STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

PRE-FILED DIRECT TESTIMONY OF JOHN DALTON ON BEHALF OF THE RHODE ISLAND OFFICE OF ENERGY RESOURCES AND DIVISION OF PUBLIC UTILITIES AND CARRIERS

APRIL 5, 2019

I. INTRODUCTION

Q. Mr. Dalton, please state your name, business address and the nature of your business.

A. My name is John Dalton. I am President of Power Advisory LLC (Power Advisory). My business address is 212 Thoreau Street, Concord, Massachusetts. Power Advisory is an electricity sector focused management consulting firm specializing in electricity market analysis and strategy, power procurement, energy policy development, and electricity project feasibility assessment.

Power Advisory's clients include power planning and procurement agencies, regulatory agencies, generation project developers, government agencies, public advocates, and electric utilities.

Q. Please summarize the scope of your Direct Testimony.

A. In my Direct Testimony I summarize the review that Power Advisory conducted of the evaluation process that was used to select DWW Rev I, LLC's 400 MW Revolution Wind Farm offshore wind facility (the Project or Revolution Wind) and the benefits offered by the Project, and also offer my assessment of whether the contract terms and pricing offered by the Revolution Wind Power Purchase Agreement, as filed by National Grid, are commercially reasonable under the standard outlined in Rhode Island General Law 39-31-1 through 39-31-9 (Affordable Clean Energy Security Act or "ACES").[1]

Q. On whose behalf are you testifying in this proceeding?

A. I am appearing on behalf of the Rhode Island Office of Energy Resources (OER) and Division of Public Utilities and Carriers (DPUC). Under ACES, the Narragansett

[1] Deepwater Wind Holdings, LLC (Deepwater Wind), the former owner of DWW Rev I, LLC, was acquired by Ørsted A/S (Ørsted) in November 2018. The remaining entity was renamed Ørsted US East Cost Offshore Wind, LLC (Ørsted US Offshore Wind).

Electric Company d/b/a National Grid (National Grid) consulted with OER and the DPUC in what was effectively a multi-state competitive procurement of domestic, renewable offshore wind resources. Pursuant to R.I. Gen. Laws § 39-31-5 (a.)(1), ACES specifically authorizes National Grid "to voluntarily participate in multi-state or regional efforts" to procure eligible renewable energy resources, such as offshore wind, in consultation with OER and DPUC.

Q. What was the scope of your engagement with OER and DPUC?

A. Power Advisory was engaged by OER and DPUC to provide technical review and consulting support independent from the procuring utility (National Grid), project developers, and other consulting firms utilized in the evaluation process for the possible acquisition of clean energy from proposed offshore wind (OSW) projects that had been solicited by a Request for Proposals (RFP) issued by the Massachusetts Electric Distribution Companies (EDCs) and Massachusetts Department of Energy Resources (DOER) pursuant to Section 83C of Chapter 169 of the Acts of 2008 as amended by Chapter 188 of the Acts of 2016, *An Act to Promote Energy Diversity* (Section 83C RFP). Consistent with the statutory authority under ACES and as allowed in the Section 83C RFP, OER and representatives from DOER discussed opportunities for mutually beneficial cooperation between the states. These discussions resulted in the opportunity for Rhode Island to effectively participate in the 83C RFP. I have advised OER and DPUC throughout the procurement process, starting with the evaluation of offshore wind proposals received by OER and DPUC in April 2018. In addition, as part of its consulting support, Power Advisory assisted OER with development of its statutorily-mandated advisory opinion on the expected energy security, reliability, environmental, and economic impacts resulting

from the proposed contract.

Q. What is your professional and academic background?

A. I am an electricity market analyst with over twenty-five years of experience in the electricity sector. I specialize in energy market analysis, electricity policy analysis and development, power procurement and contracting, generation project evaluation, and strategy development. I am experienced in the evaluation and analysis of electricity markets and of generation technologies and projects within these markets. Over the last two years, I have had a number of assignments focusing on offshore wind including supporting New York State Energy Research and Development Authority's (NYSERDA's) ongoing offshore wind RFP; assessing the implications of transmission interconnection issues on the feasibility and reasonableness of achieving the Northeast's OSW development targets; and assessments of US OSW market participants and regional market opportunities for OSW developers.

A major area of my practice is the development and oversight of competitive procurement frameworks for power supplies such as the Massachusetts EDCs used in the 83C RFP, which resulted in the selection by National Grid of Revolution Wind. I have been actively involved in the development or oversight of the administration of over 25 electricity RFPs.

Recently, I advised the Government of Alberta on the development and issuance of a 2018 RFP for solar generation and the evaluation of proposals received in response to this RFP. My role also included developing the quantitative and qualitative evaluation framework and assisting with the financial evaluation of proponents.

In 2013, I advised the Vermont Public Service Board (now the Vermont Public

Utility Commission), the entity responsible for overseeing the state's regulated utilities, on the design and development of a competitive procurement framework for small renewable energy resources located in Vermont. Over the period from 2009 to 2013, I testified on behalf of the Vermont Public Service Board as an independent expert in five separate proceedings on a range of electricity procurement issues.

From 2011 to 2012 I led a Power Advisory team that was engaged by the Province of Nova Scotia to serve as the Renewable Electricity Administrator (REA) responsible for procuring renewable energy from large independent power producers. Nova Scotia established the REA to address concerns that Nova Scotia Power, Inc. (Nova Scotia Power), the electric utility which serves the vast majority of the province, engaged in self-dealing in its administration of its renewable electricity RFP process. As the REA, Power Advisory was responsible for: (1) developing the RFP and Power Purchase Agreement (PPA) that would be used to procure the renewable energy; (2) demonstrating to the provincial regulator that the PPA represented an appropriate balancing of the interests of IPPs, the procuring electricity utility and customers; (3) administering the RFP; (4) evaluating proposals received in response to the RFP; and (5) recommending to government the proposals that it should direct Nova Scotia Power to contract with.

I have overseen the development and reviewed numerous electricity price forecasts including forecasts of prices for renewable energy certificates (RECs) and defended these forecasts and my review of them before lenders, investors, and rating agencies and in regulatory proceedings. In addition, I am familiar with industry standards for the assessment of economic development and environmental benefits, similar to those employed to assess the benefits of Revolution Wind, having prepared and reviewed such

assessments for numerous electricity infrastructure projects.

I have served as a consultant to the electricity sector for over twenty-five years with various firms and prior to this served as an economist with the Massachusetts Energy Facilities Siting Council where I reviewed electric utility demand forecasts, supply plans and applications for the construction of new facilities. Prior to this, I served as an economist with the Massachusetts Department of Environmental Protection.

I have a BA in Economics from Brown University and an MBA from Boston University. I have taken courses in resource planning methods and regional planning at the Massachusetts Institute of Technology and Boston University. A copy of my curriculum vitae is provided as Schedule JD-1.

Q. Have you testified before state regulatory commissions or courts to provide expert testimony?

A. Yes. I have testified in over twenty proceedings across North America and was qualified to speak as an expert in those proceedings on issues ranging from the need for and comparative economics of new electric generating facilities, competitive procurement programs for energy, capacity, and environmental attributes, wholesale electricity market prices, electricity resource planning issues, transmission pricing policy, and the likely competitiveness of wholesale power markets. A list of proceedings in which I provided expert testimony is provided at the end of my curriculum vitae (Schedule JD-1).

Q. Have you testified before the Rhode Island Public Utilities Commission (Commission) before?

A. No, I have not. However, in 1995, I testified before the Rhode Island Energy Facilities Siting Board with regards to the application of an independent power producer

to build a generating facility in Rhode Island.

II. REVIEW OF SECTION 83C RFP, EVALUATION AND DOCKET NO. 4929 NATIONAL GRID FILING

Q. Please review the 83C RFP.

A. Section 83C of Chapter 169 of the Acts of 2008 (Section 83C) as amended by the Energy Diversity Act required the Massachusetts EDCs to jointly and competitively solicit proposals for OSW energy.[2] Provided that reasonable proposals are received, the Massachusetts EDCs are to enter into long-term contracts for offshore wind energy equal to approximately 1,600 megawatts of nameplate capacity by June 30, 2027. Section 83C further directs that the first phase of procurement occur no later than June 30, 2017.

