEMA.
- Section 1 of Connecticut Public Act 19-71 directed CT DEEP to solicit offers for up to 2,000 MW of OSW. In December 2019, DEEP selected Vineyard Wind's 804 MW Park City Wind project which was assumed to be delivered into SEMA and will achieve commercial operation in 2025.
- NYSERDA held clean energy procurements for onshore wind and grid-scale solar in 2017, 2018, and 2019 for a total of 4,025 MW of Tier 1 renewables. The procurements also called for a total of 65 MW of paired energy storage.

In addition, the projection included generic OSW projects to fulfill policy goals in other states of the study region:

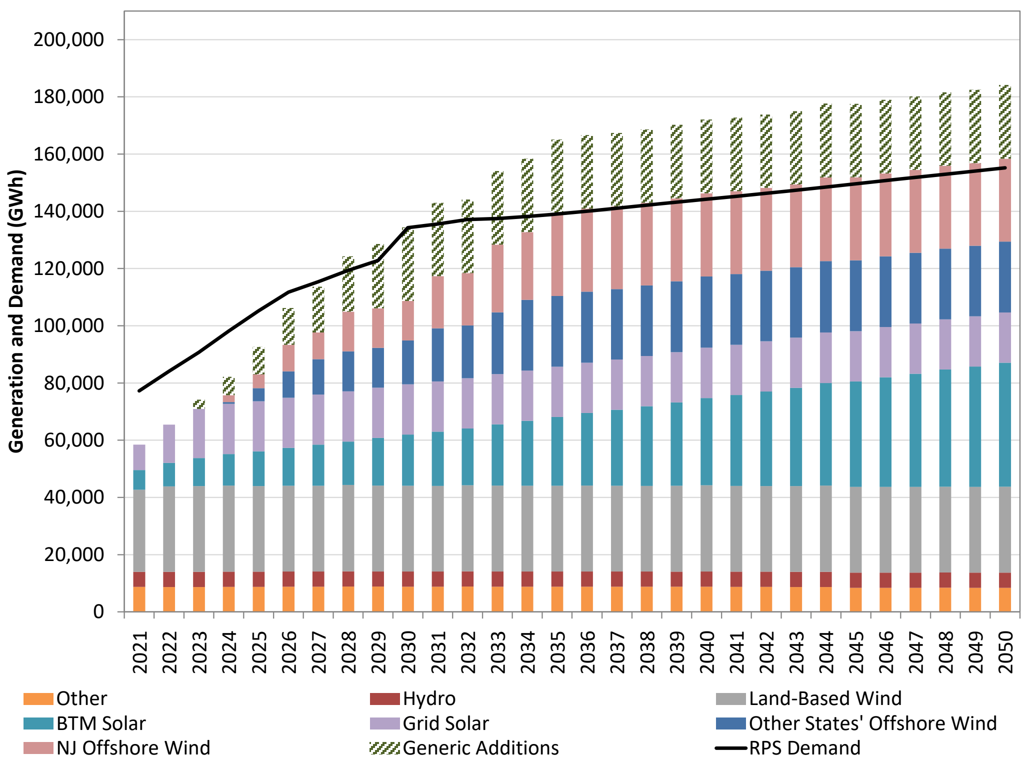
- New York State passed legislation that calls for 9,000 MW of offshore wind built by 2035.
- Maryland passed the Clean Energy Jobs Act of 2019 which calls for the development of 1,200 MW of offshore wind by 2030.
- Virginia passed legislation establishing an offshore wind target of 5,200 MW by 2034 for Dominion Energy, and Dominion has announced plans to bring a 2,640 MW offshore project online by 2026.
- Connecticut passed legislation for 2,000 MW of offshore wind by 2030.
- Massachusetts passed legislation authorizing an additional 1,600 MW of offshore wind procurement, which was formalized by the Department of Energy Resources in summer of 2019.

Generic land-based wind capacity was added to make up Class I energy deficits. Land-based wind additions were sited in "rest of RTO" in proportion to the capacity listed in PJM's interconnection queue that was

[280] At the time of modeling, NYSERDA's selections of Empire Wind 2 and Beacon Wind in the 2020 Offshore Wind Solicitation had not yet been announced.

