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September 17, 2021

VIA E-MAIL AND FIRST CLASS MAIL

Emma Rodvien, Coordinator Energy Facility Siting Board 89 Jefferson Boulevard Warwick, Rhode Island 02888

Re: Docket No. SB-2021-01 – In Re: Revolution Wind, LLC's Application to Construct and Alter Major Energy Facilities in North Kingstown, Rhode Island

Dear Ms. Rodvien:

In support of Revolution Wind, LLC's ("Revolution Wind") Application to Construct and Alter Major Energy Facilities in North Kingstown, Rhode Island (the "Application") in connection with its proposed approximately 704 MW offshore wind farm (the "Project"), Revolution Wind has enclosed the following for filing in the above-referenced docket:

- Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios Sakellaris, Kristen Trudell, and Jason Ross (the "Overview Panel"), which is marked for identification as Exhibit 3;
- Pre-Filed Direct Testimony of Mark Roll, Mark Gardella, Laura Morse, Susan Moberg, M. Wing Goodale, and Drew Carey (the "Environmental Panel"), which is marked for identification as Exhibit 4;
- Pre-Filed Direct Testimony of Kenneth Bowes, Demetrios Sakellaris, William Bailey, Ph.D., and Katherine Palmquist, Ph.D. (the "EMF Panel"), which is marked for identification as Exhibit 5;
- Pre-Filed Direct Testimony of Mark Roll, Mark Gardella, and Daniel Forrest (the "Cultural Resources Panel"), which is marked for identification as Exhibit 6; and
- Pre-Filed Direct Testimony of Gordon Perkins and Kenneth Bowes (the "Visual Resources Panel"), which is marked for identification as Exhibit 7.

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Revolution Wind also has included an Exhibit List reflecting these exhibits and the previously marked exhibits in this matter. At the hearing in this matter, scheduled to commence on October 12, 2021, Revolution Wind intends to introduce the witness panels in the order set forth above.

Revolution Wind will present the Overview Panel first. The Overview Panel presents the factual details regarding the Project, including a description of its components and construction methods. The Overview Panel also presents a general description of how the Project satisfies each of the five prongs of the standard necessary to obtain its requested license from the Energy Facility Siting Board (the "EFSB"). Additionally, the Overview Panel provides detailed information in response to questions raised in (i) the Advisory Opinion from the Rhode Island Public Utilities Commission regarding the Large Generator Interconnection Agreement by and between Revolution Wind, New England Power Company d/b/a National Grid, and ISO New England, Inc. (the "LGIA"), and (ii) the Advisory Opinion from the Town of North Kingstown Planning Commission regarding the Town of North Kingstown Noise Ordinance. The Overview Panel will be presented for cross examination regarding (a) the need for the Project; (b) costjustification; (c) consistency with Quonset Development Corporation, Town of North Kingstown, and State Building Code Commission requirements; and (d) socio-economic impact.

Revolution Wind will present the Environmental Panel second. The Environmental Panel describes the analysis Revolution Wind undertook for both the offshore and onshore components of the Project subject to EFSB jurisdiction and directly addresses questions raised in the Advisory Opinion from Rhode Island Department of Environmental Management regarding potential environmental impacts. The Environmental Panel will be presented for cross examination regarding all questions related to potential environmental impacts and the Project's satisfaction of the requirement that it not result in unacceptable harm to the environment.

Revolution Wind will present the EMF Panel third. The EMF Panel describes in detail the analysis and testing it performed on the potential impacts from electric and magnetic fields that are expected to result from the Project. The EMF Panel also responds to questions raised in the Advisory Opinions submitted by the Rhode Island Department of Health and RIDEM regarding electric and magnetic fields. The EMF Panel will be presented for cross examination regarding all questions related to electric and magnetic fields.

Revolution Wind will present the Cultural Resources Panel fourth. The Cultural Resources Panel details the analysis it performed to understand the possible impact to cultural resources from the construction and operation of the Project. The Cultural Resources Panel also addresses questions raised in the Advisory Opinion submitted by the Rhode Island Historical Preservation and Heritage Commission. The Cultural Resources Panel will be presented for cross examination on all questions related to potential impacts on cultural resources and the Project's consistency with rules and regulations regarding cultural resources.

Revolution Wind will present the Visual Resources Panel fifth. The Visual Resources Panel describes the thorough analysis Revolution Wind undertook to analyze the potential

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impacts to visual resources from the EFSB jurisdictional components of the Project. The Visual Resources Panel will be presented for cross examination on all questions related to the potential impacts to visual resources from the EFSB jurisdictional components of the Project.

This filing also includes a Motion for Protective Treatment of Confidential Information in accordance with R.I. Gen. Laws § 38-2-2(4) for Addendum 3-7 to Exhibit 3, which is a copy of the LGIA. Revolution Wind seeks protection from public disclosure of certain confidential information contained in the LGIA because it contains both confidential, commercially sensitive information and because it contains Critical Energy Infrastructure Information ("CEII"). Accordingly, Revolution Wind has provided the EFSB with an original and three complete, unredacted copies of the confidential document in a sealed envelope marked "Contains Privileged and Confidential Information – Do Not Release," and has included three redacted copies of the document for the public filing.

Thank you for your attention to this matter.

Very truly yours,

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Adam M. Ramos

Enclosures

Rotin L. Mai

Robin L. Main

CERTIFICATE OF SERVICE

I hereby certify that on September 17, 2021, I sent a copy of the foregoing to the service list below by electronic mail.

/s/ Adam M. Ramos

SB-2021-01 Revolution Wind, LLC Application for Major Energy Facility

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Associate Director Meredith Brady (DOA)	Meredith.brady@doa.ri.gov;	
Emma Rodvien (PUC)	Emma.Rodvien@puc.ri.gov;	
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Town of North Kingstown Town Council	TownCouncil@northkingstown.org;	
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PRE-FILED DIRECT TESTIMONY OF KENNETH BOWES, KELLEN INGALLS, MARK ROLL, DEMETRIOS SAKELLARIS, KRISTEN TRUDELL, AND JASON ROSS

REVOLUTION WIND, LLC Project

RevWind Exhibit 3

PRE-FILED DIRECT TESTIMONY

OF

KENNETH BOWES, KELLEN INGALLS, MARK ROLL, DEMETRIOS SAKELLARIS, KRISTEN TRUDELL, AND JASON ROSS

REVOLUTION WIND, LLC

EXECUTIVE SUMMARY

Revolution Wind, LLC has articulated in this testimony how its approximately 704 megawatt offshore wind farm (the "Project") satisfies the requirements for issuance of a license from the Energy Facility Siting Board ("EFSB"). The Project is consistent with the EFSB's five-pronged standard because it: (1) is needed to deliver the renewable wind energy necessary for Rhode Island and the region to meet its renewable energy and carbon reduction goals; (2) is cost-justified; (3) is consistent with state and local laws; (4) will not cause unacceptable harm to the environment; and (5) will enhance the socio-economic fabric of Rhode Island. This testimony also explains how the Project satisfies each of these prongs and identifies evidence in the record. Revolution Wind's satisfaction of these criteria is further demonstrated through the Advisory Opinions submitted by each of the agencies identified by the EFSB.

The testimony fully describes the onshore and offshore Project scope while focusing on the components within the jurisdiction of the EFSB. Consideration of alternatives, including the selection of certain construction methods is noted.

Additional information responding to questions raised by the Rhode Island Public Utilities Commission ("PUC") and the Town of North Kingstown Planning Commission in their Advisory Opinions has been included. To address the PUC's questions, this testimony provides a copy of the Large Generator Interconnection Agreement ("LGIA") and explains that the terms of the LGIA are consistent with explanation provided at the hearing before the PUC regarding responsibility for operation, maintenance, and decommissioning costs for the portions of the Project that The Narragansett Electric Company will own. To address the questions raised by the Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios Sakellaris, Kristen Trudell, and Jason Ross September 17, 2021 Page 1 of 43

Town of North Kingstown Planning Commission regarding compliance with the Town of North Kingstown noise ordinance, this testimony explains how the Project is in compliance with the noise ordinance, the methodology Revolution Wind used to perform its noise testing, and the reasons it chose that methodology.

Finally, environmental, electric and magnetic fields, cultural resources, and visual resources will be addressed by other witness panels.

Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios Sakellaris, Kristen Trudell, and Jason Ross September 17, 2021 Page 1 of 46

1 I. Introduction

- 2 Q. Mr. Bowes, please state your name and business address.
- 3 A. My name is Kenneth Bowes. My business address is 56 Prospect Street, Hartford,

4 Connecticut.

- 5 Q. By whom are you employed and in what capacity?
- A. I am employed by Eversource Energy as the Vice President for Offshore Wind Siting and
 Permitting.

8 Q. What are your responsibilities in that role?

- 9 A. In my role with Eversource, I am responsible for the leadership and direction of siting
- 10 and permitting activities for Offshore Wind and related transmission infrastructure
- 11 projects, and compliance for those projects. I also serve as a technical consultant for
- 12 various large transmission projects and clean energy projects.

13 Q. Please describe your educational and professional background.

- 14 A. I received my B.S. from the University of New Hampshire in Electrical Engineering and
- 15 my M.S. from Rensselaer Polytechnic Institute in Electrical Engineering. I joined
- 16 Eversource in 1984 in the System Test Department. Before my current role, I held several
- 17 engineering and management positions in Eversource's energy delivery organizations,
- 18 including becoming the Director of Transmission and Distribution Maintenance in 1999,
- 19 Director of Transmission Construction, Test, and Maintenance in 2002, Director of
- 20 Transmission Projects in 2004, Vice President of Customer Operations in 2008, Vice
- 21 President of Energy Delivery in 2010, Vice President of Engineering in 2014, Vice

Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios Sakellaris, Kristen Trudell, and Jason Ross September 17, 2021 Page 2 of 43

1		President of Transmission Performance in 2017, and Vice President of ISO Policy, Siting
2		& Compliance in 2018. Additionally, I am the past Chairman of the Edison Electric
3		Institute's Transmission Committee. I was inducted into the University of Connecticut
4		Academy of Distinguished Engineers in 2016 and the Connecticut Academy of Science
5		and Engineering in 2017.
6	Q.	Have you previously testified before the EFSB, the PUC, or any other energy
7		regulatory bodies?
8	A.	Yes. I have testified more than ten times in siting proceedings before the Connecticut
9		Siting Council, New Hampshire Site Evaluation Committee, and the Massachusetts
10		Energy Facilities Siting Board. I have also testified in more than twenty regulatory
11		proceedings on a variety of matters before the Connecticut Public Utilities Regulatory
12		Authority, the New Hampshire Public Utilities Commission, the Connecticut Department
13		of Energy and Environmental Protection, the New York Public Service Commission, and
14		once before the United States Federal Energy Regulatory Commission. I also testified in
15		the Public Utility Commission's ("PUC's") Docket No. 5151, Issuance of Advisory
16		Opinion Regarding Revolution Wind, LLC License to Construct.
17	Q.	Mr. Ingalls, please state your name and business address.
18	A.	My name is Kellen Ingalls. My business address is 399 Boylston Street, Boston,
19		Massachusetts.
20	Q.	By whom are you employed and in what capacity?

Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios Sakellaris, Kristen Trudell, and Jason Ross September 17, 2021 Page 3 of 43

1	A.	I am employed by Orsted North America Inc. ("Orsted"). My role is the Project
2		Development Director for Revolution Wind, LLC ("Revolution Wind").
3	Q.	What are your responsibilities in that role?
4	А.	In my role as Project Development Director, I oversee the early stages of the proposed
5		approximately 704 MW wind farm being developed by Revolution Wind (the "Project")
6		leading up to construction.
7	Q.	Please describe your educational and professional background.
8	А.	I have been developing wind energy projects in New England, New York, and the mid-
9		Atlantic region for the last 12 years. I received my B.A. from the State University of New
10		York at Fredonia in English and an M.A. from the University of Vermont in English. I
11		developed wind projects for VERA Renewables and EDP Renewables until I joined
12		Orsted in October 2019.
13	Q.	Have you previously testified before the EFSB, the PUC, or any other energy
14		regulatory bodies?
15	A.	Yes. I recently testified before the PUC in Docket No. 5151, Issuance of Advisory
16		Opinion Regarding Revolution Wind, LLC License to Construct. I also was a witness at
17		the March 22, 2021 preliminary hearing before the Energy Facility Siting Board
18		("EFSB") for the Project, presenting the Project to the EFSB and responding to questions
19		about the presentation under oath.
20	Q.	Mr. Roll, please state your name and business address.

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- 1 A. My name is Mark Roll. My business address is 56 Exchange Terrace, Suite 300,
- 2 Providence, RI 02903.
- 3 Q. By whom are you employed and in what capacity?
- 4 A. I am employed by Orsted and serve as permitting manager for Revolution Wind.
- 5 Q. What are your principal responsibilities in that position?
- 6 A. I am responsible for managing all environmental permit applications for the Project.
- 7 Q. How long have you worked for Orsted?
- 8 A. I have worked for Orsted for 2 years.
- 9 Q. Describe your educational background and professional experience.
- 10 A. I received my Bachelor of Science in Electrical Engineering from the Northeastern
- 11 University in 2006 and Masters in Environmental Law and Policy from Vermont Law
- 12 School in 2010. I have worked on environmental permitting of renewable energy and
- 13 other energy projects for about 11 years.
- 14 Q. Have you ever testified before the EFSB or other siting board?
- 15 A. No.
- 16 Q. Mr. Sakellaris, please state your name and business address.
- 17 A. My name is Demetrios Sakellaris. My business address is 247 Station drive, Westwood,
 18 Massachusetts.
- 19 Q. By whom are you employed and in what capacity?
- 20 A. I am employed by Eversource Energy as Manager of Transmission Capital Projects.
- 21 Q. What are your principal responsibilities in that position?

