

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

IN RE: THE NARRAGANSETT ELECTRIC :
COMPANY d/b/a NATIONAL GRID REVIEW : DOCKET NO. 4929
OF POWER PURCHASE AGREEMENT :
PURSUANT TO R.I. GEN. LAWS § 39-31-1 TO 9 :

RHODE ISLAND OFFICE OF ENERGY RESOURCES
ADVISORY OPINION

MARCH 22, 2019

Table of Contents

A.	Introduction.....	3
B.	Executive Summary.....	3
C.	About the Rhode Island Office of Energy Resources.....	5
D.	The Affordable Clean Energy Security Act, R.I. Gen. Laws § 39-31-1, et. seq.....	6
	(1) The 83C RFP constitutes a commercially-reasonable, multi-state procurement under ACES.....	9
	(2) The project evaluation process was robust and independently reviewed.....	13
	(3) Revolution Wind provides commercially-reasonable terms and pricing.....	15
	(4) Revolution Wind will enhance energy security and reliability.....	19
	(5) Revolution Wind will generate net energy market benefits for local consumers.....	21
	(6) Revolution Wind will produce significant economic and job benefits for the Rhode Island economy.....	23
	(7) Revolution Wind will reduce electric sector greenhouse gas emissions.....	26
E.	State Energy Plan & Docket 4600 Goals.....	31
	(1) Revolution Wind is consistent with the State Energy Plan.....	31
	(2) Revolution Wind advances PUC Docket No. 4600 goals.....	34
F.	Conclusion.....	41
G.	Acknowledgement.....	42

A. Introduction

In accordance with [R.I. Gen. Laws § 39-31-6\(a\)\(1\)\(vi\)\(A\)\(III\)](#), the Rhode Island Office of Energy Resources (OER) submits this Advisory Opinion to the Rhode Island Public Utilities Commission (Commission) on a proposed twenty (20) year Power Purchase Agreement (PPA) between the Narragansett Electric Company, d/b/a National Grid (National Grid or the utility), and DWW Rev I, LLC, also known as the Revolution Wind offshore wind project developed by Ørsted U.S. Offshore Wind (Ørsted). The proposed PPA, which details the terms and conditions by which National Grid will purchase energy and renewable energy certificates (RECs) from the project, was filed with the Commission on February 7, 2019 pursuant to the Affordable Clean Energy Security Act (ACES), [R.I. Gen. Laws § 39-31-1 et seq.](#) ACES requires OER to file an advisory opinion “on the expected energy security, reliability, environmental, and economic impacts” resulting from the proposed PPA.

B. Executive Summary

The 400 MW Revolution Wind offshore wind project represents a gamechanger for the Ocean State that will result in significant energy, economic, and environmental benefits for years to come. The synergies represented by this project are made possible by the leadership of Governor Gina M. Raimondo and Rhode Island’s commitment to accelerating the growth of our clean energy portfolio and the workforce and supply chain necessary to sustain it. Additionally, selection of this sizeable carbon-free resource further demonstrates the state’s leadership in addressing climate change and mitigating the harmful effects of greenhouse gas (GHG) emissions. As a frontline, oceanside community realizing the very stark realities of a warming planet, Rhode Island must take bold, but responsible steps to address economy-wide carbon emissions in the face of rising sea levels, coastal inundation, and considerable public health impacts. As demonstrated by this project, this can be achieved while unlocking new economic growth opportunities for the Ocean State.

In 2017, Governor Raimondo announced two ambitious, yet achievable strategic goals to accelerate growth in clean, affordable energy and related industry jobs by 2020.¹ Specifically, the Governor called for a tenfold increase in the state’s portfolio of clean energy resources and a doubling of the number of Rhode Islanders working in green energy jobs. Revolution Wind will more than double the size of Rhode Island’s clean energy portfolio² and add more than eight hundred (800) direct construction jobs to the local economy in the coming years. In doing so, Rhode Island can continue to mitigate greenhouse gas emissions spurring climate change and foster a burgeoning new clean technology industry emerging along the Southern New England shoreline while realizing the attendant economic benefits associated with development of its

¹ See: <https://www.ri.gov/press/view/29766>. Also, for more information on progress made toward each of these goals, please visit: <http://www.energy.ri.gov/renewable-energy/governor-clean-energy-goal.php> and <http://www.energy.ri.gov/cleanjobs/>.

² At the end of 2018, OER reported that the state’s clean energy portfolio totaled 363 MW. OER provides quarterly updates on the state’s progress toward reaching 1,000 MW of clean energy by 2020 at: <http://www.energy.ri.gov/renewable-energy/governor-clean-energy-goal.php>.

supply chain.

Based upon our review of the project, associated PPA, and underlying technical analysis, OER finds that the proposed contract will reduce long-term energy costs for local ratepayers; enhance energy reliability and security; reduce carbon emissions in the electric sector; grow clean energy jobs; and foster millions of dollars in new investment throughout the Rhode Island economy. The totality of these energy, economic, and environmental benefits far exceed the proposed costs associated with this project.

More specifically, Revolution Wind is anticipated to:

- Generate over \$1 billion (NPV 2018\$) in net energy, economic, and environmental benefits to Rhode Island, while reducing local utility bills for Rhode Island ratepayers;
- Provide Rhode Island consumers with energy price stability through a flat, fixed contract price of \$98.425 per MWh or \$0.098425 per kWh (nominal) for twenty years;
- Diversify our energy mix by injecting an estimated 1.63 million MWh of domestically-produced, carbon-free energy into the grid annually – enough electricity to meet one-quarter of the state’s demand;
- Strengthen energy system reliability and fuel security, particularly during winter months when New England’s natural gas system is most constrained and offshore wind resources are producing at their highest capacity factors;
- Reduce regional carbon emissions by more than 11 million metric tons, consistent with reduction targets set forth in the Resilient Rhode Island Act³ and the state’s Greenhouse Gas Emissions Reduction Plan;⁴
- Advance Rhode Island’s leadership position in America’s emerging offshore wind industry, adding more than 800 direct construction jobs, 50 permanent jobs, and tens of millions of dollars in capital investment, earnings, and tax revenues to our economy;
- Result in \$40 million of new investments in Rhode Island port infrastructure, helping to cement Rhode Island as a hub for offshore wind construction activities; and
- Support local educational institutions, workforce development, and supply chain expansion in the offshore wind industry through a \$4.5 million investment by the project developer.

Based upon its review, OER maintains that:

- The project was solicited as the result of a commercially-reasonable, competitive,

³ [R.I. Gen. Laws § 42-6.2-1, et. seq.](#)

⁴ Issued December 2016. See: <http://climatechange.ri.gov/documents/riggerr16.pdf>.

multi-state procurement effort for an eligible clean energy resource, consistent with the requirements of ACES;

- The requirements of the solicitation utilized were met;
- The contract terms and pricing are commercially reasonable;
- The project has a credible project operation date;
- The project is consistent with the Rhode Island State Energy Plan, *Energy 2035*;
- The contract is consistent with goals enumerated in PUC Docket #4600; and
- National Grid has met its burden to consult with OER, as required by ACES.

Supported by an independent energy market expert and power procurement consultant, OER concludes that the total portfolio of energy, environmental and economic benefits to be driven by the construction and operation of Revolution Wind will greatly exceed its costs to local consumers.

Based on a comprehensive review of the project and resulting findings, which are set forth in this Advisory Opinion, OER urges the Commission to approve the PPA submitted by National Grid for the Revolution Wind offshore wind project.

C. About the Rhode Island Office of Energy Resources

OER is the state's lead energy policy agency established pursuant to [R.I. Gen. Laws § 42-140-2](#). OER's mission is to lead Rhode Island to a secure, cost-effective, and sustainable energy future. Housed within the executive branch, OER is led by a Commissioner of Energy Resources and staff of committed professionals dedicated to advancing the energy, economic, and environmental interests of the Ocean State.

Operating at the nexus of the many on-going efforts to grow and transform Rhode Island's energy system, OER works with state and quasi-state agencies; stakeholder-driven groups (including the Distributed Generation Board and the Energy Efficiency and Resource Management Council); regional coordinating bodies; and other private and non-profit stakeholders to advance state energy policy interests.

In this matter, National Grid consulted with OER and the Rhode Island Division of Public Utilities and Carriers (DPUC) in a multi-state competitive market procurement of domestic, renewable offshore wind resources. A request for proposals (RFP) was issued to the marketplace on June 29, 2017 pursuant to the Commonwealth of Massachusetts' Act to Promote Energy Diversity, Section 83C (the 83C RFP or procurement).⁵ During the Massachusetts solicitation process, OER and representatives from the Massachusetts Department of Energy Resources (MA DOER) discussed

⁵ Massachusetts' offshore wind procurement was issued pursuant to Section 83C of Chapter 169 of the Acts of 2008, as amended by Chapter 188 of the Acts of 2016.

opportunities for mutually beneficial cooperation between the states, subject to the limitations established in the 83C RFP and consistent with Rhode Island’s statutory authorization under ACES.⁶

To assist OER and DPUC in their respective reviews, the agencies jointly engaged expert consultant services independent from the utility, potential bidders, and other consulting firms utilized in the Massachusetts evaluation process. OER and DPUC sought a consultant that could objectively provide detailed analysis and guidance throughout the procurement process; review modeling inputs, assumptions, and results; advise on potential procurement opportunities for Rhode Island and its consumers; and support any subsequent regulatory action. Power Advisory LLC, led by Mr. John Dalton, was retained to conduct this work.

Power Advisory LLC specializes in electricity market analysis and strategy, power procurement, policy development, regulatory and litigation support, market design and project feasibility assessments. The company has a strong understanding of the offshore wind industry and its potential role in addressing Southern New England’s clean energy requirements. Mr. Dalton, our lead consultant, is based in Massachusetts and has spent most of his professional career focused on the New England electricity markets. He has had major roles in more than twenty-five (25) power supply RFPs; advised clients on the appropriate allocation of risks in power purchase agreements (PPAs) and on PPA drafting; developed forecasts of Class I REC prices and critically assessed the performance of Class I REC markets; authored reports on renewable project financing and development; and assessed the challenges of transmission project development. Mr. Dalton recently advised the Massachusetts Office of Attorney General in its review of the various PPAs resulting from the New England Clean Energy RFP. He is currently assisting the New York State Energy Research and Development Authority (NYSERDA) with its own 800 MW offshore wind RFP.

D. The Affordable Clean Energy Security Act, R.I. Gen. Laws § 39-31-1, et. seq.

ACES takes a holistic view of the state’s energy system and its impact on our economy and environment within the context of a regional grid. The General Assembly stated three key purposes for ACES:

- Secure the future of the Rhode Island and New England economies, and their shared environment, by making coordinated, cost-effective, strategic investments in energy resources and infrastructure such that the New England states improve energy system reliability and security; enhance economic competitiveness by reducing energy costs to attract new investment and job growth opportunities; and protect the quality of life and environment for all residents and businesses;
- Utilize coordinated competitive processes, in collaboration with other New England

⁶ It is OER’s understanding that MA DOER held similar discussions with the State of Connecticut on mutually-beneficial opportunities for joint procurement, however, OER was not a party to those conversations.

states and their instrumentalities, to advance strategic investment in energy infrastructure and energy resources, provided 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; and

- Encourage a multi-state or regional approach to energy policy that advances the objectives of achieving a reliable, clean-energy future that is consistent with meeting regional greenhouse gas reduction goals at reasonable cost to ratepayers.⁷

More specifically, the Act establishes authorization for the electric distribution company (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.⁸ The statute requires the utility company to “utilize all appropriate competitive processes” to carry out this objective.⁹

ACES provides that National Grid “may, subject to review and approval of the commission, select a reasonable, open, and competitive method of soliciting proposals from renewable energy developers...that may include public solicitations and individual negotiations”¹⁰ and “voluntarily file proposals with the public utilities commission for approval to implement”¹¹ the policies and purposes of ACES. The statute also requires that the solicitation “permit a reasonable amount of negotiating discretion for the parties to engage in arms-length negotiations over final contract terms,”¹² and that “(e)ach long-term contract entered into pursuant to this section shall contain a condition that it shall not be effective without commission review and approval.”¹³ Finally, National Grid is directed to file any resulting contracts “along with a justification for its decision, within a reasonable time after it has executed the contract following a solicitation or negotiation.”¹⁴