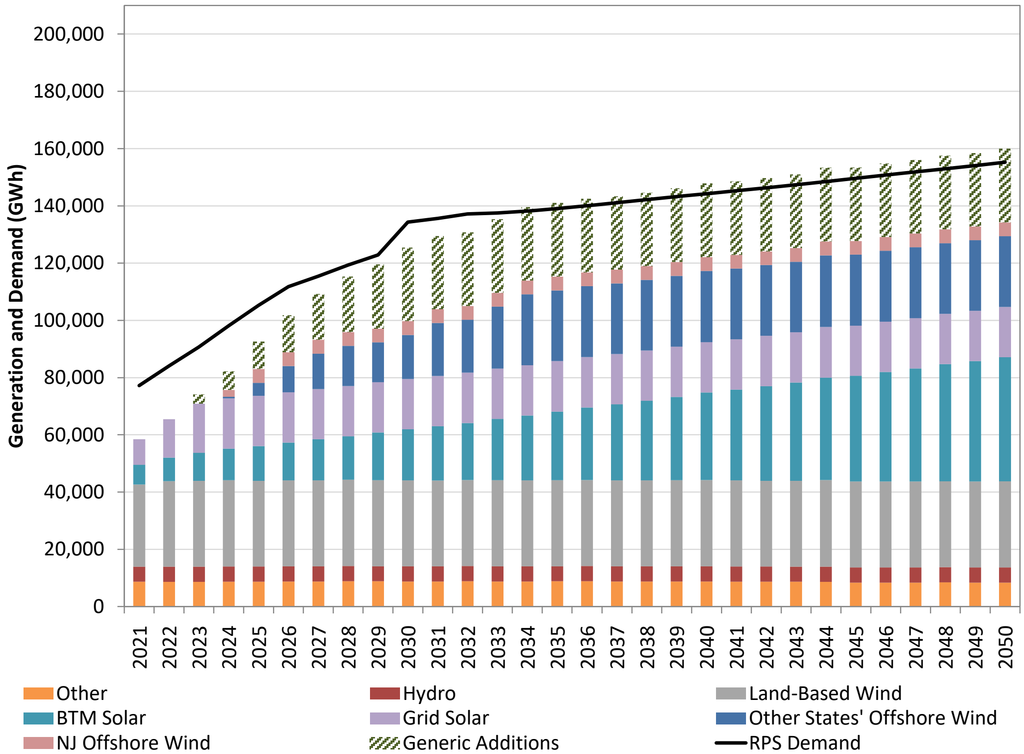
not already scheduled for addition. New Jersey's solar goals were met only by in-state solar resources and did not require generic additions. We made the simplifying assumption that RECs are fungible in PJM. The projected energy from generators with the potential of producing Class I RECs[281] in any PJM state was included as Class I existing or planned supply. The addition of Class I generic onshore wind resources in PJM started in 2023 and ended in 2030, in order to meet the most ambitious states' targets in 2030.[282] From 2030 to 2050, the growing REC production of planned Class I resources, namely offshore wind procurements, kept pace with the growing Class I REC demand. Hence, no generic Class I additions were needed in this period to meet Class I requirements in PJM. The PJM Class I supply and demand after generic additions from 2021 to 2050 with and without NJ OSW are shown below in Figure A7 and Figure A8.

Figure A7. PJM Class I Supply and Demand 2021 – 2050, with NJ OSW



[281] The GATS database lists all renewable generators and where they are registered as Class I.
[282] New Jersey and Maryland have each oriented their RPS goals around 50% Tier 1 by 2030.

Figure A8. PJM Class I Supply and Demand 2021 – 2050, without NJ OSW



Utility-scale solar and onshore wind additions in NYISO and ISO-NE were distributed to zones in proportion to zonal queued capacity.

Firm (Scheduled) Retirements

The scenarios included retirements documented by the ISOs in planning documents and notices. PJM's deactivations list was reflected in the resource mix. NYISO retirement notices and ISO-NE permanent de-list bids and non-price retirements through Forward Capacity Auction (FCA) 15 were also integrated into the retirement assumptions.