Under this authority and with the approval of the Massachusetts Department of Public Utilities (DPU), the Massachusetts EDCs and DOER (the Massachusetts Parties) issued the 83C OSW RFP on June 29, 2017. While the RFP indicated that the EDCs were seeking to procure the energy and associated environmental attributes from 400 MW of OSW capacity, it provided that proposals between 200 MW and 800 MW may be submitted. In addition, the RFP directed bidders to provide proposals with both a project specific generator lead line and an expandable transmission option. The RFP also specified that eligible offshore wind generation must "operate in a designated wind energy area for which an initial federal lease was issued on a competitive basis after January 1, 2012."[3]

[2] The Massachusetts EDCs are Fitchburg Gas & Electric Light Company d/b/a Until; Massachusetts Electric Company d/b/a National Grid; Nantucket Electric Company d/b/a National Grid; NSTAR Electric Company d/b/a Eversource Energy; and Western Massachusetts Electric Company d/b/a Eversource Energy.
[3] Massachusetts Department of Energy Resources; Distribution Companies, "Request for Proposals for Long-term Contracts for Offshore Wind Energy Projects" June 29, 2017, p. C. (83C RFP)

The 83C RFP specifically provided for joint procurement opportunities with other states noting that "the Commonwealth of Massachusetts in consultation with the Distribution Companies will consider the participation of other states as a means to achieve the Commonwealth's Offshore Wind Energy Generation goals if such participation has positive or neutral impact on Massachusetts ratepayers."[4]

Section 83C also mandated the use of an independent evaluator given that affiliates of the EDCs were eligible to participate in the OSW RFP and the EDCs, along with the DOER, were responsible for the evaluation process. Under Section 83C(f) the purpose of the independent evaluator is to help to "ensure an open, fair and transparent solicitation and bid selection process that is not unduly influenced by an affiliated company." The independent evaluator was directed to monitor the evaluation process and to submit to the DPU a report on the draft RFP and on the evaluation process.

Q. Please discuss your review of the procurement framework that was used by the Massachusetts EDCs in conjunction with the Massachusetts DOER to solicit proposals for offshore wind generation.

A. I reviewed the materials related to the 83C RFP procurement framework including the RFP, Certification, Project and Pricing Data (CPPD) and bidder response forms, draft PPA, and proposals received. I also reviewed the statutorily-mandated independent evaluator report on the Massachusetts' solicitation and bid selection process submitted by Peregrine Energy Group.

Q. How does the 83C RFP compare with other regional RFPs that recently have been

[4] 83C RFP, p. 1 Footnote 8.

reviewed by the Commission?

The 83C RFP aligns closely to these other recent regional RFPs. In particular, the 83C RFP conformed closely to the New England Clean Energy Generation RFP (Clean Energy Generation RFP) issued jointly by the Massachusetts Parties, National Grid (on behalf of Rhode Island) and the Connecticut Department of Energy and Environmental Protection. The Rhode Island Public Utilities Commission ultimately approved eight power purchase agreements resulting from this RFP in Docket No. 4764, finding that the RFP "constituted a robust procurement process."[5]

Specifically, these RFPs had a multi-stage evaluation process that are similar in many respects. In both, Stage One of the evaluation process was a review of minimum threshold requirements, which was designed to ensure that proposed projects comply with the requirements of the RFP, satisfy any relevant statutory criteria under the various state procurement statutes, and meet minimum standards demonstrating project viability. Stage Two was based on quantitative and qualitative analyses that results in a relative ranking and scoring of all proposals based on a 100-point scale. In each, proposals were to be scored with up to 75 points for quantitative factors. The quantitative scoring of proposals was based on their direct and indirect benefits (New England Clean Energy Generation RFP and Section 83C RFP) as well as other benefits and costs (Section 83C RFP). The qualitative factors considered in the two RFPs were also similar, with the Clean Energy Generation RFP qualitative factors encompassed in the expanded qualitative evaluation in the Section 83C RFP.

[5] Docket No. 4764, Order No. 23102, p. 7. http://www.ripuc.org/eventsactions/docket/4764-NGrid-Ord23102_4-9-18.pdf

Overall, the Section 83C RFP conforms closely to the Clean Energy Generation RFP that was approved by the Commission and found to comply with ACES.

Q. How many proposals were submitted in response to the 83C RFP?

A. All three Southern New England Bureau of Ocean Energy Management (BOEM) leaseholders participated in the RFP. Bids were submitted by Bay State Wind LLC, Deepwater Wind (i.e., the Revolution Wind proposal), and Vineyard Wind LLC (Vineyard Wind). A total of 18 bids, with pricing variations, were submitted by these developers.

The total number of bids and the various pricing variations enhanced the competitiveness of the RFP. The full and active participation of the three Southern New England BOEM leaseholders is further evidence of the competitiveness of the RFP process.

Q. Are there other factors that enhanced the competitiveness of the 83C RFP process and by so doing increased the benefits to Rhode Island consumers of relying on the Massachusetts 83C RFP process to generate proposals?

A. Yes. As detailed in OER's advisory opinion, the Massachusetts 83C RFP was the first large scale OSW procurement conducted in North America.[6] At the time that the 83C RFP proposals were submitted there were potential OSW procurements of at least 7,500 MW across the northeastern United States by 2035.[7] In this context, the 2017 Massachusetts OSW RFP represented an opportunity for OSW developers to secure a "first

[6] In 2013 Maryland passed the *Maryland Offshore Energy Act* which created a "carve-out" for offshore wind energy in Maryland's Renewable Energy Portfolio Standard for up to 2.5% of total retail sales. This equates to about 365 MW of OSW capacity. Two OSW projects were offered long-term contracts pursuant to that process.

[7] Massachusetts established a target of 1,600 MW of offshore wind generation to be procured by 2027. Subsequently, Governor Cuomo announced a goal of 2,400 MW of offshore wind for New York by 2030 in his 2017 State of the State address. In New Jersey, Governor Murphy made a campaign pledge 3,500 MW of offshore wind by 2030. This pledge was embodied in his Executive Order 8, issued on January 31, 2018.

mover" advantage if they were successful in this first major RFP.[8] Specifically, by securing a contract in the 83C RFP, an OSW developer would be better positioned in subsequent RFPs given the learning that would occur from permitting, constructing and operating this first major OSW project. This learning would allow the OSW developer to de-risk subsequent projects by providing better information regarding the wind resource, seabed conditions, actual project costs and reducing various permitting risks. Furthermore, the OSW developer would be able to enhance its relationships with suppliers and contractors, potentially reducing its pricing in subsequent RFPs. I believe that this significantly enhanced the competitive tension in the 83C procurement process. Rhode Island's participation allowed it to secure the benefits of this competitive tension, i.e., an attractive price for OSW generation offered by a highly qualified developer.

Furthermore, projects participating in this RFP process would likely be able to secure the benefit of the investment tax credit (ITC), which is being phased out after 2019. Given the competitiveness of this process, the cash flow benefits from the ITC are likely to flow through in terms of lower prices.[9] With the ITC scheduled to be phased out, OSW project proposals participating in subsequent Massachusetts RFPs, which according to Section 83C are scheduled to occur within 24 months of the previous solicitation, or a separate Rhode Island procurement were viewed as unlikely to be able to realize the full value of this tax benefit and share it with customers.

[8] A first mover advantage reflects the competitive benefits realized by first to the market. These benefits vary by industry but typically include superior information such as a better understanding of industry costs and available resources, strengthened relationships with suppliers, and the more effective realization of economies of scale.

[9] One issue for the investment tax credit is the ability of the OSW developer to be able to realize this benefit given that this requires taxable income and not all renewable project developers have sufficient taxable income to be able to take advantage of the tax shield. Alternatively, renewable project developers can employ tax equity financing which involves financing by entities that have such a "tax appetite" and who can realize this tax benefit.

There were significant benefits to Rhode Island from the economies of scale and first-mover advantages associated with securing the ability to participate in the first major OSW procurement in the United States.

Q. Please summarize your assessment of the 83C RFP competitive procurement process and the degree to which it conforms to the requirements of ACES.

A. In sum, based on the total number of bids received, the full and active participation of the three Southern New England BOEM leaseholders in the process, the benefits offered by being successful in the 83C RFP process and securing the associated first mover advantages, the 83C RFP procurement process was a reasonable, open, competitive method of soliciting proposals that conforms to the requirements of ACES.

Q. Did you review the standard form PPA, the negotiated Revolution Wind PPA, and National Grid's filing with the Commission?

A. I reviewed the standard form PPA, negotiated agreement, and National Grid's filing with the Commission. The agreement with DWW Rev I, LLC for 400 MW from its Revolution Wind project provides for an average annual delivery of 1,628,398 MWh of energy and Class 1 RECs for a term of 20 years starting January 15, 2024. These products are to be delivered at one of the following onshore interconnections within or in close proximity to Rhode Island: Brayton Point or Pottersville substations in Somerset, Massachusetts, or an interconnection to a new substation looped into the existing lines to the Davisville (North Kingstown) substation.[10]

The commercial terms that will apply to the proposed project are largely specified

[10] Given the level of similarity between the Rhode Island and Southeast Massachusetts zones, the specific interconnection point does not have a material impact on the projected project benefits.

in the standard form PPA that was issued as part of the 83C RFP process and to which bidders were required to identify any contract exceptions. The standard form PPA is largely consistent with other PPAs used in regional procurements, with differences reflecting the underlying difference of the OSW resource. In fact, it conforms closely to other PPAs that have been used in recent state (e.g., Massachusetts 83D RFP) and regional procurements (e.g., New England Clean Energy Generation RFP). These PPAs have become the standard in New England for such long-term contracting of renewable energy resources.

