

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's :
APPLICATION TO CONSTRUCT THE : DOCKET NO. SB-2015-06
CLEAR RIVER ENERGY CENTER IN :
BURRILLVILLE, RHODE ISLAND :

PRE-FILED SURREBUTTAL TESTIMONY OF ERIC EPNER, P.E.,
ON BEHALF OF THE TOWN OF BURRILLVILLE

1
2
3 **ERIC EPNER**
4 **PRE-FILED SURREBUTTAL TESTIMONY ON BEHALF OF THE**
5 **TOWN OF BURRILLVILLE, RI**
6
7
8

9 **Q. Please state your name and business address.**

10 A. My name is Eric Epner. My Rhode Island office is located at 317 Iron Horse Way, Suite
11 204, Providence, Rhode Island 02908.
12

13 **Q. By whom are you employed and in what capacity?**

14 A. I am employed by Fuss & O'Neill, Inc., as a Vice President and Department Manager. I lead
15 our Facilities Compliance Department. Fuss & O'Neill is a multi-disciplinary engineering
16 firm that specializes in environmental compliance and environmental permitting.
17

18 **QUALIFICATIONS**

19 **Q. Please summarize your educational background and your professional experience.**

20 A. I received my Bachelor of Science (BS) in Chemical Engineering from Clarkson University
21 located in Potsdam, New York in 1985. I am a Professional Engineer (PE) registered in the
22 Commonwealth of Massachusetts, the State of Connecticut, the Commonwealth of Virginia,
23 and the State of South Carolina. I have over 31 years of experience in environmental
24 compliance and permitting. My resume was filed with this Board on September 9, 2016.
25

26 **PURPOSE**

27 **Q. What is the purpose of your surrebuttal testimony in this case?**

28 A. The purpose of my surrebuttal testimony is to rebut the claims made by certain witnesses
testifying on behalf of Invenergy's proposed electrical generating project located in

1 Burrillville. This project is known as the Clear River Energy Center (CREC). I provided an
2 independent third party review to the Town of Burrillville. I advised the Town on
3 deficiencies in Invenergy's submitted plans and permit applications, as well as the CREC's
4 impacts to air quality. I previously filed direct testimony on behalf of the Town.

5 **Mr. Mark Wittannen**

6 **Q. Have you reviewed the rebuttal testimony of Mr. Mark Witanen?**

7 A. Yes.

8 **Q. Do you have an opinion about his claim regarding the selected GE gas turbine**
9 **model being the “model most efficient combustion turbine available on the market**
10 **today”?**

11 A. Yes. Mr. Wiitanen recently provided an excerpt from the January-February 2017 *Gas Turbine*
12 *World*, which provides Combined Cycle Performance Specs on the selected turbine and the
13 selected GE turbine does appear to be a modern, efficient turbine. However, it should be
14 noted that other turbines exist which have a higher efficiency rating and operate within
15 similar ranges of power production. For example, the slightly larger GE 7HA.01
16 specifications tout a net efficiency of 63.4%, operating in a similar block configuration.
17 However, selecting electrical production equipment or currently available turbine technology
18 is outside my expertise.

19
20 Mr. Wiitanen also asserts that due to the high efficiency of the selected turbine, it produces
21 the lowest emission rates available for natural gas bound constituents, such as CO₂. While
22 this is partially correct, as the efficiency of combustion units increases, CO₂ emissions may
23 decrease, but the NO_x emission rates typically increase. So although this is an efficient,
24 modern gas turbine, it may in fact have higher NO_x emission rates than its less efficient

1 competitors. NO_x, as stated in my direct testimony, is a precursor to ground level ozone
2 (i.e., smog) and the production of acid rain.

3 **Mr. Michael Feinblatt**

4 **Q. Have you reviewed the rebuttal testimony of Mr. Michael Feinblatt?**

5 A. Yes.

6 **Q. Do you have an opinion about his claim regarding the Emission Reduction Credits
7 (ERC) and the local benefits from ERC located in Saratoga Springs, NY?**

8 A. Yes. Although Rhode Island may generally said to be “downwind” from New York, Virginia
9 can also be said to be downwind from Kansas. There are numerous studies which indicate
10 that complex ozone transport chains exist, both in the upper atmosphere, and at ground
11 level. The biggest concern I have with Mr. Feinblatt’s assertions is that the benefits of ozone
12 reduction decrease over distance. I would concede that some regional greenhouse gas
13 (GHG) benefits may occur, but *local* benefits are not likely.

14
15 **Q. Do you have an opinion about his claim in his rebuttal testimony about pollutants
16 being below the air quality standards of EPA and RIDEM, therefore, acute and
17 chronic health effects will not occur?**

18 A. Yes. Mr. Feinblatt’s asserts that since *modeled* air emissions indicate the facility will be below
19 air quality standards, no health impacts will result. In response, there are many assumptions
20 in this statement. It assumes that there would be no instances of non-compliance for a very
21 large electrical utility producer operating over an assumed 20 to 40 year lifespan. This is
22 unlikely over the life of the facility. Further, it assumes that ground level concentrations of
23 all emitted hazardous and criteria air pollutants exist at their average modeled concentration
24 and will be inhaled by your average modeled receptor. While I understand the need for

1 averaging and modeling in a general sense, these assumptions do not indicate that health and
2 environmental impacts will not occur.

3
4 An industrial energy producer will create added pollutants which would not be present if the
5 site were to remain an undeveloped greenfield. These added pollutants will affect sensitive
6 populations, or populations that are chronically exposed, and this is not fully captured by the
7 conventional model. Increasing the pollutants present in local and regional air will increase
8 the cancer risks, respiratory health effects, and environmental impacts even if CREC
9 operates within the air quality standards.

10
11 **Q. Do you agree with Mr. Feinblatt's opinion within his rebuttal testimony about truck**
12 **emissions during construction and operations being "temporary and transient" in**
13 **nature?**

14 A. No. Increased emissions from *construction* vehicles would be temporary (about 3 years), but
15 meaningful. However, the ongoing daily need for a consistent water supply is neither
16 temporary nor transient. Additionally, although increased truck traffic when diesel is the fuel
17 source may be sporadic, it will be significant when diesel is being used and will continue
18 throughout the life of the facility for perhaps forty (40) years or more.

19
20 Mr. Feinblatt correctly states that vehicular impacts already exist and will be most acutely felt
21 by families who live along the roadways and in the areas closest to the roadways. However,
22 he does not see the increased vehicular impacts as significant. That is, Mr. Feinblatt states
23 they are "only minor increases". As my previous direct testimony states, I believe the
24 increased vehicular traffic is an unacceptable environmental harm that would result from

1 siting the CREC facility at its proposed location and impacts will be much more than
2 “minor”.

3
4 **Q. Mr. Feinblatt states that the CREC will reduce regional air emissions, specifically
5 CO₂. Do you have anything to add on this statement?**

6 A. Yes. Mr. Feinblatt fails to mention that NO_x concentrations will likely increase, both
7 regionally and locally. He only cites a **less than 1%** reduction in CO₂ which represents the
8 sum total of the cited regional air emission reductions. Mr. Feinblatt continues to focus on
9 the regional benefits of the proposed CREC facility, but fails to mention the very important
10 (and very large) local net increase in pollutants.

11
12 **Q. Have you reviewed Mr. Feinblatt’s testimony regarding the Executive Climate
13 Change Coordinating Council’s (CE4) Greenhouse Gas (GHG) Plan and the
14 Resilient Rhode Island Act?**

15 A. Yes.
16
17

18 **Q. Do you have anything to add or to contradict Mr. Feinblatt’s contention regarding
19 the operation of the CREC facility, the GHG Plan, and Rhode Island’s ability to
20 comply with the Resilient Rhode Island Act (RRIA)?**

21
22 A. Yes. The goal of the GHG Plan is to decrease GHG emissions while increasing the supply
23 of energy from renewable resource, while the goal of the RRIA is to increase the energy sold
24 in Rhode Island derived from clean energy sources. Mr. Feinblatt states that the state can
25 still implement the options put forth by the EC4 and satisfy the RRIA; however, he omits
26 that the CREC facility runs counter to the goals and options for implementation.