LAI did not retire the PSEG nuclear fleet (Hope Creek, Salem) until their respective NRC licenses expired. LAI also assumed that Ohio would provide some subsidy to the FirstEnergy units that have requested deactivations (Perry, Davis-Besse), and therefore those units will operate until their licenses expire. Per New York State's mandate, Indian Point units 2 and 3 were retired in 2020 and 2021, respectively. Other nuclear units in the study region were retired according to their license expirations, which generally amount to 60 in-service years.[283] Several nuclear units in PJM (Beaver Valley, Davis-Besse, and Perry) have withdrawn from the deactivation list with the expectation that subsidies will keep them viable.

The remaining coal units in New York were assumed to retire by 2020 per Governor Cuomo's mandate. LAI also assumed significant attrition of downstate New York peaking resources resulting from expected more restrictive NO_x regulation, on the order of about 3,000 MW.

[283] Several nuclear units in PJM have applied for or intend to apply for NRC certification to run for 80 years, such as Peach Bottom, Surry, and North Anna.

Capacity Expansion Modeling

The capacity expansion forecast utilized Aurora's Long Term Capacity Expansion functionality to determine an equilibrium path of annual resource additions and retirements beyond scheduled additions and retirements. Under this functionality, Aurora calculates the present value of all existing resources and determines which generators are candidates for retirement based on lowest present value over the forecast period.

The model iterates to an equilibrium solution given potential candidate new resource options and retirements. In each iteration, an updated set of candidate new resource options and retirements is placed into the system and the model performs its chronological commitment and dispatch logic for those resources. The model tracks the economic performance of all new resource options and resources available for retirement based on market prices developed in the iteration. At the end of each iteration the long-term logic decides how to adjust the current set of new builds and retirements, or it determines that the model has converged on an optimal solution.

The capacity proxy prices are based on the average of the previous three BRA resource clearing prices. The resource clearing price for the 2022/23 delivery year is the three-year average price, which was then escalated at a 2% annual inflation rate each year thereafter. This method is consistent with the projected capacity prices provided by BPU with the SGD for the first offshore wind solicitation and was relayed to Applicants in the SGD for this solicitation. PSEG has binding constraints in one out of the last three BRAs that led higher resource clearing prices in PSEG than in the rest of EMAAC and New Jersey. Projected PSEG capacity proxy prices are therefore slightly higher than those in ACE, HCPL, and RECO.

Capacity Demand Curve Forecast

LAI implemented its projection of the PJM demand curve, the Variable Resource Requirement (VRR), in the Aurora model to forecast PJM capacity prices. PJM's BRA planning parameters for the 2022/2023 Delivery Year served as the foundation of the VRR forecast.[284] Parameters were adjusted to reflect updates to Net Cost of New Entry (CONE), expected energy efficiency levels, and to incorporate the 2020 PJM Load Forecast Report. Adjustments to the points on the VRR curve were made for the ISO and each LDA based on a ratio of the forecasted peak demand net BTM solar to the reported BRA peak for the 2022/2023 Delivery Year.

Addition/Attrition Forecasting

Candidate Additions

LAI created candidate resources which Aurora considered for new additions. CONE study CC and CT units were modeled as candidate resources.

Candidate Retirements

LAI restricted the candidates for retirement to coal and oil-fired steam and combustion turbines.

[284] https://pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2022-2023/2022-2023-bra-planning-period-parameters.ashx

Nodal Price Regression

A regression analysis was used to convert forecasted energy prices from zonal to nodal resolution for each interconnection point proposed by the applicants, except for one node that had an incomplete price history for the historical period and was not needed for the financial analysis. Six years of historical hourly day-ahead PJM LBMP price data from June 1, 2014 to May 31, 2020 were downloaded for each relevant zone and node. The historical spread between each node and its corresponding zone was then regressed against that zone's historical prices while controlling for month, day of week and hour. These regressions were then used to predict hourly nodal prices using hourly zonal prices from Aurora for the forecast period. To control for the effects of inflation over time, all prices were deflated to the base year before the analysis was performed. The predicted real nodal-zonal spreads were inflated into nominal spreads for adding to the simulated zonal nominal prices.