Procurements must also be “commercially reasonable,”¹⁵ which ACES defines, in part, as:

terms 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. 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.¹⁶

⁷ [R.I. Gen. Laws § 39-31-2](#)

⁸ [R.I. Gen. Laws § 39-31-5\(a\)](#)

⁹ [R.I. Gen. Laws § 39-31-5\(a\)\(4\)](#)

¹⁰ [R.I. Gen. Laws § 39-31-6\(a\)\(1\)\(i\)](#)

¹¹ [R.I. Gen. Laws § 39-31-6\(a\)](#)

¹² [R.I. Gen. Laws § 39-31-6\(a\)\(1\)\(ii\)](#)

¹³ [R.I. Gen. Laws § 39-31-6\(a\)\(1\)\(iii\)](#)

¹⁴ [R.I. Gen. Laws § 39-31-6\(a\)\(1\)\(iv\)](#)

¹⁵ [R.I. Gen. Laws § 39-31-5\(b\)](#)

¹⁶ [R.I. Gen. Laws § 39-31-3](#)

This portion of the definition of “commercially reasonable” is similar to how the term is defined elsewhere in energy procurement-related statutes, namely, the Long-Term Contracting Standard for Renewable Energy.¹⁷ However, under ACES, the General Assembly determined that “commercially reasonable” also requires:

a determination by the commission that **the benefits to Rhode Island exceed the cost of the project**. The commission shall 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**. [emphasis added]¹⁸

Moreover, unlike the Long-Term Contracting Statute, ACES specifically requires three state agencies to review any contracts filed pursuant to the Act and provide advisory opinions on specific topics relevant to their subject matter expertise. These include:

- The Department of Environmental Management (DEM), which shall provide an advisory opinion on the expected greenhouse gas emissions and statewide environmental impacts resulting from the proposed contract(s);
- The Commerce Corporation, which shall provide an advisory opinion on the expected statewide economic impacts resulting from the proposed contract(s); and
- The Office of Energy Resources, which shall provide an advisory opinion on the expected energy security, reliability, environmental, and economic impacts resulting from the contract(s).¹⁹

Finally, the Act grants the Commission authority to approve any contracts filed pursuant to ACES if it determines that:

- The contract is commercially reasonable;
- The requirements for the solicitation have been met;
- The contract is consistent with the region's greenhouse gas reduction targets; and
- The contract is consistent with the purposes of the statute.²⁰

Therefore, in its totality, ACES deliberately requires the Commission to examine a broad set of potential benefits that may accrue to Rhode Island’s economy, environment, and energy system resulting from clean energy investments proposed pursuant to the Act.

¹⁷ [R.I. Gen. Laws § 39-26.1-2\(1\)](#)

¹⁸ [R.I. Gen. Laws § 39-31-3](#)

¹⁹ [R.I. Gen. Laws § 39-31-6\(A\)](#)

²⁰ [R.I. Gen. Laws § 39-31-6\(a\)\(1\)\(vii\)](#)

(1) The 83C RFP constitutes a commercially-reasonable, multi-state procurement under ACES.

On June 29, 2017, electric distribution utilities in the Commonwealth of Massachusetts, in coordination with the Massachusetts Department of Energy Resources (MA DOER), issued an RFP for long-term power purchase agreements with offshore wind energy project developers. The RFP was issued pursuant to Massachusetts’ Act to Promote Energy Diversity, Section 83C and targeted contracts for a minimum of 400 megawatts (MW) of offshore wind energy generation up to approximately 800 MW.²¹ Issuing parties included the Massachusetts Electric Company and Nantucket Electric Company, which are affiliates of National Grid.

The 83C RFP specifically addressed joint procurement opportunities with other states. According to the RFP:

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. If the Commonwealth determines that such participation provides a reasonable means to achieve its Offshore Wind Energy Generation goals cost effectively through multi-state coordination and contract execution, selected projects may be allocated on a load ration share basis to one or more electric distribution companies in such state, subject to applicable legal requirements in the Commonwealth and the respective state. Examples include: Rhode Island’s Distribution Company, Narragansett Electric Company, has expressed interest in evaluating and considering projects proposed in response to this RFP pursuant to the General Laws of Rhode Island, including Chapter 31 of Title 39, the Affordable Clean Energy Security Act (“Chapter 39-31”).²²

As the RFP noted, Rhode Island’s participation was facilitated by ACES – a statute which specifically contemplates multi-state action on clean energy procurements of this type. For instance, [R.I. Gen. Laws § 39-31-5](#) authorizes the electric distribution utility, in coordination with OER and DPUC, “to voluntarily participate in multi-state or regional efforts” to “(p)rocur[e] domestic or international large-or small-scale hydroelectric power and eligible renewable energy resources, including wind...”

The 83C procurement represented a unique and timely opportunity for Rhode Island to leverage

²¹ The RFP also called for “proposals that include expandable, nondiscriminatory, open-access offshore transmission facilities for the efficient delivery of their power to the Onshore Transmission System.” MA 83C RFP, 1. Massachusetts did not select any such proposals.

²² Page 1, Footnote 8.

the economies of scale and first-mover²³ advantages associated with the largest procurement of its kind in North America to date. Specifically, by securing a contract in the 83C RFP, an offshore wind project developer would be better positioned in subsequent RFPs given the learning that would occur from permitting, constructing and operating a major project at such scale. This learning would allow a successful 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 project developer would be able to enhance its relationships with suppliers and contractors, thereby strengthening its competitive position in subsequent competitive procurements. With potential offshore wind procurements of at least 13,000 MW across the northeastern United States in coming years,²⁴ developers were highly motivated to secure a market position that would strengthen their competitive advantage in these subsequent RFPs. This enhanced the competitive tension within the 83C procurement process. Rhode Island’s participation in 83C allowed it to secure the benefits of this important moment at the launch of the United States offshore wind industry, evidenced through extremely attractive bid prices. Finally, projects participating in the 83C 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 the procurement process, the cash flow benefits from the ITC were likely to flow through to procuring utilities and, therefore, end use customers, in the form of lower prices. With the ITC phase out, offshore wind proposals planned for subsequent Massachusetts offshore wind RFPs may not realize this critical tax benefit.

Specific to offshore wind, Rhode Island has collaborated with other northeastern states on offshore wind industry development. These efforts have helped lay a strong foundation for the type of clean energy investments now being realized along our shores, as evidenced by this docket. For instance, representatives from Rhode Island, Massachusetts, and New York state energy offices recently participated in a multi-state effort to “explore the potential for mutual action to develop offshore wind at the scale necessary to reduce costs by achieving economies of scale and establishing a regional supply chain.” Coordinated by the Clean Energy States Alliance (CESA) and supported by a United States Department of Energy (US DOE) grant, “(t)he states agreed to work together to develop a series of analytical reports and a regional roadmap to identify each state’s individual objectives and the objectives of the region to scope out a near-term and long-term pipeline of projects using several possible penetration scenarios.” Three analytical reports were released publicly in November 2017 and a final summary report was issued in March 2018. According to CESA, “Based on the successful conclusion of the Roadmap for Multi-State Cooperation on Offshore Wind project and the potential next steps for multi-state cooperation outlined in the Roadmap document, the states decided to continue working together and to expand the group to

²³ A first mover advantage reflects the competitive benefits realized by being 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.

²⁴ For example, Massachusetts established a target of 1,600 MW of offshore wind generation to be procured by 2027, of which 800 MW remain following the selection of Vineyard Wind. 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. By his 2019 State of the State address, Governor Cuomo almost quadrupled New York’s target by calling for 9,000 MW of offshore wind by 2035. 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.

other Northeast and Mid-Atlantic states.”²⁵

OER is confident that Rhode Island customers were well served by participating in the 83C competitive procurement process for offshore wind resources. We acknowledge that this solicitation method did not receive prior Commission approval in Rhode Island. However, this does not preclude the Commission from now finding that the solicitation method utilized to select Revolution Wind was an “appropriate competitive process”²⁶ to reasonably, openly, and competitively attracted proposals from renewable energy developers of offshore wind resources, on a multi-state basis, pursuant to ACES. We concur with National Grid witnesses Mr. Timothy J. Brennan and Ms. Corinne M. DiDomenico that ACES does not require the Commission to approve the method of soliciting renewable energy proposals (on a multi-state or regional basis) prior to RFP issuance. The statute is silent on timing.²⁷ ACES does allow the utility to “select a reasonable, open, and competitive method of soliciting proposals from renewable energy developers...that may include public solicitations and individual negotiations.” Furthermore, “(t)he solicitation process shall permit a reasonable amount of negotiating discretion for the parties to engage in arms-length negotiations over final contract terms.” Therefore, the Commission now has an opportunity to determine that the procurement process leveraged by Rhode Island in this instance was “reasonable, open, and competitive” and “permit(ed) a reasonable amount of negotiating discretion for the parties to engage in arms-length negotiations.”²⁸

OER acknowledges the testimony set forth by National Grid detailing the review and approval of the solicitation process by the MA DPU. We concur that the Commission should consider the MA DPU findings in the process of making its own determination. In addition, OER and DPUC directed Power Advisory to examine the solicitation method and process independently from National Grid. Based upon these findings, OER is confident that the requirements of the solicitation method, timetables, and evaluation process all conformed to industry standards for transparency and fairness relative to similar renewable procurements undertaken in Rhode Island and across the region:

- While the target procurement amount for Massachusetts was 400 MW of offshore wind, the solicitation allowed for bidders to offer proposals for up to 800 MW. For an emerging renewable technology and clean energy industry in the United States, this range was sufficient to attract timely, competitive bids from cost-effective offshore wind projects at scales necessary to reduce development costs, drive net consumer

²⁵ Rhode Island continues to be engaged in multi-state conversations regarding offshore wind industry development. As indicated, these discussions have been expanded to include Connecticut, Delaware, Maryland, New Hampshire, and New Jersey.

²⁶ [R.I. Gen. Laws § 39-31-6\(a\)](#)

²⁷ We note that, in contrast, the General Assembly did require certain approvals by the Commission prior to issuance of a solicitation in the Long-Term Contracting Standard. [R.I. Gen. Laws § 39-26.1-3\(b\)](#) states, “The timetable and method for solicitation and execution of such contracts shall be proposed by the electric-distribution company, and shall be subject to review and approval by the commission prior to issuance by the company.” No such clause exists under ACES.

²⁸ OER notes that the 83C RFP included a standard form PPA to which bidders were requested to identify proposed changes subject to negotiation with procuring entities.

benefits, and support a burgeoning regional supply chain.

- RFP eligibility requirements were reasonable. The solicitation was accessible by domestic and international offshore wind energy generation developers and entities in possession of a “federal lease issued on a competitive basis after January 1, 2012 for an Offshore Wind Energy Generation site that is located on the Outer Continental Shelf and for which no turbine is located within 10 miles of any inhabited area.” These criteria allowed for sufficient market competition in an industry driven by global players. The 83C solicitation ultimately attracted bids from all the offshore wind developers with title to federal offshore lease areas located near Southern New England at that time, including two European-based companies and one company then headquartered in the United States.
- The solicitation process included issuance of a draft RFP to the marketplace that provided an opportunity for proponent and public comment. The issuance of this draft RFP, which was similar in form and content to the final RFP, extended the amount of time available to potential proponents to develop their proposals and mature their proposed projects.
- The RFP schedule was reasonable for a procurement of this scale and complexity. Upon RFP issuance (June 29, 2017), bidders had nearly six months to develop and submit their proposals (December 20, 2017). The five months it took for project evaluation and selection was in line with recent solicitations. In comparison, the clean energy RFP recently approved by the Commission in Docket #4822 projected a six-month evaluation period prior to conditional project selection. Similarly, the multi-state clean energy RFP approved in Docket #4570 originally contemplated up to six months for evaluation.
- The RFP provided clear instructions to prospective bidders regarding proposal requirements, eligibility and threshold requirements, acceptable forms of bid pricing, and how to submit proposals. It also provided bidders an opportunity to seek clarification on the RFP requirements, and provided clear instructions on how proposals should be submitted. It described the price and non-price evaluation criteria and metrics that would be used to evaluate bids.
- Non-confidential bid materials, including the RFP, responses to bidder questions, and other process notifications, were made available to interested bidders and the public at-large through a website, <https://macleanenergy.com/83c/>.
- An independent evaluator was used by Massachusetts to monitor the development of the RFP and the proposal evaluation and selection process. This independent evaluator submitted comments on the Draft RFP and a report on the proposal evaluation and selection process to the MA DPU.