1 Specifically, Mr. Feinblatt fails to mention how many of the EC4 GHG Plan's 10 mitigation
2 options the CREC fulfills and how many does it contramand. If the CREC facility is sited in
3 the Town of Burrillville, it would support *possibly* one of the mitigation options
4 recommended by the GHG Plan, Energy Efficiency. If the CREC facility is sited in the
5 Town of Burrillville, the CREC facility would likely contramand seven (7) of the GHG
6 reduction options: (1) vehicle miles traveled (VMT) reductions, (2) utility-scale renewable
7 energy, (3) clean energy imports, (4) nuclear re-licensing, (5) biodiesel/biomass heat, (6)
8 electric vehicles, and (7) transport biofuels. So while Mr. Feinblatt states that meeting the
9 goals of the EC4 GHG Plan and the RRIA is still possible, he is ignoring the fact that the
10 CREC facility would make meeting the goals and implementation of the GHG Plan even
11 more difficult.

12
13 **2010 RIDEM Advisory Opinion on BIPCo**

14 **Q. Are you familiar with the 2010 Advisory Opinion issued by RIDEM, relating to the**
15 **Power Purchase Agreement Between Narragansett Electric Company and**
16 **Deepwater Wind Block Island, LLC?**

17 A. I have read the advisory opinion, yes. A copy is attached as Exhibit 1.

18
19 **Q. Can you tell us generally what information is contained in the 2010 RIDEM Opinion?**

20 A. Yes. Block Island Power Company (BIPCo) had operated a diesel-powered 10,816,826 kW-hr
21 per year power plant to supply electricity to Block Island, Rhode Island. A proposal to build
22 a 75,686,400 kW-hr per year windfarm was proposed by Deepwater Wind Block Island,
23 LLC. RIDEM supported the development of the windfarm, as the proposed windfarm
24 would allow the BIPCo to decommission the diesel generating station. The proposed

1 windfarm would produce more than enough energy to replace the diesel-fired plant. To this
2 end, RIDEM cited environmental and health benefits in support of decommissioning BIPCo
3 and building the windfarm. The following represents the calculated decrease in emissions by
4 decommissioning the BIPCo diesel plant:

- 5 • Decrease in PM of 6,872 pounds per year;
- 6 • Decrease in CO₂ of 20,655,284 pounds per year;
- 7 • Decrease in CO of 55,051 pounds per year
- 8 • Decrease in NO_x of 40,499 pounds per year;
- 9 • Decrease in VOC of 8,609 pounds per year; and,
- 10 • Decrease in SO₂ of 6,299 pounds per year.

11 These amounts represent the environmental benefits touted by RIDEM if the BIPCo diesel
12 plant was taken off line and replaced with clean wind energy.

13
14 **Q. What is the expected cost to Rhode Island ratepayers of these emission reductions?**

15 A. As shown by the PUC filing on Exhibit 2, Rhode Island ratepayers will pay \$786,075,145 for
16 this project through 2036 (Attachment PUC10-2(b), page 1 of 12). This includes
17 \$533,570,451 of above-market electric costs (Attachment PUC10-1(b), page 1 of 6).

18
19 **Q. How do these reductions compare with the predicted emissions from CREC?**

20 A. CREC, if constructed and operated as proposed, will emit vastly more emissions than the
21 reductions strongly supported by RIDEM in 2010 and for which Rhode Island ratepayers
22 will pay over \$786 million. For example, the predicted CREC PM emissions will be on the
23 order of 310,000 pounds per year (155 tons per year), which is 45 times more pollutant than
24 was eliminated by taking the BIPCO diesel plant off line. The decreases noted above from

1 decommissioning the BIPCo diesel plant compare to the CREC proposed emissions as
2 follows:

- 3 • CREC will produce roughly 45 times more PM emissions (310,000 pounds
4 per year) than the decrease of 6,872 pounds per year from decommissioning
5 BIPCo;
- 6 • CREC will produce roughly 349 times more CO₂ emissions (7,208,712,000
7 pounds per year) than the decrease of 20,655,284 pounds per year from
8 decommissioning BIPCo;
- 9 • CREC will produce roughly 8 times more CO emissions (446,000 pounds per
10 year) than the decrease of 55,041 pounds per year from decommissioning
11 BIPCo;
- 12 • CREC will produce roughly 13 times more NO_x emissions (546,000 pounds
13 per year) than the decrease of 40,449 pounds per year from decommissioning
14 BIPCo;
- 15 • CREC will produce roughly 18 times more VOC emissions (156,000 pounds
16 per year), than the decrease of 8,609 pounds per year from decommissioning
17 BIPCo; and,
- 18 • CREC will produce roughly 16 times more SO₂ emissions (104,000 pounds
19 per year), than the decrease of 6,299 pounds per year from decommissioning
20 BIPCO.

21
22 **Q. What does this tell you about RIDEM's position with respect to CREC ?**

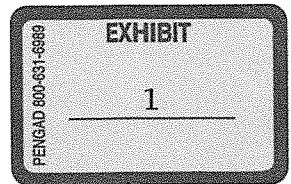
23 A. The contents of this RIDEM Advisory Opinion leads me to believe that if RIDEM was in
24 support of the smaller reductions in emissions and benefits to air quality stemming from

1 decommissioning the BIPCO diesel plant, it would surely see the benefits and strongly
2 recommend against siting the CREC facility in Burrillville. It would seem that RIDEM
3 would be supportive of clean energy sources instead of a large polluting natural gas/oil fired
4 facility and the associated adverse and unacceptable air and health impacts.

5

6 **Q. Does this conclude your surrebuttal testimony?**

7 **A. Yes.**



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

RECEIVED

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2010 JUL 20 PM 4:06
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Ms. Luly Massaro
Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, Rhode Island 02888

July 20, 2010

Re: Docket No. 4185

Dear Luly:

On behalf of the Rhode Island Department of Environmental Management and in response to Rhode Island Gen. Laws Section 39-26.1-7 (Senate Bill 2819 Sub A as amended and House Bill 8083 Sub A as amended) and the procedural schedule of July 9, 2010, enclosed please find an original and 12 copies of the Department's Advisory Opinion.

Sincerely

Mary E. Kay
Acting Executive Counsel

cc: Service List (w/enclosure)

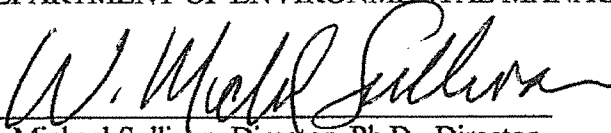
STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

IN RE: REVIEW OF AMENDED POWER :
PURCHASE AGREEMENT BETWEEN :
NARRAGANSETT ELECTRIC COMPANY : DOCKET NO. 4185
D/B/A NATIONAL GRID AND DEEPWATER :
WIND BLOCK ISLAND, LLC PURSUANT TO :
R.I. GEN. LAWS § 39-26.1-7 :

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
ADVISORY OPINION
REVIEW OF POWER PURCHASE AGREEMENT BETWEEN NARRAGANSETT
ELECTRIC COMPANY AND DEEPWATER WIND BLOCK ISLAND, LLC
PURSUANT TO R.I. GEN. LAWS § 39-26.1-7

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

July 20, 2010



W. Michael Sullivan, Director, Ph.D., Director
235 Promenade Street
Providence, Rhode Island 02908

**Department of Environmental Management Advisory Opinion on Environmental Issues
Public Utilities Commission – Docket Number 4185**

The Department of Environmental Management (“DEM”) hereby submits this advisory opinion pursuant to Section 39-26.1-7 (c) (iv) of the Rhode Island General Laws, as amended, to the Rhode Island Public Utilities Commission (“RIPUC”) concerning the Amended Power Purchase Agreement (“PPA”) between Narragansett Electric Company d/b/a National Grid and Deepwater Wind Block Island, LLC. The project proposed in the PPA will provide environmental benefits, including but not limited to the reduction of carbon emissions. The PPA submitted to the RIPUC is for a demonstration project of a proposed larger off-shore wind farm.