New Jersey Class I REC Prices

LAI forecasted annual New Jersey Class I REC prices using LAI's proprietary in-house model of the missing money, absent REC revenue, for onshore wind resources. The model used onshore wind firm capital and operating costs and financial parameters for a representative generic marginal supply wind farm in the PJM area, together with zonal hourly energy prices and annual capacity prices forecast using the Aurora model. The primary source for capital and operating cost and operating performance data is the Lawrence Berkeley National Laboratory ("LBNL") 2020 Wind Energy Technology Data report.[285] The REC model simultaneously solves for a time-series of annual REC prices for annual vintages of wind farms as a mathematical programming model that minimizes REC prices while satisfying a minimum target internal rate-of-return (IRR) for each vintage. Capital and operating costs are projected to decrease over time in the model as the technology improves, with each subsequent vintage embodying improved cost performance. An output degradation function is applied over the 30-year operating life of each vintage's marginal resource. The full (without degradation) capacity factor ("CF") assumed for the marginal wind resources is 34.9%, equal to the average CF of recent (2014-2018) projects in Ohio. While some onshore wind resources in PJM have qualified to receive capacity market revenue, LAI projects that future marginal wind projects will not qualify. Thus, no capacity market revenue was assigned to any of the 30 resource vintages. The December 2020 re-extension of the federal PTC allows the 2021 to 2025 vintages to qualify for the PTC. Primarily because wind farm capital and operating costs have continued to fall, the 2021 to 2025 vintages receiving the PTC would not need any REC revenue to meet the model's minimum IRR constraint. Because the current futures price for vintage 2021 NJ Class I RECs is about $11.50, that price was linearly interpolated as a "bridge" from that price for 2021 to 2026, the first post-PTC vintage's model result.

[285] Ryan Wiser et al., Wind Energy Technology Data Update: 2020 Edition, Lawrence Berkeley National Laboratory, August 2020.

APPENDIX B: LEVELIZED NET OREC COST CALCULATION

Nominal LNOC for a project *p* is $PVANC_p$ divided by $PVAQ_p^n$, where PVANC is the Present Value of Annual Net Cost, discounted at the nominal discount rate, *NDR*, and $PVAQ_p^n$ is the Present Value of Annual OREC Quantity, discounted at the nominal discount rate. Annual Net Cost and Annual OREC Quantity are discounted to 2021 from the first OREC contract delivery year, *yf*, to the last delivery year, *yl*.

$$LNOC_p^n = PVANC_p \div PVAQ_p^n$$

$$PVANC_p = \sum_{y=yf}^{yl} \left(OP_{y,p} - ER_{y,p} - CR_{y,p} - RR_{y,p}\right) \div (1 + NDR)^{(y-2021)}$$

$$PVAQ_p^n = \sum_{y=yf}^{yl} OQ_{y,p} \div (1 + NDR)^{(y-2021)}$$

Real LNOC for a project *p* is $PVANC_p$ divided by $PVAQ_p^r$, where $PVAQ_p^r$ is the Present Value of Annual OREC Quantity, discounted at the real discount rate, *RDR*.

$$LNOC_p^r = PVANC_p \div PVAQ_p^r$$

$$PVAQ_p^r = \sum_{y=yf}^{yl} OQ_{y,p} \div (1 + RDR)^{(y-2021)}$$

$$RDR \;=\; (1 + NDR) \div (1 + InflationRate) - 1$$

$OQ_{y,p}$ is the total OREC quantity (MWh) for project p in calendar year *y*:

$$OQ_{y,p} = \sum_{m=1}^{12} MOQ_{m,y,p}$$

$MOQ_{m,y,p}$ is the monthly OREC quantity (MWh) for project *p* in month *m* of calendar year *y*:

$$MOQ_{m,y,p} = \sum_{d=1}^{DIM_{m,y}} \sum_{h=1}^{24} HOQ_{h,d,m,y,p}$$

$HOQ_{h,d,m,y,p}$ is the hourly OREC quantity (MWh) for hour *h* of day *d* of month *m* of calendar year *y* for project *p*, and $DIM_{m,y}$ is the number of days in month m of calendar year *y*.

$OP_{y,p}$ is the OREC Payment amount for project *p* in calendar year *y*:

$$OP_{y,p} = \sum_{m=1}^{12} MOQ_{m,y,p} \times OBP_{m,y,p}$$

$OBP_{m,y,p}$ is the OREC bid price of the energy year applicable to month *m* of calendar year *y* for project *p*. It may be adjusted for transmission system upgrade cost sharing if appropriate.