OER's advisory opinion details a number of contract exceptions that were negotiated by Ørsted and National Grid from the standard form PPA, including: (1) assessing delivery deficiencies on a biennial rather than annual basis; (2) providing flexibility with respect to the facility size recognizing that the wind turbine model had not been selected and its nameplate capacity rating was therefore not known; (3) adding language that prevented National Grid from terminating the contract in the event of a one-year or less delay in the commercial operation date, but only if Revolution Wind has paid all delay damages and an independent engineer certifies that commercial operation is reasonably likely to occur within one year of the original commercial operation date; (4) revising language to conform to Rhode Island's Renewable Energy Standard; (5) allowing Revolution Wind to sell test energy to a third-party; (6) limiting the proportion of the project that can be unavailable during the summer months as a result of scheduled maintenance; (7) adding a most favored nations clause which ensured that the price paid for products (i.e., energy and RECs) is not greater than the price paid for any products sold pursuant to the Connecticut Department of Energy and Environmental Protection's January 31, 2018 RFP; and (8) adding Davisville, Rhode Island as a possible interconnection point.

In my opinion these contract amendments represent a balancing of commercial interests and will benefit Rhode Island consumers. Furthermore, the solicitation process permitted a reasonable amount of negotiating discretion for the parties to engage in arms-length negotiations over final contract terms, consistent with ACES.

Q. Please describe the review that you performed of the 83C RFP evaluation process?

A. I reviewed the evaluation workbooks prepared by Tabors Caramanis Rudkevich (TCR) in detail, as well as other analyses performed such as Navigant Consulting's economic benefit assessment conducted on behalf of Ørsted. The Massachusetts Parties engaged TCR to evaluate the costs and benefits of the OSW proposals received in response to the RFP. TCR served in a similar role and employed a similar evaluation process for the Massachusetts 83D RFP which was administered just before the 83C RFP and sought proposals for 9.45 TWh of clean energy.[11]

The evaluation was robust and based upon the best available information at the time. Based on this bid evaluation and consultation between OER, DPUC, and National Grid, it was determined that the 400 MW Revolution Wind project should be selected for contract negotiations after Massachusetts selected the 800 MW Vineyard Wind project. A project selection announcement was made on May 23, 2018.

III. COMMERCIALLY REASONABLE STANDARD IN ACES

Q. Please review the "commercially reasonable" standard that is employed in ACES to assess the reasonableness of long-term contracts.

A. R.I. Gen. Laws § 39-31-3 of the ACES statute defines "commercially reasonable" as "terms

[11] Massachusetts Parties "Request for Proposals for Long-term Contracts for Clean Energy Resources" March 31, 2017. https://macleanenergy.files.wordpress.com/2017/03/83d-rfp-and-appendices-final.pdf

and pricing that are reasonably consistent with what an experienced power market analyst would expect to see in transactions involving regional-energy resources and regional-energy infrastructure" Furthermore, the statute states, "Commercially reasonable shall include having a credible project operation date, as determined by the commission, but a project need not have completed the requisite permitting process to be considered commercially reasonable. Commercially reasonable shall require a determination by the commission that the benefits to Rhode Island exceed the cost of the project." R.I. Gen. Laws § 39-31-3 of ACES also charges the Commission to "determine, based on the preponderance of the evidence, that the total energy security, reliability, environmental and economic benefits to the state of Rhode Island and its ratepayers exceed the costs of such projects."[12]

In the discussion which follows, I assess the degree to which the Revolution Wind project and the project's PPA with National Grid satisfies ACES' commercially reasonable standard. Specifically, I first assess whether the project offers a credible operation date and then assess the project's energy market, environmental, economic development, energy security and reliability benefits.

Q. Does the Project offer a credible operation date?

A. Yes, it does. The Revolution Wind project offers an operation date of January 15, 2024. This commercial operation date was the latest offered by the three bidders in the 83C OSW RFP. Deepwater Wind, who has subsequently been acquired by Ørsted, successfully developed the only operating OSW project in North America, the Block Island Wind Farm (BIWF). Ørsted asserts that the schedule proposed is consistent with that used for the BIWF

[12] RIGL §39-31-3.

and employs a similarly conservative, sequential schedule. Power Advisory reviewed Ørsted's proposed schedule and found it to be credible. Therefore, I believe that National Grid's PPA for 400 MW from Ørsted's Revolution Wind Project offers a credible project operation date.

Q. How does the contract pricing for the Project compare to that offered by other renewable energy resources solicited at about this time?

A. It compares favorably. This assessment is based on a comparison of the Project's contract pricing with that secured from renewable energy resources procured by Rhode Island in another recent competitive procurement for which pricing data was available at the time of the procurement decision. This was the best available information at the time the procurement decision was made. During this time the US had just imposed tariffs on foreign manufactured solar panels and the trajectory of future solar PV costs was uncertain. The comparison presented in Figure 1 indicates that the Revolution Wind project pricing is at the middle of the range of other renewable energy projects recently contracted by National Grid on behalf of Rhode Island consumers.[13]

Connecticut also procured 200 MW from the Revolution Wind project at about the same time as Rhode Island. This is further evidence of the reasonableness of the project pricing given that Connecticut also determined that the Revolution Wind project offered attractive pricing and an overall portfolio of benefits. National Grid has indicated that the contract pricing secured by Connecticut is slightly higher than it secured.[14] Subsequent to

[13] New England Clean Energy Generation RFP contracts approved in Rhode Island on February 9, 2018 in Docket No. 4764.
[14] RI PUC Docket 4929, National Grid filing, Review of Power Purchase Agreements Pursuant to R.I. Gen. Laws § 39-31, Direct Testimony of Timothy J. Brennan and Corinne M. DiDomenico, p. 12.

this, Connecticut elected to procure an additional 100 MW from Revolution Wind at a price equal to that secured by National Grid, along with 165 MW of solar PV in a July 31, 2018 Request for Proposals From Private Developers for Zero Carbon Energy.[15,16]

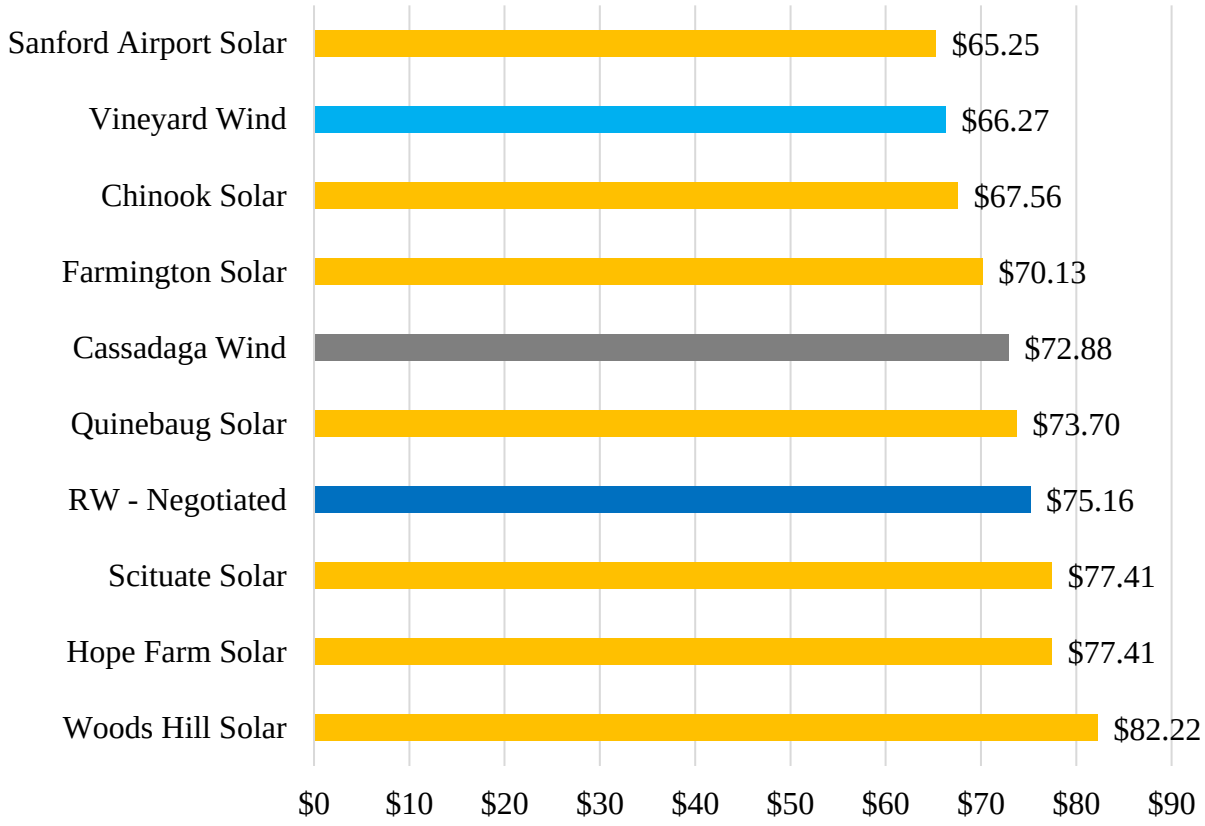
This comparison is of the cost of the proposals, not of their respective value or benefits and how these compare to the costs. With higher capacity factors during the high winter demand periods when New England's fuel security risks are greatest, the output of OSW generation is particularly valuable. As discussed further below, analysis indicates that these volumes of OSW generation are also likely to contribute to lower natural gas prices as the clean energy they produce displaces natural gas-fired generation and reduces the strains on New England's natural gas supply infrastructure during peak winter periods. Furthermore, the project represents an opportunity for Rhode Island to participate in the development of an offshore wind supply chain and the realization of the attendant economic development benefits from the development in the US Northeast of a new renewable energy industry.