DEM’s comments will be focused on what potential benefits this demonstration project will have on air quality from termination of generating activities at Block Island Power Company (“BIPCO”). At this time, the DEM does not have any site specific information on the placement of wind turbines off the coast of Block Island. DEM recognizes that placement of wind turbine generators off the coast of Block Island will have impacts on the marine environment. At this time other potential environmental impacts are being evaluated in the Rhode Island Coastal Resources Management Council’s Ocean Special Area Management Plan (“SAMP”).¹ DEM and other stakeholders including municipal, state and federal agencies, and environmental organizations have been involved in the SAMP process providing input into draft chapters on potential environmental impacts including chapters on Ecology², Commercial and Recreational Fisheries³, and Recreation and Tourism⁴

AIR QUALITY ISSUES

At the present time, electricity demand for Block Island is provided by electrical generating units owned by BIPCO. The electrical generating units are powered by engines that burn diesel fuel. According to information provided to the DEM Office of Air Resources (“OAR”) from the Division of Public Utilities and Carriers, BIPCO generates, on average, 10,816,826 kW-hrs of electricity per year⁵.

According to the PUC filing, the Deepwater Wind project has a rated output of 21.6 MW and a capacity factor of 40%. Based on these factors, this facility will be capable of producing 75,686,400 kW-hrs of electricity per year when operating under these performance expectations. The energy produced from the wind turbine units and the installation of the transmission line to the mainland should allow the existing BIPCO diesel-fired electric generating facility to be closed. The termination of this facility will result in the elimination of the emission of a number of air pollutants. Information concerning the existing air pollution emissions rates from the BIPCO facility is included in Appendix A. As set forth in Appendix A, the following pollutants will be eliminated: particulate matter, oxides of nitrogen, carbon monoxide, sulfur dioxide, volatile organic compounds, carbon dioxide and ammonia. It should be noted that the first five substances are pollutants that are regulated by the United States Environmental Protection Agency (“EPA”) and four of the pollutants are regulated by National Ambient Air Quality Standards, set to protect public health and the environment. Carbon dioxide has been linked to climate change and is being regulated because of that impact.

¹ <http://seagrant.gso.uri.edu/oceansamp/samp.html>

² http://seagrant.gso.uri.edu/oceansamp/pdf/samp/samp_200_Ecology_6.28.10_Clean.pdf

³ http://seagrant.gso.uri.edu/oceansamp/pdf/samp/samp_500_fisheries_7.12.10.pdf

⁴ http://seagrant.gso.uri.edu/oceansamp/pdf/samp/samp_600_recreation_1.13.10.pdf

⁵ Average annual sales based on filings with the Division of Public Utilities and Carriers (2005-2009)

The wind turbine demonstration project will provide the following major environmental benefits:

- **Diesel Particulate Emissions** (3.4 tons/year eliminated) - The US Environmental Protection Agency determined that inhalation of diesel emissions is likely to cause cancer and causes respiratory irritation, the aggravation of allergy and asthma symptoms, and long-term lung disease. Children, the elderly and individuals with chronic lung disease, such as asthma, are particularly vulnerable to these effects.⁶

- **Carbon Dioxide** (10,328 tons/year eliminated) Carbon dioxide has been recognized as one of the gasses that contribute to global warming⁷. The Administrator of EPA signed the following two findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

1. **Endangerment Finding:** the Administrator of EPA found the current and projected concentrations of the six key well-mixed greenhouse gases in the atmosphere threaten the public health and welfare of current and future generations through the increase in average temperature and other climate changes. The six gasses included carbon dioxide (CO₂) and five others, i.e., methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆)

2. **Cause or Contribute Finding:** the Administrator of EPA found that the combined emission of well-mixed greenhouse gases threatens public health and welfare. Although this finding was directed to emissions from motor vehicles, the underlying science applies to other sources of greenhouse gasses.

The scientific analysis also confirms that climate change impacts human health in several ways. Findings from a recent EPA study titled Assessment of the Impacts of Global Change on Regional U.S. Air Quality: A Synthesis of Climate Change Impacts on Ground-Level Ozone, for example, suggest that climate change may lead to higher concentrations of ground-level ozone, a harmful pollutant. "Additional impacts of climate change include, but are not limited to:

- increased drought;
- more heavy downpours and flooding;
- more frequent and intense heat waves and wildfires;
- greater sea level rise;
- more intense storms; and
- harm to water resources, agriculture, wildlife and ecosystems."⁸

⁶ EPA's Health Assessment Document for Diesel Engine Exhaust, 2002, <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=29060>

⁷ <http://epa.gov/climatechange/endangerment.html>

⁸ <http://yosemite.epa.gov/opa/admpress.nsf/0/0ef7df675805295d8525759b00566924>

ADDITIONAL OFFSETS

According to the PPA, the power produced by the Deepwater project is larger than the electrical demand of Block Island. The excess power (supporting documentation can be found in Appendix B) could result in the displacement of power production from fossil fuel fired electric generating facilities located on mainland Rhode Island. This additional power would result in the reductions of the following emissions:

Pollutant	Emission Reductions
Carbon Dioxide	32,565 tons/year
Nitrogen Oxides	9.1 tons/year
Sulfur Dioxide	18.5 tons/year

FINDINGS

The environmental benefits of this project should be evaluated as the first installment of the larger environmental benefit that will accrue from the project when it is finalized. As a demonstration project it would serve as a platform to study and to fine tune the placement of off-shore wind turbine generators.

Based on the information presented in Appendix A, the approval of the PPA will provide Block Island and the region with measurable environmental benefits. The emissions of diesel particulate will be reduced on Block Island, resulting in a reduction in cancer risk and a reduction in the risk of respiratory disease, especially for sensitive individuals. In addition the project will also provide benefit to regional air pollution by the reduction of pollutants that have been detailed in both Appendix A and Appendix B.

This project would also lead to much larger emission reductions if a larger wind farm is approved. The reduction of air pollution will be considerably greater and these reductions are detailed in Appendix C.

Based on the above facts, the Department has determined that there are substantive environmental benefits concerning this project with respect to reducing air pollution emissions both on Block Island and other fossil-fuel based electrical generating facilities in the region.

Appendix A - Supporting Calculations BIPCO emissions

Pollutant	Emissions
Particulate Matter	6872 lbs/year (3.4 tons/yr) ¹
Nitrogen Oxides	40,499 lbs/year (20.2 tons/yr) ¹
Carbon Monoxide	55,041 lbs/year (27.5 tons/yr) ¹
Sulfur Dioxide	6299 lbs/year (3.1 tons/year) ¹
Volatile Organic Compounds	8609 lbs/year (4.3 tons/yr) ¹
Ammonia	13,510 lbs/year (6.8 tons/yr) ¹
Carbon Dioxide	20,655,284 lbs/yr (10,328 tons/yr) ²

¹From Air Pollution Inventory filings with the Office of Air Resources
Average annual emissions for 2005-2009

²Calculated from Air Pollution Inventory filings with the Office of Air Resources as follows:
Average annual fuel usage for 2005-2009: 922,770 gallons/yr
Carbon dioxide emission factor: 22.384 lbs CO₂/gallon burned
922,770 gals/yr x 22.384 lbs/gal = 20,655,284 lbs/yr (10,328 tons/yr)

Appendix B - Supporting Calculations of Displaced Power

Deepwater Wind production: 21.6 MW @ 40% capacity¹

$$21.6 \text{ MW} \times 8760 \text{ hrs/year} \times 0.4 \times 1000 \text{ kW/MW} = 75,686,400 \text{ kW-hrs/year}$$

BIPCO Electricity Sales: 10,816,826 kW-hrs/year²

Displaced power generation: 64,869,574 kW-hrs/year (64,870 MW-hrs/yr)

2007 Calculated New England Marginal Emission Rates (Annual Averages)³

Nitrogen oxides: 0.28 lbs/MWh

Carbon dioxide: 1004 lbs/MWh

Sulfur dioxide: 0.57 lbs/MWh

Nitrogen oxides: 18,164 lbs/year (9.1 tons/yr)

Carbon dioxide: 65,129,480 lbs/year (32,564.7 tons/yr)

Sulfur dioxide: 36,976 lbs/year (18.5 tons/yr)

¹Public Utilities Commission Report and Order, Docket 4111, page 4.