Therefore, OER maintains that the 83C procurement process, inclusive of Rhode Island’s participation, was a commercially-reasonable, open, and competitive method for soliciting bids for qualified offshore wind energy resources on a multi-state basis, as specifically authorized by the

General Assembly in ACES. We affirm that the requirements for the solicitation were met. Through its participation in this procurement, National Grid advanced the General Assembly’s desire to “utilize coordinated competitive processes, in collaboration with other New England states...to advance strategic investment in energy infrastructure and energy resources,” with a goal to “improve energy system reliability and security; enhance economic competitiveness by reducing energy costs to attract new investment and job growth opportunities; and protect the quality of life and environment for all residents and businesses.”²⁹

The cross-border collaboration represented by the 83C process allowed Rhode Island to leverage the economies of scale associated with the nation’s largest and most significant commercial offshore wind procurement to date. It was a procurement that attracted global attention, with bids received from both American and European developers, ultimately resulting in a combined selection of 1,400 MW of new, locally-produced, reliable, carbon-free energy.³⁰ While various contracts remain subject to regulatory approvals, it is clearly evident that a regional approach to clean energy development, as enabled in Rhode Island by ACES, can be successful in producing meaningful net benefits for participating jurisdictions.³¹ In this regard, Rhode Island’s active participation and continued leadership will spur the development of a new clean technology industry along New England’s shoreline, creating jobs and investment opportunities throughout our economy, while placing significant downward pressure on electric sector greenhouse gas emissions. The procuring states and utilities are demonstrating that these benefits can be achieved while diversifying our energy portfolio, strengthening system reliability, and bringing affordable clean energy – at scale – to local consumers.

(2) The project evaluation process was robust and independently reviewed.

As part of the 83C process, the Massachusetts soliciting parties retained Tabors Caramanis Rudkevich (TCR) as its Evaluation Team Consultant to assist with cost and benefit evaluation of proposals received in response to the RFP. We note that OER was not a member of the Massachusetts 83C evaluation team and was not involved in the original development of TCR evaluation criteria or modeling assumptions and tools. However, at the concluding stages of the Massachusetts evaluation, OER and DPUC received project-specific summaries of TCR’s analysis, subject to a non-disclosure agreement. Power Advisory independently reviewed the evaluation modeling inputs and outputs and found that TCR’s results were reasonable and within industry standards. TCR subsequently updated several assumptions given the availability of more current information since the initial evaluation had been conducted, and these changes were also reviewed and found to be reasonable by Power Advisory.

²⁹ [R.I. Gen. Laws § 39-31-2](#)

³⁰ In addition to the offshore wind selections made by Rhode Island and Massachusetts, Connecticut made public its decision to contract for 200 MW of incremental offshore wind energy. See <https://www.ct.gov/deep/cwp/view.asp?A=4965&Q=603300>.

³¹ Importantly, this was not Rhode Island’s first attempt at leveraging a multi-state clean energy procurement to produce net benefits for Ocean State consumers. In February 2018, the Commission approved (Docket #4764) eight long-term PPAs for approximately 44 MW of cost-effective, newly-developed renewable energy resources resulting from a three-state effort (including Rhode Island, Massachusetts, and Connecticut).

Power Advisory examined, in detail, the capacity assumptions utilized for the model, which reasonably factored in both existing and anticipated resources. Capacity additions included: (1) the New England Clean Energy Connect (NECEC) Hydro project; (2) additional off-shore wind to be procured by Massachusetts and Connecticut; (3) distributed solar PV levels per ISO-NE’s 2018 Final PV Forecast through 2027; (4) fuel cell and biomass generation from a recent Connecticut clean energy procurement; and (5) generator retirements (both economic retirements and those approved by ISO-NE prior to August 2017). Power Advisory also confirmed that the load forecast utilized by TCR was extrapolated from ISO-NE’s 2018 Capacity, Energy, Loads and Transmission (CELT) Report and reflective of New England state RES/RPS requirements. In addition, they reviewed natural gas price assumptions, which were based on forecasts of Henry Hub prices and basis differential estimates for four New England hubs. The Henry Hub forecast was based on a blend of forward prices and the reference forecast assuming no Clean Power Plan from the Energy Information Administration (EIA) Annual Energy Outlook 2018.

In addition to the robust energy market impact evaluation detailed above, OER requested that the Massachusetts Evaluation Team solicit supplemental information on economic and environmental benefits *specific* to Rhode Island, including, but not limited to, job creation, tax revenues, purchase of capital equipment, materials or services from local businesses, and research and development funding for local universities. Each of the 83C bidders responded to this request prior to selection.³²

As noted earlier, Massachusetts law also required an independent evaluator to monitor the 83C solicitation and bid selection process.³³ This was a significant refinement to previous renewable energy RFPs in the region and increased the integrity of the evaluation process. In its findings, the selected independent evaluator, Peregrine Energy Group, concluded:³⁴

- the RFP was implemented transparently and there was strong independent oversight over the 83C solicitation process;
- the “evaluation framework overall was standardized, fair, objective, non-discriminatory, and non-preferential”;³⁵ and
- “the evaluation of bids...was fair and objective and consistent with the provisions and intent of the 83C RFP...”³⁶

Upon completion of 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

³² The Massachusetts Evaluation Team sent each bidder a letter requesting supplemental economic and environmental impact data specific to Rhode Island on April 6, 2018.

³³ MA 83C(f) called for an independent evaluator to “monitor and report on the solicitation and bid selection process” and help “ensure an open, fair and transparent solicitation and bid selection process that is not unduly influenced by an affiliated company.”

³⁴ The Independent Evaluator Report conducted under MA Section 83C was prepared by Peregrine Energy Group on August 3, 2018. A copy of the redacted report can be found in MA DPU Docket 18-77.

³⁵ Peregrine report, Section VB.

³⁶ Peregrine report, Section VC.

negotiations. Based upon all available information, it was evident that the project would result in significant energy, economic, and environmental benefits for the state, consistent with the requirements of ACES. A project selection announcement was made on May 23, 2018; concurrently, Massachusetts publicly announced its selection of the 800 MW Vineyard Wind project.³⁷

OER asserts that the project evaluation conducted as part of this competitive solicitation was robust and based upon the best available information at the time. The models utilized by TCR were developed as part of a multi-utility effort in Massachusetts, with input by state agencies in that jurisdiction. The process was also reviewed by an independent evaluator pursuant to Commonwealth statute. Moreover, at the direction of OER and DPUC, Power Advisory independently reviewed model assumptions and outputs separate from the sponsoring utility and found them to be reasonable.

The Commission – and the state’s ratepayers – should have confidence that the analytical evaluation which forms the basis of Rhode Island’s selection and contracting of Revolution Wind involved a very significant, multi-layered technical review and level of oversight by multiple parties. The significance of this investment to local consumers and its potential to advance Rhode Island’s energy, economic, and environmental interests most certainly warranted such an effort.

(3) Revolution Wind provides commercially-reasonable terms and pricing.

In its February 7, 2019 filing, National Grid proposed a twenty-year PPA for the energy and RECs generated by the 400 MW³⁸ (nameplate) Revolution Wind project owned by Ørsted U.S. Offshore Wind. Revolution Wind was originally developed by Deepwater Wind, the Providence-based developer responsible for the 30 MW Block Island Wind Farm, which became operational in late-2016. On October 8, 2018, Ørsted announced its agreement with the D.E. Shaw Group to acquire a one-hundred percent (100%) equity interest in Deepwater Wind.³⁹ That acquisition was finalized on November 7, 2018.⁴⁰ These activities occurred after the selection of the Revolution Wind project, which was announced in May 2018. To OER’s knowledge, this transaction has had no negative impact on any aspect of the project. As a global leader in offshore wind development, with approximately one-quarter share of the market, Ørsted is fully qualified to construct, operate, and maintain a project as significant as Revolution Wind.^{41 42}

³⁷ See: <https://www.providencejournal.com/news/20180523/ri-selects-deepwater-wind-to-build-400-megawatt-offshore-wind-farm>.

³⁸ The PPA specifies a maximum contract amount of up to 408 MWh per hour. For the purposes of this Advisory Opinion and underlying analysis, OER assumes a 400 MW nameplate capacity facility.

³⁹ See: <https://orsted.com/en/Company-Announcement-List/2018/10/1819975>.

⁴⁰ See: <https://orsted.com/en/Company-Announcement-List/2018/11/1840215>.

⁴¹ The company has facilities being developed, constructed, and/or operational in Denmark, Germany, the Netherlands, Taiwan, the United Kingdom, and the United States, and projects to have 7.45 GW of offshore wind capacity by 2020. See: <https://orsted.com/en/Our-business/Offshore-wind/Our-offshore-wind-farms>.

⁴² On February 8, 2019, Ørsted announced a fifty-fifty partnership for certain offshore wind assets with Boston-based Eversource. The transaction included the Revolution Wind project – both the proposed Rhode Island portion (400 MW) and commitments made by Connecticut (304 MW). The developer and Eversource have indicated that this transaction will not impact the commitments made to Rhode Island.

The project will consist of approximately fifty (50) turbines located in the Federal outer continental shelf in BOEM Lease Area OCS-A 0486, at least fifteen (15) miles from the Rhode Island coast. According to the proposed contract,⁴³ the energy delivery point will be either an interconnection at the 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.⁴⁴ The project has an expected commercial operation date of January 15, 2024.

Regarding the project's transmission interconnection, GridAmerica – a wholly-owned unregulated subsidiary of National Grid USA doing business as National Grid Ventures – has an option on the right to acquire the delivery facility upon commercial operation. As a non-regulated business unit of National Grid, plc, National Grid Ventures is a corporate affiliate of the contracting, regulated utility, Narragansett Electric. If this option right is exercised, National Grid Ventures will provide transmission services to the project under a transmission service agreement at Federal Energy Regulatory Commission (FERC) approved rates. In this event, Revolution Wind will pay National Grid Ventures for transmission service. This would have no bearing on the purchase price that Rhode Island electricity customers effectively pay for the output of the Revolution Wind project. The purchase price will continue to be \$98.425 per MWh (nominal) regardless of whether this option is exercised.

At OER's direction, Power Advisory reviewed the commercial terms and pricing that will apply to the proposed project. These terms are specified in a standard form PPA that was issued as part of the RFP process and to which bidders are required to identify contract exceptions, which were negotiated by National Grid and Ørsted. Power Advisory reviewed the standard form PPA and found it consistent with other recent PPAs, conforming closely to those used in recent state (e.g. Massachusetts 83D) and regional procurements (e.g. New England Multi-State Clean Energy RFP). These PPAs have become the standard in New England for such long-term contracting of renewable energy resources.

Power Advisory also reviewed the changes made to the standard contract to assess their reasonableness. The material changes included:

- Assessing delivery deficiencies on a biennial rather than annual basis;
- Providing flexibility with respect to the facility size recognizing that the wind turbine model had not been selected and its nameplate capacity rating was not known;
- 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;

⁴³ See Exhibit A, Schedule NG-1.

⁴⁴ Locational marginal prices in the Southeast Massachusetts zone, which includes the Brayton Point and Pottersville substations, are not materially different than those in the Rhode Island zone so the ultimate selection of these specific interconnection points does not have a material impact on the projected project benefits.

- Revising language to conform to Rhode Island’s Renewable Energy Standard;
- Allowing Revolution Wind to sell test energy to a third-party;
- Limiting the proportion of the project that can be unavailable during the summer months as a result of scheduled maintenance;
- 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
- Adding Davisville, Rhode Island as a possible interconnection point.

Power Advisory found that these contract amendments represent a reasonable balancing of the commercial interests of each party. As the seller, Revolution Wind secured greater flexibility, recognizing the annual variability of project output and the potential for delays in commercial operation as one of the first large offshore wind projects in North America. As the buyer, National Grid secured a guarantee that the price that it and its customers were paying was no greater than that which Revolution Wind offered to another subsequent buyer and secured a constraint on the scheduling of maintenance during the summer months when electricity demand and market prices can be high.