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1 A. In my role with Eversource, I am responsible for managing the technical design for large 2 capital projects, including offshore wind. I serve as lead point of contact for all onshore 3 transmission line and substation design items. 4 **Q**. How long have you worked for Eversource Energy? 5 I have been working for Eversource Energy for 11 years now. A. 6 Q. Describe your educational background and professional experience. 7 A. I received my B.S. from Northeastern University in Electrical Engineering in 2010, my 8 M.S. in Power Systems Engineering from Worcester Polytechnic Institute in 2014 and 9 my M.B.A. from Northeastern University in 2014. I joined Eversource in 2010 in the 10 Transmission Line Engineering department. Before my current role, I held several 11 engineering and management positions in Eversource's engineering organization, 12 including becoming the Supervisor of Underground Transmission Lines Engineering in 13 2014 and a Lead Engineer in Transmission Engineering in 2016. Additionally, I am a 14 licensed Professional Engineer in the Commonwealth of Massachusetts. I have also been 15 a guest speaker at various industry conferences. 16 Q. Have you ever testified before the EFSB or other siting board? 17 Yes. I have testified in siting proceedings before the Massachusetts Energy Facilities A. 18 Siting Board with projects associated with the Greater Boston Reliability program. 19 Q. Ms. Trudell, please state your name and business address 20 A. My name is Kristen Trudell. My business address is 56 Exchange Terrace Suite 300 21 Providence RI 02903.

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1	Q.	By whom are you employed and in what capacity?
2	A.	I am employed by Orsted. My role is Lead Offshore Cable Installation Specialist.
3	Q.	What are you principal responsibilities in that position?
4	А.	My responsibilities include supporting projects across the Orsted portfolio from the
5		development to construction phase, optimizing the cable installation scope.
6	Q.	How long have you worked for Orsted?
7	A.	I have worked for Orsted for 1 year and 4 months.
8	Q.	Describe your educational background and professional experience.
9	A.	I received my Bachelor of Science from the University of Massachusetts in 2006, and a
10		Certificate in Hydrogeology studies form the University of Massachusetts.
11	Q.	Have you ever testified before the EFSB or other siting board?
12	A.	Yes, I have testified before siting boards in Massachusetts.
13	Q.	Mr. Ross, please state your name and business address.
14	A.	My name is Jason Ross. My business address is 101 Walnut Street, Watertown,
15		Massachusetts.
16	Q.	By whom are you employed and in what capacity?
17	А.	I am employed by Vanasse Hangen Brustlin, Inc. ("VHB") as the Director of Noise and
18		Vibration.
19	Q.	What are your responsibilities in that role?
20	А.	In my role at VHB, I conduct noise and vibration studies for energy and other
21		infrastructure projects.

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1	Q.	Please describe your educational and professional background.
2	A.	I received a B.S in Mechanical Engineering from University of Colorado at Boulder. I
3		received a Master of Engineering in Acoustics from Pennsylvania State University. I
4		have worked in noise and vibration for over 23 years. I worked with Harris Miller Miller
5		& Hanson Inc. for 17 years prior to joining VHB, where I have been for 6 years.
6	Q.	Have you previously testified before the EFSB, the PUC, or any other energy
7		regulatory bodies?
8	A.	Yes. I have testified before the New York State Department of Public Service for the
9		Deepwater Wind Offshore Wind Project n/k/a South Fork Wind (Case Number 18-T-
10		0604). I have submitted pre-filed testimony to the State of Vermont Public Utility
11		Commission for a 22.2 MW solar electric generation facility project.
12	Q.	Will you be sponsoring any proposed addenda to the testimony?
13	A.	Yes, we are sponsoring the following addenda:
14	•	Addendum 3-1: Curriculum Vitae of Kenneth Bowes;
15	•	Addendum 3-2: Curriculum Vitae of Kellen Ingalls;
16	•	Addendum 3-3: Curriculum Vitae of Mark Roll;
17	•	Addendum 3-4: Curriculum Vitae of Demetrios Sakellaris;
18	•	Addendum 4-5: Curriculum Vitae of Kristen Trudell;
19	•	Addendum 4-6: Curriculum Vitae of Jason Ross; and
20	•	Addendum 4-7: the Large Generator Interconnection Agreement ("LGIA").
21	Q.	What is the purpose of your testimony?

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1	A.	The purpose of our testimony is to: (1) provide the EFSB with an overview of the Project;
2		(2) explain how the Project satisfies the standard for the EFSB to issue it a license, as set
3		forth in the Advisory Opinions submitted to the EFSB; (3) identify additional information
4		that will be provided by other witnesses addressing certain questions raised in the
5		Advisory Opinions; and (4) respond to the additional questions raised regarding the cost
6		justification for the Project in the Advisory Opinion filed by the Rhode Island PUC and
7		compliance with the Town of North Kingstown noise ordinance in the Town of North
8		Kingstown Planning Commission's Advisory Opinion.
9	Q.	How is your testimony organized?
10	A.	This Section I is the Introduction, which provides an overview of our relevant
11		background. Section II provides an overview of the Project, including a description of
12		the specific components subject to EFSB jurisdiction (described herein as the
13		"Facilities"). Section III identifies the criteria the Project must meet for the issuance of a
14		license from the EFSB, summarizes how the Project satisfies those criteria as reflected in
15		the Advisory Opinions, and identifies the questions raised by the Advisory Opinions
16		information. Section IV addresses the questions regarding cost justification identified in
17		the Advisory Opinion submitted by the Rhode Island PUC. Section V addresses specific
18		questions regarding the Town of North Kingstown Noise Ordinance. Section VI is the
19		Conclusion.

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1	II.	Overview of the Project
2	Q.	What is Revolution Wind?
3	A.	Revolution Wind is a Delaware limited liability company formed to develop, own,
4		operate, and maintain the project components identified in Revolution Wind's application
5		to the EFSB. Revolution Wind is a 50/50 joint venture between wholly-owned
6		subsidiaries of Orsted and Eversource. DWW Rev I, LLC served notice of its name
7		change to Revolution Wind, LLC in October 2020. The name change is administrative
8		only and will have no substantive impact on any Power Purchase Agreement ("PPA")
9		documents previously filed in Rhode Island PUC Docket No. 4929.
10		
11		Orsted is the world's leader in offshore wind development and construction, with decades
12		of experience executing complex capital projects, including the completion of 28 offshore
13		wind projects with an aggregate capacity of 7,600 megawatts.
14		
15		Eversource has established a successful track record in delivering customer value and has
16		demonstrated expertise in constructing, financing, owning, maintaining and
17		decommissioning infrastructure assets for the electric industry. Eversource has invested
18		approximately \$8.0 billion over the past three years on new energy infrastructure in New
19		England.
20	Q.	Are you familiar with Revolution Wind's EFSB application and the Environmental
21		Report submitted in support of the Application?

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1 A. Yes.

2 Q. Can you describe the Project and its benefits?

3 A. Revolution Wind proposes to construct the Project, an offshore wind farm that will 4 deliver approximately 704 megawatts ("MW") of renewable energy to Rhode Island and 5 Connecticut. Revolution Wind developed the Project in direct response to the ambitious 6 clean energy goals of the State of Rhode Island. The Project significantly advances 7 Rhode Island's renewable energy directives set forth in the State energy plan – Energy 8 2035 – which calls for Rhode Island to "increase sector fuel diversity, produce net 9 economic benefits, and reduce greenhouse gas emissions by 45 percent by the year 2035" 10 in part "through support for state and federal offshore wind projects." The Project plays 11 an integral role in advancing Rhode Island's goal of procuring 1,000 MW of renewable 12 energy by 2020 and a 100% Renewable Energy Future by 2030, set forth in former 13 Governor Gina Raimondo's Executive Order No. 20-01. Moreover, the Project meets the 14 State of Rhode Island's needs under the 2021 Act on Climate.

15

16 The Project will provide clean, reliable offshore wind energy that will significantly 17 increase the renewable energy available to Rhode Island and Connecticut and reduce 18 carbon emissions across the region. The Project will displace electricity generated by 19 fossil fuel-powered plants, improve energy system reliability and security, and enhance 20 economic competitiveness by attracting new investments and job growth opportunities. 21 The Project will include both offshore and onshore components. This overview of the

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- Project is set forth at page 3 of the Environmental Report submitted with Revolution 1
- 2 Wind's EFSB Application.

- 3 Q. Please describe the onshore components of the Project.
- 4 The onshore components will consist of: (1) a Landfall Work Area located at Quonset A.
- 5 Business Park in North Kingstown, Rhode Island, which will include two transmission
- 6 joint bays ("TJBs"); (2) two underground transmission circuits (referred to as the
- 7 Onshore Transmission Cable) co-located within a single corridor; (3) a new Onshore
- 8 Substation ("OnSS") and Interconnection Facility ("ICF") located adjacent to the existing
- 9 The Narragansett Electric Company ("TNEC") Davisville Substation - the ICF is an
- 10 expansion of TNEC's existing Davisville Substation; (4) a new Interconnection right-of-
- 11 way ("ROW") connecting the OnSS to the ICF (underground); and (5) an Overhead
- 12 ROW ("TNEC ROW") connecting the ICF to TNEC's Davisville Substation. The
- 13 overhead transmission line is a reconfiguration of existing overhead lines. This overview
- of the onshore components of the Project is set forth at page 4 of the Environmental 14
- 15 Report submitted with Revolution Wind's EFSB Application.
- 16

Please describe the offshore components of the Project. Q.

- 17 The offshore components will consist of (1) up to 100 Wind Turbine Generators A.
- 18 ("WTGs") connected by a network of Inter-Array cables in federal waters; (2) up to two
- 19 Offshore Substations ("OSSs") connected by an OSS-Link Cable in federal waters; and
- 20 (3) up to two submarine export cables, referred to as the Revolution Wind Export Cable
- 21 ("RWEC"), generally co-located within a single corridor within federal and Rhode Island

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1		State Waters. This overview of the offshore components of the Project is set forth at page
2		4 of the Environmental Report submitted with Revolution Wind's EFSB Application.
3	Q.	Please describe the components of the Project that are subject to EFSB jurisdiction?
4	A.	The Project components subject to EFSB jurisdiction include the following: (1) the
5		RWEC-RI, which includes two submarine cables, each measuring up to 23 miles in
6		Rhode Island State Waters; (2) the Landfall Work Area, which totals up to 3.1 acres (1.3
7		hectares) and includes the onshore portion of the RWEC-RI, two underground TJBs for
8		jointing the RWEC-RI to the Onshore Transmission Cable, a portion of the Onshore
9		Transmission Cable, and temporary construction access; (3) an Onshore Transmission
10		Cable that is approximately 1 mile (1.6 kilometers) long; (4) the OnSS with an
11		operational footprint of approximately 4 acres (1.6 hectares); (5) an Interconnection
12		ROW between the OnSS and ICF consisting of two underground transmission lines with
13		a length of up to approximately 519 feet (158.2 m) that will connect the OnSS to the
14		proposed ICF; (6) an ICF that consists of a 115kV ring-bus with an operational footprint
15		of 1.6 acres (0.6 hectares); and (7) the reconfiguration of overhead segments of the
16		existing TNEC Davisville Transmission Tap lines (approximately 122 feet) and new
17		overhead lines approximately 744 feet long between the ICF and the TNEC Davisville
18		Substation on property owned by TNEC proximate to the TNEC Davisville Substation in
19		North Kingstown, Rhode Island. Further details about the EFSB jurisdictional
20		components of the Project are set forth at page 9 of the Environmental Report.

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- 1 Revolution Wind has received its I.3.9 approval from ISO New England, Inc. for all the
- 2 EFSB jurisdictional facilities confirming no significant adverse effect on the reliability or

3 operating characteristics of the transmission facilities.

4 Q. Did Revolution Wind consider alternatives to the proposed Project?

- 5 A. Yes. A full explanation of the alternatives analysis Revolution Wind conducted is set
- 6 forth at sections 2.4 and 5 of the Environmental Report. Revolution Wind also detailed
- 7 the alternatives analysis it performed in the testimony it provided to the Rhode Island
- 8 PUC as part of its Advisory Opinion proceeding.

9 Q. How deep will RWEC-RI be buried?

- A. Revolution Wind will bury the RWEC-RI at a target depth of 4-6 feet below the surface
 of the seabed. The specifics of the offshore cable design and installation process are set
- forth in section 4.4 of the Environmental Report Revolution Wind submitted as part of itsapplication.
- Q. What is the construction method Revolution Wind will use to bring the offshore
 cables onshore at the landfall location?
- 16 A. Revolution Wind will employ the Horizontal Directional Drill ("HDD") construction
- 17 method to bring the cables from offshore to onshore. As Revolution Wind indicated at
- 18 the Preliminary Hearing, Revolution Wind selected the HDD method for the Project
- 19 because geo-technical investigations revealed that a trenchless installation is feasible and
- 20 that fine sediments at landing would, for the alternative method, result in a more
- 21 impactful large open cut footprint.

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Q. Can you summarize the construction and installation of the Onshore Transmission Cable?

3 Yes. The Onshore Transmission Cable will be jointed with the RWEC-RI at the TJBs A. 4 located at the landfall area. The cable will be installed approximately 3-6 feet below 5 ground along a route that traverses approximately 1 mile of public roadways and crosses 6 through one privately owned parking lot. As Revolution Wind explained at the 7 Preliminary Hearing, Revolution Wind chose this Onshore Transmission Cable route 8 because it was the shortest route and would allow for improved traffic management 9 during construction. Additionally, the owners of the private land through which the cable 10 will run have been supportive of the route. The specific details of the construction and installation of the Onshore Transmission Cable are set forth in section 4.3 of the 11 12 Environmental Report. 13 **Q**. Can you summarize the design and construction of the OnSS and the ICF? 14 A. Yes. The details of the design and construction of the OnSS and the ICF are set forth in 15 section 4.2 of the Environmental Report. In summary, the OnSS will be constructed on a 16 parcel adjacent to the existing Davisville Substation owned by TNEC, and the ICF will 17 be between the OnSS and the TNEC Davisville Substation. The underground 18 transmission lines for the Interconnection ROW will interconnect the OnSS with the ICF, and the reconfigured and new overhead transmission lines will interconnection the ICF 19 20 with the TNEC Davisville Substation.