²Average annual sales based on filings with the Division of Public Utilities and Carriers (2005-2009)

³Table 1.1, 2007 New England Marginal Emission Rate Analysis, System Planning Department, ISO New England Inc., July 2009

Appendix C – Displaced Power from Deepwater Wind’s Rhode Island Sound Wind Farm Supporting Calculations

Project capacity: 385 MW

Capacity factor assumed to be 40%

$$385 \text{ MW} \times 8760 \text{ hrs/year} \times 0.4 = 1,349,040 \text{ MW-hrs/year}$$

2007 Calculated New England Marginal Emission Rates (Annual Averages)¹

Nitrogen oxides: 0.28 lbs/MWh

Carbon dioxide: 1004 lbs/MWh

Sulfur dioxide: 0.57 lbs/MWh

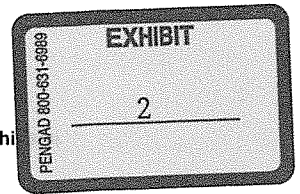
Nitrogen oxides: 377,731 lbs/yr (189 tons/yr)

Carbon dioxide: 1,354,436,160 lbs/yr (677,218 tons/yr)

Sulfur dioxide: 768,953 lbs/yr (384 tons/yr)

Note: The carbon dioxide reduction is approximately 25% of the Regional Greenhouse Gas Initiative (“RGGI”) allowance budget for RI

¹Table 1.1, 2007 New England Marginal Emission Rate Analysis, System Planning Department, ISO New England Inc., July 2009



January 5, 2017

VIA HAND DELIVERY & ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

**RE: Docket 4371 - Long-Term Contracting for Renewable Energy Recovery Factor
Response to Commission Post-Hearing Data Requests – Set 10**

Dear Ms. Massaro:

Enclosed are National Grid's¹ responses to the Rhode Island Public Utilities Commission's (PUC) Tenth Set of Post-Hearing Data Requests in the above-referenced docket.

Thank you for your attention to this filing. Please contact me if you have any questions concerning this matter at 401-784-7288.

Very truly yours,

A handwritten signature in black ink that reads "Jennifer Brooks Hutchinson".

Jennifer Brooks Hutchinson.

Enclosures

cc: Docket 4371 Service List
Steve Scialabba, Division
Leo Wold, Esq.

¹ The Narragansett Electric Company d/b/a National Grid.

Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

The paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.



Joanne M. Scanlon

January 5, 2017

Date

Docket No. 4371 - National Grid – Tariff Advice Filing to Amend Long-Term Contracting for Renewable Energy Recovery Factor effective

Service List updated 1/5/17

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File an original & 10 copies w/: Luly E. Massaro, Commission Clerk Public Utilities Commission 89 Jefferson Blvd. Warwick, RI 02888	Luly.massaro@puc.ri.gov ;	401-780-2017
	Cynthia.WilsonFrias@puc.ri.gov ;	
	Alan.nault@puc.ri.gov ;	
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Christopher Kearns, Program Service Officer RI Office of Energy Resources	Christopher.Kearns@energy.ri.gov ;	
	Nicholas.Ucci@energy.ri.gov ;	
	Danny.Musher@energy.ri.gov ;	
Laurence Ehrhardt	replarry@gmail.com ;	

PUC 10-1

Request:

Please provide a projection of the above-market or below-market cost of the pricing for each project with which National Grid has entered an agreement to purchase power, the costs of which will be recovered through the LTCRER Tariff. Please use the most recent 2016 ESAI market price forecast for energy RECs and capacity in the same format as the Company's response to Commission Post Hearing Data Request issued September 28, 2015.

Response:

Please see Attachment PUC 10-1(a) and Attachment PUC 10-1(b).

Attachment PUC 10-1(a) contains a summary of the above-market cost for the long-term contracts and distributed generation standard contracts by year. Attachment PUC 10-1(b) contains a detailed listing of the above-market cost by unit.

Year	Long-term Contracts	DG Standard Contracts	Totals by Year
	Above Market Cost	Above Market Cost	Above Market Cost
2017	\$30,573,476	\$4,462,293	\$35,035,769
2018	\$21,087,898	\$4,504,926	\$25,592,824
2019	\$14,319,114	\$4,300,872	\$18,619,987
2020	\$24,357,379	\$4,618,867	\$28,976,246
2021	\$31,617,736	\$4,816,445	\$36,434,181
2022	\$34,693,703	\$4,852,479	\$39,546,182
2023	\$34,689,049	\$4,746,787	\$39,435,836
2024	\$36,305,072	\$4,715,637	\$41,020,709
2025	\$36,621,941	\$4,630,094	\$41,252,035
2026	\$38,583,539	\$4,624,496	\$43,208,035
2027	\$40,967,051	\$4,624,149	\$45,591,200
2028	\$43,606,334	\$4,173,129	\$47,779,463
2029	\$28,764,305	\$1,926,344	\$30,690,649
2030	\$30,536,213	\$1,341,005	\$31,877,219
2031	\$32,218,430	\$1,012,765	\$33,231,195
2032	\$35,190,269	\$416,382	\$35,606,651
2033	\$37,285,411	\$0	\$37,285,411
2034	\$36,424,376	\$0	\$36,424,376
2035	\$38,028,047	\$0	\$38,028,047
2036	\$35,839,215	\$0	\$35,839,215
Total	\$661,708,560	\$59,766,669	\$721,475,230
NPV (7%, 2017)	\$333,748,304	\$38,254,410	\$372,002,714

Notes:

- RI LTC & RI DG Contracts as of December 2016; approximately 101.8% of the 90 MW minimum requirement

- Above market cost is calculated using market price forecasts for Energy, Capacity and RECs provided by ESAI in December 2016

- Capacity factors for the FCM, commercial operation dates, and annual output have been estimated for the given projects' technology and location

	Deepwater Wind 30 MW	Rhode Island Landfill Gas GenCo 32MW	Orbit Energy HSAD Biogas 3.2 MW (\$95)	Black Bear Hydro 3.958 MW	Champlain (Bowers) Wind 48 MW	Copenhagen Wind 79.9 MW
Year	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost
2017	\$19,982,172	\$10,386,094	\$44,879	\$496,638	(\$336,307)	\$0
2018	\$17,275,498	\$6,500,969	(\$247,857)	\$210,456	(\$2,383,678)	(\$267,491)
2019	\$16,576,562	\$5,467,696	(\$391,710)	\$91,975	(\$3,374,888)	(\$4,050,520)
2020	\$18,360,159	\$9,307,714	(\$20,063)	\$411,300	(\$1,891,523)	(\$1,810,208)
2021	\$20,389,934	\$11,756,775	\$204,301	\$623,630	(\$1,021,011)	(\$335,892)
2022	\$21,611,427	\$12,728,900	\$270,951	\$714,920	(\$843,058)	\$210,565
2023	\$22,352,975	\$12,819,745	\$241,212	\$689,220	(\$1,334,855)	(\$79,249)
2024	\$23,378,651	\$13,350,713	\$258,113	\$721,787	(\$1,503,385)	\$99,192
2025	\$24,165,938	\$13,407,160	\$223,436	\$720,366	(\$1,871,581)	(\$23,378)
2026	\$25,238,612	\$13,899,617	\$235,133	\$781,509	(\$1,892,445)	\$321,113
2027	\$26,459,051	\$14,601,583	\$267,129	\$845,904	(\$1,902,225)	\$695,608
2028	\$27,779,610	\$15,426,335	\$310,217	\$912,628	(\$1,906,304)	\$1,083,848
2029	\$29,090,863	\$0	\$343,597	\$0	(\$2,025,612)	\$1,355,457
2030	\$30,483,601	\$0	\$383,998	\$0	(\$2,057,629)	\$1,726,243
2031	\$31,900,936	\$0	\$420,448	\$0	(\$2,137,194)	\$2,034,241
2032	\$33,362,588	\$0	\$47,311	\$0	(\$556,740)	\$2,337,110
2033	\$34,870,235	\$0	\$0	\$0	\$0	\$2,415,176
2034	\$36,424,376	\$0	\$0	\$0	\$0	\$0
2035	\$38,028,047	\$0	\$0	\$0	\$0	\$0
2036	\$35,839,215	\$0	\$0	\$0	\$0	\$0
Total	\$533,570,451	\$139,653,301	\$2,591,095	\$7,220,334	(\$27,038,435)	\$5,711,815
NPV (7%, 2017)	\$256,996,692	\$87,711,910	\$1,082,677	\$4,403,357	(\$15,922,186)	(\$524,146)