[Figure 1 beings on next page]

[15] CT Department of Energy and Environmental Protection "Procurement for Zero-Carbon Resources Pursuant to CT General Statutes – 16a-3m" http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/f18419651b249e2e852582db006cbca3?OpenDocument

[16] CT Department of Energy and Environmental Protection, "Gov. Malloy Announces Zero-Carbon Resource Selections" December 28, 2018 https://www.ct.gov/deep/cwp/view.asp?Q=607002&A=4965

Figure 1: Price Comparison of Recently-Contracted Renewable Energy Resources (Real Levelized 2018$/MWh)



Q. Please summarize the energy market benefits of the Project.

A. The total electricity market-related benefits of the Project (both direct and indirect) are projected to exceed the costs of the PPA by $91.6 million or $5.16/MWh (NPV 2018$). The direct project benefits include a stable price for energy and RECs that is fixed over the term of its twenty-year PPA. The projected market value of the energy produced and injected into the Rhode Island/Southeast Massachusetts load zone and the Class I RECs together are greater than the cost of the total contract payments (the direct benefit) by $4.7 million (NPV 2018$). On a unit basis the direct net benefit is $0.26/MWh (2018$).

The primary indirect benefit is a reduction in Rhode Island energy prices. The

estimated energy price savings to Rhode Island consumers through 2045 (the last year in the TCR analysis) are $87 million (NPV 2018$), which represents a benefit of $4.90/MWh (2018$). Class 1 REC market price change impacts were also modeled but were not found to be statistically significant.

The Project will also reduce Rhode Island's exposure to electricity market price volatility, particularly during extreme winter periods. The ISO-NE electricity market typically experiences price volatility when there is sustained cold weather in the winter and natural gas supplies become constrained. For example, in January and February 2014 day ahead energy prices in the Rhode Island load zone averaged more than $180/MWh due to severe winter weather and resulting high natural gas prices.[17] Another cold spell was experienced in the 2017-2018 winter, with similarly high locational marginal prices (LMPs) experienced in the ISO-NE market. As discussed later, ISO-NE has estimated that if a portfolio of 1,600 MW of OSW were operating during this period, it could have reduced the region's natural gas use for power generation by 20% and offered production cost savings up to $195/MWh.[18] To reflect this winter benefit which is beyond the other energy market benefits of the Revolution Wind project, TCR modeled an extreme winter as a 1 in 15-year event. The resulting estimate of an increase in the project PPA's market value during extreme winter periods is $25.4 million (NPV 2018$). If such events were to be more frequent, as we have experienced two such events in last five years, the benefits to Rhode Island consumers would be even greater.

[17] ISO-New England market data accessed via S&P Global Market Intelligence.
[18] ISO New England System Planning Department memo to New England Stakeholders, "High-Level Assessment of Potential Impacts of Offshore Wind Additions to the New England Power System During the 2017-2018 Cold Spell", December 17, 2018. Table 2. https://www.iso-ne.com/static-assets/documents/2018/12/2018_iso-ne_offshore_wind_assessment_mass_cec_production_estimates_12_17_2018_public.pdf

I reviewed this analysis with National Grid and TCR. It is rigorous and credible. It indicates that the Revolution Wind project's direct and indirect market benefits exceed its costs. There are other benefits which enhance the Project's value to Rhode Island consumers including environmental, economic, reliability and energy security benefits. These are discussed in the next sections.

Q. Please summarize the environmental benefits of the Project.

A. Revolution Wind offers 1.63 million MWh of carbon free energy annually. In most hours of operation, it will displace emitting resources connected to the ISO-New England electricity grid. The Project's generation is expected to avoid about 502,000 metric tons of greenhouse gas (GHG) emissions annually.[19] It will also result in cumulative NOx emissions reductions of nearly 1,400 metric tons through 2045. The societal value of the GHG emissions reductions net Regional Greenhouse Gas Initiative (RGGI) compliance costs is $533 million (NPV 2018$).[20] The net present value of NOx emissions reductions is $11 million (2018$).

I reviewed these environmental benefit calculations in detail as well as other available estimates of the emissions reductions associated with the Project. All these estimates indicate Revolution Wind will have a positive environmental impact on Rhode Island and offer significant environmental benefits in accord with ACES and other state environmental goals.

Q. Please review the benefits of the Project to Rhode Island natural gas customers.

[19] These values, which are based upon TCR's modeling of the project, reflect Rhode Island's share of a proposal case portfolio that included offshore wind projects spurred by the 83C procurement, including Rhode Island's 400 MW, Massachusetts' 800 MW Vineyard Wind project, Connecticut's 200 MW purchase (also from Revolution Wind).
[20] Based on a societal value of $100/short ton (or $110.23 per metric ton) of CO2e emissions (2018$) from the AESC study. Chang, Max et al. "Avoided Energy Supply Components in New England: 2018 Report" Synapse Energy Economics, June 2018, Page 142.

A. The output of the Revolution Wind project will reduce natural gas prices by reducing the natural gas demand to supply natural gas-fired generators whose output would be displaced by the Revolution Wind project (further explained in the energy security section of my Direct Testimony). This will result in lower electricity prices, beyond the reduction estimated, given that natural gas-fired generation establishes wholesale electricity prices in New England for the majority of hours in the year.[21] Rhode Island natural gas ratepayers will also benefit from this reduction in natural gas prices. TCR found the benefit of a reduction in National Grid's gas supply costs to Rhode Island retail gas customers to be $28.7 million (NPV 2018$).[22] These benefits are to be realized throughout the year, but particularly during the winter when the New England gas and electricity systems are most constrained and Revolution Wind's output is highest. In sum, the Revolution Wind project is projected to contribute to lower natural gas prices for Rhode Island natural gas customers.

Q. Please summarize the economic development benefits of the Project to Rhode Island.

A. The economic development benefits over the three-year construction period are estimated to be $251.3 million value added and over the twenty-five-year operations and maintenance (O&M) period $14.3 million per year.[23] The net present value of these construction and O&M impacts is $405.1 million (2018$). The total direct, indirect and

[21] ISO-NE "Key Grid and Market Stats" Online. Accessed March 15, 2019 https://www.iso-ne.com/about/key-stats/
[22] These values are based on TCR's modeling of reduction in natural gas prices at the Henry Hub as well as a reduction in the New England basis differential. The basis differential is the difference between winter market prices in New England and market prices at the Henry Hub. This is the result of reduced pipeline constraints in the winter period during peak demand periods (i.e., extreme cold weather) and the same impact referred to as DRIPE in the AESC 2018 report (Chang, Max et al. "Avoided Energy Supply Components in New England: 2018 Report" Synapse Energy Economics, June 2018, Page 176 / 181).
[23] Navigant Consulting, "Advisory Opinion on the Economic Development Benefits of the Revolution Wind Project" October 2018; report was prepared for Revolution Wind using the NREL JEDI model. In the record of Docket No. 4929 as Schedule NG-6. http://www.ripuc.org/eventsactions/docket/4929-NGrid-ScheduleNG6-NG9.pdf

induced employment impacts are about 2,600 jobs (FTEs) including 812 direct jobs during construction. For the length of the O&M period the Project is expected to support 32 direct and about 130 total jobs given indirect and induced impacts.

I reviewed Navigant's advisory opinion and the TCR present value calculations of these economic development benefits presented by National Grid. These estimates are reasonable and consistent with what would be expected for such an electricity infrastructure investment and are within a reasonable range of the independent economic assessment conducted by Appleseed on behalf of the Rhode Island Commerce Corporation.[24]

Q. Are there any incremental economic benefits to Rhode Island and Southern New England more broadly from selecting a second large OSW project from the 83C RFP?

A. Yes, there are. The economic benefits estimated above for the 400 MW Revolution Wind PPA are based on the development and construction of the project under a static OSW industry supply chain and industry infrastructure. As such, the analysis does not fully consider the broader economic benefits of the development of an OSW industry supply chain in Southern New England to serve the region's ambitious OSW procurement target. The economic benefits from the development of such an industry supply chain are likely to be considerably greater than those estimated, and more enduring. The decision to contract for a second OSW project in the region is likely to advance and support the development of such a supply chain and the realization of attendant economic benefits to Rhode Island.