The PPA between National Grid and Ørsted also calls for a maximum contract amount of up to 408 MW based upon turbine selection and final engineering designs; requires that the project be qualified as an Eligible Renewable Energy Resource in Rhode Island; and specifies a twenty-year term from the commercial operation date, expected to be January 15, 2024. We find these terms to be reasonable and within industry norms. Regarding the contract term, twenty-year PPAs are common in the industry and there is substantial precedent for the Commission to rely on.⁴⁵ Longer duration contract terms are preferred because they support long-term financing arrangements that enable lower contract prices (i.e., project capital costs can be recovered over a longer period, resulting in lower prices). Regarding the proposed commercial operation date, this, too, is viewed as credible and consistent with the requirements of [R.I. Gen. Laws § 39-31-3](#). This commercial operation date was the latest offered by the three bidders in the 83C procurement. Deepwater Wind, subsequently acquired by Ørsted, successfully developed the first and only offshore wind project now operational in North America, the Block Island Wind Farm (BIWF), and Revolution Wind employs a similarly conservative, sequential schedule. While there is some risk of delay with respect to different elements of the project development schedule, the project timeline for these activities appears sufficient for successful development by the proposed commercial operation date. In sum, we believe that the Revolution Wind 400 MW project offers a credible project operation date. Assuming the underlying power purchase agreement is approved, construction (on-shore) is anticipated to begin as early as 2021.

⁴⁵ For example, long-term renewable energy contracts approved in PUC Docket #4764 had twenty-year terms. The 800 MW Vineyard Wind PPA selected by Massachusetts also has a twenty-year term.

At OER’s direction, Power Advisory compared the Revolution Wind contract pricing against other recent renewable energy power purchase agreements. This comparison included Massachusetts’ 800 MW Vineyard Wind selection and Commission-approved contracts that resulted from a Multi-State Clean Energy RFP (w/ MA & CT and approved in Rhode Island on February 9, 2018 in Docket #4764):

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

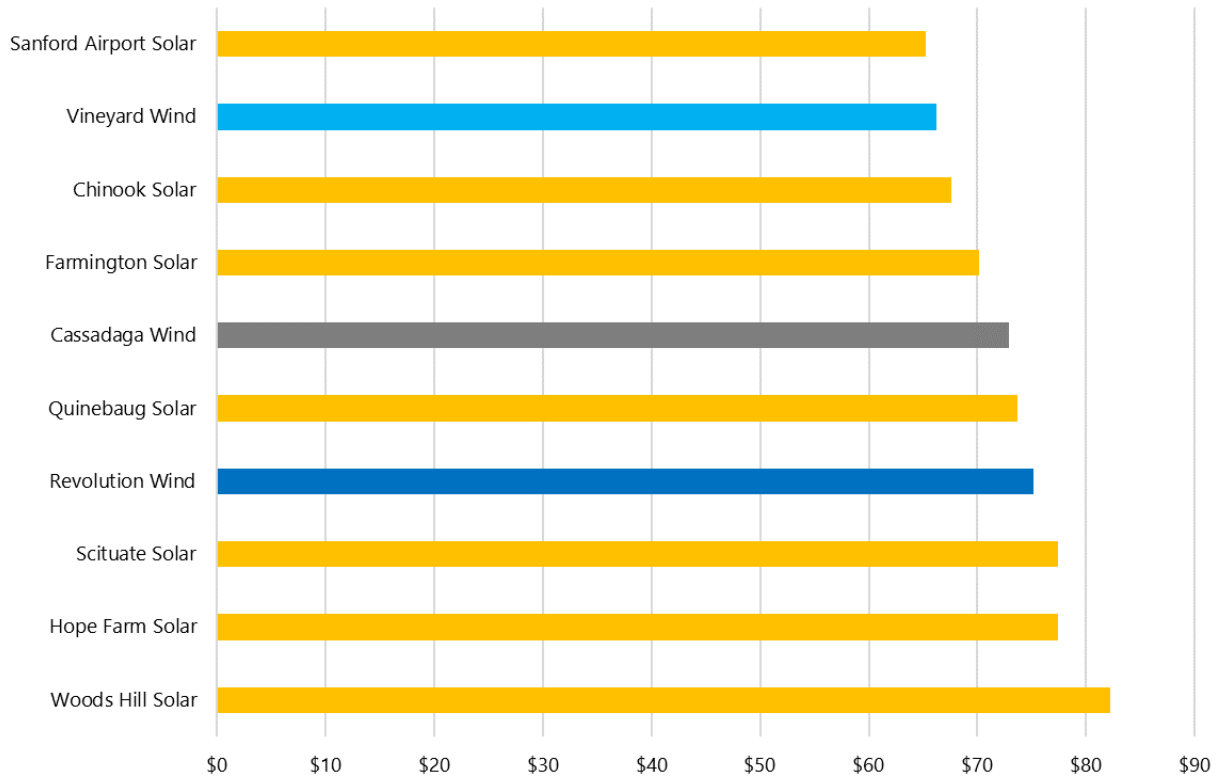


Figure 1 above indicates that the proposed pricing for Revolution Wind compares favorably with other renewable energy projects recently contracted by National Grid on behalf of Rhode Island consumers and approved by the Commission. However, this comparison is of the *cost* of the proposals, not of their respective value or *benefits* and how these compare to the costs. With higher capacity factors during the winter period, when New England’s fuel security risks are greatest and market prices highest, the output of offshore wind generation is particularly valuable.

At a fixed price of \$0.098425/kWh for twenty years, Revolution Wind is anticipated to provide more than \$91.6 million (NPV 2018\$) in net energy benefits (direct + indirect) and spur \$28.7 million (NPV 2018\$) in supply cost reductions for local gas distribution customers. Moreover, during extreme winter weather (estimated at once in fifteen years), this project could generate an additional \$25.4 million (NPV 2018\$) in market value for local consumers as the project’s peak capacity coincides with gas system constraints and resulting electric price spikes on the grid. Rhode Island ratepayers are anticipated to realize a small reduction in their monthly electric bills

of approximately -0.4 percent. For the average 500 kWh residential customer, this equates to bill savings of roughly fifty cents per month.

Based upon our review and independent assessment, OER find the PPA terms and pricing negotiated by National Grid and Ørsted to be commercially-reasonable and consistent with what an experienced power market analyst would expect to see in transactions involving regional-energy resources.

(4) Revolution Wind will enhance energy security and reliability.

Revolution Wind’s injection of newly-developed, carbon-free energy into the Southern New England load pocket will produce energy security and reliability benefits for Rhode Island on several fronts. On its face, this project will require no domestically-produced or imported sources of fossil fuels (e.g. pipeline natural gas or liquified natural gas) to operate. In fact, its production of zero fuel cost energy will displace other resources that do rely on such sources, particularly during winter periods when New England generators turn to dirty oil in storage tanks or foreign-sourced LNG shipments to meet regional energy demand.

Offshore wind 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 on the margin. In turn, these resources can assist in alleviating the fuel security risks now facing New England. A recent December 2018 analysis performed by ISO-NE of the potential impacts of various levels of offshore wind penetration supports this assertion.⁴⁶ The regional grid operator examined the energy, production cost, and emissions impacts associated with hypothetical offshore wind injections of 400 MW, 800 MW, and 1,600 MW into New England coincident with a real-life sixteen-day cold spell that spanned from December 24, 2017 through January 8, 2018. The projected offshore wind output estimates (provided by the Massachusetts Clean Energy Center) reflected capacity factors of about seventy percent (70%) during this winter cold snap and resulted in avoided production costs of \$20-25 million (400 MW) to \$80-85 million (1,600 MW). Moreover, without these modeled offshore wind energy injections, electric sector carbon emissions would have increased from three percent (3%; 400 MW) to eleven percent (11%; 1,600 MW) during that period. Under a 1,600 MW scenario – just slightly higher than the 1,500 MW of approved or pending offshore wind contracts in Southern New England – ISO-NE estimated that 160,200 barrels of oil, 5,300 short tons of coal, and 1.81 billion cubic feet of natural gas would have been avoided during that short period. This translates to seven percent (7%) of the oil consumed during that period; four percent (4%) of the coal burned; and, incredibly, twenty percent (20%) of the natural gas utilized for power generation in New England during that span.

Ørsted estimates that the project’s winter period capacity value in the Forward Capacity Market will be 226.7 MW, almost fifty-seven percent (57%) of its nameplate capacity rating. While the

⁴⁶ ISO-NE’s “High-Level Assessment of Potential Impacts of Offshore Wind Additions to the New England Power System During the 2017-2018 Cold Spell” was issued on December 17, 2018 and can be accessed at: 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.

capacity contribution during the summer is lower – Ørsted estimates it to be 155.5 MW or approximately thirty-eight percent (38%) of its nameplate capacity rating – it is still significantly higher than onshore wind and other intermittent renewable resources. The high relative capacity ratings of offshore wind projects will provide meaningful reliability benefits, particularly during the winter period when the ISO-NE electricity market faces the greatest reliability challenges. More consistent output can reduce requirements for fast responding resources, which are often fossil fuel-fired generation, to provide various backup services (e.g., ramping and regulation). In addition, the Revolution Wind project will deliver energy directly into ISO-NE’s Rhode Island or Southeast Massachusetts load zone (adjacent to the Rhode Island zone) and close to major load centers. In turn, this will reduce losses associated with delivering that energy to customers.

Further diversification of Rhode Island’s energy portfolio, as represented by Revolution Wind, can also help address fuel security concerns. The region continues to grapple with periods of limited availability of natural gas supplies during the winter when gas-fired generators are competing with local gas distribution companies for limited fuel supplies into the region. In January 2018, ISO-NE released a report titled Operational Fuel-Security Analysis⁴⁷ which identified fuel security and limited availability of natural gas during winter peak periods as the region’s greatest risk to power system reliability. The analyses and scenarios considered by ISO-NE 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.”

To assess the risks posed by different fuel-mix scenarios, ISO-NE evaluated operational risks. The report considered a “More Renewables” scenario that included 1,400 MW of offshore wind by 2024 (i.e. consistent with Massachusetts, Rhode Island and Connecticut offshore wind procurement commitments) and an additional 1,000 MW of clean energy over a new transmission tie to a neighboring system (i.e. consistent with the New England Clean Energy Connect, which Massachusetts selected in 2018). In that scenario, no load shedding was required. A “Max Renewables” case was also considered, which reflected 2,000 MW of offshore wind. The report found that “(l)arge 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.”

To a degree, some of these operational and system impacts can be quantified on an economic basis. Specifically, both OER and DPUC were interested in examining how the annual injection of Revolution Wind’s 1.63 million MWhs might affect gas supply costs for Ocean State consumers. Also, in periods of very extreme winter weather and acute spikes in fuel prices, it stood to reason that this winter-peaking renewable resource might produce enhanced economic benefits to ratepayers. Guided by Power Advisory and working in coordination with National Grid, the parties were able to monetize these specific effects to gauge their economic value to Rhode Islanders, as detailed below.

⁴⁷ https://www.iso-ne.com/static-assets/documents/2018/01/20180117_operational_fuel-security_analysis.pdf.

(5) Revolution Wind will generate net energy market benefits for local consumers.

ACES also requires OER to advise the Commission on the expected economic impacts associated with contracts filed under the statute. “Economic impacts” can include both changes to energy costs for Rhode Island residents and businesses as well as overall local economic development impacts, such as job growth and capital investments. This section details the former based upon analysis conducted by TCR. On behalf of OER and DPUC, Power Advisory independently reviewed TCR’s analysis and found it to be rigorous and credible.

TCR calculated several sets of energy-related benefits stemming from Revolution Wind. These benefits are detailed in TCR’s Quantitative Evaluation Report submitted as Schedule NG-5 of National Grid’s February 7, 2019 filing in this docket. They include direct energy and REC costs and benefits; indirect energy price benefits; and several other types of energy and environmental benefits, which are detailed on the following pages.