$ER_{y,p}$ is the annual market energy revenue for project *p* in calendar year *y*.

$HEP_{h,d,m,y,l}$ is the hourly market energy price ($/MWh) in hour *h* of day *d* of month *m* in calendar year *y* at location *l*, where location *l* is determined by the project interconnection point.

$$ER_{y.p} = \sum_{m=1}^{12} \sum_{d=1}^{DIM_{m,y}} \sum_{h=1}^{24} HOQ_{h,d,m,y,p} \times HEP_{h,d,m,y,l}$$

$CR_{y,p}$ is the annual market capacity revenue for project *p* in calendar year *y*.

$$CR_{y,p} = \sum_{m=1}^{12} UCAP_{m,y,p} \times DIM_{m,y} \times PC_{m,y.l}$$

$UCAP_{m,y,p}$ is the amount of project *p* UCAP recognized by PJM for month *m* of calendar year *y* (MW).

$PC_{m,y,l}$ is the PJM capacity price applicable to the project location *l* for month *m* of calendar year *y* ($/MW-day).

$RR_{y,p}$ is the annual market REC revenue (avoided cost) for project *p* in calendar year *y*.

RP_y is the New Jersey Class I REC price ($/MWh) for calendar year *y*.

$$RR_{y,p} \ = \ RP_y \ \times OQ_{y,p}$$

To compare portfolios of projects with roughly the same total nominal capacity, first the present value measures $PVANC_p$, $PVAQ_p^n$, and $PVAQ_p^r$ are summed for the *np* included projects. Then, portfolio nominal and real LNOC, and are calculated for each portfolio in the same manner as for individual projects:

$$PLNOC^n = \sum_{p=1}^{np} PVANC_p \div \sum_{p=1}^{np} PVAQ_p^n$$

$$PLNOC^r = \sum_{p=1}^{np} PVANC_p \div \sum_{p=1}^{np} PVAQ_p^r$$

APPENDIX C: INPUT-OUTPUT MODEL DESCRIPTION AND ASSUMPTIONS

LAI first reviewed the information submitted by each Applicant, and then conducted independent analysis using the IMPLAN input-output model to support a standard and consistent basis for evaluation.

The purpose of this appendix is to provide a high-level description and key assumptions of the economic input-output model that LAI used to evaluate the economic impacts of Project submissions. We first provide background on the conceptual framework of input-output modeling. Then we discuss aspects of IMPLAN and input assumptions relevant to applying it as a standard framework for all project evaluations. Finally, we describe the procedures for preparing project-specific inputs to IMPLAN and for reporting results of the IMPLAN analysis.

Economic Input-Output Modeling Overview

Input-output analysis is a form of economic analysis based on the interdependencies among economic sectors. Input-output analysis is commonly used to estimate the effects of new or incremental project or program spending to a local economy.

An economic input-output ("IO") model contains an inter-industry and inter-institutions matrix of inputs and outputs representing current account flows of economic activity within a defined geographic region. Figure C1 is a schematic of an input-output model matrix of flows. The core of the IO model is the inter-industry matrix, where each column represents an industry's activity and each row represents outputs of goods or services by the industry. Institutional sectors of households, businesses, and government represent expenditure activities in the right-hand columns, plus next exports as a balancing account. Final demand (use or consumption) in the region is the sum of household personal consumption expenditures ("PCE"), private fixed investment ("PFI"), government spending, and net exports. The bottom rows represent the income or receipts by the institutional sectors. Labor compensation includes employee compensation and proprietor income paid by businesses. Indirect business taxes include excise, sales, and property taxes, and various fees. Property income includes rents, royalties, dividends, and corporate profits. Total value-added equals total expenditures for final use, and gross regional product is equivalent to either measure.[286] In Figure C1, the value added, final use, and gross regional product blocks have the same color to make the point that they are equivalent in total value. Their value does not include the value of intermediate products and services. Rather, gross output value, shown at the bottom of the schematic, does include the value of intermediate production.

[286] The equivalent gross regional product term is often called GDP because the latter is a familiar term and the local or regional footprint under study is understood.