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1	Q.	Does Revolution Wind have a plan for decommissioning the Project at the end of its
2		useful life?
3	A.	A decommissioning application will be submitted to BOEM no later than two years
4		before the expiration of the lease, as required by 30 CFR § 585.905, at which time
5		BOEM will determine what further environmental or technical review may be required
6		under 30 CFR § 585.907. Revolution Wind anticipates that decommissioning will follow
7		the same relative sequence as construction but in reverse.
8	Q.	Will the construction and decommissioning of the Project cause any long term
9		impacts?
10	А.	No. The activity associated with construction and decommissioning of the Project and
11		each of its components will be limited and temporary and, thus, any corresponding
12		impacts will be limited and temporary.
13	III.	Satisfaction of Licensing Criteria
14	Q.	What is your understanding of the standard Revolution Wind must satisfy to obtain
15		a license from the EFSB?
16	А.	We understand that there are five prongs to the standard established by R.I. Gen. Laws \S
17		42-98-11 and Rule 1.13(C) of the EFSB Rules of Practice and Procedure. To satisfy
18		those five prongs Revolution Wind must demonstrate that the Project: (1) is necessary to
19		meet the needs of the state and/or region for energy of the type to be produced; (2) is
20		cost-justified, meaning it can be expected to produce energy at the lowest reasonable cost
21		to the consumer; (3) is consistent with the laws, rules, regulations, and ordinances that

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- 1 would govern it in the absence of EFSB jurisdiction or a waiver of compliance with
- 2 such laws is justified; (4) will not cause unacceptable harm to the environment; and (5)
- 3 will enhance the socio-economic fabric of the state.

4 Q. Has Revolution Wind satisfied these criteria with respect to the Facilities?

- 5 A. Yes. As demonstrated by the Advisory Opinions submitted to the EFSB as requested in
- 6 the EFSB Preliminary Decision and Order (Preliminary Order 149), issued on April 26,
- 7 2021, the Facilities satisfy each of the five prongs of the EFSB standard for issuance of a
- 8 license. Although some of the Advisory Opinions identified certain remaining questions
- 9 to be addressed by the EFSB at the hearing, this testimony, as well as the other pre-filed
- 10 testimony submitted on behalf of Revolution Wind contemporaneously with this
- 11 testimony, addresses those outstanding questions and demonstrates that the Facilities
- 12 satisfy all the necessary criteria for the issuance of a license by the EFSB.
- Q. Can you identify the advisory opinions submitted to the EFSB and subject matters
 covered by each advisory opinion?

A. Yes. The EFSB requested and received nine Advisory Opinions. The agencies that provided Advisory Opinions were:

- The Rhode Island Building Code Commission (the "RI BCC");
- The Rhode Island Historical Preservation and Heritage Commission (the
 "HPHC");
- The North Kingstown Department of Public Works (the "DPW");
- The North Kingstown Planning Commission;

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1	• The Rhode Island Department of Environmental Management ("RIDEM");
2	• The Quonset Development Corporation ("QDC");
3	• The Rhode Island PUC;
4	• The Statewide Planning Program; and
5	• The Rhode Island Department of Health ("RIDOH").
6	
7	Each of these Advisory Opinions addressed specific questions related to the Project's
8	satisfaction of the EFSB licensing criteria.
9	
10	The PUC Advisory Opinion addresses the need for the Project and whether it meets the
11	cost-justification requirement.
12	
13	The Advisory Opinions from QDC, the North Kingstown Planning Commission, the
14	DPW, the RI BCC, and the HPHC each addressed whether the Project is consistent with
15	the state and local laws, rules, regulations, and ordinances that would govern in the
16	absence of EFSB jurisdiction.
17	
18	The Advisory Opinions from RIDEM and RIDOH address whether the Project will cause
19	unacceptable harm to the environment.

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1		The Advisory Opinion from Statewide Planning addresses whether the Project will
2		enhance the socio-economic fabric of the state.
3		A. <u>Project Need and Cost Justification</u>
4	Q.	Are you familiar with the R.I. PUC's Docket No. 5151, Issuance of Advisory
5		Opinion Regarding Revolution Wind's License to Construct?
6	А.	Yes, two of us, Mr. Bowes and Mr. Ingalls, offered testimony in that docket. The PUC
7		initiated the docket in response to the EFSB's Preliminary Order 149 requesting an
8		Advisory Opinion from the PUC.
9	Q.	On what topics did the EFSB request the PUC issue an advisory opinion?
10	А.	The EFSB requested that the PUC provide an Advisory Opinion with respect to (1) the
11		need for the proposed Project components subject to EFSB jurisdiction, and (2) whether
12		the Facilities are expected to transmit energy from the offshore generating source of the
13		Project to the mainland at the lowest reasonable cost to the consumer consistent with the
14		objective of ensuring that the construction and operation of the Facilities will be
15		accomplished in compliance with all of the requirements of the laws, rules, and
16		regulations. The EFSB requested that the PUC specifically take into account the PUC's
17		prior approval of the PPA in Docket No. 4929 and consider (a) the need for the Facilities
18		to connect the proposed offshore generating components of the Project to the onshore
19		electric transmission grid and (b) the extent to which there is any additional cost impact
20		to consumers related to the Project that would be incurred outside of the cost to
21		consumers already embedded in the PPA.

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1	Q.	Did any other agencies participate in the PUC docket?
2	A.	Yes. The Office of Energy Resources ("OER") and the Division of Public Utilities and
3		Carriers (the "Division") participated in the docket. OER offered testimony to the PUC,
4		and the Division provided an Advisory Opinion.
5	Q.	What did the PUC conclude with respect to the need for the Facilities?
6	A.	The PUC concluded that the "issue of the specific need for the [jurisdictional components
7		of the Project] was an uncontested subject in this matter." Revolution Wind submitted
8		testimony in support of the need for the Facilities, and both OER and the Division
9		concluded that there was a need for them. The Division concluded that the PUC's
10		"previous approval of the PPA in Docket 4929 was tantamount to a determination that
11		there is a need for the generating facility which in turn creates the need for the proposed
12		transmission facilities to transmit the power from the offshore windfarm to the regional
13		electric transmission system." OER concluded that the jurisdictional components of the
14		Project are "necessary to deliver the zero-emission electricity and associated market
15		products, including environmental attributes, from the offshore wind generating units to
16		the mainland electrical grid."
17	Q.	Please explain briefly how the Project meets a need for energy of the type to be
18		generated in Rhode Island and the region.
19	A.	As explained in greater detail in Revolution Wind's application to the EFSB and in our
20		testimony to the PUC, Revolution Wind developed the Project in direct response to the
21		expressed needs of the States of Rhode Island and Connecticut to increase the renewable

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1		energy load serving each state. The State of Rhode Island and the entire New England
2		region have established a commitment to securing an energy future driven by renewable
3		resources. Specific to the Project, Rhode Island and Connecticut have statutory
4		requirements for utilities in their states to procure significant volumes of clean energy to
5		achieve that goal, and the regulatory authorities in both states have approved PPAs for
6		energy to be generated by the Project. The Project, therefore, meets the "need"
7		requirement for two reasons: (1) it will provide substantial amounts of energy to meet the
8		expected demand of customers in Rhode Island and Connecticut, and (2) it will provide
9		clean energy from renewable resources that is necessary for Rhode Island and
10		Connecticut to meet their renewable energy goals.
11	Q.	Did the PUC evaluate whether the Project satisfies the cost-justification
11 12	Q.	Did the PUC evaluate whether the Project satisfies the cost-justification requirement?
11 12 13	Q. A.	Did the PUC evaluate whether the Project satisfies the cost-justificationrequirement?Yes. The PUC considered specifically whether the Project is cost-justified, including the
11 12 13 14	Q. A.	Did the PUC evaluate whether the Project satisfies the cost-justification requirement? Yes. The PUC considered specifically whether the Project is cost-justified, including the extent to which there is any additional cost impact to consumers related to the Project that
11 12 13 14 15	Q. A.	Did the PUC evaluate whether the Project satisfies the cost-justification requirement? Yes. The PUC considered specifically whether the Project is cost-justified, including the extent to which there is any additional cost impact to consumers related to the Project that would be incurred outside of the costs already embedded in the PPA.
11 12 13 14 15 16	Q. A. Q.	Did the PUC evaluate whether the Project satisfies the cost-justificationrequirement?Yes. The PUC considered specifically whether the Project is cost-justified, including theextent to which there is any additional cost impact to consumers related to the Project thatwould be incurred outside of the costs already embedded in the PPA.What did the PUC conclude with respect to whether the Project is cost-justified?
 11 12 13 14 15 16 17 	Q. A. Q. A.	Did the PUC evaluate whether the Project satisfies the cost-justificationrequirement?Yes. The PUC considered specifically whether the Project is cost-justified, including theextent to which there is any additional cost impact to consumers related to the Project thatwould be incurred outside of the costs already embedded in the PPA.What did the PUC conclude with respect to whether the Project is cost-justified?The PUC concluded that the Project is cost-justified, meaning that it is "expected to
 11 12 13 14 15 16 17 18 	Q. A. Q. A.	Did the PUC evaluate whether the Project satisfies the cost-justificationrequirement?Yes. The PUC considered specifically whether the Project is cost-justified, including theextent to which there is any additional cost impact to consumers related to the Project thatwould be incurred outside of the costs already embedded in the PPA.What did the PUC conclude with respect to whether the Project is cost-justified?The PUC concluded that the Project is cost-justified, meaning that it is "expected totransmit energy from the offshore generating source of the Project to the mainland at the
 11 12 13 14 15 16 17 18 19 	Q. A. Q. A.	Did the PUC evaluate whether the Project satisfies the cost-justificationrequirement?Yes. The PUC considered specifically whether the Project is cost-justified, including theextent to which there is any additional cost impact to consumers related to the Project thatwould be incurred outside of the costs already embedded in the PPA.What did the PUC conclude with respect to whether the Project is cost-justified?The PUC concluded that the Project is cost-justified, meaning that it is "expected totransmit energy from the offshore generating source of the Project to the mainland at thelowest reasonable cost to the consumer."

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1	A.	The PUC took into consideration its prior approval of the PPA. Further, both the Division
2		and OER concluded that Revolution Wind will bear all costs for the Project through the
3		PPA and that, to their knowledge, Rhode Island ratepayers will not incur any additional
4		costs beyond those embedded in the PPA. Mr. Bowes and Mr. Ingalls testified that
5		Revolution Wind has responsibility for all costs to develop the Project and that there will
6		be no additional costs to Rhode Island ratepayers other than those embedded in the PPA,
7		which was competitively bid and selected.
8		
9		A witness for TNEC also testified that it will not incur any construction or operations and
10		maintenance costs that are not borne by Revolution Wind. Although TNEC will own
11		portions of the Project located adjacent to the existing TNEC Davisville Substation and
12		will have responsibility for maintenance and repairs of those Facilities, Revolution Wind
13		will reimburse National Grid for those costs.
14	Q.	What did the PUC conclude with respect to whether there is any additional cost
15		impact to consumers related to the Facilities that would be incurred outside of the
16		cost to consumers already embedded in the PPA?
17	A.	The PUC concluded that "the risks associated with the cost of the Facilities are borne
18		exclusively by Revolution Wind."
19	Q.	On what did the PUC base this conclusion?
20	A.	Revolution Wind will have responsibility for construction, ongoing operation and
21		maintenance, and potential decommissioning costs. Although TNEC is responsible for

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1		operation and maintenance of certain portions of the Project it will own adjacent to the
2		existing TNEC Davisville Substation—specifically the ICF and the transmission
3		connection from that facility to the TNEC Davisville Substation-Revolution Wind is
4		responsible for those costs pursuant to a Large Generator Interconnection Agreement
5		("LGIA") entered into by Revolution Wind, New England Power Company d/b/a
6		National Grid, and ISO New England, Inc These operations and maintenance costs
7		consist of actual costs and imputed costs, which are based on the LGIA and calculated
8		pursuant to Schedule 21 - New England Power, Direct Assignment Facilities Charge, of
9		the ISO-New England, Inc. Open Access Transmission Tariff.
10		
11		With respect to decommissioning, Revolution Wind is responsible for all
12		decommissioning costs of the facilities owned by Revolution Wind. Pursuant to the
13		federal permitting process, Revolution Wind must submit a decommissioning plan and
14		post a bond. Pursuant to the LGIA, Revolution Wind is responsible for all
15		decommissioning costs of the portions of the Project owned by TNEC.
16	Q.	Did the PUC raise any questions associated with its conclusion that the Project will
17		not have any additional cost impact to Rhode Island consumers?
18	A.	The PUC noted that at the time of its Advisory Opinion, the LGIA had not been executed.
19		The PUC recommended that the EFSB review the LGIA once executed to confirm the
20		parties' representations. Additionally, the PUC noted that the ongoing operations and
21		maintenance charges for which Revolution Wind will be responsible are based on a

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1		formula rate and will not reflect actual costs for operation and maintenance of TNEC
2		facilities. Section IV of this testimony addresses these questions.
3		B. <u>Compliance with State and Local Laws Rules, Regulations, and Ordinances</u>
4	Q.	What are the state and local laws, rules, regulations and ordinances applicable to
5		the Project?
6	A.	The following bodies of law include requirements applicable to the Project: (1) the QDC
7		regulations; (2) the Town of North Kingstown ordinances; (3) the RI BCC's
8		requirements; and (4) the Rhode Island HPHC requirements. Additionally, RIDEM and
9		the Rhode Island Coastal Resources Management Council ("CRMC") have rules and
10		regulations applicable to the Project. The CRMC rules and regulations and certain of the
11		RIDEM requirements are not part of the EFSB licensing process.
12	Q.	Which portions of the Project are subject to QDC regulations?
13	A.	Three portions of the Project are located within the Quonset Business Park, including the
14		underground transmission cables, OnSS and ICF. These portions of the Project required
15		review by the QDC to assess whether they are in compliance with those regulations or
16		whether any waiver from QDC requirements would be appropriate.
17	Q.	What does the QDC evaluate in determining whether the relevant portions of the
18		Project meet its requirements?
19	A.	Under the Quonset Business Park Development Package (the "Development Package"),
20		the QDC is required to evaluate the Project's development plan for consistency with the
21		objectives of the Development Package.