Massachusetts' selection of the 800 MW Vineyard Wind project and Rhode

[24] Advisory Opinion on Proposed Revolution Wind Project, Rhode Island Commerce Corporation, Docket No. 4929.

Island's selection of the 400 MW Revolution Wind project, resulted in a combined 1,200 MW of OSW under contract. With this collective action, Massachusetts and Rhode Island strengthened Southern New England's position as a first mover in the development of the OSW industry supply chain in North America. Connecticut subsequently in two separate solicitations has contracted for an additional 300 MW of OSW, further enhancing the demand pull of Southern New England to the OSW supply chain. Under *An Act to Promote Energy Diversity* Massachusetts committed to procuring upwards of 1,600 MW of OSW. Rhode Island's commitment of 400 MW increased that commitment by 25% and Connecticut's 300 MW purchase by almost 19%. This is significant because other Northeast states such as New York and New Jersey have also indicated their intention to contract for OSW in an effort to realize the economic benefits that the development of such an industry offers. Massachusetts, Rhode Island, and Connecticut's combined purchases strengthen their first mover position and their ability to induce the various industries that will develop near major OSW projects to locate in the three states.

Importantly, Rhode Island's decision to contract with a second OSW project developer strengthens the region's position by providing a broader base of customers. The inducement for these suppliers to locate in Southern New England is further enhanced by the fact that the two developers have different commercial operation dates, with effectively two projects scheduled to go into commercial operation from early 2022 to early 2024. This will offer OSW industry suppliers a sustained market, particularly given that the Massachusetts Parties are to issue subsequent Section 83C RFPs. The prospect of a series of OSW projects being developed in succession provides investors with greater confidence regarding their ability to secure sufficient contracts to support the required investment in

the necessary elements of the OSW supply chain.

A second OSW project in Southern New England also significantly enhances the competitiveness of OSW development. If only one OSW project were awarded a contract, then it would have been in a position to capture all of the first mover benefits described above. As a result, this OSW project developer would have a strong competitive position vis-à-vis other OSW project developers when bidding on subsequent RFPs. With two OSW project developers having large OSW projects under development there is greater competitive tension in these RFP processes.

I believe that there are greater economic benefits to Rhode Island and Southern New England from having selected a second large offshore wind project in addition to Massachusetts' decision to select the 800 MW Vineyard Wind project.

Q. How will the project improve energy security and electric reliability?

A. A major issue facing New England and one that is receiving increasing attention is fuel security, particularly the limited availability of natural gas supplies during the winter period when natural gas-fired generators are competing with natural gas distribution companies for natural gas supplies. In January 2018, ISO-NE released a report titled *Operational Fuel-Security Analysis*, which identified fuel security, in particular the availability of natural gas during the winter peak periods, as the region's greatest risk to power system reliability. The analyses and scenarios considered by ISO-NE given these fuel supply reliability risks "suggest that New England could be headed for significant levels of emergency actions, particularly during major fuel or resource outages. Harder to measure are the risks to the region from brief, high-demand cold spells, which present

particular logistical challenges for fuel procurement and transportation."[25]

To assess the risks posed by different fuel-mix scenarios, ISO-NE evaluated operational risks. The report considered a "More Renewables" scenario, which included 1,400 MW of OSW by 2024 (100 MW less than the Massachusetts, Rhode Island and Connecticut OSW procurement commitments) and an additional 1,000 MW of clean energy over a new transmission tie to a neighboring system (i.e., a project consistent with the New England Clean Energy Connect which the Massachusetts EDCs selected in 2018 in response to the Massachusetts Clean Energy RFP and is currently under development). In the More Renewables scenario, no load shedding was required.[26] A "Max Renewables" case was also considered, which reflected 2,000 MW of OSW. The report found that "Large amounts of renewable resources combined with additional imports lower the fuel-security risk compared with the reference case, with no load shedding and a greatly reduced need for emergency actions."[27] In sum, the report noted that "Renewable resources can mitigate the region's fuel-security risk", but that "more renewables help, but don't eliminate the risk".[28]

OSW projects have output profiles that are highly coincident with high winter demand periods and as renewable energy resources with low variable costs their energy output will displace fossil generating units and as such assist in alleviating these fuel security risks. A recent analysis performed by ISO-NE of the potential impacts of OSW additions to the New England power system during the 2017-2018 cold spell demonstrated

[25] ISO-New England, "Operational Fuel-Security Analysis" January 2018, p. 9.
[26] Ibid, p. 38.
[27] Ibid, p. 48.
[28] Ibid, p. 52.

this.[29] Specifically, OSW output estimates provided by the Massachusetts Clean Energy Center (MassCEC) reflected capacity factors of about 70% during the 16-day cold spell from December 24, 2017 to January 8, 2018. This represents about a 50% increase relative to the annual average capacity factor reported by Ørsted for the Revolution Wind Project. Figure 2 presents the projected output profile of 1,600 MW of OSW and contrasts this with LMPs during this period. ISO-NE analysis indicated that during this period the production cost savings from this OSW output were greater than $180/MWh.

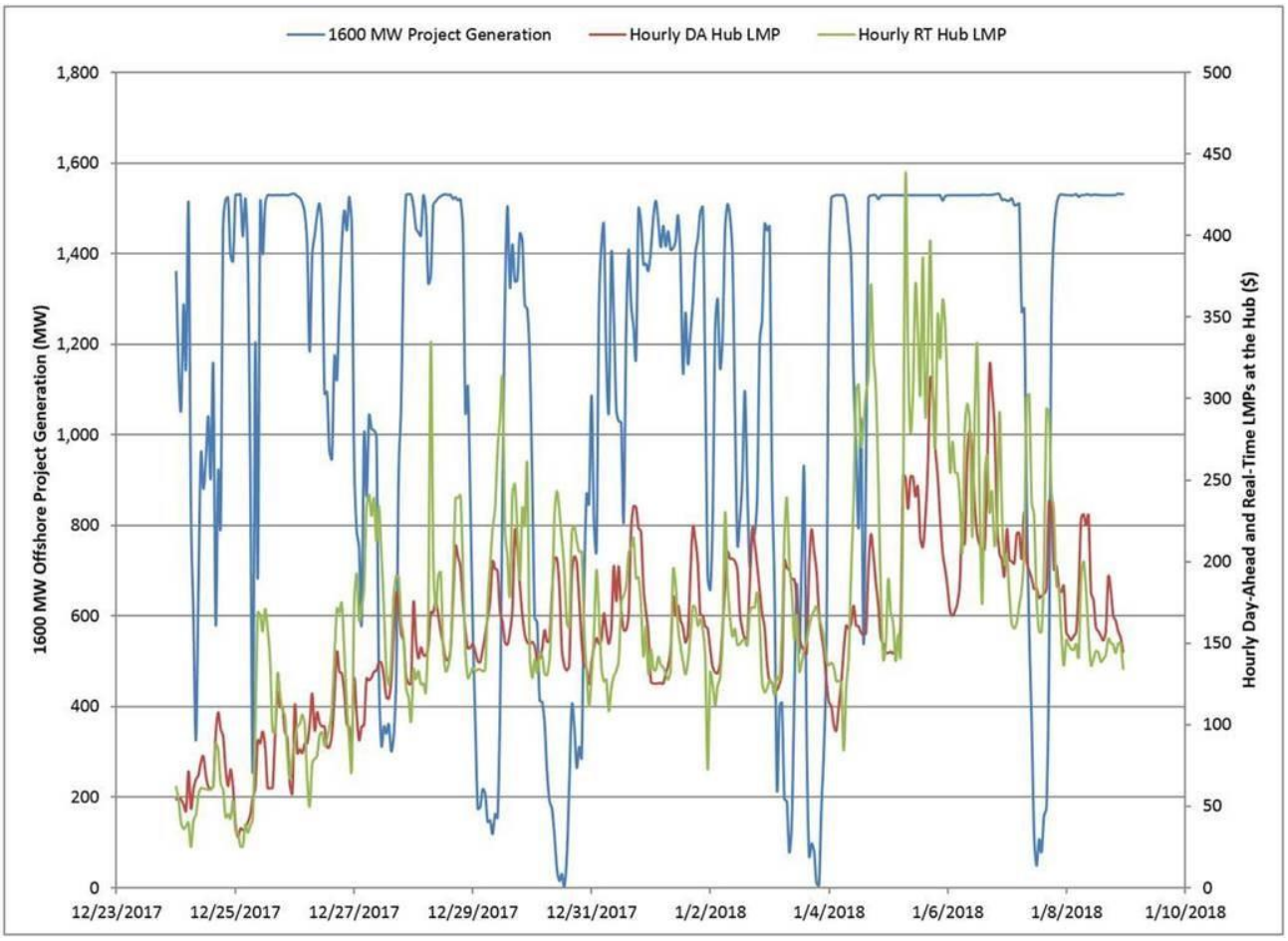
The high projected output levels during this cold spell when the ISO-NE system was stressed is particularly important for the fuel security issues that ISO-NE has identified. These high capacity factors suggest an OSW project could displace close to an equivalent amount of natural gas-fired capacity on a MW per MW basis and assist in addressing fuel security issues. In fact, the ISO-NE assessment of potential impacts of OSW additions to the New England power system during the 2017-2018 cold spell projected that 1,600 MW of OSW could reduce the region's natural gas use for power generation by 20% over such a period.[30]

[Figure 2 begins on next page]

[29] ISO New England System Planning Department memo to New England Stakeholders, "High-Level Assessment of Potential Impacts of Offshore Wind Additions to the New England Power System During the 2017-2018 Cold Spell", December 17, 2018. https://www.iso-ne.com/static-assets/documents/2018/12/2018_iso-ne_offshore_wind_assessment_mass_cec_production_estimates_12_17_2018_public.pdf

[30] See Table 5 of the ISO-NE memo.