Figure C1. Schematic Structure of an Input-Output Model

<table>
<tr><th></th><th></th><th colspan="6">Industries</th><th colspan="4">Final Expenditures</th><th></th></tr>
<tr><th></th><th></th><th>Agricul-ture</th><th>Construc-tion</th><th>Manufac-turing</th><th>Transpor-tation</th><th>Trade</th><th>Services</th><th>PCE</th><th>PFI</th><th>Net Exports</th><th>Govern-ment</th><th>Total</th></tr>
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<tr><td>Transportation</td></tr>
<tr><td>Trade</td></tr>
<tr><td>Services</td></tr>
<tr><td rowspan="3">Income</td><td>Labor Compensation</td><td colspan="6" rowspan="3">Value Added</td><td colspan="4" rowspan="3">Gross Regional Product</td><td rowspan="3"></td></tr>
<tr><td>Indirect Business Taxes</td></tr>
<tr><td>Property Income</td></tr>
<tr><td></td><td>Total</td><td colspan="6">Gross Output</td><td colspan="4"></td><td></td></tr>
</table>

Value added is a measure of new economic activity in each stage of production beyond the value of intermediate products and services already produced. Total gross output is a measure of total revenue or sales, which includes the value of intermediate goods and services from earlier stages of production as well as newly created economic value. Hence, for reporting the regional economic impacts of a project, value-added is a more appropriate measure than gross output for representing new economic activity.

Economic effects (impacts) of project expenditures are analyzed in a regional IO model with respect to their local economic interactions in three categories:

- *Direct effects* are the spending or production changes in the industry (industries) used to characterize the events under analysis.
- *Indirect effects* reflect the backward linkage changes in inter-industry purchases in response to the new demands of the directly affected industry (industries).
- *Induced effects* reflect the backward linkage changes in household purchases of goods and services out of the additional income of employees and proprietors that is created by the changes in direct and indirect expenditures.

Total effects are the sum of the direct, indirect, and induced effects.[287]

[287] Indirect effects are sometimes described as "supply chain" effects but that simple metaphor does not fully reflect the dense, recursive network of multiple rounds of inter-industry purchases. Induced effects are sometimes referred to as "respending" effects, but they arise from increased household income while businesses and governments also respend higher revenues.

IMPLAN Model Overview

Due to its minimal project-specific data requirements, ease-of-use, and moderate licensing costs, IMPLAN (IMpact PLANning) is the predominant tool used to estimate project specific local economic impacts.[288] The IMPLAN tool is a general input-output model comprised of software and regional data sets.[289]

IMPLAN Model Assumptions

The IMPLAN model estimates sector and total impacts assuming that the relationships of the current base data year are maintained. IMPLAN datasets and the model's equations are used to provide a static analysis or snapshot in time (a single year) of the local economy. While estimates of economic activity related to specific demand changes and their associated supply linkages can be estimated with IMPLAN, the model cannot predict the dynamic effects on the local economy in future years. The economy of even a small region is constantly in flux, affected by decisions made by businesses, households, and by local, state, and federal government policies. Uncertainties surrounding technical and demographic changes and the local environmental impacts of climate change further limits the ability to model long-run local economy effects.

IMPLAN also has several other limitations which must be recognized to properly apply the tool and appropriately interpret or adjust its results. IMPLAN's static, single-period model assumes that adjustments in the local economy resulting from the direct project expenditures under consideration occur fully and instantly (within the same year), rather than partially with a multi-period distributed time lag. Also, IMPLAN uses fixed proportions production coefficients (the inputs recipe for making the products of an industry), so it has no factor or product substitution, and assumes constant returns to scale, fixed prices, and unlimited supply availability of inputs (labor, products, capital).

Press releases often report the numbers of "jobs" created without referring to the duration of the jobs. IMPLAN models annual flows of economic activity, so it uses the definition of a "job-year" as one FTE job at 40 hours per week. This FTE job-years definition allows temporary jobs created during the development, construction, and decommissioning phases of a project to be aggregated with the longer-lived jobs created during the operational phase.

IMPLAN Database

A major strength of the IMPLAN database is that it has substantial geographic detail, including state, county, and zip code levels. This allows it to be configured to the desired local study region and to capture product imports and exports between the study region and elsewhere. Inter-area trade is accounted for with regional purchase coefficients that represent the proportion of each dollar of local demand for a given commodity that is purchased from local producers.