1	Q.	Has the QDC determined whether the Project's development plan meets its
2		requirements?
3	A.	Yes. The QDC, after review by its Technical Review Committee, and with review by the
4		Town of North Kingstown, determined in its joint Advisory Opinion with the Town of
5		North Kingstown, dated August 23, 2021 (the "QDC Advisory Opinion") that Revolution
6		Wind's plans are consistent with the Development Package, and advised that the QDC
7		concurs that the Project is consistent with the plans.
8	Q.	Will any variances be necessary?
9	A.	No. The QDC has determined in the QDC Advisory Opinion that no variances will be
10		necessary for the Project.
11	Q.	Will any further QDC review or approval be required for the Project?
12	A.	Yes. Although the QDC has no objections to the location of the onshore transmission
13		cable route, Revolution Wind will submit final drawings for the substations and the
14		underground cables for the QDC to review to ensure the Project remains consistent with
15		regulations and no variance is required.
16	Q.	In addition to plan specifications for the OnSS and the ICF, what other information
17		did Revolution Wind submit to the QDC?
18	A.	Revolution Wind submitted the requisite Environmental Review and Socioeconomic
19		Review information to the QDC, which the QDC will forward to other relevant agencies.
20	Q.	Has the QDC determined whether the Project is subject to any other local
21		regulations? If so, which ones?

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1	A.	Yes. The QDC Advisory Opinion determined that the development and construction
2		activity that will occur within Camp Avenue is subject to the Town of North Kingstown's
3		Noise Ordinance. The QDC deferred to the Town's Advisory Opinion on that issue.
4		The QDC also determined that the Project is subject to Rhode Island's Soil Erosion and
5		Sediment Control Handbook (the "Handbook"). The QDC Advisory Opinion determined
6		that the Project's Erosion and Sediment Control Plan for the OnSS and ICF is consistent
7		with the Handbook. The QDC will review the Erosion and Sediment Control Plan for the
8		underground transmission cable installation once available to ensure compliance with the
9		Handbook.
10	Q.	Did the QDC determine whether any other necessary items were outstanding for
11		Project review?
12	A.	Yes. The QDC Advisory Opinion stated that Revolution Wind is required to submit
13		traffic control plans to the appropriate regulatory entity for approval prior to construction
14		within the Quonset Business District and in the vicinity of Camp Avenue. Revolution
15		Wind also must submit a Construction Operations Plan to the Town and QDC addressing
16		measures to be taken to address noise and other potential impacts to surrounding area.
17		Revolution Wind will submit these plans.
18	Q.	Which permits or approvals are required for the Project to comply with the Town's
19		requirements?

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1	А.	The Town was involved in the QDC's Development Plan Review, review of
2		requirements relative to excavation permits, and review of requirements relative to noise
3		ordinances.
4	Q.	What involvement did the Town have in the QDC review?
5	A.	The Town, along with the QDC, reviewed the Project's plan and issued a joint Advisory
6		Opinion, discussed above, dated August 23, 2021, advising that the Project plans are
7		acceptable.
8	Q.	Is any excavation permit required for the Project?
9	A.	Yes. The Town's ordinances require that any excavation in the Town right-of-way obtain
10		an excavation permit.
11	Q.	Has the Town determined whether the Project meets the requirements for an
12		excavation permit?
13	A.	Yes. In an Advisory Opinion dated July 19, 2021, the Town of North Kingstown
14		Department of Public Works stated that the potential impact of the Project on traffic and
15		road conditions would be temporary, mitigated by police details and signage to manage
16		traffic, which would be stipulated in the permit. The impact of the long-term operation of
17		the Project would be negligible because it is underground. Therefore, the Department of
18		Public Works stated that it did not foresee any issues with the Project.
19	Q.	Are the Town's Noise Ordinances applicable to the Project?
20	A.	Yes. Section V of this testimony addresses the Town's Noise Ordinance.
21	Q.	Does the Project require building approval from the State Building Office?

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- 1 A. Yes.
- 2 Q. Which portions of the Project require approval from the State Building Office?
- 3 A. The OnSS and ICF require approval from the Building Code Commission within the

4 State Building Office.

- 5 Q. Has Revolution Wind submitted its site plans to the State Building Office?
- 6 A. Yes. Revolution Wind submitted site plans for the construction of an OnSS to be located
- 7 at 594 Camp Avenue, North Kingstown, and an ICF to be located at 109 Circuit Drive,
- 8 North Kingstown to the State Building Office on June 21, 2021.
- 9 Q. Has the State Building Office determined whether the site plans meet the
- 10 requirements of the applicable Rhode Island State Building Codes and Standards?
- 11 A. Yes. In an Advisory Opinion dated August 12, 2021, the State Building Office
- 12 determined, after reviewing the site plans, that the Project meets all applicable
- 13 requirements and no variances are required for building permit approvals. The State
- 14 Building Office stated that it supports the Project. Revolution Wind will submit its final
- 15 plans in support of its permit application.
- Q. What did HPHC conclude about the Project's potential impacts on cultural
 resources?
- 17 resources?
- 18 A. As described in the HPHC Advisory Opinion issued on August 20, 2021 (the "HPHC
- 19 Advisory Opinion"), HPHC is reviewing the Project under Section 106 of the National
- 20 Historic Preservation Act ("NHPA") for impacts to archaeological and above-ground
- 21 cultural resources. Although HPHC's review under Section 106 of the NHPA is ongoing,
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- 1 HPHC expressly stated that it has "no objection to the [EFSB] granting any required
- 2 approval or exception." Additional detail regarding Revolution Wind's efforts regarding
- 3 cultural resources is set forth in the Pre-Filed Direct Testimony of Mark Roll, Mark
- 4 Gardella, and Dan Forrest.
- 5 C. <u>Environmental Impact</u>

6 Q. Has Revolution Wind satisfied the requirement that the Project will not cause
7 unacceptable harm to the environment?

8 A. Yes.

9 Q. How has Revolution Wind satisfied this requirement?

10 A. Revolution Wind has taken great care to make decisions about the Project that minimize 11 environmental impacts. As reflected by the Advisory Opinion issued by RIDOH on June 12 25, 2021, the project "does not have anticipated human health consequences." Further, as 13 reflected by the Advisory Opinion issued by RIDEM on August 26, 2021, the Project is subject to several permitting requirements exempted from the EFSB process, and the 14 question of whether the Project will cause unacceptable harm to the environment will 15 16 turn on whether those separate permits are issued. As of the date of RIDEM's Advisory 17 Opinion, RIDEM indicated that "it appears that it is possible for the Applicant to meet its regulatory burden for each permit." Although it is not predetermined, Revolution Wind 18 19 expects that it will receive all the necessary environmental permits outside the EFSB 20 process.

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1	Q.	Did RIDOH and/or RIDEM raise any questions in their Advisory Opinions about
2		the Project and its potential impacts on the environment?
3	A.	Yes.
4		
5		Although not raising any concerns, the RIDOH and RIDEM Advisory Opinions inquired
6		about electric and magnetic fields. Revolution Wind addresses those questions in the
7		Pre-Filed Direct Testimony of Kenneth Bowes, Demetrios Sakellaris, William Bailey,
8		and Katherine Palmquist.
9		
10		The RIDEM Advisory Opinion also raised questions related to various potential
11		environmental impacts to plant and animal life in the area of the Project. Revolution
12		Wind addresses those questions in the Pre-Filed Direct Testimony of Mark Roll, Mark
13		Gardella, Laura Morse, Susan Moberg, M. Wing Goodale, and Drew Carey.
14	Q.	Are there any other environmental factors Revolution Wind wishes to address?
15	A.	Yes. Revolution Wind further discusses other environmental factors in the Pre-Filed
16		Direct Testimony of Mark Roll, Mark Gardella, Laura Morse, Susan Moberg, M. Wing
17		Goodale, and Drew Carey. Additionally, although not specifically raised as a concern by
18		any of the agencies charged with issuing an Advisory Opinion to the EFSB, Revolution
19		Wind took great care to ensure that the visual impact of the Project is minimal.
20		Revolution Wind discusses those efforts in the Pre-Filed Direct Testimony of Kenneth
21		Bowes and Gordon Perkins.

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Socioeconomic Impact 1 D. 2 **Q**. What are the criteria to be addressed in evaluating whether the Project satisfies the 3 criteria that it will enhance the socioeconomic fabric of the state? 4 A. The key analyses are the economic benefits the Project will bring to the State of Rhode 5 Island and the Project's consistency with state policy and energy goals, including the 6 State's energy plan, *Energy 2035*, and the 2021 Act on Climate. 7 Q. Has Revolution Wind demonstrated that the Project will enhance the socioeconomic 8 fabric of the state? 9 Yes. As reflected in the Advisory Opinion issued by the Statewide Planning Program in A. 10 the Division of Statewide Planning of the Rhode Island Department of Administration ("Statewide Planning") on August 26, 2021, the Project is consistent with the State Guide 11 12 Plan generally, and specifically *Energy 2035*. Further, Statewide Planning concluded that 13 the Project will have "an overall positive socio-economic impact." 14 Q. Please describe what impact, if any, the Project will have on the State from a 15 societal and economic standpoint. 16 As demonstrated by the information submitted in support of the Application, and A. 17 supported by the findings of Statewide Planning's Advisory Opinion, the Project will have a positive impact on the socio-economic fabric of the State. It will reduce energy 18 prices and lower electricity costs for consumers. It will benefit businesses by creating 19 20 hundreds of construction jobs and dozens of jobs during operations. Indirect jobs also 21 will be created by the Project. A study commissioned by the Rhode Island Department of Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios Sakellaris, Kristen Trudell, and Jason Ross September 17, 2021 Page 31 of 43

1		Commerce estimates that the Project will result in a one-time increase of more than \$282
2		million in the state's Gross Domestic Product ("GDP") during the three-year construction
3		period and, once operational, the Project will yield more than \$8 million in the state's
4		annual GDP.
5		
6		In addition, the Project will add revenue to the state through the payment of state income
7		tax, state sales/use tax, and state payroll tax. Municipal revenue will also increase.
8		
9		The Project will not create any significant population changes in the Town of North
10		Kingstown and will not unfairly impact federally protected populations. No significant
11		impacts to the number of housing units that are within the Town of North Kingstown will
12		result from the Project.
13	Q.	Describe whether the Project is consistent with the Energy 2035: Rhode Island
14		State Energy Plan.
15	A.	Yes. The Project is consistent with Energy 2035: Rhode Island State Energy Plan. As
16		reflected in the PUC's Advisory Opinion, the Project is needed and cost-justified.
17		Further, as described in the Statewide Planning Advisory Opinion, with the assistance of
18		the Rhode Island OER, the Project will advance goals of: (a) increasing fuel diversity, (b)
19		enhancing electric system resiliency, (c) lessening exposure to winter fuel price and
20		supply volatility, (d) decreasing dependence on foreign energy imports and production
21		constraints, (e) not causing incremental costs to local ratepayers, (f) reducing greenhouse

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1		gas emissions, and (g) creating significant economic development through increased
2		government revenue, infrastructure investments and job growth.
3	Q.	Is the Project consistent and in compliance with the other state guide plans?
4	A.	Yes.
5	Q.	Please explain how.
6	A:	As described in the Statewide Planning Advisory Opinion, there are numerous state guide
7		plans applicable here, and Revolution Wind is pleased to say that the Project is consistent
8		and compliant with each one as set forth below:
9		1. Land Use 2025: Rhode Island's State Land Use Policies & Plan
10		i. The Project is consistent because:
11		a. It is located within Quonset Business Park and will connect to and be co-
12		located with the existing Davisville Substation;
13		b. It does not displace or negatively impact existing land uses;
14		c. Its location within the Quonset Business Park will preserve distinction
15		between urban and rural centers;
16		d. Advances goals of achieving a vibrant sustainable economy and providing
17		abundant economic opportunities
18		2. Rhode Island Rising: A Plan for People, Places and Prosperity
19		i. The Project is consistent because:
20		a. It advances State's resilience and competitiveness; and

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1	b. This guide plan recognizes that economic development requires a reliable
2	energy infrastructure providing energy at competitive costs over the short-
3	term as well as the potential for long-term economic benefits resulting
4	from the development of sustainable, clean, and renewable energy
5	systems, which the Project provides.
6	3. Housing Plan
7	i. The Project is consistent because:
8	a. It is sited in industrial zone; and
9	b. It will not make the view significantly different from that of the existing
10	substation and facilities.
11	4. State Historical Preservation Plan
12	i. The Project is consistent as noted in the HPHC Advisory Opinion
13	5. Ocean State Outdoors: Rhode Island's Comprehensive Outdoor Recreation Plan
14	i. The Project is consistent because:
15	a. All proposed work occurs within existing developed urban land uses and
16	utility rights-of-way in Quonset Business Park; and
17	b. It will have minimal to no impact on recreational resources
18	6. A Greener Path Greenspace & Greenways for Rhode Island's Future
19	i. The Project is consistent because:
20	a. All proposed work occurs within existing developed urban land uses and
21	utility rights-of-way in Quonset Business Park; and