Notes:

- RI LTC & RI DG Contracts as of December 2016; approximately 101.8% of the 90 MW minimum requirement
- Above market cost is calculated using market price forecasts for Energy, Capacity and RECs provided by ESAI in December 2016
- Capacity factors for the FCM, commercial operation dates, and annual output have been estimated for the given projects' technology and location

Year	RI DG - Plain Meeting House Solar 2 MW	RI DG - ACP 28 Jacome Way 500 kW	RI DG - North Kingstown Green Wind 1.5 MW	RI DG - Forbes Street Solar 3.7 MW	RI DG - West Davisville Solar 2.34 MW	RI DG - 100 Dupont 1.5 MW	RI DG - Altus Comtram Cable Plant 499 kW
	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost
2017	\$472,970	\$143,384	\$148,380	\$713,561	\$444,294	\$233,314	\$143,097
2018	\$444,396	\$136,240	\$114,704	\$660,556	\$410,863	\$211,883	\$135,968
2019	\$430,314	\$132,720	\$98,107	\$634,434	\$394,387	\$201,322	\$132,454
2020	\$452,259	\$138,206	\$123,971	\$675,142	\$420,063	\$217,781	\$137,930
2021	\$465,894	\$141,615	\$140,041	\$700,436	\$436,016	\$228,007	\$141,331
2022	\$468,381	\$142,236	\$142,972	\$705,048	\$438,925	\$229,872	\$141,952
2023	\$461,087	\$140,413	\$134,376	\$691,518	\$430,392	\$224,402	\$140,132
2024	\$458,937	\$139,876	\$131,842	\$687,531	\$427,876	\$222,789	\$139,596
2025	\$453,034	\$138,400	\$124,884	\$676,580	\$420,969	\$218,362	\$138,123
2026	\$452,647	\$138,303	\$124,429	\$675,863	\$420,517	\$218,072	\$138,026
2027	\$452,624	\$138,297	\$124,401	\$675,819	\$420,489	\$218,054	\$138,020
2028	\$263,872	\$80,634	\$20,680	\$675,316	\$385,158	\$217,851	\$103,465
2029	\$0	\$0	\$0	\$0	\$0	\$54,202	\$0
2030	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$5,276,415	\$1,610,323	\$1,428,789	\$8,171,804	\$5,049,950	\$2,695,910	\$1,630,094
NPV (7%, 2017)	\$3,533,720	\$1,078,467	\$968,520	\$5,409,295	\$3,350,430	\$1,771,197	\$1,086,519

Year	RI DG - Cox Comm 181 kW	RI DG - 0 Martin 500 kW	RI DG - 225 Dupont 300 kW	RI DG - 35 Martin 500 kW	RI DG - Cox Comm 498 kW	RI DG - Brickle Group 1.08 MW
	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost
2017	\$51,905	\$143,384	\$86,030	\$143,384	\$142,810	\$136,569
2018	\$49,319	\$136,240	\$81,744	\$136,240	\$135,695	\$121,082
2019	\$48,045	\$132,720	\$79,632	\$132,720	\$132,189	\$113,450
2020	\$50,031	\$138,206	\$82,924	\$138,206	\$137,653	\$125,344
2021	\$51,265	\$141,615	\$84,969	\$141,615	\$141,048	\$132,734
2022	\$51,490	\$142,236	\$85,342	\$142,236	\$141,667	\$134,082
2023	\$50,829	\$140,413	\$84,248	\$140,413	\$139,851	\$130,129
2024	\$50,635	\$139,876	\$83,925	\$139,876	\$139,316	\$128,963
2025	\$50,101	\$138,400	\$83,040	\$138,400	\$137,846	\$125,764
2026	\$50,066	\$138,303	\$82,982	\$138,303	\$137,750	\$125,554
2027	\$50,064	\$138,297	\$82,978	\$138,297	\$137,744	\$125,541
2028	\$50,039	\$138,229	\$82,938	\$138,229	\$114,730	\$125,394
2029	\$8,319	\$34,470	\$20,682	\$34,470	\$0	\$114,253
2030	\$0	\$0	\$0	\$0	\$0	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$612,105	\$1,702,388	\$1,021,433	\$1,702,388	\$1,638,300	\$1,638,860
NPV (7%, 2017)	\$403,115	\$1,118,345	\$671,007	\$1,118,345	\$1,089,436	\$1,056,667

Year	RI DG - Gannon & Scott 406 kW	RI DG - All American Solar 331 kW	RI DG - TEAM 182 kW	RI DG - CMS 128 kW	RI DG - Newport Vineyard 53 kW	RI DG - Johnston Solar 11.7 MW
	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost
2017	\$100,494	\$81,930	\$45,942	\$32,311	\$14,126	\$193,536
2018	\$94,694	\$77,201	\$43,342	\$30,482	\$13,369	\$169,248
2019	\$91,835	\$74,870	\$42,060	\$29,581	\$12,996	\$157,279
2020	\$96,290	\$78,502	\$44,057	\$30,985	\$13,577	\$175,932
2021	\$99,058	\$80,759	\$45,298	\$31,858	\$13,939	\$187,522
2022	\$99,563	\$81,170	\$45,524	\$32,017	\$14,005	\$189,636
2023	\$98,082	\$79,963	\$44,861	\$31,550	\$13,811	\$183,436
2024	\$97,646	\$79,608	\$44,665	\$31,413	\$13,754	\$181,609
2025	\$96,447	\$78,631	\$44,128	\$31,035	\$13,598	\$176,591
2026	\$96,369	\$78,567	\$44,093	\$31,010	\$13,588	\$176,262
2027	\$96,364	\$78,563	\$44,090	\$31,009	\$13,587	\$176,242
2028	\$96,309	\$78,518	\$44,066	\$25,826	\$13,580	\$176,012
2029	\$32,009	\$65,240	\$40,277	\$0	\$12,414	\$174,829
2030	\$0	\$0	\$0	\$0	\$0	\$101,615
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$1,195,158	\$1,013,521	\$572,403	\$369,077	\$176,344	\$2,419,748
NPV (7%, 2017)	\$783,210	\$654,771	\$368,945	\$245,430	\$113,661	\$1,530,798