The evaluation framework employed by TCR assumed a twenty-five-year analysis period, 2021 to 2045, for the quantification of *indirect and other benefits*.⁴⁸ Since the Revolution Wind project is not scheduled to be operational until 2024, the effective evaluation period for indirect and other benefits is twenty-two years (i.e., from 2024-2045). The reported economic benefits to Rhode Island are analyzed over twenty-eight-years, reflecting a three-year construction period (2021-2023) and an operational period (2024-2048). OER finds these evaluation periods to be reasonable as they conform to the anticipated useful life of the Revolution Wind project (at least 25 years). The effective twenty-two-year evaluation period for indirect and other benefits may *understate* the benefits that Rhode Island will realize from the project over its lifetime. Regarding direct benefits and costs, it is appropriate to consider a twenty-year contract term only. Such treatment of costs and benefits is consistent with the Vineyard Wind project in Massachusetts and the evaluation frameworks for other regional procurements, including those for which the Commission has approved other long-term contracts.

Based upon this framework, TCR’s analysis determined that total energy market-related benefits are projected to exceed total contract costs by \$91.6 million or \$5.16/MWh (NPV 2018\$). The direct project benefits that were quantified include a stable price of energy that is fixed by a twenty-year PPA, which establishes the price for energy and RECs for each year of the contract term. The total projected market value of the energy and RECs produced by Revolution Wind will be \$4.7 million (NPV 2018\$) greater than the total cost of the contract. On a unit basis, the direct net benefit is \$0.26/MWh (2018\$).

Indirect benefits were examined utilizing a proposal case that best reflected the impacts that the

⁴⁸ Indirect and other benefits include the change in Rhode Island energy market prices, societal impacts of CO₂ and NO_x emission reductions, increase in project PPA market value from years with extreme winter fuel prices, and the impact of a reduction in gas supply cost to Rhode Island gas customers.

multi-state offshore wind procurement will have on Rhode Island consumers.⁴⁹ The primary indirect benefit resulting from this regional effort is a reduction in energy supply costs for Rhode Island electric consumers. These savings are derived at the wholesale level through reductions in locational marginal prices (LMPs) and are estimated to be \$87.0 million (NPV 2018\$) through 2045. This represents a benefit of \$4.90/MWh (2018\$). Class 1 REC market price change impacts were also modeled but were found to be statistically insignificant.

In addition to the quantified direct benefit of a stable price for clean energy generated by the Revolution Wind project and indirect energy market price reductions, the project will reduce Rhode Island's exposure to electricity market price volatility during extreme winter periods. As noted above, the ISO-NE electricity market experiences volatility when there is sustained cold weather and natural gas supplies throughout the region 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. Another cold spell was experienced in the 2017-2018 winter with similarly high locational marginal prices (LMPs) experienced in the regional markets.

To reflect this additional winter-period benefit, TCR modeled the increase in market value of energy from the project during an extreme one-in-fifteen-year winter pricing event relative to a normal weather year. The resulting benefit was calculated at \$25.4 million (NPV 2018\$). If such events were to be more frequent – for example, we have experienced two such events in the last five years alone – the benefits to Rhode Island consumers would be even greater.

Another indirect benefit of the project is its impact on natural gas commodity prices resulting from reduced generator fuel demand as their output is displaced by Revolution Wind's zero-fuel cost energy. TCR modeled impacts on the wholesale gas supply costs incurred by National Grid to serve its retail gas customers under the proposal case relative to the base case. This benefit was estimated to be \$28.7 million (NPV 2018\$).

Two additional metrics related to greenhouse gases – the non-embedded, societal value of CO₂ and NO_x emissions reductions – were also evaluated by TCR and equate to \$544 million (NPV 2018\$) in combined benefits. Also, economic development benefits were calculated by Ørsted's consultant, Navigant, and totaled \$405.1 million (NPV 2018\$). These benefits were adopted by National Grid as part of their overall benefit/cost test analysis. Both sets of analyses – the environmental and economic development impacts – were reviewed by OER and Power Advisory and are discussed in more detail below.

When the aforementioned direct and indirect benefits are combined and compared against direct contract costs for Rhode Island consumers, the total net benefit of Revolution Wind, as quantified by TCR and after accounting for National Grid's proposed remuneration, is \$1.06 billion (NPV

⁴⁹ As detailed by TCR, the proposal case included Rhode Island's 400 MW Revolution Wind project (400 MW), the Vineyard Wind project (800 MW), and a 200 MW (Revolution Wind) offshore wind project selected by Connecticut.

2018\$).⁵⁰ In addition to the energy market benefits described above, Revolution Wind may generate other future wholesale-level cost benefits that have not been quantified. For instance, the future value associated with the project's participation in regional capacity markets were not factored into the evaluation, as quantification of these impacts was beyond the capabilities of TCR's model.

Power Advisory independently reviewed the TCR assumptions and analyses used to derive market impact projections, and assessed their reasonableness based upon accepted best practices for similar procurement evaluations. Power Advisory's review and assessment confirmed that the TCR assumptions and analytical methods were appropriate, reasonable, and represent a sound analytical foundation for assessing the costs and benefits of a regional energy resource such as Revolution Wind.

(6) Revolution Wind will produce significant economic and job benefits for the Rhode Island economy.

Regarding statewide economic development and job impacts, it is clear that the construction of this project will result in significant investments in local infrastructure and supply chain capacity, while generating hundreds of jobs for Ocean State workers. In total, Revolution Wind is expected to support more than eight hundred (800) jobs during its three-year construction phase and fifty (50) permanent jobs upon operation. In-state capital expenditures are estimated at \$305 million or 0.5 percent of state GDP.

At the direction of OER and DPUC, Power Advisory independently reviewed an economic development impact analysis produced by Navigant Consulting, which was prepared for Revolution Wind in October 2018. The analysis properly assessed a 400 MW offshore wind project and its job and investment impacts on Rhode Island. Power Advisory did not perform its own economic benefits assessment but is experienced in the best practices for assessing economic impacts from prior consulting engagements.

Navigant utilized the Jobs and Economic Development Impact (JEDI) Offshore Wind Model developed by the National Renewable Energy Laboratory (NREL). The group of JEDI models, which also cover land-based resources, are commonly used to assess the economic benefits of renewable energy projects in the United States. NREL has refined the JEDI models over a decade for a wide range of public and commercial uses. The underlying macroeconomic multipliers are from IMPLAN Group, a leader in economic impact analysis whose input/output (I/O) models are used across sector.⁵¹ The Offshore Wind Model, released on January 5, 2017, is specified for this specific generation technology and is the most recent of the JEDI models. In sum, Power Advisory found that the JEDI model was an appropriate I/O model to use and is well suited to estimate the

⁵⁰ TCR estimates that National Grid's proposed remuneration factor of 2.75% will result in a \$36.7 million reduction in total estimated net benefits to consumers. To the extent the Commission adjusts the utility's proposed remuneration factor, consumer net benefits under this analysis would be impacted accordingly.

⁵¹ Input-output (I/O) models are the standard tool used to assess economic development impacts including direct, indirect, and induced impacts on employment, earnings, output and value added.

economic impacts of an offshore wind project.

As with any model, the reasonableness of the results depends in large part on the assumptions used. The JEDI model is specified with a project costing capability that requires the user to indicate the project size, year of construction and location. Rather than rely on the JEDI derived default project cost information, Navigant used project cost data provided by Ørsted, which should ensure that this cost information is fully consistent with Ørsted’s capital budgeting. This is particularly important given offshore wind cost declines being realized across the industry and the limited United States construction cost experience that NREL would have had available to rely on to specify JEDI.

The next step in the modeling process is to delineate between construction and operation and maintenance (O&M) costs. The total capital expenditure during the construction period of 2021-2023 is estimated to be \$1.4 billion (nominal) and the annual O&M expenditures are estimated to be approximately \$35 million for the twenty-five years between 2024 and 2048. The breakdown of costs requires assumptions about local content, and these were reviewed by Power Advisory. Certain assumptions applied by Navigant, such as specifying ninety-eight percent (98%) of onshore substation materials and equipment derived from in-state, appear to be high for Rhode Island given the regional nature of many of these activities. However, assumptions for the largest cost components are what would be expected. For example, zero percent of turbine equipment costs are expected to be local. With Rhode Island, Massachusetts, and Connecticut combining to procure 1,500 MW of offshore wind, Power Advisory believes that some of the local share estimates may ultimately prove to be conservative, as the industry supply chain anticipates the development of this industry and begins siting facilities in Southern New England to strengthen their competitive position. For instance, as discussed below, the \$4.5 million investment that Ørsted has committed to make in local colleges and universities, workforce development initiatives, and supply chain development is likely to strengthen the ability of the Ocean State to support the offshore wind industry well into the future. Overall, Navigant appears to have used reasonable inputs and calibrated the JEDI Offshore Wind models in a way that is consistent with best industry practice. As a result, Power Advisory found Navigant’s economic development impact estimates to be reasonable.

In sum, utilizing the same Navigant data available to OER, DPUC and Power Advisory, TCR calculated the net present value (2018\$) of these impacts and investments at \$405.1 million. This is the discounted sum of the three-year construction period benefits of \$251.3 million value added and twenty-five-year O&M period benefits of \$14.3 million per year.⁵²

OER is also in receipt of a separate, independent economic assessment conducted by Appleseed on behalf of the Rhode Island Commerce Corporation. We note that Appleseed’s findings on Revolution Wind’s job and investment impacts are within a reasonable range of Navigant’s results. For instance, Appleseed notes a “substantial, positive impact on Rhode Island’s economy – including 2,767 person-years of employment and a one-time addition of \$282.2 million to the

⁵² Navigant modeled a 3-year construction period and 25-year operational period (through 2048) conforming to the anticipated useful life of Revolution Wind and reflecting the expected long-term benefits to be realized by the local economy.

state’s gross domestic product – during a three-year construction period.” They estimate a “more modest annual impact” of 86 full-time equivalent jobs and \$8.1 million increase in annual GDP after operation. These findings do not vary greatly from the Navigant report. For additional insight on potential economic impacts, OER defers to Commerce as subject matter experts in this field.

We note that Revolution Wind has committed to invest \$40 million in Rhode Island port infrastructure, likely concentrated at the Port of Providence and facilities at the Quonset Business Park.⁵³ Building on the company’s existing relationships with ProvPort and the Quonset Development Corporation, these investments will support foundation fabrication and other project construction activities. This injection of private capital may create positive synergies with the \$70 million of general obligation bonds approved by Rhode Island in November 2016 to support critical port infrastructure.⁵⁴

Finally, OER is pleased that Ørsted has made a commitment to invest \$4.5 million in local colleges and universities, workforce development programs, and supply chain initiatives. This investment is incremental to those assessed by Navigant or captured in TCR’s net present value calculation. It is OER’s understanding that the details of the investments in higher education and workforce development will be developed in coordination with recipient organizations. Likewise, investments in the offshore wind supply chain will be coordinated with industry stakeholders to ensure that Rhode Island has the capacity to grow and sustain offshore wind-related commerce well beyond Revolution Wind.

The investment activity driven by Revolution Wind will cement the Ocean State as a hub for construction activities as the sector expands, driven, in part, by future clean energy procurements throughout the northeast. For example, under its 2016 Act Relative to Energy Diversity, Massachusetts is on track an additional 800 MW of offshore wind beyond the 800 MW award made to Vineyard Wind. Furthermore, because of legislation passed in July 2018, the Commonwealth is targeting solicitation of an additional 1,600 MW of offshore wind energy in the coming years. Outside of New England, the trends are similar. On January 17, 2019, Governor Andrew Cuomo announced a “Green New Deal” that quadrupled New York’s previous goals by setting a 2035 offshore wind target of 9,000 MW for the Empire State.⁵⁵ New Jersey has also stepped up to the plate. In September 2018, that state’s Board of Public Utilities voted unanimously to approve a 1,100 MW procurement as a first step toward meeting New Jersey’s 3,500 MW offshore wind goal by 2030.⁵⁶

Due to the significant nature of the economic development benefits detailed above and elsewhere

⁵³ “Revolution Wind to invest \$250 million in Rhode Island to build utility-scale offshore wind farm.” Providence Journal, May 30, 2018. See: <http://www.providencejournal.com/news/20180530/Revolution-wind-to-invest-250-million-in-rhode-island-to-build-utility-scale-offshore-wind-farm>. Also, “New R.I. wind project expected to create 800 construction jobs, 50 permanent jobs.” PBN, May 30, 2018. See: <https://pbn.com/new-r-i-wind-project-expected-to-create-800-construction-jobs-50-permanent-jobs/>.