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1	b. It will not impact habitats and the environment as described more fully in
2	the Pre-Filed Direct Testimony of Mark Roll, Mark Gardella, Laura
3	Morse, Susan Moberg, and Drew Carey.
4	7. Forest Resources Management Plan
5	i. The Project is consistent because only a small amount of forested land will be
6	cleared.
7	8. Urban and Community Forestry Plan
8	i. The Project is consistent because wind energy lessens the need for other types
9	of energy, like solar, that can require greater deforestation.
10	9. Moving Forward RI 2040: Long-Range Transportation Plan
11	i. The Project is consistent because it will not create a significant increase to
12	local traffic volume on public roads.
13	10. Waterborne Transportation Plan
14	i. The Project is consistent because it will have no impact to navigation safety, as
15	the cables are targeted to be buried to sufficient depth in Rhode Island waters.
16	11. Rhode Island Water 2030
17	i. The Project is consistent because it will create no impacts to surface waters.
18	12. Water Quality 2035
19	i. The Project is consistent because it will obtain the required permits relating to
20	water quality from RIDEM as described more fully in the Pre-Filed Direct

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1		Testimony of Mark Roll, Mark Gardella, Laura Morse, Susan Moberg, M.
2		Wing Goodale, and Drew Carey.
3	Q.	Finally, please describe if the Project is consistent with the Resilient Rhode Island
4		Act and the Act on Climate.
5	A.	Yes, the Project is consistent with both of those acts. As reflected by the analysis in the
6		Statewide Planning Advisory Opinion, prepared with the support of OER, the Project
7		contains necessary transmission and interconnection facilities for carbon-free power.
8		Moreover, Rhode Island is unlikely to meet its goal of 100% renewable energy by 2030
9		without the Project.
10	IV.	Response to Cost-Justification Questions from PUC Advisory Opinion
11	Q.	Has Revolution Wind considered the questions the PUC raised in its advisory
12		opinion regarding cost-justification of the Project?
13	A.	
		Yes. Revolution Wind has considered the PUC's request that the EFSB review the
14		Yes. Revolution Wind has considered the PUC's request that the EFSB review the executed LGIA to confirm the representations made regarding cost responsibility.
14 15		Yes. Revolution Wind has considered the PUC's request that the EFSB review the executed LGIA to confirm the representations made regarding cost responsibility. Revolution Wind also has evaluated the PUC's observation that the formula rate for the
14 15 16		Yes. Revolution Wind has considered the PUC's request that the EFSB review the executed LGIA to confirm the representations made regarding cost responsibility. Revolution Wind also has evaluated the PUC's observation that the formula rate for the calculation of operations and maintenance expenses for TNEC-owned facilities will not
14 15 16 17		Yes. Revolution Wind has considered the PUC's request that the EFSB review the executed LGIA to confirm the representations made regarding cost responsibility. Revolution Wind also has evaluated the PUC's observation that the formula rate for the calculation of operations and maintenance expenses for TNEC-owned facilities will not necessarily reflect actual costs.
14 15 16 17 18	Q.	 Yes. Revolution Wind has considered the PUC's request that the EFSB review the executed LGIA to confirm the representations made regarding cost responsibility. Revolution Wind also has evaluated the PUC's observation that the formula rate for the calculation of operations and maintenance expenses for TNEC-owned facilities will not necessarily reflect actual costs. With respect to the PUC's question regarding the LGIA, have the parties now fully

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1	A.	Yes. Revolution Wind, New England Power Company d/b/a National Grid, and ISO New
2		England have executed the LGIA. A copy of the fully executed confidential LGIA is
3		attached hereto as Confidential Addendum 3-7.
4	Q.	What does the LGIA state with respect to responsibility for costs associated with the
5		operations and maintenance of the portions of the Facilities owned to be owned by
6		TNEC?
7	A.	The LGIA confirms that Revolution Wind is responsible for all costs of operating and
8		maintaining the portions of the Facilities owned by TNEC, which costs will be
9		determined by the ISO-NE Tariff, and calculated pursuant to Schedule 21 – New England
10		Power Company.
11	Q.	What does the LGIA state with respect to responsibility for costs associated with
12		any necessary repairs or replacements of the portions of the Facilities that will be
13		owned by TNEC?
14	A.	The LGIA confirms that Revolution Wind is responsible for all costs of necessary repairs
15		or replacements of the portions of the Facilities owned by TNEC.
16	Q.	What question did the PUC raise regarding the formula rate that TNEC will use to
17		charge Revolution Wind for ongoing operations and maintenance of TNEC-owned
18		Facilities?
19	A.	The PUC noted that Revolution Wind will pay TNEC for ongoing operations and
20		maintenance of the components owned by TNEC pursuant to the formula established in
21		the Schedule 21 – New England Power Company, Direct Assignment Facilities Charge of

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1		the ISO-New England Inc. Open Access Transmission Tariff. Because the charge to
2		Revolution Wind is based on a formula, and not actual expenses incurred by TNEC, the
3		PUC noted that Revolution Wind's charge in any year could theoretically be higher or
4		lower than actual expenses.
5	Q.	How does Revolution Wind respond to this possibility?
6	A.	Revolution Wind understands and recognizes that it will be paying for operations and
7		maintenance costs based on a formula rate that may differ from actual expenses and
8		accepts responsibility for the charges it will receive as calculated by the approved Federal
9		Energy Regulatory Commission formula rate.
10	V.	Additional Information Regarding the Town of North Kingstown Noise Ordinance
11	Q.	Has the Town issued an opinion as to whether the Project complies with the Town's
12		Noise Ordinance?
13	A.	The Town Planning Commission issued an Advisory Opinion dated August 20, 2021 (the
14		"Town Advisory Opinion"), in which it did not issue an opinion as to whether the Project
15		complies with relevant Noise Ordinance, but sought additional information relative to the
16		Project's sound implications.
17	Q.	Will the Project comply with the Town's Noise Ordinance?
18	A.	Yes. The Project's construction noise activities that occur between 7:00 a.m. and 9:00
19		p.m. are exempt under the Town's Noise Ordinance. Section 8-85(9) expressly exempts
20		from the Noise Ordinance requirements the "emission of sound relative to permitted
21		construction and demolition activities, provided such activity does not occur between the

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1	hours of 9:00 p.m. and 7:00 a.m." Because the Project's approved construction activities
2	of the cofferdam (if used), HDD casing, HDD site preparation, Onshore Transmission
3	Cable, OnSS, and ICF will occur between 7:00 a.m. and 6:00 p.m. on weekdays and 7:00
4	a.m. and 5:00 p.m. on Saturdays, the Town's Noise Ordinance does not apply to these
5	phases of the Project's construction.
6	
7	The Town's Noise Ordinance, Section 8-93(a) expressly prohibits the "construction,
8	drilling or demolition work or in preventive maintenance work for public service utilities
9	between the hours of 6:00 p.m. and 7:00 a.m. in any manner that creates a <i>noise</i>
10	disturbance, as defined in section 8-84, across a residential real property boundary or
11	within a noise sensitive area." (Emphasis added.) Because HDD construction and
12	construction of the onshore portion of the RWEC-RI may occur between 6:00 p.m. and
13	7:00 a.m., the Town's Noise Ordinance applies to HDD and cable installation activities in
14	regard to the potential to cause a noise disturbance. The Town's Noise Ordinance,
15	Section 8-84, expressly defines a noise disturbance as "any sound that: (1) Injures or
16	endangers the safety or health of humans, (2) Annoys or disturbs a reasonable person of
17	normal sensitivities, or (3) Endangers or injures personal or real property." The Town's
18	Noise Ordinance applies to post-construction, operational sound.
19	
20	The Project's operational sound will comply with the Town's Noise Ordinance. The only
21	sound-emitting components of the Project are the OnSS and two line traps associated

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1		with the ICF. Operational sound at residential property lines is limited by the Noise
2		Ordinance Section 8(87) to 50 dBA at night, and 60 dBA during the day, and 70 dBA at
3		all times in industrial areas. The Town's Noise Ordinance, Section 8-86 expressly
4		prohibits "any noise disturbances as defined in this article or any noise in excess of the
5		limits for such noise established in this article." See Environmental Report at pp. 224-27.
6		Operational sound for the Project will be below 50 dBA at the nearest residential property
7		lines and below 70 dBA at nearest commercial/industrial property lines. These levels are
8		compliant with the Town's Noise Ordinance restrictions, which, in addition to the
9		prescribed limits, prohibits sound that would injure humans or property, or annoy or
10		disturb a person of normal sensitivities. See Environmental Report. P. 180.
11	Q.	Will the Project comply with the Town's Noise Ordinance during construction?
12	A.	Yes. Because the Project's approved construction activities of the cofferdam (if used),
13		HDD casing, HDD site preparation, Onshore Transmission Cable, and OnSS and ICF
14		will occur between 7:00 a.m. and 6:00 p.m. on weekdays and 7:00 a.m. and 5:00 p.m. on
15		Saturdays, the Town's Noise Ordinance does not apply to these construction activities
16		and the Project complies with the Town Ordinance.
17		
18		See Environmental Report at pp. 218-24. HDD activities may occur between 6:00 p.m.

20 defined in the Town's Noise Ordinance. The Town's Noise Ordinance, Section 8-84,

and 7:00 a.m., construction noise was assessed in regard to potential noise disturbance as

19

21 expressly defines a *noise disturbance* as "any sound that; 1) Injures or endangers the

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1		safety or health of humans, (2) Annoys or disturbs a reasonable person of normal
2		sensitivities, or (3) Endangers or injures personal or real property." See Environmental
3		Report at p. 180. To address the Town's Noise Ordinance's qualitative definition of a
4		potential noise disturbance, the Project identified the United States Occupational Safety
5		and Health Administration thresholds of a sustained sound level of 85 dBA for 8 hours or
6		longer as a threshold that may cause potential injury to humans and identified that
7		construction noise at lower levels may cause annoyance or disturbance. See
8		Environmental Report at p.219-20. Construction noise from HDD activities that may
9		occur between 6:00 p.m. and 7:00 a.m. will be up to 43 dBA at Blue Beach and up to 36
10		dBA at the closest residential receptors. Construction noise from HDD activities will be
11		below existing measured ambient conditions (44 dBA at night) which would not be
12		expected to cause annoyance or disturbance or cause a significant adverse noise impact.
13		Therefore, HDD construction activities will be well below the OSHA noise threshold,
14		will be below ambient nighttime noise levels, and are not expected to cause a noise
15		disturbance. As such, all of the Project's construction activities will comply with the
16		Town's Noise Ordinance.
17	Q.	What additional information has the Town requested relative to determining
18		compliance with its Noise Ordinance?
19	A.	The Town Advisory Opinion stated that it seeks additional information regarding the
20		methodology used in Revolution Wind's collection of baseline ambient sound data

21 including the type of noise meter, calibration, time, duration, and frequency of data

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- collection, randomness of data collection, whether data collected is representative of the
 entire area, and how it was incorporated into the analysis.
- 3

4 Measurements were conducted using sound level meters certified to have Type I accuracy 5 according to the ANSI S1.4 "Specifications for Sound Level Meters." Larson Davis 6 model 831 and model LxT sound level meters were utilized. The sound level meters were 7 calibrated in the field prior to and after the measurements and by a laboratory traceable to 8 the National Institute of Standards and Technology within one year of the field 9 measurements. The measurements included overall A-weighted sound levels and one-10 third-octave band sound levels, which provide information on the frequency content (i.e., 11 low or high-pitched) character of sound. Data collection included one-second time 12 histories of all sound level metrics and hourly interval summaries of the minimum, 13 maximum, percentile values (L01, L10, L33, L50, L90, and L99), and the energy-average sound level (Leq). Atmospheric observations of wind speed, wind direction, air 14 temperature, precipitation, barometric pressure and sky conditions were made in the field 15 16 and from a nearby weather station (data accessible online). See Environmental report 17 p.181-5. Ambient sound measurements were conducted at three sites near the OnSS and 18 the Landfall Work Area from August 27 to August 31, 2019 (see Environmental Report 19 Figure 7-2). The ambient measurements were conducted for four consecutive days at 20 each location. The two measurement locations on the OnSS Site are at similar proximities 21 to existing sources of noise (*i.e.*, traffic on Camp Avenue and Roger Williams Way) as

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1	nearby residential receptors on Camp Avenue, Cattail lane, Brook View Drive, and
2	Gateway Road. The measurement at Blue Beach is at a similar proximity to existing
3	sources of noise (i.e., natural sources and ocean waves) as nearby residential receptors on
4	Middle Street and Sauga Avenue.
5	
6	The ambient sound measurement data were evaluated, and observations were made to
7	determine that there was significant sound from insects present during the nighttime
8	period. Sound from the insects caused nighttime sound levels to be up to 6 dBA higher
9	than they would be without insects. Since insect noise is a seasonal occurrence and is not
10	always present, they have been filtered out of the sound measurement results to provide
11	results which are representative of the periods throughout the year when insect noise is
12	not as prevalent. See Environmental Report pp. 219-20. Ambient sound measurement
13	results are used in the assessment of potential nighttime construction noise impact by
14	comparing construction noise levels to existing ambient sound levels.
15	
16	The Town Advisory Opinion stated that it seeks information on noise mitigation efforts
17	and requests a noise monitoring and mitigation plan. The Project, however, will comply
18	with the Town's Noise Ordinance during construction and during post-construction
19	operations without noise mitigation, and, therefore, a noise monitoring and mitigation
20	plan is not proposed.

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1 VI. <u>Conclusion</u>

2 Q. Please summarize Revolution Wind's position on how the Project satisfies the

3

standard for receiving an EFSB license.

- 4 A. Revolution Wind has demonstrated that the Project is: (1) needed to deliver the
- 5 renewable wind energy necessary for Rhode Island and the region to meet its renewable
- 6 energy and carbon reduction goals; (2) is cost-justified; (3) is consistent with state and
- 7 local laws; (4) will not cause unacceptable harm to the environment; and (5) will enhance
- 8 the socio-economic fabric of Rhode Island. Revolution Wind's satisfaction of these
- 9 criteria is demonstrated through the Advisory Opinions submitted by each of the agencies
- 10 identified by the EFSB. Each of the Advisory Opinions was supportive of the Project,
- 11 and Revolution Wind has addressed all questions raised in the Advisory Opinions
- 12 through this testimony and the other testimony submitted on behalf of Revolution Wind.
- 13 Q. Does this conclude your testimony?
- 14 A. Yes.