Year	RI DG - Randall Steere Farm 91 kW	RI DG - Nexamp 76 Stilson Rd 498 kW	RI DG - North Kingstown Solar 1720 Davisville Rd 500 kW	RI DG - SER Solar 23 Appian Way 52 kW	RI DG - Foster Solar - 23 Theodore Foster Drive 1.3 MW	RI DG - Brookside Equestrian Center - 90 Tiff Rd 1.2 MW
	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost
2017	\$24,253	\$68,836	\$66,120	\$12,461	\$189,814	\$103,496
2018	\$22,953	\$61,722	\$58,977	\$11,718	\$171,955	\$85,694
2019	\$22,312	\$58,215	\$55,456	\$11,352	\$163,154	\$76,921
2020	\$23,311	\$63,679	\$60,943	\$11,923	\$176,870	\$90,593
2021	\$23,931	\$67,075	\$64,352	\$12,277	\$185,391	\$99,087
2022	\$24,044	\$67,694	\$64,973	\$12,342	\$186,946	\$100,637
2023	\$23,713	\$65,878	\$63,150	\$12,152	\$182,387	\$96,093
2024	\$23,615	\$65,342	\$62,612	\$12,096	\$181,043	\$94,753
2025	\$23,346	\$63,872	\$61,136	\$11,943	\$177,354	\$91,075
2026	\$23,329	\$63,776	\$61,040	\$11,933	\$177,112	\$90,835
2027	\$23,328	\$63,770	\$61,034	\$11,932	\$177,097	\$90,820
2028	\$23,315	\$63,703	\$60,966	\$11,925	\$176,928	\$90,651
2029	\$23,252	\$63,356	\$60,618	\$11,889	\$176,058	\$89,784
2030	\$5,805	\$10,529	\$50,360	\$0	\$175,594	\$89,321
2031	\$0	\$0	\$0	\$0	\$116,539	\$73,782
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$310,507	\$847,447	\$851,738	\$155,943	\$2,614,242	\$1,363,541
NPV (7%, 2017)	\$198,200	\$542,448	\$535,048	\$100,288	\$1,604,000	\$833,924

Year	RI DG - North Kingstown Organic Energy 500 kW	RI DG - 200 Frenchtown Road Solar 1.25 MW	RI DG - Wilco 260 South County Trail 1.246 MW	RI DG - Smart Technologies 22 Christiansen Way 1.043 MW	Totals by Year
	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost	Above Market Cost
2017	\$140,641	\$87,250	\$209,851	\$88,151	\$35,035,769
2018	\$378,551	\$156,640	\$192,049	\$161,400	\$25,592,824
2019	\$357,176	\$147,839	\$183,276	\$154,056	\$18,619,987
2020	\$390,486	\$161,555	\$196,948	\$165,501	\$28,976,246
2021	\$411,182	\$170,077	\$205,443	\$172,611	\$36,434,181
2022	\$414,957	\$171,631	\$206,992	\$173,908	\$39,546,182
2023	\$403,886	\$167,072	\$202,448	\$170,104	\$39,435,836
2024	\$400,623	\$165,729	\$201,109	\$168,983	\$41,020,709
2025	\$391,662	\$162,039	\$197,431	\$165,905	\$41,252,035
2026	\$391,076	\$161,798	\$197,190	\$165,703	\$43,208,035
2027	\$391,039	\$161,783	\$197,175	\$165,691	\$45,591,200
2028	\$390,628	\$161,613	\$197,006	\$165,549	\$47,779,463
2029	\$388,515	\$160,743	\$196,139	\$164,824	\$30,690,649
2030	\$387,389	\$160,279	\$195,677	\$164,436	\$31,877,219
2031	\$385,481	\$159,494	\$113,688	\$163,761	\$33,231,195
2032	\$255,555	\$79,305	\$0	\$81,522	\$35,606,651
2033	\$0	\$0	\$0	\$0	\$37,285,411
2034	\$0	\$0	\$0	\$0	\$36,424,376
2035	\$0	\$0	\$0	\$0	\$38,028,047
2036	\$0	\$0	\$0	\$0	\$35,839,215
Total	\$5,878,846	\$2,434,847	\$2,892,423	\$2,492,125	\$721,475,230
NPV (7%, 2017)	\$3,414,701	\$1,430,956	\$1,778,515	\$1,464,450	\$372,002,714

PUC 10-2

Request:

For each project listed in the Company's response to PUC-10-1, please provide the total contract cost and the annual financial remuneration National Grid expects to receive for each contract for each year. Please include column totals on the spreadsheets in addition to the row totals already provided.

Response:

Please see Attachment PUC 10-2(a) and Attachment PUC 10-2(b). Attachment PUC 10-2(a) contains a summary of the contract cost and annual financial remuneration for the long-term contracts and distributed generation standard contracts by year. Attachment PUC 10-2(b) contains a detailed listing of the contract cost and annual financial remuneration by unit.

Year	Long-term Contracts		DG Standard Contracts		Totals by Year	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Total Contract Cost	Total Remuneration
2017	\$72,275,022	\$1,987,563	\$7,063,354	\$194,242	\$79,338,376	\$2,181,805
2018	\$77,399,351	\$2,128,482	\$7,839,524	\$215,587	\$85,238,875	\$2,344,069
2019	\$94,596,882	\$2,601,414	\$7,839,524	\$215,587	\$102,436,406	\$2,817,001
2020	\$96,840,825	\$2,663,123	\$7,839,524	\$215,587	\$104,680,349	\$2,878,710
2021	\$99,149,135	\$2,726,601	\$7,839,524	\$215,587	\$106,988,658	\$2,942,188
2022	\$101,523,743	\$2,791,903	\$7,839,524	\$215,587	\$109,363,267	\$3,007,490
2023	\$103,966,641	\$2,859,083	\$7,839,524	\$215,587	\$111,806,165	\$3,074,670
2024	\$106,479,882	\$2,928,197	\$7,839,524	\$215,587	\$114,319,406	\$3,143,784
2025	\$109,065,585	\$2,999,304	\$7,839,524	\$215,587	\$116,905,109	\$3,214,890
2026	\$111,725,934	\$3,072,463	\$7,839,524	\$215,587	\$119,565,458	\$3,288,050
2027	\$114,463,181	\$3,147,737	\$7,839,524	\$215,587	\$122,302,704	\$3,363,324
2028	\$117,279,650	\$3,225,190	\$7,011,412	\$192,814	\$124,291,061	\$3,418,004
2029	\$77,712,356	\$2,137,090	\$3,520,560	\$96,815	\$81,232,917	\$2,233,905
2030	\$79,650,437	\$2,190,387	\$2,528,100	\$69,523	\$82,178,537	\$2,259,910
2031	\$81,649,403	\$2,245,359	\$1,906,790	\$52,437	\$83,556,194	\$2,297,795
2032	\$72,920,441	\$2,005,312	\$776,170	\$21,345	\$73,696,611	\$2,028,657
2033	\$68,566,759	\$1,885,586	\$0	\$0	\$68,566,759	\$1,885,586
2034	\$50,049,587	\$1,376,364	\$0	\$0	\$50,049,587	\$1,376,364
2035	\$51,801,323	\$1,424,536	\$0	\$0	\$51,801,323	\$1,424,536
2036	\$48,787,021	\$1,341,643	\$0	\$0	\$48,787,021	\$1,341,643
Totals	\$1,735,903,159	\$47,737,337	\$101,201,624	\$2,783,045	\$1,837,104,783	\$50,520,382
NPV (7%, 2017)	\$954,759,599	\$26,255,889	\$64,569,166	\$1,775,652	\$1,019,328,766	\$28,031,541

Notes:

- RI LTC & RI DG Contracts as of December 2016; approximately 101.8% of the 90 MW minimum requirement
- Above market cost is calculated using market price forecasts for Energy, Capacity and RECs provided by ESAI in December 2016
- Capacity factors for the FCM, commercial operation dates, and annual output have been estimated for the given projects' technology and location