⁵⁴ “R.I. bond issues: Voters OK borrowing a total of \$227.5M.” Providence Journal, November 8, 2016. See: <http://www.providencejournal.com/news/20161108/ri-bond-issues-voters-ok-borrowing-total-of-2275m>.

⁵⁵ See: <https://www.governor.ny.gov/news/governor-cuomo-announces-green-new-deal-included-2019-executive-budget>.

⁵⁶ See: <http://www.njcleanenergy.com/nj-offshore-wind>.

in the record, OER strongly recommends that the Commission require periodic reporting by the project developer detailing investment and job creation impacts associated with Revolution Wind. The reporting should include updates on commitments made pursuant to the educational, workforce development, and supply chain investments noted above. These reports should detail benefits on an incremental and cumulative basis. Regarding cadence, the Commission should consider requiring semi-annual reporting through the construction phase of the project and, once operational, annual reporting throughout the contract period. For transparency, the reports should be posted publicly on the Commission’s website, with copies distributed to relevant Rhode Island state agencies, including OER and Commerce.

(7) Revolution Wind will reduce electric sector greenhouse gas emissions.

In addition to advising on energy and economic impacts, ACES directs OER to examine environmental impacts as well. Revolution Wind’s 400 MW of newly-developed, carbon-free energy will significantly reduce electric sector emissions for the state and region. The project will require no fossil fuels or water to generate its estimated 1.63 million MWh annually and, in most hours of operation, will displace carbon-emitting resources connected to the New England power system. In turn, a reduction in the burning of fossil fuels will decrease particulate matter and harmful greenhouse gases in the atmosphere. Directionally, these outcomes are consistent with state policy goals addressing climate change, particularly the Resilient Rhode Island Act.

Based upon our review of available data sources, Revolution Wind is expected to reduce regional electric sector carbon emissions by at least eleven (11) million metric tons over the first twenty-two (22) years of its operation. This equates to average annual CO₂ reductions of nearly 502,000 metric tons⁵⁷ over two decades. 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, and Connecticut’s 200 MW purchase (also Revolution Wind). OER notes that the emissions reduction benefits generated by Rhode Island’s procurement of the Revolution Wind project may exceed the twenty-two-year totals above, as the useful life of the development exceeds the contract term and this evaluation period.

At OER’s request, Power Advisory compared TCR’s results against other available estimates of potential societal emissions reduction benefits resulting from Revolution Wind. These sources included: a) analysis prepared for the project developer by Navigant Consulting; b) the United States Environmental Protection Agency’s (EPA) AVOIDED Emissions and generation Tool (AVERT);⁵⁸ and c) analysis utilizing monthly marginal emission rates as reported by ISO-NE⁵⁹ and monthly projected project output. Importantly, *all of the emission reduction estimates*

⁵⁷ Using EPA’s Greenhouse Gas Equivalencies Calculator, annual carbon emission reductions of 502,000 metric tons is equivalent to taking more than 106,500 passenger cars off the road, eliminating energy use across 60,000 homes, slashing gasoline consumption by more than 56 million gallons, or reducing oil consumption by 1.2 million barrels each year. It is also equivalent to the carbon sequestered by more than 590,000 acres of forest each year. The EPA calculator can be accessed at: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.

⁵⁸ For more information on AVERT, see: <https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert>.

⁵⁹ Based on the 2016 ISO New England Electric Generator Air Emissions Report.

examined by Power Advisory are directionally and substantially positive. A comparative summary of these methodologies – on an annual and cumulative basis – is provided below:

Table 1				
Estimated CO₂ Emissions Reductions (metric tonnes) ⁶⁰				
<i>400 MW Revolution Wind, through 2045</i>				
	<i>TCR</i>	<i>Navigant</i>	<i>EPA AVERT</i>	<i>“ISO Benchmark”</i>
Average Annual Reduction	501,722	653,954	336,924	625,419
Cumulative Reduction (22 years)	11,037,882	14,386,986	7,412,319	13,759,215

As in any comparative analysis, it is important to examine fundamental differences between various tools and methodologies. Of the data sources and models examined, TCR utilized a sophisticated and robust New England-specific market simulation to generate its environmental (and energy market) impact data. Model runs with and without the 400 MW Revolution Wind project allowed TCR to make a direct comparison to determine the projected impact of the Revolution Wind project on the operation of New England’s generation fleet and the resulting reductions in greenhouse gas emissions from its presence on the grid.

In contrast, while still providing a valuable assessment of environmental benefits from Revolution Wind, Navigant’s methodology appears to be less dynamic than TCR’s market simulation. Navigant appears to have applied professional judgment to estimate the generation that would be displaced by offshore wind (i.e., assumed that only fossil generation would be displaced) and then assumed different impacts for different regions of New England, assigning the greatest impact to Rhode Island. That and several other assumptions led Power Advisory to determine that Navigant may have overestimated GHG impacts.

Although it is a recognized tool for emissions reductions calculations, EPA’s AVERT is less tailored to assessing the specific impacts on the ISO-NE electricity sector from generation additions than the models employed by TCR and Navigant. For instance, the AVERT tool does not distinguish between onshore and offshore wind, which have significantly different characteristics. The AVERT User Manual acknowledges that it is less sophisticated than the

⁶⁰ Based upon methodology, GHG reduction estimates may have originally been presented in different units. To assist with comparability, Power Advisory converted all reduction estimates to metric tonnes. A short ton represents approximately 0.907 metric tonnes.

“production cost” type model that TCR used.⁶¹ Given these limitations and the magnitude of difference between results, the AVERT tool appears to understate the emissions reduction benefits of the Revolution Wind project.

Finally, Power Advisory applied a regional emissions reduction estimate that considers the GHG emission rates for marginal generating units in the ISO-NE market (presented as “ISO Benchmark” in the table above). This information is reported by ISO-NE for monthly peak and off-peak periods. By applying Revolution Wind’s monthly peak and off-peak output profile to the GHG emission rates for these marginal units, an alternative estimate for GHG emission reductions was derived. Increases in clean energy resources in ISO-NE that are greater than net load growth are likely to reduce these marginal GHG emission rates; retirements of non-GHG emitting resources (e.g., the 670 MW Pilgrim Nuclear Generating Station, which is scheduled to retire in 2019) are likely to increase marginal emission rates. Running a market simulation model, as TCR has done, allows these impacts to be more reliably estimated.

OER also considered Revolution Wind’s GHG emissions reduction potential within the context of the targets set forth in the Resilient Rhode Island Act, [R.I. Gen. Laws § 42-6.2-1, et. seq.](#) According to the state’s Greenhouse Gas Emissions Reduction Plan,⁶² published in December 2016, “(a)n 80% GHG reduction by 2050 would likely require a near-zero carbon grid.” Although Rhode Island is on pace to meet and exceed the 2020 GHG reduction target (10% below 1990 levels), achievement of the 2035 (45% below 1990 levels) and 2050 (80% below 1990 levels) targets “will require much deeper cuts in emissions throughout all major GHG source sectors.”

To support achievement of these critically-important targets, the Rhode Island Executive Climate Change Coordinating Council (EC4) identified a “mix of strategies, programs, and actions” to guide policymakers and stakeholders in the work ahead. Relevant to the matter at hand, EC4 identified ACES as one of the “existing policies in place to promote the use of renewable and clean energy” and highlighted the vital importance of leveraging regional collaboration. The Emissions Reduction Plan states, “In the near, medium, and long-term, Rhode Island should continue to prioritize collaborative action with neighboring states, where the power to leverage regional markets has the potential to yield larger and potentially more cost-effective emissions reductions.” Rhode Island’s participation in the 83C procurement and resulting selection of Revolution Wind is wholly consistent with this recommendation.

Quantitatively, on a consumption basis consistent with the state’s Emissions Reduction Plan, CO₂ reductions resulting from Revolution Wind’s operation are projected to average 102,432 metric tons per year or 2.3 million metric tons through 2045. Differing from the societal calculations stated elsewhere, these calculations account only for Rhode Island’s proportional, load-weighted share of emissions reductions resulting from the portfolio of projects examined. When measured against Rhode Island’s load-weighted share of emissions through 2045, as modeled by TCR,

⁶¹ AVERT User Manual, Version 2.1, October 2018. The User Manual indicates that “The use of AVERT to estimate forward-looking dispatch decisions is made more difficult when there are changes to the electrical grid.” We note that there may be a considerable number of changes to the electrical grid given the analysis timeframe. See: https://www.epa.gov/sites/production/files/2018-10/documents/avert_user_manual_10-05-18_508_0.pdf.

⁶² The Plan is available at: <http://climatechange.ri.gov/documents/riggerr16.pdf>.

Revolution Wind will help reduce cumulative electric sector emissions by ten percent (10%) over a twenty-five-year period.

Revolution Wind’s displacement of fossil fuel generation will also help reduce nitrogen oxide (NO_x) emissions. According to the United States National Library of Medicine,⁶³ which is part of the National Institutes of Health, “(n)itrogen oxides are a group of seven gases and compounds composed of nitrogen and oxygen” that are emitted from the “burning of coal, oil, diesel fuel, and natural gas, especially from electric power plants,” and other sources. As a greenhouse gas, NO_x emissions contribute to climate change and can have harmful effects on human health. Short-term health impacts of NO_x include “irritation of the respiratory system, eyes, and skin; aggravation of respiratory diseases, particularly asthma; coughing and choking; nausea; headache; abdominal pain; and general breathing difficulties.” Long-term exposure to nitrogen dioxide can cause asthma and respiratory infections; health effects can be significantly worse at very high levels of exposure. Based upon TCR’s modeling, the operation of Revolution Wind will result in cumulative NO_x reductions, on a societal basis, of nearly 1,400 metric tons through 2045.

Power Advisory reviewed TCR’s economic valuation of greenhouse gas emissions reductions from Revolution Wind and found them to be reasonable. In sum, TCR calculated the total societal benefits of CO₂ reductions from the project to be \$533.2 million (NPV 208\$), with an additional \$10.8 million (NPV 2018\$) in benefits from NO_x emission reductions. Underlying TCR’s analysis is a \$100/short ton (or \$110.23 per metric ton) of CO_{2e} emissions (2018\$) assumption derived from the “Avoided Energy Supply Components in New England: 2018 Report” (AESC Study).⁶⁴ This assumption, based on global marginal abatement costs, has been used in recent Rhode Island energy efficiency proceedings and is recognized as an appropriate value to use for the region. Given that the New England electricity sector is subject to carbon pricing through the Regional Greenhouse Gas Initiative (RGGI), the RGGI compliance price must be netted from this societal value. This, too, was accounted for by TCR in its analysis.

In addition to ACES’ requirement to consider greenhouse gas emission impacts, OER is cognizant that an energy project’s environmental impacts may extend to public health. Public health is also a benefit/cost category in the Commission’s Docket 4600 framework. Admittedly, OER is not a public health agency. However, OER is generally aware of the impacts that the burning of fossil fuels can have on our climate and surrounding environment. Such impacts may take the form of air pollution, which can result in a variety of health effects “including respiratory, cardiovascular and neurological diseases and cancer.”⁶⁵ The Rhode Island Department of Health (DOH) has placed an emphasis on addressing the linkages between public health and climate change. DOH notes that, as climate change continues, our citizens will face significant consequences, including:

- Increased deaths and illnesses from heat stress as temperatures rise;

⁶³ See: <https://toxtown.nlm.nih.gov/chemicals-and-contaminants/nitrogen-oxides>.

⁶⁴ The AESC Study was authored by Synapse Energy Economics, Resource Insight, Les Deman Consulting, North Side Energy, and Sustainable Energy Advantage. It is available at: <http://www.synapse-energy.com/sites/default/files/AESC-2018-17-080-June-Release.pdf>.

⁶⁵ RIDOH Advisory Opinion, September 12, 2016, 17-22. See: http://www.ripuc.org/efsb/efsb/SB2015_06_ADV_DOH.pdf.