Figure 2: Estimated OSW Production and LMPs During 2017-18 Cold Snap [31]



Ørsted estimates that the value of Revolution Wind's capacity in the Forward Capacity Market for the winter period will be 226.7 MW, almost 57% of its 400 MW nameplate capacity rating. While the capacity contribution during the summer is lower, Ørsted estimates it to be 155.5 MW in summer capacity period, almost 38% of its nameplate capacity rating. This is significantly higher than onshore wind. The high relative capacity ratings of OSW projects will provide meaningful reliability benefits, particularly during the winter period when the ISO-NE electricity market faces the greatest reliability

[31] Figure 1 from ISO-NE OSW Analysis with hourly Day-Ahead and Real-Time LMPs (at the Hub) overlaid for the period studied (December 24, 2017 through January 8, 2018) by ISO-NE for Rhode Island OER dated January 7, 2019.

challenges. Other clean energy resources that can be developed (e.g., onshore wind and solar PV) do not do this or those that can do this (e.g., storage hydro), cannot be cost-effectively developed at significant scale in New England.

Another reliability benefit of OSW is that their output profiles are appreciably different than other renewable energy resources. This is important because the combined output profile of these variable output generating resources is more consistent and as a result reduces the requirements for fast responding resources, which are often fossil fuel-fired generation, to provide various backup services such as ramping and regulation service.

In addition, Ørsted's Revolution Wind project will deliver energy directly into ISO-NE's Rhode Island/SEMA load zones. Unlike onshore wind, which is predominately located in Northern New England distant from major load centers, the Revolution Wind project will deliver 400 MW directly into the ISO-NE high voltage transmission network close to the major load centers, reducing losses associated with delivering that energy to customers.

In sum, National Grid's PPA with revolution wind offers significant energy security and reliability benefits.

Q. Is the PPA consistent with the goals enumerated in Rhode Island Docket 4600?

A. Generally speaking, yes. While some distribution system-level goals may not be applicable to this matter, the Revolution Wind proposal will have a positive impact on several Docket 4600 goals. National Grid's filing also provides information relevant to the Docket 4600 cost/benefit framework. OER's advisory opinion provides further detail on these matters. I have reviewed and concur with their findings.

IV. SUMMARY AND CONCLUSIONS

Q. Do you believe that National Grid's long-term contract with Ørsted for 400 MW from its Revolution Wind project satisfies the commercially reasonable standard in ACES?

A. Yes, I do. This conclusion draws on my more than twenty-five years' experience as an electricity market analyst. As discussed, the long-term PPA offers terms and pricing that are consistent with what I would expect to see in transactions involving regional-energy resources. Furthermore, the Revolution Wind project offers a credible project operation date that is well supported and was the most conservative of the OSW proposals received in the Section 83C RFP. The market value of the Project's energy and environmental attributes (direct benefits) alone exceeds its costs. The PPA, along with other OSW resources selected in concert, offers Rhode Island customers wholesale electricity price reductions and energy price savings during extreme winter weather events. Finally, the Project will provide significant energy security, reliability, environmental and economic benefits to the state of Rhode Island. In sum, the project's total expected energy, economic, and environmental benefits to the state and its ratepayers far exceed the projected costs of the project.

Q. Have you reviewed OER's Advisory Opinion submitted in this Docket and do you agree with its findings?

A. Yes. I have thoroughly reviewed OER's Advisory Opinion and agree with its findings and conclusions. OER's Advisory Opinion is fully consistent with the findings that I have made in this Direct Testimony.

Q. Does this conclude your Direct Testimony?

A. Yes, it does.

John Dalton

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Professional History

- Navigant Consulting
- Reed Consulting Group
- R.J. Rudden Associates Inc., 1987-1988
- Massachusetts Energy Facilities Siting Council, 1984-1987
- Massachusetts Department of Environmental Protection, 1981-1984

Education

- Boston University, MBA, 1987
- Brown University, AB, Economics, 1980

A senior electricity market analyst and electricity policy consultant with over 25 years of experience in energy market analysis, power procurement, project valuation, and strategy development. Experienced in the evaluation and analysis of electricity markets and the competitive position of generation technologies and projects within these markets including the assessment of the competitiveness of the underlying market, the development of power market price forecasts, the implementation of power procurement processes, and the development and evaluation of renewable energy policies. Frequent speaker on these subjects at energy industry conferences.

Professional Experience

Market Assessment

Developed and supported numerous market price forecasts for wholesale power markets across North America. Price forecasts were used to support generation project development efforts, project financings and acquisitions, regulatory policy development, and power procurement efforts.

Demonstrated the need for electric generation projects in filings submitted to various state and provincial regulatory agencies. Evaluated the cost of a wide range of different generation technologies for a number of clients. Defended analyses in prepared and oral testimony before these state agencies.

Conducted wholesale power market analyses across North America for a wide range of market participants. Analysis included identifying likely competitors and pricing, security provisions, and general terms and conditions of various power supply options. Evaluated pricing required to compete in the market.

Advised the Ontario Electricity Financial Corporation with the management of its non-utility generation contracts. Advice included addressing the policy issues associated with balancing concerns with the sanctity of existing contracts and the desire to minimize stranded debt as well as to use the contracts as a source of competitive discipline for the incumbent provincial electric utility.

Managed a team that was retained by a large power generation company to develop a market assessment and wholesale power market price forecast for the Alberta market. Our assessment focused on issues affecting the fundamentals of the Alberta power market, including the future demand supply balance, growth in demand, market interconnections, and potential new generation capacity additions.

Retained by the financial advisors for the developer of a proposed new combined cycle gas turbine project in Alberta to establish the toll between the Corporate entity participating in the income fund and the parent. Defended forecast assumptions and the modelling approach before investors as part of a public offering.

Directed the use of ProSym in a proceeding before the Alberta Energy and Utilities Board (AEUB) to estimate the costs of transmission congestion and the benefits of increasing the transfer capability of the North South transmission interface. Modeling assumptions and methodology were successfully defended before the AEUB.

Advised numerous generation project developers across North America on opportunities offered by participating in the relevant wholesale power market and various power supply procurement RFPs. Evaluated market risks and outlined strategies for managing these risks most efficiently.

Analyzed and critiqued the supply planning methodologies of electric and gas utilities, focusing on the appropriateness of the supply planning models and methods. Provided recommendations for improving supply planning methods which were designed to assist the utilities in addressing the uncertainties associated with long-range planning. Prepared recommendations for the refinement of demand forecasting methods for electric and natural gas utilities. Analyzed and evaluated the statistical and quantitative projection methods used, including end-use and econometric forecasting techniques.

Evaluated electric generating technologies on the basis of the capital and operating costs, technological risk, and environmental impact, identifying a preferred alternative in light of these considerations. Defended the selection process before a regulatory agency.

Prepared strategic plan for a number of electric and natural gas market participants which evaluated the state/provincial and federal regulatory climate for cogeneration and generation projects, market prices and risks and recommended a competitive strategy.

Market Structure Development and Evaluation

Advised the governments of Ontario, New Brunswick, Nova Scotia, Western Australia, and Manitoba regarding the restructuring of their wholesale power markets and possible market structures to achieve a workably competitive wholesale market.

Responsible officer for market design project for the Province of New Brunswick. Navigant Consulting assisted the Market Design Committee and its subcommittees in providing the Minister of Natural Resources and Energy with recommendations on the implementation of electricity restructuring. Issues addressed included developing a market design that addresses concerns with the potential for the exercise of market power and enables New Brunswick to integrate with its interconnected markets. The Market Design Committee addressed development of the electricity market including its design, structure and rules. Navigant Consulting provided advice on the issues to be addressed, prepared issue papers and presentations, created strawmen for resolution of issues, and developed guidelines and direction for the creation of market design rules and protocols.