Year	Deepwater Wind 30 MW		Rhode Island Landfill Gas GenCo 32MW		Orbit Energy HSAD Biogas 3.2 MW (\$95)	
	Contract Cost less Outperform Adj Credit	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$30,131,666	\$828,621	\$28,966,690	\$796,584	\$1,100,100	\$30,253
2018	\$28,863,893	\$793,757	\$29,690,858	\$816,499	\$2,244,204	\$61,716
2019	\$29,874,128	\$821,539	\$30,433,129	\$836,911	\$2,289,088	\$62,950
2020	\$30,919,723	\$850,292	\$31,193,957	\$857,834	\$2,334,870	\$64,209
2021	\$32,001,913	\$880,053	\$31,973,806	\$879,280	\$2,381,567	\$65,493
2022	\$33,121,981	\$910,854	\$32,773,151	\$901,262	\$2,429,199	\$66,803
2023	\$34,281,250	\$942,734	\$33,592,480	\$923,793	\$2,477,783	\$68,139
2024	\$35,481,093	\$975,730	\$34,432,292	\$946,888	\$2,527,338	\$69,502
2025	\$36,722,932	\$1,009,881	\$35,293,099	\$970,560	\$2,577,885	\$70,892
2026	\$38,008,234	\$1,045,226	\$36,175,427	\$994,824	\$2,629,443	\$72,310
2027	\$39,338,522	\$1,081,809	\$37,079,813	\$1,019,695	\$2,682,032	\$73,756
2028	\$40,715,372	\$1,119,673	\$38,006,808	\$1,045,187	\$2,735,672	\$75,231
2029	\$42,140,409	\$1,158,861	\$0	\$0	\$2,790,386	\$76,736
2030	\$43,615,323	\$1,199,421	\$0	\$0	\$2,846,193	\$78,270
2031	\$45,141,859	\$1,241,401	\$0	\$0	\$2,903,117	\$79,836
2032	\$46,721,825	\$1,284,850	\$0	\$0	\$1,480,590	\$40,716
2033	\$48,357,089	\$1,329,820	\$0	\$0	\$0	\$0
2034	\$50,049,587	\$1,376,364	\$0	\$0	\$0	\$0
2035	\$51,801,323	\$1,424,536	\$0	\$0	\$0	\$0
2036	\$48,787,021	\$1,341,643	\$0	\$0	\$0	\$0
Totals	\$786,075,145	\$21,617,066	\$399,611,510	\$10,989,317	\$38,429,466	\$1,056,810
NPV (7%, 2017)	\$387,933,096	\$10,668,160	\$259,318,359	\$7,131,255	\$22,012,042	\$605,331

Notes:

- RI LTC & RI DG Contracts as of December 2016; approximately 101.8% of the 90 MW minimum requirement
- Above market cost is calculated using market price forecasts for Energy, Capacity and RECs provided by ESAI in December 2016
- Capacity factors for the FCM, commercial operation dates, and annual output have been estimated for the given projects' technology and location

Year	Black Bear Hydro 3.958 MW		Champlain (Bowers) Wind 48 MW		Copenhagen Wind 79.9 MW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$2,766,349	\$76,075	\$9,310,217	\$256,031	\$0	\$0
2018	\$2,821,676	\$77,596	\$12,413,622	\$341,375	\$1,365,098	\$37,540
2019	\$2,878,110	\$79,148	\$12,413,622	\$341,375	\$16,708,805	\$459,492
2020	\$2,935,672	\$80,731	\$12,413,622	\$341,375	\$17,042,981	\$468,682
2021	\$2,994,385	\$82,346	\$12,413,622	\$341,375	\$17,383,841	\$478,056
2022	\$3,054,273	\$83,993	\$12,413,622	\$341,375	\$17,731,517	\$487,617
2023	\$3,115,358	\$85,672	\$12,413,622	\$341,375	\$18,086,148	\$497,369
2024	\$3,177,666	\$87,386	\$12,413,622	\$341,375	\$18,447,871	\$507,316
2025	\$3,241,219	\$89,134	\$12,413,622	\$341,375	\$18,816,828	\$517,463
2026	\$3,306,043	\$90,916	\$12,413,622	\$341,375	\$19,193,165	\$527,812
2027	\$3,372,164	\$92,735	\$12,413,622	\$341,375	\$19,577,028	\$538,368
2028	\$3,439,607	\$94,589	\$12,413,622	\$341,375	\$19,968,569	\$549,136
2029	\$0	\$0	\$12,413,622	\$341,375	\$20,367,940	\$560,118
2030	\$0	\$0	\$12,413,622	\$341,375	\$20,775,299	\$571,321
2031	\$0	\$0	\$12,413,622	\$341,375	\$21,190,805	\$582,747
2032	\$0	\$0	\$3,103,406	\$85,344	\$21,614,621	\$594,402
2033	\$0	\$0	\$0	\$0	\$20,209,670	\$555,766
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$37,102,523	\$1,020,319	\$186,204,330	\$5,120,619	\$288,480,185	\$7,933,205
NPV (7%, 2017)	\$24,171,555	\$664,718	\$111,213,054	\$3,058,359	\$150,111,494	\$4,128,066

Year	RI DG - Plain Meeting House Solar 2 MW		RI DG - ACP 28 Jacome Way 500 kW		RI DG - North Kingstown Green Wind 1.5 MW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2018	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2019	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2020	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2021	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2022	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2023	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2024	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2025	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2026	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2027	\$674,520	\$18,549	\$193,771	\$5,329	\$385,922	\$10,613
2028	\$393,470	\$10,820	\$113,033	\$3,108	\$64,320	\$1,769
2029	\$0	\$0	\$0	\$0	\$0	\$0
2030	\$0	\$0	\$0	\$0	\$0	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$7,813,190	\$214,863	\$2,244,516	\$61,724	\$4,309,460	\$118,510
NPV (7%, 2017)	\$5,232,711	\$143,900	\$1,503,215	\$41,338	\$2,922,461	\$80,368

Year	RI DG - Forbes Street Solar 3.7 MW		RI DG - West Davisville Solar 2.34 MW		RI DG - 100 Dupont 1.5 MW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2018	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2019	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2020	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2021	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2022	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2023	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2024	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2025	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2026	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2027	\$1,087,437	\$29,905	\$680,108	\$18,703	\$384,476	\$10,573
2028	\$1,087,437	\$29,905	\$623,433	\$17,144	\$384,476	\$10,573
2029	\$0	\$0	\$0	\$0	\$96,119	\$2,643
2030	\$0	\$0	\$0	\$0	\$0	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$13,049,239	\$358,854	\$8,104,623	\$222,877	\$4,709,836	\$129,520
NPV (7%, 2017)	\$8,637,168	\$237,522	\$5,376,722	\$147,860	\$3,093,661	\$85,076

Year	RI DG - Altus Comtram Cable Plant 499 kW		RI DG - Cox Comm 181 kW		RI DG - 0 Martin 500 kW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2018	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2019	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2020	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2021	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2022	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2023	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2024	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2025	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2026	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2027	\$193,384	\$5,318	\$70,145	\$1,929	\$193,771	\$5,329
2028	\$145,038	\$3,989	\$70,145	\$1,929	\$193,771	\$5,329
2029	\$0	\$0	\$11,691	\$321	\$48,443	\$1,332
2030	\$0	\$0	\$0	\$0	\$0	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$2,272,258	\$62,487	\$853,433	\$23,469	\$2,373,697	\$65,277
NPV (7%, 2017)	\$1,514,520	\$41,649	\$561,992	\$15,455	\$1,559,166	\$42,877

Year	RI DG - 225 Dupont 300 kW		RI DG - 35 Martin 500 kW		RI DG - Cox Comm 498 kW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2018	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2019	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2020	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2021	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2022	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2023	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2024	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2025	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2026	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2027	\$116,263	\$3,197	\$193,771	\$5,329	\$192,996	\$5,307
2028	\$116,263	\$3,197	\$193,771	\$5,329	\$160,830	\$4,423
2029	\$29,066	\$799	\$48,443	\$1,332	\$0	\$0
2030	\$0	\$0	\$0	\$0	\$0	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$1,424,218	\$39,166	\$2,373,697	\$65,277	\$2,283,787	\$62,804
NPV (7%, 2017)	\$935,500	\$25,726	\$1,559,166	\$42,877	\$1,518,626	\$41,762