- Increased injuries and illnesses due to extreme weather events, such as storms and floods;
- Increased respiratory and cardio-vascular illness and deaths from higher levels of smog (low level ozone);
- More problems with allergies brought about by elevated levels of pollens from more vigorous weed growth and longer pollen seasons.
- Increased rates of infectious diseases carried by insects or in food and water;
- Threats to food and water supplies;
- Increased damage to property and infrastructure due to flooding, storms, and sea-level rise; and
- Greater levels of mental and emotional stress in response to climate change and extreme weather-related emergencies.⁶⁶

It is irrefutable that non-renewable generation facilities (e.g. natural gas, oil, coal) contribute harmful air pollutants during their operation, including, but not limited to, NO_x, VOC, SO₂, PM₁₀ and PM_{2.5}. While most direct health effects are multi-factorial, these pollutants can contribute to disease. For instance, according to DOH, “(s)maller PM particles are associated with greater respiratory risk due to the ability of those particles to move deep into the lungs. NO_x and VOC also react in the atmosphere, in the presence of light and heat, to form ozone, another pollutant which is of concern for asthma.”⁶⁷ In fact, Rhode Island has asthma rates that are significantly higher than national averages:

Approximately 16% of adults in Rhode Island have been diagnosed with asthma at some point in their lifetime, compared to 13% nationally, and 11% of adults in Rhode Island currently experience asthma, compared to 9% nationally. 17.1% of children in RI have been diagnosed with asthma, compared to 14.5% nationally, and 10.9% of children in RI currently experience asthma, compared to 8.8% nationwide. Within Rhode Island, the burden of asthma is primarily concentrated within the four core cities of Providence, Pawtucket, Central Falls, and Woonsocket. In 2010 – 2012, 12.8% of all children statewide between the ages of 2 and 17 had an asthma claim.⁶⁸

⁶⁶ RIDOH, Climate Change. <http://www.health.ri.gov/healthrisks/climatechange/>.

⁶⁷ Ibid, 20.

⁶⁸ Ibid. According to DOH, statistics were derived from multiple data sources, including the Rhode Island Behavioral Risk Factor Surveillance System (BRFSS), the National Survey of Children’s Health, Rhode Island Hospital Discharge Data, Rhode Island Emergency Department (ED) Data, and the 2014 Asthma Claims Data

OER does not claim that the operation of Revolution Wind, on its own, will dramatically shift these statistics, whether it be respiratory or other disease rates; however, Rhode Island’s broader momentum toward adopting carbon-free energy resources – including offshore wind, energy efficiency, distributed solar, and other renewables – will continue to place downward pressure on the harmful health impacts associated with fossil fuel burn in the electric sector. Moreover, achievement of longer-term GHG reduction goals, which is furthered by grid decarbonization, will help mitigate other health consequences of climate change.

E. State Energy Plan & Docket 4600 Goals

(1) Revolution Wind is consistent with the State Energy Plan.

Energy 2035,⁶⁹ the Rhode Island State Energy Plan (the Plan), “provides a long-term, comprehensive energy strategy” for the state and sets “ambitious but achievable goals and performance measure targets for transforming” our energy system.⁷⁰ It is built around three major themes – Security, Cost-Effectiveness, and Sustainability – each of which consists of goals and performance measure targets. The Plan “proposes state-of-the-art policies and strategies to achieve those goals and identifies activities needed to keep the energy systems on which the state depends functioning optimally.”⁷¹ At the highest level, the Plan “shows that Rhode Island can increase sector fuel diversity, produce net economic benefits, and reduce greenhouse gas emissions by 45 percent (below 1990 levels) by 2035.”⁷² Based on OER’s analysis, the proposed project and underlying contract is consistent with the themes, goals, and performance measure targets enumerated in *Energy 2035*. In fact, the potential synergies represented by Revolution Wind are consistent with *Energy 2035*’s prediction that, “Rhode Island will likely witness substantial additional human, economic, and environmental benefits from major investments in its energy systems and infrastructure.”⁷³

First, *Energy 2035* presents a security goal measured by increasing fuel diversity above 2013 levels.⁷⁴ OER finds that the proposed project will inherently advance this goal through its injection of 1.63 million MWh of newly-developed, carbon-free energy into the grid. In fact, Revolution Wind’s production estimates are enough to offset approximately one-quarter of Rhode Island’s annual net electric demand. Within the context of non-carbon electric resource potential assumed for 2035 by the Plan, this single project will fall within the “aggressive” bandwidth for offshore wind deployment in Rhode Island, thereby outpacing earlier expectations by more than a decade.

Revolution Wind will also enhance system reliability and resiliency as a new, non-gas fired

Book (RIDOH, 2014).

⁶⁹ The State Energy Plan was adopted on October 8, 2015. *Energy 2035* is available at: <http://www.planning.ri.gov/documents/LU/energy/energy15.pdf>.

⁷⁰ *Energy 2035*, 1.

⁷¹ *Ibid.*

⁷² *Ibid.*, 7.

⁷³ *Energy 2035*, 50.

⁷⁴ *Energy 2035*, 38. Fuel diversity is defined as “a risk management strategy that seeks to mitigate the potentially harmful effects of disproportionate reliance on certain fuels by expanding the portfolio of demand and supply sources used to provide energy services.”

resource interconnected to the grid. *Energy 2035* notes that our electricity supply “remains heavily reliant on natural gas.” According to the United States Energy Information Administration (EIA), in 2017, natural gas fueled 92 percent of Rhode Island’s net electricity generation. Regionally, natural gas accounted for 48 percent of New England’s electricity energy production in 2017. Taken together, fossil-fuel based resources (gas, oil, and coal) accounted for 50.3 percent of total energy production that year. With zero fuel costs, Revolution Wind will help displace generation resources on the margin, such as natural gas or oil-fired assets during some winter hours. The project’s anticipated high capacity factor during cold weather months represents an enhancement to fuel security and system reliability. As previously discussed, ISO-NE has estimated the energy system impacts of offshore wind during cold spells – including effects on fuel use, production costs and emissions – to be significant.⁷⁵ Therefore, OER finds that the proposed project is a viable supply-side opportunity “to increase in-state fuel diversity and increase energy security by shifting away from dependence on fuels like natural gas,” consistent with *Energy 2035*.

Next, the Plan takes note of the importance of a cost-effective energy future for Rhode Island. It sets a performance measure target to “produce economy-wide net benefits,” defined as “the product of an economic policy that prioritizes prudent, strategic energy system investments that generate long-term energy savings and more stable energy costs for consumers, businesses, and institutions in Rhode Island.”⁷⁶ There are four underlying goals to the cost-effective theme: energy affordability, stability,⁷⁷ economic growth, and increased employment.⁷⁸ Recognizing that the Plan contemplated “cost-effectiveness” across all sectors of the economy (electric, thermal, and transportation), we can utilize these four components as lenses through which we view how this particular project contributes to a cost-effective energy future in Rhode Island.

Regarding energy affordability and price stability, the twenty-year contract filed by National Grid is projected to save Rhode Island consumers more than \$91.6 million (NPV 2018\$) in total net energy costs over the term of the PPA. The proposed PPA offers a stable and fixed \$0.098425 per kWh delivered for energy and RECs throughout the contract term and will result in an estimated -0.4 percent bill reduction for local electric consumers. As the Plan notes, “increasing amounts of renewable energy will likely produce other benefits and savings to consumers in the form of price hedging against volatile fossil fuel prices and wholesale power market price suppression.”⁷⁹ These indirect energy pricing benefits, which have been calculated by TCR and independently reviewed by Power Advisory, are detailed elsewhere in this advisory opinion and are significant. Therefore, Revolution Wind advances *Energy 2035*’s goal of contributing to a more cost-effective energy future for the Ocean State.

Revolution Wind will also support the “economic growth” and “employment” components of the Plan’s cost-effectiveness theme. As previously indicated, the project is projected to create

⁷⁵ See: 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.

⁷⁶ *Energy 2035*, 46.

⁷⁷ Defined as reducing “the impacts of energy price volatility on consumers.”

⁷⁸ *Energy 2035* – Figure 28, 46.

⁷⁹ *Energy 2035*, 50.

hundreds of jobs while infusing in-state capital expenditures estimated at \$300 million.⁸⁰ The project developer has also committed \$40 million in port investments and an additional \$4.5 million to support local educational institutions, workforce initiatives, and supply chain development. Total net economic development benefits to the state are estimated at \$405.1 million (NPV 2018\$) while lowering energy prices for local families and businesses. Therefore, it is OER’s opinion that Revolution Wind will produce net economy-wide benefits consistent with *Energy 2035*.

The third and final pillar of the State Energy Plan is “sustainability,” measured by the reduction of greenhouse gas emissions. This theme has four goals consisting of impacts on climate, air quality, water use and quality, and land and habitat. *Energy 2035* is clear that “Rhode Island must address supply-side GHG emissions, via displacement of fossil fuel generation by renewable energy generation.” Continuing, the Plan states, “This can be achieved either through the promotion of renewable energy development in state or out of state” and “through direct power procurement, purchasing of renewable energy credits, or both.”⁸¹ This is not an “either-or” proposition. As the Commission is aware, OER and Rhode Island’s energy policy portfolio supports an “all-of-the-above” approach when it comes to clean energy resources and their potential to reduce greenhouse gas emissions. From Least Cost Procurement to the Renewable Energy Growth (REG) Program, Rhode Island is investing in local resources right here in the Ocean State that grow jobs, reduce net energy demand, and shrink carbon footprints for families, businesses, and governments. However, as the State Energy Plan and Greenhouse Gas Emissions Reduction Plan show, these investments – on their own – are not enough if Rhode Island is to substantially decarbonize our energy system by 2035 or 2050. Therefore, the Governor and the General Assembly have supported important legislation and procurement initiatives that leverage our place within a regional electric grid to drive scale and cost effectiveness.

The 400 MW offshore wind contract before the Commission is one example of how competitive power procurements that extend beyond state borders can attract competitively-priced bids capable of stabilizing energy costs and enhancing system reliability, while putting a sizeable dent in our emissions profile. As demonstrated in this advisory opinion and reinforced by recent analysis by ISO-NE, offshore wind resources such as Revolution Wind will reduce greenhouse gas emissions from the electric sector. In doing so, it may (incrementally) improve air quality by displacing costlier, carbon-intense electricity generating resources while in operation. The project will not affect water supplies or result in unacceptable land use impacts. However, as an offshore resource, the project may impact – to some degree – sensitive ocean ecosystems. On these matters, OER defers to the Rhode Island Department of Environmental Management and other agencies and stakeholders with specialized expertise and jurisdiction over our state’s water resources and fisheries.

Finally, the proposed project is consistent with a key strategy supported by the Plan – the promotion of local and regional renewable energy resources. According to *Energy 2035*:

Rhode Island cannot achieve the Energy 2035 Vision without bold

⁸⁰ Navigant, 1. Schedule NG-6.

⁸¹ *Energy 2035*, 52.

steps to increase the generation and use of clean, renewable sources of energy—wind, solar, hydropower, anaerobic digestion, and others. Renewable energy will diversify the state’s energy supply portfolio, help mitigate long-term energy price volatility, stimulate the state’s economy through industry growth and job creation, and set Rhode Island on pace to meet ambitious greenhouse gas emission reduction targets. Furthermore, as electricity use grows in the thermal and transportation sectors—through the proliferation of highly efficient cold-climate heat pumps and electric vehicles, for example—increasing amounts of renewable energy will assist in diversifying and decarbonizing these other sectors as well.⁸²

Achievement of this strategy has taken form in Governor Raimondo’s 1,000 MW by 2020 goal. This call for a ten-fold increase in the state’s clean energy portfolio, while balancing consumer affordability and system reliability impacts, can be responsibly advanced by approval of this contract. *Energy 2035’s* modeling suggested that the state “should aim to bring online over 500 MW of local renewable energy projects through expansion of the State’s successful renewable energy procurement policies...and through support for state and federal offshore wind projects.” [emphasis added].⁸³ The proposed contract is well in-line with the State Energy Plan’s recommendation.

For these reasons, OER asserts that the proposed Revolution Wind project and underlying power purchase agreement is highly consistent with the State Energy Plan and advances the strategies and goals enumerated within.