Kenneth Bowes

Vice President, Siting & Permitting

Kenneth Bowes is Vice President, Offshore Wind Siting & Permitting for Eversource Energy. In that role, he is responsible for the leadership and direction of siting and permitting activities for Offshore Wind and related transmission infrastructure projects, and compliance for those projects. He serves as a technical consultant for various large transmission projects, clean energy projects, and provides expert testimony in regulatory proceedings concerning them.

A native of New Hampshire, Bowes joined Eversource in July 1984 in the System Test department. He has held several engineering and management positions in the Energy Delivery organizations becoming the Director – Transmission and Distribution Maintenance in 1999, Director – Transmission Construction, Test, and Maintenance in 2002, Director – Transmission Projects in 2004, Vice President – Customer Operations in 2008, Vice President of Energy Delivery in 2010, Vice President of Engineering in 2014, Vice President of Transmission Performance in 2017, and Vice President of ISO Policy, Siting & Compliance in 2018.

Ken has a Bachelor of Electrical Engineering degree from the University of New Hampshire and a Master's Degree in Electrical Engineering from Rensselaer Polytechnic Institute. He is the past Chairman of the Edison Electric Institute's Transmission Committee. He serves on the Connecticut Science Center - Women in Science Steering Committee, Chairman of the Board of Directors - Special Olympics Connecticut, University of Connecticut School of Engineering -Industry Advisory Board, and is Past Chairman of the Board of Nutmeg Big Brothers Big Sisters. Bowes was inducted into the University of Connecticut, Academy of Distinguished Engineers in 2016 and elected into the Connecticut Academy of Science and Engineering in 2017.

PUBLICATIONS AND PREVIOUS TESTIMONY Kenneth B. Bowes

Publications:

- Yan Li, *Member, IEEE*, Kenneth B. Bowes, Lingyu Ren, *Member, IEEE*, "Reinforcement Learning-Enabled Seamless Microgrids Interconnection", IEEE, Power Engineering Society, Summer Meeting 2021
- Bowes K., Beehler M., "Defining the Value of the Grid", IEEE, The Sixth Annual IEEE PES Conference on Innovative Smart Grid Technology, February 2015
- Bowes K., Hogan J., "CL&P Explores Sustainable Solutions", Transmission & Distribution World Magazine, January 2012, Volume 64, Number 1, pp. 24-31.
- IEEE Working Group on Nonsinusoidal Situations, "Practical Definitions for Powers in Systems with Nonsinusoidal Waveforms and Unbalanced Loads: A Discussion", 95 WM 040-6 PWRD, 1995
- IEEE Working Group on Nonsinusoidal Situations, "A Survey of North American Electric Utility Concerns Regarding Nonsinusoidal Waveforms", 95 WM 036-4 PWRD, 1995
- Bowes, K. B., "The Effects of Temporary Overvoltage (TOV) on Consumer Products", POWER QUALITY '91 USA, Official Proceedings of the Third International Power Quality Conference, Universal City, CA, September 22-27, 1991
- Bowes, K. B., Lorusso, A., "Harmonic and Power Characteristics of Electronic Ballasts for Fluorescent Lighting Applications", POWER QUALITY '90 USA, Official Proceedings of the Second International Power Quality ASD Conference, Philadelphia, PA, October 21, 29, 1990
- Anderson, L.M., Bowes, K.B., "The Effects of Power-line Disturbances on Consumer Electronic Equipment", IEEE Transactions on Power Delivery, Volume 5, Number 2, pp. 1062-65, April 1990
- Bowes, K. B., "The Effects of Power-line Disturbances on Electronic Products", POWER QUALITY '89 USA, Official Proceedings of the First International Power Quality Conference, Long Beach, CA, October 15-20-1989 (Also edited and reprinted in Power Quality Magazine - Premier V Issue)

Mr. Bowes has testified extensively in many cases in a variety of forums, including: Siting Proceedings:

 Connecticut Siting Council Docket No. 474 – The Connecticut Light & Power Company d/b/a Eversource Energy application for a Certificate of Environmental Compatibility and Public Need for the Greater Hartford-Central Connecticut Reliability Project that traverses the municipalities of Hartford, West Hartford, and Newington, , which consists of construction, maintenance and operation of a new 115-kilovolt (kV) electric transmission line within existing Eversource, Amtrak and public road rights-of-way and associated facilities extending overhead approximately 2.4 miles and underground approximately 1.3 Page 3 of 6 miles.

- Connecticut Siting Council Docket No. 461, Docket No. 461A Eversource Energy
 application for a Certificate of Environmental Compatibility and Public Need for the
 construction, maintenance, and operation of a 115-kilovolt (kV) bulk substation located at
 290 Railroad Avenue, Greenwich, Connecticut, and two 115-kV underground
 transmission circuits extending approximately 2.3 miles between the
 proposed substation and the existing Cos Cob Substation, Greenwich, Connecticut, and
 related substation improvements.
- Connecticut Siting Council Docket No. 292 The Connecticut Light & Power Company application for a Certificate of Environmental Compatibility and Public Need for the construction and operation of 8.7 miles of new underground 115-kilovolt electric transmission cables extending from CL&P's existing Glenbrook Substation in the City of Stamford, through the Town of Darien, to CL&P's existing Norwalk Substation in the City of Norwalk.
- Connecticut Siting Council Docket No. 302 Northeast Utilities Service Company, on behalf of The Connecticut Light and Power Company (CL&P) application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of the proposed Killingly 2G Substation at 193 Tracy Road and 227-257 Park Road in the Towns of Killingly and Putnam, and the proposed connections to the existing #347 345-kV line and the existing #1607 and #1505 115-kV lines.
- Connecticut Siting Council Docket No. 311 Northeast Utilities Service Company, on behalf of The Connecticut Light and Power Company (CL&P) Application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of the proposed Wilton 35A Substation at 53 Old Danbury Road in the Town of Wilton.
- Connecticut Siting Council Docket No. 326 The Connecticut Light and Power Company application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a proposed substation located at Stepstone Hill Road, Guilford, Connecticut.
- Connecticut Siting Council Docket No. 327 The Connecticut Light and Power Company application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a proposed substation located off Commerce Drive, Oxford, Connecticut.
- Connecticut Siting Council Docket No. 352 The Connecticut Light and Power Company application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a proposed substation located at 264 Rood Avenue and 25 Shelley Avenue, Windsor, Connecticut.
- Connecticut Siting Council PETITION NO. 737 The Connecticut Light and Power Company petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed Manchester to Hopewell 115kV Transmission Line Reconductor Project in the Towns of Manchester and Glastonbury.
- Connecticut Siting Council PETITION NO. 702 The Connecticut Light & Power Company petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed Plumtree to Triangle 115-kV Transmission Upgrade Project in the towns of Bethel and Danbury, Connecticut.

- State of New Hampshire, Site Evaluation Committee, Docket No. 2015-06, Joint Application of Northern Pass Transmission LLC and Public Service Company of New Hampshire d/b/a Eversource Energy For A Certificate of Site and Facility To Construct A New High Voltage Transmission Line And Related Facilities In New Hampshire.
- State of New Hampshire, Site Evaluation Committee, Docket No. 2015-04 Application of Public Service Company of New Hampshire d/b/a Eversource Energy ("Eversource") for a Certificate of Site and Facility for the Construction of a New 115 kV Transmission Line from Madbury Substation to Portsmouth Substation.
- Commonwealth of Massachusetts, Energy Facilities Siting Board, EFSB 07-4/D.P.U. 07-35/07-36, Petition of Russell Biomass, LLC and Western Massachusetts Electric Company for a proposed project consisting of (1) an approximately 5.3-mile, 115 kilovolt transmission line from the proposed Russell Biomass generating facility in Russell to Western Massachusetts Electric Company's ("WMECo") transmission system in Westfield, and (2) a new switching station facility in Westfield.
- New York State Public Service Commission, Case Number: 18-T-0604, Application of Deepwater Wind South Fork, LLC for a Certificate of Environmental Compatibility and Public Need for the Construction of Approximately 3.5 Miles of Submarine Export Cable from the New York State Territorial Waters Boundary to the South Shore of the Town of East Hampton in Suffolk County and Approximately 4.1 Miles of Terrestrial Export Cable from the South Shore of the Town of East Hampton to an Interconnection Facility with an Interconnection Cable Connecting to the Existing East Hampton Substation in the Town of East Hampton, Suffolk County.
- New York State Public Service Commission, Case Number: 21-E-0261, Petition of South Fork Wind, LLC for an Original Certificate of Public Convenience and Necessity and for an Order Providing for Lightened Regulation.
- New York State Public Service Commission, Case Number: 20-T-0617, Application of Sunrise Wind LLC for a Certificate of Environmental Compatibility and Public Need for the Construction of Up to 6.2 Miles (320 kilovolt [kV]) of Direct Current (DC) Submarine Export Cable from the New York State Territorial Waters Boundary to the Smith Point County Park on Fire Island in the Town of Brookhaven in Suffolk County and Up to 17.5 Miles (320 kV) of Onshore Transmission Cable from the Landfall at Fire Island to a New Onshore Converter Station in the Town of Brookhaven and Up to 1 Mile (138 kV) of Alternating Current (AC) Onshore Interconnection Cable Connecting to the Existing Holbrook Substation in the Town of Brookhaven in Suffolk County.
- State of Rhode Island, Energy Facilities Siting Board, Docket No. SB-2021-01, Revolution Wind, LLC's Application to Construct and Alter Major Energy Facilities in North Kingstown, Rhode Island. The application filed by Revolution Wind, LLC seeks Board approval for the following six transmission and interconnection components located within the state of Rhode Island: an onshore transmission cable consisting of two one-mile underground transmission lines between the Quonset Business Park landing location and the new onshore substation; a 23-mile submarine export cable running from federal waters to the onshore transmission cable; an onshore substation located proximate to the existing Davisville substation in Quonset; expansion of the Davisville substation; two new 519-foot underground transmission lines between the onshore substation and the

expanded Davisville substation; and reconfiguration of 1,340 feet of existing overhead transmission lines looped into the Davisville substation.

• State of Rhode Island, Public Utilities Commission, Docket No. 5151 – Needs Advisory Opinion to EFSB regarding Revolution Wind, LLC

Litigation:

- Connecticut Superior Court, Allyn vs. CL&P, CV-96-0109273-S.
- Connecticut Superior Court, Scanlon vs. CL&P, CV-96-0536911S.
- Connecticut Superior Court, Segalla vs. CL&P, X-04-CV-98-0117225S.
- <u>DSV MR. SONNY</u>: Damage to submarine electric cables in Long Island Sound. Complex, multi-party limitation of liability proceeding in U.S. District Court for the Eastern District of New York. Settled at mediation.
- Supreme Court of the State of New York, County of Suffolk, Citizens for Preservation of Waiscott et al vs. Town Board of the Town of East Hampton, and South Fork Wind LLC., Index No. 601847/2021

Regulatory Proceedings:

- Connecticut DPUC Docket No. 94-05-35 DPUC Investigation Into Stray Voltage On Dairy Farms.
- Connecticut DPUC Docket No. 08-02-06 DPUC Investigation Into The Connecticut Light and Power Company's Billing Issues.
- Connecticut DPUC Docket No. 09-12-05 Application of The Connecticut Light and Power Company to Amend Its Rate Schedules.
- Connecticut DPUC Docket No. 10-03-08 Investigation of the Service Response and Communications of The Connecticut Light and Power Company (CL&P) and The United Illuminating Company (UI) Following the Outages from the Severe Weather over the Period of March 12 through March 14, 2010.
- Connecticut DPUC Docket No. 10-05-09 DPUC Investigation of the Safety of the Connecticut Light and Power Company Underground Electric Distribution System in Waterbury.
- Connecticut PURA Docket No. 11-03-07 PURA Investigation Into The Appointment Of A Third Party Statewide Utility Telephone Pole Administrator For The State Of Connecticut.
- Connecticut PURA Docket No. 11-09-09 PURA Investigation of Public Service Companies' Response to 2011 Storms.
- Connecticut PURA Docket No. 12-01-07 Application for Approval of Holding Company Transaction Involving Northeast Utilities and NSTAR.
- Connecticut PURA Docket No. 12-01-10 Investigation Into the Tree Trimming Practices of CT Utility Companies.
- Connecticut PURA Docket No. 12-06-09 PURA Establishment of Industry Performance Standards for Electric and Gas Companies.
- Connecticut PURA Docket No. 12-07-06RE01 Application of the Connecticut Light and Power Company For Approval of its System Resiliency Plan Expanded Plan.