Year	RI DG - Brickle Group 1.08 MW		RI DG - Gannon & Scott 406 kW		RI DG - All American Solar 331 kW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2018	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2019	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2020	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2021	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2022	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2023	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2024	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2025	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2026	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2027	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2028	\$245,809	\$6,760	\$141,409	\$3,889	\$115,287	\$3,170
2029	\$225,325	\$6,196	\$47,136	\$1,296	\$96,072	\$2,642
2030	\$0	\$0	\$0	\$0	\$0	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$3,175,037	\$87,314	\$1,744,042	\$47,961	\$1,479,510	\$40,687
NPV (7%, 2017)	\$2,045,888	\$56,262	\$1,142,726	\$31,425	\$955,551	\$26,278

Year	RI DG - TEAM 182 kW		RI DG - CMS 128 kW		RI DG - Newport Vineyard 53 kW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2018	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2019	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2020	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2021	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2022	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2023	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2024	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2025	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2026	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2027	\$64,283	\$1,768	\$45,210	\$1,243	\$19,467	\$535
2028	\$64,283	\$1,768	\$37,675	\$1,036	\$19,467	\$535
2029	\$58,926	\$1,620	\$0	\$0	\$17,845	\$491
2030	\$0	\$0	\$0	\$0	\$0	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$830,322	\$22,834	\$534,985	\$14,712	\$251,452	\$6,915
NPV (7%, 2017)	\$535,032	\$14,713	\$355,743	\$9,783	\$162,027	\$4,456

Year	RI DG - Johnston Solar 1.7 MW		RI DG - Randall Steere Farm 91 kW		RI DG - Nexamp 76 Stilson Rd 498 kW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2018	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2019	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2020	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2021	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2022	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2023	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2024	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2025	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2026	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2027	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2028	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2029	\$364,854	\$10,033	\$33,424	\$919	\$119,022	\$3,273
2030	\$212,832	\$5,853	\$8,356	\$230	\$19,837	\$546
2031	\$0	\$0	\$0	\$0	\$0	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$4,955,934	\$136,288	\$442,865	\$12,179	\$1,567,128	\$43,096
NPV (7%, 2017)	\$3,131,862	\$86,126	\$282,585	\$7,771	\$1,002,441	\$27,567

Year	RI DG - North Kingstown Solar 1720 Davisville Rd 500 kW		RI DG - SER Solar 23 Appian Way 52 kW		RI DG - Foster Solar - 23 Theodore Foster Drive 1.3 MW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2018	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2019	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2020	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2021	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2022	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2023	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2024	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2025	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2026	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2027	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2028	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2029	\$116,508	\$3,204	\$17,701	\$487	\$315,783	\$8,684
2030	\$97,090	\$2,670	\$0	\$0	\$315,783	\$8,684
2031	\$0	\$0	\$0	\$0	\$210,522	\$5,789
2032	\$0	\$0	\$0	\$0	\$0	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$1,611,694	\$44,322	\$230,118	\$6,328	\$4,631,479	\$127,366
NPV (7%, 2017)	\$1,011,386	\$27,813	\$147,942	\$4,068	\$2,837,970	\$78,044

Year	RI DG - Brookside Equestrian Center - 90 Tiff Rd 1.2 MW		RI DG - North Kingstown Organic Energy 500 kW		RI DG - 200 Frenchtown Road Solar 1.25 MW	
	Contract Cost	Remuneration	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$229,061	\$6,299	\$242,616	\$6,672	\$150,234	\$4,131
2018	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2019	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2020	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2021	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2022	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2023	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2024	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2025	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2026	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2027	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2028	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2029	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2030	\$229,061	\$6,299	\$727,847	\$20,016	\$300,468	\$8,263
2031	\$190,884	\$5,249	\$727,847	\$20,016	\$300,468	\$8,263
2032	\$0	\$0	\$485,231	\$13,344	\$150,234	\$4,131
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0
Totals	\$3,397,743	\$93,438	\$10,917,698	\$300,237	\$4,507,020	\$123,943
NPV (7%, 2017)	\$2,072,434	\$56,992	\$6,340,041	\$174,351	\$2,647,121	\$72,796

Year	RI DG - Wilco 260 South County Trail 1.246 MW		RI DG - Smart Technologies 22 Christiansen Way 1.043 MW	
	Contract Cost	Remuneration	Contract Cost	Remuneration
2017	\$335,417	\$9,224	\$140,705	\$3,869
2018	\$335,417	\$9,224	\$281,410	\$7,739
2019	\$335,417	\$9,224	\$281,410	\$7,739
2020	\$335,417	\$9,224	\$281,410	\$7,739
2021	\$335,417	\$9,224	\$281,410	\$7,739
2022	\$335,417	\$9,224	\$281,410	\$7,739
2023	\$335,417	\$9,224	\$281,410	\$7,739
2024	\$335,417	\$9,224	\$281,410	\$7,739
2025	\$335,417	\$9,224	\$281,410	\$7,739
2026	\$335,417	\$9,224	\$281,410	\$7,739
2027	\$335,417	\$9,224	\$281,410	\$7,739
2028	\$335,417	\$9,224	\$281,410	\$7,739
2029	\$335,417	\$9,224	\$281,410	\$7,739
2030	\$335,417	\$9,224	\$281,410	\$7,739
2031	\$195,660	\$5,381	\$281,410	\$7,739
2032	\$0	\$0	\$140,705	\$3,869
2033	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0
2036	\$0	\$0	\$0	\$0
Totals	\$4,891,494	\$134,516	\$4,221,146	\$116,082
NPV (7%, 2017)	\$3,004,292	\$82,618	\$2,479,217	\$68,178

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Request:

For each contract entered into under the Long Term Contracting for Renewable Energy statute (not including distributed generation) for which commercial operation has not begun, please provide an update as to the status, including copies of any extensions that may have been executed and which have not already been filed with the PUC.

Response:

Champlain Wind

On December 30, 2015, Champlain Wind provided notice to the Company that it elected to extend by one year the critical milestone dates under the Power Purchase Agreement with National Grid (the PPA). That election extended the Critical Milestone for the receipt of the permit from the Maine Department of Environmental Protection (the Maine DEP) that is required to construct and operate the Champlain Wind project to December 31, 2016. The Maine DEP denied Champlain Wind's application for that permit, and Champlain Wind appealed that denial to the Maine Board of Environmental Protection. The Board of Environmental Protection affirmed the Maine DEP's order denying that permit application, and Champlain Wind appealed that decision to the Maine Supreme Judicial Court. On December 3, 2015, the Maine Supreme Judicial Court affirmed the Board of Environmental Protection's decision.

Under Section 3.1(b) of the PPA, Champlain Wind must provide National Grid with notice of the achievement of a Critical Milestone within seven days after that achievement, and Champlain Wind has not provided any notice with respect to the Maine DEP permit. Section 3.1(c) of the PPA allows Champlain Wind to extend the Critical Milestone deadlines by up to two additional six-month periods and Champlain Wind did not elect to further extend the Critical Milestone deadlines or provide the additional Development Period Security prior to the December 31, 2016 deadline for obtaining the Maine DEP permit.

The Company is currently assessing its options with respect to the PPA.

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Copenhagen Wind

On October 13, 2016, EDF Renewable Energy provided a progress report for activities performed during the third quarter of 2016. As indicated in that progress report, permit and real property and site control access is ongoing. The PPA letter of credit was extended from \$4.2 million to \$7 million on July 1, 2016 and the project's expected Commercial Operation Date is November 30, 2018.

Orbit Energy

In a recent communication to National Grid, Orbit Energy provided the following status update: "The project has not yet achieved partial generation. That is scheduled to occur by the end of February. We are in the process now preparing to load the inoculate to start methane production. It will take about 1.5 months of inoculum feeding until methane production is sufficient to operate a generation unit. Production will then ramp throughout the remainder of the spring and we will achieve COD according to the PPA by June 30th."