Project manager for an assignment with the Province of New Brunswick to assist with the development of its ten-year energy policy. The cornerstone of this energy policy was the framework for restructuring its wholesale and retail electric markets. Advised regarding developments in other wholesale and retail markets and the prospects for meaningful competition in New Brunswick's wholesale and retail markets. Navigant Consulting advised regarding benefits offered by wholesale and retail competition; strategies for protecting New Brunswick consumers from market dislocations and higher prices; appropriate regulatory frameworks for the wires businesses and the prospects for achieving a workably competitive wholesale market in New Brunswick and the resulting market design requirements; and policies for addressing stranded costs raised by market restructuring.

Markets and economics expert for a project with Western Power, the state-owned fully integrated utility that serves the vast majority of Western Australia. Advised regarding potential changes to the wholesale and retail electric power markets to enhance the competitiveness of these markets. Alternative market structures were evaluated and assessed in an effort to determine the market structure that offers the greatest societal net benefits. Offered proposed market structure changes that would accommodate government policy objectives of allowing greater levels of retail contestability and new entrants to satisfy the market's need for additional capacity. Evaluated restructuring reforms that had been implemented in a range of different markets that were of a similar size as Western Australia.

Advised the Energy Strategy Working Group regarding the development of an electricity restructuring policy for the Province of Nova Scotia. Reviewed the experience with respect to the wholesale and retail market restructuring in California, New England, PJM, and Alberta and based on this experience outlined lessons learned and potential implications for electric restructuring Nova Scotia. Outlined the arguments for considering the restructuring of Nova Scotia's electricity market, reviewed contrasting market models, and discussed the critical constraints on wholesale and retail market restructuring in Nova Scotia.

.Provided numerous presentations regarding the experiences with the restructuring of wholesale power markets and the lessons learned. Markets evaluated have included California, Alberta, New York, New England, PJM, Victoria, and England and Wales.

Served as independent expert regarding cost and availability of clean energy alternatives to Site C hydroelectric project. Presented findings before BC Utilities Commission Site C Review Committee.

Drafted and defended an expert report that was filed before the Nova Scotia Utility and Review Board (UARB). Report assessed a preferred plan (the Maritime Link, which would deliver power from Muskrat Falls through Newfoundland and Labrador across the Maritime Link and into Nova Scotia) and two alternative plans (more domestic generation or more imports) across a wide range of sensitivity cases covering demand growth, electricity, natural gas and fuel prices, and various supply scenarios. The analysis also assessed the interaction of each alternative with adjacent markets for export and import opportunities and considered the impact of renewable energy obligations in these markets on sales options that would be available. Analysis and results were subjected to information requests and cross-examination and successfully defended before the UARB in a formal hearing.

Conducted a market study evaluating the economic benefits of a major HVDC transmission interconnection between the three provinces: Alberta, Saskatchewan and Manitoba. A critical element of this market study was developing a market price forecast of electricity prices and production costs in the three provinces with and without the proposed transmission facilities.

For NB Power provided an independent review of their 2017 and 2014 Integrated Resource Plans (IRPs), which was filed with Government. Review focused on methods, assumptions, consultation activities and reasonableness of results.

Reviewed Manitoba Hydro's NFAT application and offered comments to client on deficiencies in the application. Comments focused on reasonableness of assumptions, methods and models. Reviewed comments provided by other parties in the proceeding.

Developed independent analysis of resource alternatives available to Nova Scotia to comply with various emission control requirements. Work involved developing a comprehensive model that assessed the relative cost of the different resource alternatives that were available to the Province. In a subsequent project, the model was used compare the effective cost of the Maritime Link to other resource alternatives. Defended this analysis before the provincial regulator.

Testified on behalf of an IPP on the reasonableness of an electric utility's integrated resource planning process and the corresponding investment in the repowering of a natural gas-fired generation resource. A primary focus of the testimony was on the deficiencies in the utility's economic evaluation methodologies and resulting biases from these methods.

Project Valuation

Served as Project Manager for assignments requiring the development of valuation estimates for numerous energy projects. Projects typically entailed modeling revenues and costs to predict cash flows and calculate the cumulative present worth of after-tax cash flows. The overall viability of projects were assessed by reviewing the status of project permitting efforts and financial commitments, the major provisions of power purchase agreements and steam purchase agreements.

Managed a project to provide an independent valuation of a multi-unit generating portfolio as part of a refinancing for the portfolio. Oversaw and managed the development of an electricity market price forecast and estimate of the fair market value of the proposed portfolio. Defended analyses before credit rating agencies and lenders.

Completed a comprehensive valuation of an oil-sands cogeneration project. As part of this effort, the team examined various market scenarios and potential spot market volatility and the subsequent impact on the client's electricity commodity costs.

Performed detailed analyses of numerous generation projects' financial feasibility. Analyses considered alternative financing schemes and identified strategies for enhancing project values.

Evaluated the economic and financial feasibility of a number of different generation projects for project developers, project hosts, and a gas utility. Assisted in the development of a cogeneration feasibility assessment model.

Developed an estimate of the capital and operating costs of a wide range of generating technologies as part of a comprehensive assessment of the costs of new entry. Also estimated the appropriate cost of equity using the capital asset pricing model and debt and capital structure based on market information for merchant generators.

Oversaw the development of numerous electricity distribution company valuation models. Used models to derive an estimate of the fair market value of the LDCs. Defended analysis before utility boards and management.

Developed quantitative and qualitative analyses of generating assets in support of numerous generation asset acquisitions. Assisted in the management and coordination of multiple facets of the due diligence process, including technical engineering assessments, environmental, fuel supply, etc. Experience includes a broad range of fuels / technologies, including wind and other renewables.

Competitive Procurement Support

Advised on the development of over 25 RFPs for power supplies and demand-side resources for electric utilities across North America, serving as project manager for well over half of these RFPs. Support covered the full range of RFP support services including advising regarding the appropriate form of the RFP and evaluation process to secure resources that best satisfy the client's objectives, drafting the RFP, developing the evaluation framework, marketing the RFP process to prospective bidders and negotiating with bidders.

Testified before the Alberta Utilities Commission on the appropriate structure for the Alberta Electric System Operator's competitive procurement process. The applicant adopted the many of the recommendations made in rebuttal testimony and the Commission directed the applicant to revise its proposal to conform to other recommendations. A primary focus of the testimony was how to enhance competitive tension in the procurement process for the benefit of electricity consumers.

Managed a multi-disciplinary team that served as the Renewable Electricity Administrator for the Province of Nova Scotia responsible for procuring 300 GWh of renewable energy through a competitive procurement process.

Advised the Vermont Public Service Board on the development of a market-based mechanism for the procurement of renewable energy. Legislation identified a reverse auction as a possible procurement mechanism. This along with other procurement methods were evaluated to determine the method that would be serve customers. Alternatives were evaluated by contrasting the product and other distinguishing characteristics, degree of price transparency, requirements for bidders, with each alternatives evaluated in terms of efficiency of outcomes given the anticipated level of competition.

Advised on commercial issues for power purchase agreements.

Offered testimony before the Massachusetts Department of Public Utilities on a utility RFP process. Authored reports on the evaluation of proposals.

Reviewed the performance of the Alberta PPA Auction and critically assessed elements of the PPAs and the auction design which caused the auction to reduce the value secured for the generation assets that were auctioned.

Outlined the pro and cons of different frameworks that could be used for the sale of surplus energy and reviewed whether these sales frameworks were appropriate for the products being offered and the relevant market.

Advised the Western Australia Electricity Restructuring Task Force with respect to the performance of auctions in Ireland for the sale of capacity and energy. Reviewed the structure of the auction how it could be employed in Western Australia to mitigate the market power of the incumbent state generator.

Managed numerous competitive solicitations for renewable energy resources and energy efficiency projects. Projects involved the development of frameworks for evaluating these energy alternatives and for comparing them on a consistent basis with conventional electricity supplies. Analyses considered the relative environmental impacts, reliability benefits, and cost-effectiveness of alternatives.

Acted as Project Manager for several assignments to serve as the independent evaluator of conventional generation, renewable resource and demand-side RFPs. Responsible for determining whether proposals satisfy the threshold requirements in the RFP and for scoring all proposals. Also responsible for identifying the short-list of proposals, conducting bid clarification meetings with shortlisted bidders, and recommending to the selection of winning bidders.

Transmission Facility Review and Pricing Proceeding Support

Advised the staff of the Ontario Energy Board on the evaluation of the proposal for a 1,250 MW HVDC line between Quebec and Ontario and served as a participating staff member for the Massachusetts Energy Facilities Siting Board's evaluation of the 2,000 MW HVDC interconnection between Massachusetts and Quebec.

Assessed the implications of transmission interconnection issues on the feasibility and reasonableness of the Northeast states achieving their OSW development targets. As part of this analysis we reviewed the ISO-NE, NYISO, and New Jersey transmission systems and the various interconnection points that have been publicly proposed by market participants and third parties. Study identified the most obvious interconnection points based on generating unit retirements and the regional electric transmission systems.

Drafted a white paper reviewing the potential benefits, costs and risks of coordinated independent transmission development for OSW development in the US Northeast. The white paper identified potential cost savings and improvements in reliability offered by a coordinated independent transmission network.