- Connecticut PURA Docket No. 12-06-12 PURA Investigation of the Feasibility of the Establishment of a Program to Reimburse Residential Customers for Spoilage Loss of Food items or Refrigerated Medications Caused by a Lack of Refrigeration During Electric Service Outages.
- Connecticut PURA Docket No. 12-09-13 PURA Investigation of the Best Practices of Other State Public Utility Commissions, Public Utility Companies and Municipal Utilities' Emergency Management Best Practices.
- Connecticut PURA Docket No. 12-11-07 PURA Investigation Into the Performance of Connecticut's Electric Distribution Companies and Gas Companies in Restoring Service Following Storm Sandy.
- Connecticut PURA Docket No. 13-03-23 Petition of the Connecticut Light and Power Company for Approval to Recover its 2011-2012 Major Storm Costs.
- Connecticut PURA Docket No. 14-05-06 Application of the Connecticut Light and Power Company To Amend Rate Schedules.
- Connecticut PURA Docket No. 14-07-18 PURA Report to the General Assembly Concerning its Review of Each Electric Distribution Company's Vegetation Management Practices.
- Connecticut PURA Docket No. 15-01-27 Attorney General and Office of Consumer Counsel Request for Investigation of Northeast Utilities Facilities Closures in Connecticut.
- Connecticut PURA Docket No. 15-12-20 PURA Review of Electric Companies' and Electric Distribution Companies' Plans for Maintenance of Transmission and Distribution Overhead and Underground Lines.
- Public Act 15-5 Section 103 Connecticut Department of Energy & Environmental Protection, Demonstration Projects for Grid-Side System Enhancements.
- Connecticut PURA Docket No. 17-10-46 Application of The Connecticut Light and Power Company d/b/a Eversource Energy to Amend its Rate Schedules
- New Hampshire Public Utilities Commission, Docket No. DE 15-464, Public Service Company of New Hampshire d/b/a Eversource Energy, Petition for Approval of Lease Agreement between PSNH dba Eversource Energy and Northern Pass Transmission LLC.
- New Hampshire Public Utilities Commission, Docket No. DE-17-081, Public Service Company of New Hampshire d/b/a Eversource Energy, 2017 Transmission Cost Adjustment Mechanism.
- New Hampshire Public Utilities Commission, Docket No. DE-18-089, Public Service Company of New Hampshire d/b/a Eversource Energy, 2018 Transmission Cost Adjustment Mechanism.
- United States of America, Federal Energy Regulatory Commission, Docket No. EL16-64-002.
- United States of America, Federal Energy Regulatory Commission, Docket No. ER21-1637-000

Revolution Wind, LLC RIEFSB Docket No. 2021-01 Addendum 3-2 Page 1 of 1

PROJECT DEVELOPMENT DIRECTOR **REVOLUTION WIND FARM**

PROFESSIONAL EXPERIENCE

2019 – present **Project Development Director**

Ørsted

- · Responsible for leadership and direction of the early stages of the Revolution Wind Farm project.
- Overseeing permitting, site investigations, wind farm design, commercial management, and market/government affairs

2012 - 2019**Development Project Manager, Offshore Business Development** Manager

EDP Renewables North America

- Managed greenfield development pipeline of over 1 GW large-scale wind and solar energy projects in the eastern United States
- Strategy and bid development team for the successful Mayflower Wind Massachusetts bid
- · Led the land acquisition, federal and jurisdictional permitting, interconnection, consultant management, financial, public outreach, and other cross-functional aspects of development
- · Oversaw a team of Project Developers and support staff in all stages of the project life cycle

2009 - 2012**Project Coordinator**

VERA Renewables

- Coordinated the successful permitting and development of 73 MW of New England wind energy projects
- Oversaw consultant teams in all phases of development
- Managed the Vermont Small-Scale Wind Energy **Demonstration Program**

2008 - 2009Paralegal / Project Manager Shlansky Law Group / Burchfield Resources

> Redeveloped Brownfield and historic properties utilizing solar energy and conservation practices

PROJECT EXPERIENCE

Revolution Wind, RI & CT 704 MW offshore wind, proposed

Mayflower Wind, MA 804 MW offshore wind, proposed

Arkwright Summit Wind, NY 78 MW onshore wind, operational

Georgia Mountain Community Wind, VT 10 MW onshore wind, operational

Kingdom Community Wind, VT 63 MW onshore wind, operational

Early-Stage Project Scoping, North East and Mid-Atlantic Over 1200 MW onshore wind and solar, development

EDUCATION

MA, English 2008 University of Vermont **Environmental Studies Focus**

Post-Graduate 2006 University of Oregon **Ecocritical Theory**

BA, English 2004 State University of New York at Fredonia

KELLEN INGALLS

Mark Roll

Permit Manager, Revolution Wind

Mark's professional and academic background includes a combination of environmental science, law, and policy. Over the course of his professional career, he has developed broad expertise in permitting of renewable energy projects and other large complex infrastructure projects. Specific areas of expertise include managing environmental reviews under the National Environmental Policy Act (NEPA) and permitting under the federal Endangered Species Act. Mark has also managed and supported permitting efforts under other federal laws (e.g., Clean Water Act), as well as a wide-range of state-level permitting across multiple states in the U.S.

Orsted, Permit Manager, Revolution Wind. As Permit Manager for the Revolution Wind Project, proposed on the Outer Continental Shelf (OCS) in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0486, Mark is responsible for overseeing all aspects of federal, state and local permitting and licensing for the project including the BOEM Construction and Operations Plan (COP), US Army Corps of Engineers (USACE) Individual Permit, Environmental Protection Agency (EPA) OCS Air Permit, Federal Aviation Administration (FAA) Notice of Proposed Construction and Department of Defense (DoD) consultation, National Marine Fisheries Service consultations, RI Energy Facility Siting Board Application for a Major Energy Facility, RI Coastal Resources Management Council (CRMC) Coastal Zone Management Consistency Certification, CRMC Category B Assent application, CRMC Freshwater Wetlands Permit application, RIDEM Water Quality Certification, RIDEM RI Pollutant Discharge Elimination System authorization and Quonset Development Corporation (QDC) Development Plan Review application.

Sempra Renewables, Various Projects, Multiple States. As a consultant to Sempra Renewables, Mark served as permit manager with Sempra Renewable's environmental, permitting, compliance and safety group where he managed environmental permitting and compliance efforts on a portfolio of wind and solar energy projects in California, Michigan, Kansas, and Nebraska. In this role he worked to advance project development by securing permit approvals and ensured permit compliance during operations.

First Solar, Inc., Federal Permitting Support for Various Projects, NV and AZ. As a consultant to First Solar, Mark provided as-needed permitting support for various large-scale solar energy projects on federal land in Nevada and Arizona. Responsibilities included preparation of right-of-way grant applications, Plans of Development, management plans, and various NEPA documents (e.g., Categorical Exclusions for geotechnical testing and Determinations of NEPA Adequacy for project changes).

Invenergy, LLC., Environmental Review and Endangered Species Permitting for the Shu'luuk Wind Energy Project, San Diego County, CA. As a consultant to Invenergy, Mark provided technical and strategic permitting support for a 160 megawatt wind energy project proposed on federal land in eastern San Diego County. Provided Section 7 consultation support per the federal Endangered Species Act, NEPA support, and assisted in the preparation of a Bird and Bat Conservation Strategy and Eagle Conservation Plan (ECP).



Education

Vermont Law School

Master of Environmental Law and Policy (MELP), *Magna cum laude* (August 2010)

San Diego State University B.S. Biology (May 2006)

Employment History Orsted, Permit Manager (July 2019-current)

AECOM,

Project Manager and Permitting Specialist (October 2011 – January 2016; February 2018-July 2019)

Environmental Science Associates,

Project Manager (February 2016 – February 2018)

Technology Associates, Wildlife Biologist (March 2006 – June 2009) Bureau of Land Management (BLM), Environmental Review for the Desert Quartzite Solar Project, Riverside County, CA. As a consultant to the BLM, Mark assisted with development of an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for an approximate 300-megawatt photovoltaic solar energy facility and associated generation tie-line located on private land and land administered by the BLM.

Confidential Client, Critical Issue Assessment for Solar Energy Project, CA. As a consultant to a confidential client, Mark served as project manager for due diligence support for a potential solar energy project on private land in central California.

Recurrent Energy, Environmental Review and Endangered Species Permitting for the RE Cinco Solar Project, Kern County, CA. As a consultant to Recurrent Energy, Mark provided endangered species permitting support under Section 7 and Section 10 of the federal Endangered Species Act for a solar project on private and associated generation tie-line on land administered by the BLM. Mark also supported NEPA compliance and Section 7 consultation between the USFWS and BLM.

Confidential Client, Evaluation of Avian Detection and Deterrent Technologies and Eagle Take Permitting for Wind Energy Project, Kern County, CA. As a consultant to a confidential client, Mark provided project management and technical support for evaluation studies of avian detection and deterrent systems at an operating wind facility. Mark also managed development of an ECP to support application for an eagle take permit.

Sacramento Municipal Utility District (SMUD), Eagle Permitting for Solano Wind Project, Solano County, CA. As a consultant to SMUD, Mark provided technical and strategic permitting support for development of an ECP for the 230 megawatt Solano Wind Energy Facility.

Soitec, Rugged, LanEast, LanWest, and Tierra del Sol Solar Projects, Environmental Review and Permitting, San Diego County, CA. As a consultant to Soitec, Mark provided technical and strategic permitting support for three solar projects proposed on private land and totaling up to 168 megawatts. The projects required local land use approvals as well as environmental review and permitting under California state law.

Revolution Wind, LLC RIEFSB Docket No. 2021-01 Addendum 3-4 Page 1 of 1

Demetrios Sakellaris (PE)

demetrios.sakellaris@eversource.com

Experience

Eversource Energy, Westwood, MA

Transmission Capital Projects, Manager (December 2019 – Present)

• Manage technical elements of large capital projects, including offshore wind, serve as lead technical point of contact for all onshore design

• Initiate engagement of additional subject-matter experts, as needed, to progress the design in a timely manner, in coordination with construction commencement, and facilitate equipment energization

• Coordination with multiple entities, including domestic and international teams, for progression of detailed design, budget coordination and constructability assessments; including external agencies having jurisdiction and permitting authority

Transmission Engineering and Project Estimating, Lead Engineer (April 2016 – December 2019)

- Complete detailed review of all transmission related projects (substation and transmission line)
- Optimize projects by promoting standardized engineering designs across service territory
- Identify and implement more efficient design and construction methods to reduce cycle time
- Provide leadership and guidance to all project teams for execution of the optimized project

• Represent the Company at Department of Public Utilities (DPU)/Energy Facility Siting Board (EFSB) hearings, open houses and at meetings with local political authorities/officials

Underground Transmission Line Engineering, Supervisor (January 2014 – April 2016)

- Perform line design work ranging from calculating/sizing underground conductors (USAmp)
- to compiling ductbank layout and installation specifications (XLPE and HPFF systems)

• Initiated effort to complete detailed diagnostics on failed equipment (specifically terminations and underground conductor) to identify root cause and determine if other areas of the system were at similar risk; thereby assisting in the justification for proactive replacement

Transmission Line Engineering, Supervisor (April 2010 – January 2014)

• Performed overhead line design work ranging from modeling structures in PLS-Pole and developing detailed plan and profile designs in PLS-CADD for line replacement/upgrade projects to compiling installation specifications

• Created multiyear programs for all transmission line work ranging from new counterpoise installations in areas of poor historical lightning performance, complete line rebuilds bringing clearances to ground up to current industry standards, promoting a redundant pump plant at all remote line terminals to select underground HPFF reconductoring efforts

Certification and Education

Professional Engineer (PE)

Commonwealth of Massachusetts (April 2016)

Worcester Polytechnical Institute, Worcester, MA *Master of Science in Power Systems Engineering (June 2014)*

Northeastern University, Boston, MA

Master of Business Administration (May 2014) Bachelor of Science in Electrical Engineering (May 2010)

KRISTEN TRUDELL

17 Annabel Street • Boston, MA 02125 • 617-694-5727 • kristentrudell55@gmail.com

PROJECT MANAGER

Project Management, Environmental and Siting background with experience in the areas of:

Project Management Public Hearing/Testimony Regulatory Compliance Contract Management Program/Policy Development Project Permitting Budget Management Customer Service

EMPLOYMENT / EXPERIENCE

Lead Offshore Installation Specialist

Orsted, 56 Exchange Terrace Suite 300, Providence RI 02903

Support the planning, development, permitting and construction of offshore wind projects across Orsted's North American portfolio of projects optimizing the cable installation scope. Duties include:

- <u>Secure project permits, licenses, and siting approvals</u> providing written and verbal guidance on cable installation methodologies and practices. Development of project permit strategy including evaluations of risk, and construction methodologies.
- <u>Support procurement of cable installation contractors</u> including the issuance of request for proposal documentation, evaluation of bidder submittals, and recommendations of contract award. Assist in the sourcing of local construction contractors and suppliers. Support efforts to produce a procurement strategy to align with the US project life cycle with contract strategy.
- <u>Development of construction processes</u> for North American portfolio of projects. Coordinate contractor compliance with project conditions including quality controls, environmental conditions, health and safety, etc.

Project Manager

Eversource Energy, 247 Station Drive, Westwood MA 02090

Manage the planning, development, permitting and construction for large utility construction projects. Responsibilities also include providing supervision and guidance for a staff of field supervisors and inspectors charged with the overall coordination, direction, implementation and execution of the project construction plan as well as compliance with safety and environmental rules and permits. Other duties include:

April 2020 – Present

2011 - 2020

- Lead project planning and development efforts of major overhead and underground transmission line, substation, and communications projects. Responsible for defining project scope, engineering oversight, cost estimating, outage planning and scheduling of projects throughout the conceptual and construction phases.
- Secure project permits, licenses and siting approvals allowing projects to proceed to construction. Such authorizations include State DPU, local bylaws, ISO New England, US Army Corps of Engineers, budgets, materials, equipment contractors, and resources for transmission construction projects.
- Coordinate and provide direction for internal and external resources for project execution including creation of RFP requests, approval of project contracts, assemble an internal project team, and ensure procurement of equipment and supplies.
- Manage the overall project budget and report on a monthly basis to senior management team and company leadership.
- Track project deliverables and if necessary, implement interventions and solutions to achieve • desirable project outputs
- Execute projects meeting company safety, quality, budget, and schedule requirements. Executed • 83 million dollars in transmission projects during time with Project Management Department.

Environmental Engineer

NSTAR Electric & Gas, One NSTAR Way, Westwood MA

- Environmental Construction Support associated with electric and gas projects. Support consists of • managing all environmental aspects of a project including sitting, permitting, soil management, dewatering, hazardous waste disposal, and project compliance.
- Develop programs, policies and procedures to ensure company compliance with environmental, • health and safety regulations. Such items include either direct responsibility or assisting with including Company Soil Management Plan., Construction Dewatering Plan and project permit tracking system
- Provide written and oral testimony for regulatory filings and public hearings. Testimony typically • consists of presenting a project description, schedule, and explanation of resource impacts and mitigation practices.