IMPLAN data sets are constructed annually by IMPLAN, Inc. Regional data are obtained from many sources, primarily federal agencies responsible for data collection. IMPLAN data contains 546 sectors representing all private industries in the United States, as aggregations of industries defined by the North American Industry Classification System ("NAICS"), plus construction, household, and government

[288] IMPLAN has been used for numerous local area evaluations of OSW projects by LAI and other consultants on behalf of both project applicants and state procurement or economic development agencies.

[289] More background information on IMPLAN and its databases is available at www.implan.com.

sectors. Employment, employee compensation, industry expenditures, commodity demands, and other information are collected to form IMPLAN's database.

The primary sources for data include:

- U.S. Bureau of Labor Statistics ("BLS") Covered Employment and Wages ("CEW") program
- U.S. Bureau of Economic Analysis ("BEA") Regional Economic Information System ("REA") program
- U.S. Bureau of Economic Analysis Benchmark I/O Accounts of the U.S.
- BEA Output estimates
- BLS Consumer Expenditure Survey
- U.S. Census Bureau County Business Patterns ("CBP") program
- U.S. Census Bureau Decennial Census and Population Surveys
- U.S. Census Bureau Economic Censuses and Surveys
- U.S. Department of Agriculture Census.

Offshore Wind Project Evaluation with IMPLAN

Applicant Project Data Review

Applicants were requested to provide information regarding local (in-state) expenditures for labor and in total for each item during the development, construction, operations, and decommissioning phases. LAI vetted this information for completeness, consistency, and realism. LAI prepared two sets of CQs to the Applicants to clarify issues related to the input-output model inputs used by the Applicants and other information related to the technical and commercial aspects of the Applicants' projects that would affect estimation of economic development effects. The main objective of the examination of Applicant information is to promote standardization across rival project submissions and to have a firm basis for LAI's independent modeling with IMPLAN.

Sanity checks during the vetting process included, among others:

- Share of locally supplied labor for a direct labor expenditure category, i.e., share of local construction workers engaged in the temporary construction activities
- Share of locally supplied good/service within an industry expenditure category
- Average labor compensation per FTE worker by occupational category relative to that for the current local labor force.

Preparing Project Data Inputs to IMPLAN

As a small, emerging industry, IMPLAN does not have industry sectors specific to offshore wind facility construction or operations. To surmount this limitation, shared with other I-O models, LAI applied the standard Analysis-by-Parts ("ABP") method of formulating composite industry activities to represent in-state expenditures for labor, procurement of materials, products, and services, and transfer payments to organizations that will implement workforce development and other economic development initiatives.[290] The ABP method is basically a budget expenditures recipe to construct the inter-sector economic linkages

[290] The ABP method is also known as the Bill-of-Goods method, but that term does not reflect the fact that labor and other services are also part of the recipe for developing and operating a project.

of a customized industry, such as offshore wind.[291] The four lifecycle phases for an offshore wind project may be thought of as a combination of the offshore wind development, offshore wind construction, offshore wind generation, and offshore wind decommissioning industries. Hence, these four customized industries define the extent of direct effects during the respective project phase.

Direct effects result from project-centric expenditures associated with the development, construction, operations, and decommissioning phases of the project. "Project-centric" expenditures include contracted services that could be provided by offshore wind project employees in addition to those performed by internal employees. For example, WTG maintenance and inspection activities may be done by local workers that are either direct employees of the offshore wind resource owner or by the original equipment manufacturer ("OEM") service and maintenance contract provider. Another example is that operation and maintenance of a vessel for ferrying workers to the offshore wind site could be done by a subcontractor or by the owner.

The Applicants were requested to specify local expenditures by budget item, and to also provide estimates for labor FTE-years and labor compensation used in their modeling of Project economic effects. The local materials and services expenses were provided separately for the project development, construction, operation, and decommissioning phases. Applicants were required to map the expenditure line items to the appropriate NAICS industry. LAI used the IMPLAN mappings of these detailed NAICS expenditure categories into the much more aggregated IMPLAN industry sectors. In a few cases, LAI used its judgment based on knowledge of the production technology underlying the product procured, to reassign the expenditure to a different NAICS category, but that only resulted in a few instances that altered the IMPLAN industry used for the expenditure item.

[291] IMPLAN does not have a sufficiently specific industry for its representation.