Assessed the implications of transmission interconnection issues on the feasibility and reasonableness of achieving the OSW development targets that have been embraced by states in the Northeast US. The report reviewed: (1) the process of expanding interconnection capability under FERC Open Access Transmission Tariffs; (2) various transmission development case studies that should how offshore transmission has been developed in the US Northeast; and (3) contract provisions regarding transmission and how these contract provisions mitigated curtailment risks based on the required scope of the interconnection (e.g., capacity capability interconnection standard) and the impact of locational marginal pricing, which will induce the supplier to self-curtail.

Advised clients in Saskatchewan, Newfoundland and Labrador, and Alberta on transmission pricing issues. Testified in the Alberta Transmission Congestion Pricing Principles proceeding.

Led a consulting team that assisted with the preparation of the East-West Electrical Transmission Grid Study. Authored subsequent updates to this study for Natural Resources Canada.

Advised a client regarding the elements of a comprehensive electricity export policy framework. Advice focused on economic and social issues arising from the development of export oriented transmission infrastructure to support the development generation for export.

Provided testimony on Northeast power markets and transmission issues and consequential damages in a civil case in New York. Evaluated the implications of the loss of a transmission facilities on the power system adequacy.

Advised a number of clients on the issues associated with the development of merchant transmission facilities. Projects included reviewing the status of merchant project development efforts, merchant project structures, key success factors for merchant plant development and a review of merchant plant development opportunities worldwide.

Renewable Energy Policy Development and Evaluation

Advised governments of Ontario, New Brunswick, Nova Scotia, and Manitoba on policies for the promotion of renewable energy technologies.

Advised the Ontario Select Committee on Alternative Fuels on the most promising renewable technologies, identified barriers to their development and adoption and proposed policies for overcoming these barriers.

Directed a project for a group of municipalities in Manitoba that evaluated the economic opportunity offered by wind projects in Manitoba and identified policies to promote the development of Manitoba's wind resources.

Evaluated a Continental Renewable Portfolio Standard (RPS) that would span the US and Canada. Project included reviewing the RPS designs for all the major RPS programs in the US and evaluating the changes in electricity trade and resulting electricity cost savings from relaxing various RPS provisions.

Advised the Ontario Power Authority on the development of a standard offer for renewable energy technologies.

Delivered a presentation on Canadian policies to promote the development of wind energy projects. Presentation reviewed federal and all relevant provincial programs and policies to promote the development of wind energy projects.

Developed recommendations for the Manitoba Sustainable Energy Association on policies to promote the adoption of renewable energy technologies in Manitoba. Reviewed the relative advantages and disadvantages of standard offers versus RFPs and made recommendations regarding the appropriate applications of each.

Advised numerous electricity generation development companies on the implications and opportunities presented by renewable energy policies. Developed strategic plans for a wide range of renewable energy technologies including large scale wind, landfill gas, biomass, anaerobic digestion, and small hydro.

Evaluated electricity wholesale market and REC prices that would apply to landfill gas projects and reviewed US federal policies that benefited these projects including the production tax credit.

Reviewed the general market for the development of renewable energy projects in Canada and contrasted market conditions with those in other countries.

Led the development of a multi-client study that evaluated the opportunities for wind project development in Ontario under existing federal and provincial programs.

Contrasted state RPS programs by identifying eligible technologies, eligibility requirements for projects in different jurisdictions, strategies for assessing compliance, RPS targets, and penalty provisions for failure to achieve the target.

Speaking Engagements

"Strategies for Enhancing the Value of Your Asset", IBC Conference, (November, 1999)

"Electricity Restructuring Lessons Learned: Implications for Ontario", Ontario Energy Marketers Association (April, 2001)

"Electricity Power Prices in the Deregulated Ontario Market, 2001 CERI Conference, (October, 2001)

"Electricity Restructuring in the US and Eastern Canada", World Bank/CREG/CERI Conference, (November, 2001)

"Prices and Price Volatility in the Ontario Wholesale Power Market" PowerFair 2002, (May, 2002)

"Pricing Fundamentals in the Ontario Wholesale Power Market" PowerFair 2003, (August, 2003)

"The Economics of Power Generation in Atlantic Canada", 2003 Atlantic Power Summit (October, 2003)

"Future Opportunities in the Maritimes", 2003 Ontario Energy Contracts Conference, (November, 2003)

"A Perspective on Ontario's Evolving Wholesale and Retail Power Market Structures", PowerFair 2004, (May, 2004)

"Canadian Policies to Promote Wind Project Development" EUCI's 4th Wind Energy and Power Markets Conference (September, 2004)

"Effectively Navigating Ontario's RFP Processes" Power ON Conference, (October, 2004)

"Enhancing the Performance of the Maritimes Market", 2004 Atlantic Power Summit, (November, 2004)

"What Will the Ontario Landscape Look Like?", 2005 Ontario Energy Contracts Conference, (January, 2005)

"Policies to Promote the Adoption of Renewable Energy Technologies in Manitoba", Manitoba Sustainable Energy Association, (April, 2005)

"Outlook for Ontario Electricity Supply & Pricing", PowerFair 2005, (May, 2005)

"Key Risks Affecting Ontario Electricity Consumers", AMPCO General Member Seminar (November, 2005)

"What Kind of Market Structure Would Spark New Investment?" Canadian Institute's Generation Adequacy in Ontario Conference (April 19, 2006)

"Where are Electricity Pricing Going" Insight Information, Ontario Power Forum (June 15, 2006)

"Transmission Planning and Policy Development: An Update", APPrO Conference (November 15, 2006)

"Recent Developments in Transmission Access and Pricing" Insight Information's Grid Reliability and Competition in the Power Sector (December 12, 2006)

"Renewables in Ontario" Insight Info Conference (June 14, 2007)

"Report Card on Ontario's Electricity Market" Ontario Energy Association Annual Conference (September 6, 2007)

"Opportunities for Selling Renewable Power into the New England Market" Insight Info's 5th Annual Atlantic Power Summit (September 26, 2007)

"New England Market Opportunities and the Prospects for Increased Inter-Regional Trade" Canadian Institute's Atlantic Energy Conference (May 28, 2008)

"Cost Recovery and Return on Equity for Transmission Investment in the U.S.", Canadian Electricity Association Transmission Council (February 25, 2009)

"Ontario's Feed In Tariff in the Context of North American Renewable Energy Policies", 2009 OEA Industry Leaders' Roundtable (April 30, 2009)

"Transmission as Barrier to Wind Power Exports from the Maritime Provinces to the US Northeast", Canadian Wind Energy Association Wind Matters Conference (May 20, 2009)

"Electricity Transmission Enhancements to Capitalize on Opportunities for Renewable Resource Development", Renewable Energy Conference 2009 (May 28, 2009)

"Lessons Learned in the Design of Standard Offer and Feed-in Tariff Programs" Vermont Public Service Board Standard Offer Workshop (July 10, 2009)

"Impact of the Current Economic Climate on North American Renewable Energy Investment", Rothesay Energy Dialogue 2009 (July 14, 2009)

"Evaluation of Opportunities and Barriers to Wind Power Exports from the Maritime Provinces to the US Northeast", CanWEA 2009: Infinite Possibilities (September 21, 2009)

"Stakeholder Conference Presentation on the Cost of Capital", Ontario Energy Board (September 22, 2009)

"Opportunities Offered by the New England Power Market", Insight Info's 7th Annual Atlantic Canada Power Summit (October 5, 2009)

"Assessment of Ontario's Green Energy Act and its Implications for Ontario", PowerLogic ION Users Conference 2009 (October 23, 2009)

"Securing Regulatory Support for Smart Grid Investments", Canadian Electricity Association Customer Council (November 24, 2009)

"Creating a Policy Environment that Supports New Transmission Development", Canadian Institute's Transmission and Integrating New Power into the Grid, (April 19, 2010)

"Policies for Facilitating Transmission Investment" 2010 OEA Energy Leader's Roundtable, (April 21, 2010)

Clean Energy Dialogue Conference, U.S. Department of Energy and Natural Resources Canada, (May 20, 2010)

"Providing Revenue Stability for Offshore Wind: PPAs, RFPs and FITs", Insight Info's Freshwater Wind 2010 (July 19, 2010)

"Market and Economic Barriers to Electricity Storage", Canadian Electricity Association Generation Council Meeting,, (September 16, 2010)

"Opportunities Offered by the New England Power Market", Canadian Wind Energy Association: Growing Wind Energy in Atlantic Canada, (September 22, 2010)

"Considerations for Implementing Feed in Tariffs in Atlantic Canada", 8th Annual Atlantic Canada and US NE Power Summit (October 26, 2010)

"The Role of Cross Border Trade in Achieving Regional Renewable Energy Objectives", Council of State Governments Energy Plenary (August 8, 2011)

"Overview of RFP Process for the Procurement of 300 GWh of Renewable Energy from IPPs", The Nova Scotia Feed In Tariff Forum (September 22, 2011)

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