(2) Revolution Wind advances PUC Docket No. 4600 goals.

In PUC Docket #4600, Order #22851, the Commission adopted eight goals that a modernized electric system should be able to meet.⁸⁴ The Order stated, “(t)he PUC’s expectation is that all parties to a National Grid rate matter will include a discussion in any testimony of how a proposal advances, detracts from, or is neutral to each of the stated goals of the electric system.”⁸⁵ To meet this directive, OER provides the following chart, which describes how the proposed contract may impact these goals:

⁸² Energy 2035, 62.

⁸³ Energy 2035, 63.

⁸⁴ PUC Docket #4600, Order #22851, 25. The list of goals begins on page 9 of the Order.

⁸⁵ PUC Docket #4600, Order #22851, 25.

Table 2		
Docket 4600 Goals		
<i>Docket 4600 Goals</i>	<i>Directional Impact (+, -, Neutral, N/A)</i>	<i>Detailed Impact</i>
Provide reliable, safe, clean and affordable energy to Rhode Island customers over the long term.	Positive Impact	<p>Revolution Wind will provide 400 MW of newly-developed, domestic, clean, carbon-free energy to local consumers for at least 20 years. When operating, the project will displace other sources of less cost-efficient and higher-emitting energy resources on the grid. Its high capacity factor during winter months will produce enhanced system reliability benefits during periods of natural gas supply constraints.</p> <p>Regarding affordability, the project has direct contract cost net benefits of \$4.7 million (NPV 2018\$) over its contract term and is expected to help generate an additional \$87.0 million (NPV 2018\$) in energy market price reductions over the next two decades. These savings translate to bill savings of approximately fifty cents per month for the typical residential electric customer.</p>
Strengthen the RI economy, support economic competitiveness, retain and create jobs by optimizing the benefits of a modern grid and attaining appropriate rate design structures	Positive Impact	<p>The project will support more than 800 construction jobs, 50 permanent jobs, and a substantial number of indirect and induced jobs for local workers. Revolution Wind will also inject – directly and indirectly – millions of dollars into the local economy. Other economic benefits are detailed in this advisory opinion.</p>
Address the challenge of climate change and other forms of pollution	Positive Impact	<p>As a carbon-free, clean energy resource with no fuel costs, the project will be dispatched in economic merit and displace other, higher-emitting resources, including natural gas in most hours of the year and/or oil during winter hours. By displacing carbon-emitting resources, Revolution Wind will help reduce regional power sector GHG emissions by an estimated 11</p>

		<p>million metric tons of CO₂ and nearly 1,400 metric tons of NO_x.</p> <p>It should be noted that the integration of clean energy resources, at scale, is critical if the state and region are to meet long-term greenhouse gas emission reduction goals, not only for the electric sector, but for the decarbonization of the transportation and thermal sectors, too.</p>
Prioritize and facilitate increasing customer investment in their facilities where that investment provides recognizable net benefits	Not Applicable	This goal is not applicable. OER reads this goal as applying to individual customer investments, such as implementing energy efficiency measures at a warehouse or installing solar panels on a single-family home. The underlying procurement was focused on identifying grid-scale offshore wind resources that can directly interconnect to the region's high-voltage transmission system.
Appropriately compensate distributed energy resources for the value they provide to the electricity system, customers, and society	Not Applicable	This goal is not applicable. This procurement is seeking grid-scale resources and not behind-the-meter resources or other distributed energy resources.
Appropriately charge customers for the cost they impose on the grid	Not Applicable	This goal is not applicable. OER interprets this goal as applying to customer-side resources, such as behind-the-meter distributed generation or appropriately charging customers for their billing demand.
Appropriately compensate the distribution utility for the services it provides	Neutral	<p>ACES provides for the recovery from distribution customers of reasonable costs incurred by the electric distribution company in furtherance of statutory purposes, but does not specify any additional financial remuneration for the utility.</p> <p>In this docket, National Grid has proposed to receive a financial remuneration of 2.75 percent of actual annual payments made under the</p>

		contract.
Align distribution utility, customer, and policy objectives and interests through the regulatory framework, including rate design, cost recovery, and incentives	Positive Impact	Through its passage of ACES, the General Assembly established a regulatory framework that allows for multi-state clean energy procurements benefiting the state’s energy, economic, and environmental systems. This framework compensates the utility for costs incurred; fosters delivery of a multitude of energy and non-energy benefits for local consumers; and advances important state policy goals.

The Commission also adopted a benefit/cost framework “as a starting point in making a business case for a proposal.”⁸⁶ The framework consists of thirty-five (35) categories, several of which are not applicable to this procurement since they apply to distribution system investments and opportunities for customer-level participation, and not to grid-scale resources interconnected at the transmission level. These include “distribution system safety loss/gain” and “distribution system performance,” as examples. Several other categories – such as “avoided ancillary services value” and “capacity valuation” – are beyond the capabilities of the modeling system utilized to quantify system-level impacts and extremely difficult to apply. However, there are categories that do apply to this procurement and can be quantified (through modeling or economic analysis); are embedded within the developer’s costs; and/or can be considered on a qualitative basis.

The following charts detail each of the Docket #4600 benefit/cost framework categories and provides guidance to the Commission as to where information relevant to each category may be found:

Table 3	
Power System Level	
<i>Docket 4600 Benefit/Cost Category</i>	<i>Data Source</i>
Energy Supply & Transmission Operating Value of Energy Provided or Saved (Time- & Location-specific LMP)	Market value of energy (direct benefit) and increase in market value during periods of extreme winter weather; See Page 17 of 49, Lines 4 and 16, Schedule NG-5.
Renewable Energy Credit Cost/Value	Market value of RECs is a Direct Benefit and can be found on Page 17 of 49, Line 5, Schedule NG-5.

⁸⁶ PUC Docket #4600, Order #22851, 23.

Retail Supplier Risk Premium	N/A
Forward Commitment: Capacity Value	N/A; beyond the capabilities of the TCR model.
Forward Commitment: Avoided Ancillary Services Value	N/A; beyond the capabilities of the TCR model.
Utility/3 rd Party Developer Renewable Energy, Efficiency, or DER costs	PPA costs of energy and RECs can be found on Page 17 of 49, Line 3, Schedule NG-5.
Electric Transmission Capacity Costs / Value	Contained in Cost of Bid
Electric transmission infrastructure costs for Site Specific Resources	Contained in Cost of Bid
Net risk benefits to utility system operations (generation, transmission, distribution)	N/A
Option value of individual resources	Includes indirect benefits on energy and RECs; as well as the estimated reduction in gas supply costs to Rhode Island gas customers; See Page 17 of 49, Lines 7, 8 and 17 in Schedule NG-5.
Investment under Uncertainty: Real Options Cost / Value	Considered as part of project evaluation and costs/benefits found in Schedule NG-5.
Energy Demand Reduction Induced Price Effect (DRIPE)	N/A
Greenhouse gas compliance costs (Embedded Cost)	Reflected in the market prices of fuels and marginal electricity prices.
Criteria air pollutant and other environmental compliance costs	Project will reduce power system CO ₂ and NO _x emissions.
Innovation and Learning by Doing	Although not quantifiable, construction of Revolution Wind and other recently-selected offshore wind projects – at scale – will drive industry momentum and supply chain development. We anticipate that some learning – from a permitting, construction, and operations perspective – will occur as new market participants and developers access North American markets. This learning would allow a successful 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 project developer would be able to enhance its relationships with suppliers and contractors, thereby strengthening its competitive position in subsequent procurements.
Distribution capacity costs	N/A; this is a project that will be interconnected to the high-voltage grid.
Distribution delivery costs	N/A; this is a project that will be interconnected to the high-voltage grid.
Distribution system safety loss/gain	N/A; this is a project that will be interconnected to the high-voltage grid.
Distribution system performance	N/A; this is a project that will be interconnected to the high-voltage grid.
Utility low income	The project will result in a monthly utility bill reduction of -0.4 percent for local electric customers.
Distribution system and customer reliability / resilience impacts	N/A; this is a project that will be interconnected to the high-voltage grid.
Distribution system safety loss/gain	N/A; this is a project that will be interconnected to the high-voltage grid.

Table 4	
Customer Level	
Program participant / prosumer benefits / costs	The contract is projected to result in energy cost and bill savings for all consumers. It will also result in positive non-energy impacts (e.g. environmental, public health).
Participant non-energy costs/benefits: Oil, Gas, Water, Waste Water	By operating during periods of cold weather and high natural gas demand, the project is estimated to reduce National Grid gas supply costs by \$28.7 million (NPV 2018\$), savings which show ultimately flow to local consumers.
Low-Income Participant Benefits	The contract is projected to result in energy cost and bill savings for all consumers. It will also result in positive non-energy impacts enjoyed by all Rhode Islanders (e.g. environmental, public health).

Consumer Empowerment & Choice	N/A
Non-participant (equity) rate and bill impacts	Impacts all distribution customers, resulting in a utility bill decrease estimated at fifty cents per month for the average 500 kWh/month customer.

Table 5	
Societal Level	
Greenhouse gas externality costs (Non-Embedded Cost)	GHG emission reduction benefits found on Page 17 of 49, Line 13, Schedule NG-5.
Criteria air pollutant and other environmental externality costs	NO _x emission reduction benefits found on Page 17 of 49, Line 14, Schedule NG-5.
Conservation and community benefits (Land Use Impact)	Project developer responsible for all required permits.
Non-energy costs/benefits: Economic Development	Economic benefits to Rhode Island found on Page 17 of 49, Line 15, Schedule NG-5.
Innovation & knowledge spillover	Not quantifiable, but the project will help cement Rhode Island's leadership in an emerging clean tech industry.
Societal Low-Income Impacts	The project is projected to result in direct and indirect energy cost benefits, which will reduce costs for local energy consumers.
Public Health	Not separately quantified but embedded within GHG emission reduction benefits and discussed in this advisory opinion.
National Security & US International Influence	The project represents a domestic source of clean, renewable energy and is not dependent on any fuels that may require sourcing from outside of the U.S.

F. Conclusion

OER finds that the proposed 400 MW Revolution Wind Project and associated PPA meet all the statutory requirements of ACES and will deliver significant energy, economic, and environmental benefits to Rhode Island that exceed its costs to consumers. Specifically, OER finds that:

- Revolution Wind will provide affordable, clean energy to Rhode Island consumers resulting in millions of dollars in net energy price benefits over the life of the contract.
- Revolution Wind will strengthen energy security and reliability by helping to diversify our state's energy mix and create a new, winter-peaking source of non-gas fired generation at scale.
- Revolution Wind will produce significant economic benefits to the Rhode Island economy and its workforce, including tens of millions of dollars in new investment and hundreds of new jobs.
- Revolution Wind will reduce electric sector greenhouse gas emissions, including CO₂ and NO_x, consistent with Resilient Rhode Island Act goals.
- The total energy, economic, and environmental benefits associated with the Revolution Wind project far exceed projected ratepayer costs; on a societal level, total net benefits are estimated to exceed \$1 billion and generate a benefit/cost ratio of 1.77.
- Revolution Wind will advance Rhode Island's energy policy goals, including the Governor's call to increase our clean energy portfolio ten-fold by 2020 while growing clean energy jobs.
- The construction and operation of Revolution Wind will not prohibit the state from continuing to make other important investments in carbon-free energy resources, such as energy efficiency and local small-scale renewable resources.
- The project is consistent with the State Energy Plan and advances Plan strategies and goals.
- The proposal is consistent with the goals and framework enumerated in Docket #4600.

For these reasons, OER respectfully urges the Commission to approve the power purchase agreement filed by National Grid in Docket #4929.

OER also recommends that, as a condition of its approval, the Commission require the project developer to submit periodic reports detailing economic investment and job creation impacts spurred by Revolution Wind's construction and operation, and that such reports be made accessible to the public and relevant State agencies.

G. Acknowledgement

OER would like to recognize the professionalism of the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) and its Department of Energy Resources (DOER) during the 83C procurement process. Although we await regulatory outcomes here in Rhode Island and in the Commonwealth, an endeavor of this magnitude – one which may positively impact the collective economies, environment, and energy system of Southern New England for decades – can only be successful if founded on collegiality and leadership. We are truly appreciative of their collaboration.