Researcher and Permit Processor

The Fallon Company, One Marina Park Drive, Boston, MA

- Attained data and performed permit analysis for multiple commercial and residential site development projects.
 - Researched and preformed construction and site permitting.
 - Performed property due diligence research for possible redevelopment sites. •
 - Performed environmental impacted and mitigation analysis.

Emergency Restoration Supervisor

Kristen Trudell

2007 - 2011

(Full time equivalent 1.5 years) 2005 - 2007

NSTAR Electric (M&C - Yarmouth District)

• Oversee and direct electric line department personnel and/or contracted line crews during storm restoration.

SELECTED ACCOMPLISHMENTS

Harbor Electric Energy Company 115kV Submarine Cable

- Land Rights acquisition from private and public entities.
- Help reach multi stakeholder MOU with Massport, MWRA, US Federal Government, and USACE.
- Contract management of all major equipment and construction contracts
- Project permits including DPU waiver, Chapter 91 license and USACE section 404 and 408
- Managed engineering, procurement and construction of 3 miles of submarine cable and two 36" HDD.
- Removed 8,000 ft of abandoned cable in Federal Shipping Channel and Reserve Channel in Boston Harbor.

<u>Responsible for a 2014 project budget representing approximately 44 percent of the overall company</u> transmission budget. Project list includes a variety of major projects including:

- Line 191, 133,132,112, 136 rebuild
- Structure refurbishment Program Lines
- Dewar Street 115 kV UG PTC Line
- Line 139 Massachusetts Department of Public Utilities siting

Transmission Line experience includes:

- Line reconductoring 13.8 miles
- Line refurbishment 10 miles
- New Overhead and Underground line construction
- Counterpoise installation -80 miles
- SEECO Switch installation
- DPU petition development for Falmouth Substation expansion, Line 111, and Mid Cape Line

Electric Substation experience includes:

- 345Kv Transformer installation
- Breaker/ circuit switcher replacements
- Heat Exchanger, 8 units
- Pump Plant

Other Programmatic Maintenance Projects include:

- Gate and Barrier Program.
- ROW Road Improvement Program. 216 Miles
- Structure Painting Program 120 345kV structures
- Cathodic protection Program Mystic Tunnel

Provided expert written and oral testimony for the following regulatory proceedings:

D.P.U. 13-86: Dewar Street Project – 115kV UG Transmission Line

D.P.U. 14-08: Line 139 Transmission Line – Barnstable to Harwich Tap

EDUCATION

University of Massachusetts Bachelor of Science Degree in Earth and Geographic Science Certificate in Hydrogeology Studies Honors: University Presidents Scholarship, Grace Grossman Scholarship Boston, MA May 2006

ADDITIONAL SKILLS

Knowledgeable in Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Maximo, and Primavera P6

Jason C. Ross, PE

Physical Resources – In-Air Acoustics

Education

ME, Acoustics, Pennsylvania State University, 2010

BS, Mechanical Engineering, University of Colorado, 1996

Registrations/Certifications

Professional Engineer (Mechanical) MA, 2007

Professional Engineer (Mechanical) TX, 2011

Affiliations/Memberships

Transportation Research Board, ADC40 (Rail), Chair, 2014

Institute of Noise Control Engineering Jason is VHB's Director of Noise and Vibration Services. He has considerable experience leading teams that provide state-of-the-art noise and vibration services for a wide-range of energy projects including offshore wind, solar facilities, electrical transmission and distribution, and gas pipelines. Jason's expertise includes project oversight, preparing local, state and federal acoustical studies, advanced engineering and final design of noise and vibration control, and public outreach. Jason also has experience with noise and vibration research and development, industrial noise control, developing measurement and analysis systems, providing noise and vibration course instruction and expert testimony.

23 years of professional experience

Orsted Revolution Wind Farm Sound Study, North Kingston, RI

Jason is leading an airborne sound study of the proposed Orsted Revolution Wind Farm Project approximately 15 miles south of the Rhode Island coast. This project would include offshore wind turbine generators, transmission line connection to an onshore vault and substation. The sound study included ambient onshore sound monitoring, sound modeling of operations including sound from the wind turbine generators, nautical hazard devices (fog horns), and sound from the onshore substation. Sound from the construction activities including horizontal directional drilling and operational noise from the proposed substation have also been predicted. Potential noise effects were evaluated according to federal, state, and local noise regulations and ordinances.

Deepwater Wind South Fork Wind Farm Sound Study, Easthampton, NY

Jason has led a sound study of the proposed Deepwater Wind South Fork Wind Farm Project in Easthampton, NY in support of the New York State Article VII process. This project would include 15 offshore wind turbine generators, transmission line connection to an onshore vault and substation. The sound study included ambient sound monitoring and sound modeling for construction activities including horizontal directional drilling and operational noise from the proposed substation. Potential noise effects were evaluated according to federal U.S. EPA, New York State Department of Environmental Conservation, Suffolk County, and local noise regulations, policies, and ordinances. Jason evaluated the need to attenuate sound from the proposed facility to meet applicable limits and identified a range of options to adequately attenuate sound from the facility through substation equipment sound power rating specifications and perimeter sound walls.

Emera Maine, Atlantic Link HVDC Substation Sound Study, Plymouth, MA

Jason has led a sound study of a proposed 1000-megawatt subsea transmission cable system and associated high-voltage direct current (HVDC) converter station. The sound study included conducting ambient sound measurements in the study area, predicting sound emissions from the proposed HVDC station, and evaluating potential sound attenuation measures to mitigate potential effects. Sound from the proposed station was evaluated according to stated noise regulations, the Massachusetts Department of Environmental Protection noise policy, the Town of Plymouth bylaws, and other national



guidelines for minimizing the noise effects from the construction and operation of the proposed project.

Champlain Hudson Power Express HVDC Converter Station Sound Study

Jason has conducted a sound study to assess potential noise impact from the proposed installation of an HVDC Converter Station. The CHPE Project includes the construction of an HVDC transmission line approximately 330 miles from the New York/Canada Border. The sound study involved ambient sound measurements, detailed acoustical analysis of the proposed facility, a noise control analysis, and acoustical design of a perimeter noise wall. Jason has supported the client with discussions with the New York State Department of Public Service Article VII process.

Sudbury to Hudson Shunt Reactor Sound Study, Sudbury, MA

Jason has conducted a sound study to assess potential noise impact from the proposed installation of a 20 megavolt-ampere reactive air core shunt reactor and associated switching and protection equipment at an existing substation. The installation of the shunt reactor is in association with the proposed construction of the 9-mile underground transmission line. The study included measurements of existing ambient sound conditions, future sound level predictions with the proposed equipment, and an assessment of potential impact according to the Massachusetts Department of Environmental Protection noise regulation and the Town of Sudbury Zoning By Laws.

Granite Bridge Pipeline and LNG Facility, Exeter to Manchester, NH

Jason is leading a sound and vibration study for a proposed 27-mile natural gas pipeline and liquified natural gas (LNG) facility located along New Hampshire (NH) Route 101 and a 140-acre parcel in Epping, NH. The sound study includes both long-term and shortterm ambient sound measurements to characterize the existing conditions, a threedimensional noise model of the proposed LNG facility, and a construction noise and vibration assessment. This sound study supplements the NH Site Evaluation Committee Process in accordance with SEC Chapter 300 Part Site 301.08 Effects on Public Health and Safety and Part Site 301.13 Criteria Relative to Findings of Unreasonable Adverse Effects.

Mystic River Natural Gas Pipeline Acoustical Assessment, Somerville MA

Jason conducted an acoustical assessment of the construction (repair) of the section of the natural gas transmission pipeline that crosses the Mystic River between Medford and Arlington, Massachusetts. The construction included the horizontal directional drilling (HDD) method to install the new section of pipe with two primary construction areas for entry and exit of the pipeline. In support of the Prior Notice Filing for the project, Jason conducted an acoustical assessment according to the Federal Energy Regulatory Commission "Guidance Manual for Environmental Report Preparation for Applications Filed Under the Natural Gas Act" (guidance manual) dated December 2015.

Upland Pipeline Draft Environmental Impact Statement, North Dakota

Jason has conducted a noise and vibration study for the proposed Upland Pipeline project for the construct, connect, operate and maintain facilities at the border of the United States with Canada in support of the Draft Environmental Impact Statement with the U.S. Department of State. The noise and vibration study evaluated potential effects during the construction and operation of the proposed project. Noise and vibration was evaluated in accordance with the U.S. EPA and North Dakota Public Service Commission

noise guidelines. The project included detailed noise and vibration predictions and mitigation recommendations.

County Road Substation Oakland, ME

Jason has conducted a sound study to assess potential noise effects from a proposed substation including one 46.5/12 kV transformer and two 115/46.5kV transformers in Oakland, Maine. The sound study included ambient sound measurements and predictions of sound from the proposed facility. Sound was evaluated in accordance with the Maine Department of Environmental Protection Noise Site Location Law Chapter 375.10 (Control of Noise), the Central Maine Power sound technical manual, and local noise ordinances.

MassDOT, On-Call Noise Services, Massachusetts

Jason is the Contract Manager who oversees a range of noise studies for highway improvement projects as part of an on-call contract with the Massachusetts Department of Transportation (MassDOT). Past work includes noise measurements, development and validation of the Federal Highway Administration's (FHWA) Traffic Noise Model (TNM), conducting noise barrier evaluations, and supporting public outreach efforts.

ConEdison Battery Storage Project, Queens, NY

Jason led a noise analysis of a proposed Distributed Energy Storage System in Queens to assess future sound levels in the surrounding neighborhood. The DESS would help provide transmission and distribution load relief for Consolidated Edison. The team modeled future sound levels from all the system equipment, as planned on the site, using acoustic software to predict emissions throughout the site and at nearby sensitive receptors. Jason also was responsible for determining the need for mitigating noise with the use of noise barriers and providing preliminary design information.

Solar Array Sound Evaluation, Whately, MA

Jason has conducted a sound evaluation of a proposed 2.2 MW solar array system in Whately, MA. The sound evaluation included ambient noise measurements at the proposed project site, predictions of future sound conditions including the proposed solar array system and an assessment of noise compliance with the Massachusetts Department of Environmental Protection noise regulation.

Solar Array Sound Evaluation, Wendell, MA

Jason has conducted a sound evaluation of a proposed 2.8 MW solar array system in Wendell, MA. The sound evaluation included ambient noise measurements at the proposed project site, predictions of future sound conditions including the proposed solar array system and an assessment of noise compliance with the Massachusetts Department of Environmental Protection noise regulation.

This document has been redacted for Critical Energy/Electric Infrastructure Information (CEII) and Confidential Information.

LARGE GENERATOR INTERCONNECTION AGREEMENT

BY AND AMONG

ISO NEW ENGLAND INC.

AND

REVOLUTION WIND, LLC

AND

NEW ENGLAND POWER COMPANY dba NATIONAL GRID

APPENDIX 6 LARGE GENERATOR INTERCONNECTION AGREEMENT

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THIS STANDARD LARGE GENERATOR INTERCONNECTION AGREEMENT

("Agreement") is made and entered into this 30th day of July, 2021, by and between Revolution Wind, LLC, a limited liability company organized and existing under the laws of the State of Delaware ("Interconnection Customer" with a Large Generating Facility), ISO New England Inc., a non-stock corporation organized and existing under the laws of the State of Delaware ("System Operator"), and New England Power Company dba National Grid, a company organized and existing under the laws of the Commonwealth of Massachusetts ("Interconnecting Transmission Owner"). Under this Agreement, the Interconnection Customer, System Operator, and Interconnecting Transmission Owner each may be referred to as a "Party" or collectively as the "Parties."

RECITALS

WHEREAS, System Operator is the central dispatching agency provided for under the Transmission Operating Agreement ("TOA") which has responsibility for the operation of the New England Control Area from the System Operator control center and the administration of the Tariff; and

WHEREAS, Interconnecting Transmission Owner is the owner or possessor of an interest in the Administered Transmission System; and

WHEREAS, Interconnection Customer intends to own, lease and/or control and operate the Generating Facility identified as a Large Generating Facility in Appendix C to this Agreement; and

WHEREAS, System Operator, Interconnection Customer and Interconnecting Transmission Owner have agreed to enter into this Agreement for the purpose of interconnecting the Large Generating Facility to the Administered Transmission System.

NOW, THEREFORE, in consideration of and subject to the mutual covenants contained herein, it is agreed:

When used in this Standard Large Generator Interconnection Agreement, terms with initial capitalization that are not defined in Article 1 shall have the meanings specified in the Article in which they are used.

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ARTICLE 1. DEFINITIONS

The definitions contained in this Article 1 and those definitions embedded in an Article of this Agreement are intended to apply in the context of the generator interconnection process provided for in Schedule 22 (and its appendices). To the extent that the definitions herein are different than those contained in Section I.2.2 of the Tariff, the definitions provided below shall control only for purposes of generator interconnections under Schedule 22. Capitalized terms in Schedule 22 that are not defined in this Article 1 shall have the meanings specified in Section I.2.2 of the Tariff.

Administered Transmission System shall mean the PTF, the Non-PTF, and distribution facilities that are subject to the Tariff.

Adverse System Impact shall mean any significant negative effects on the stability, reliability or operating characteristics of the electric system.

Affected Party shall mean the entity that owns, operates or controls an Affected System, or any other entity that otherwise may be a necessary party to the interconnection process.

Affected System shall mean any electric system that is within the Control Area, including, but not limited to, generator owned transmission facilities, or any other electric system that is not within the Control Area that may be affected by the proposed interconnection.

Affiliate shall mean, with respect to a corporation, partnership or other entity, each such other corporation, partnership or other entity that directly or indirectly, through one or more intermediaries, controls, is controlled by, or is under common control with, such corporation, partnership or other entity.

Applicable Laws and Regulations shall mean all duly promulgated applicable federal, state and local laws, regulations, rules, ordinances, codes, decrees, judgments, directives, or judicial or administrative orders, permits and other duly authorized actions of any Governmental Authority.

Applicable Reliability Council shall mean the reliability council applicable to the New England Control Area.

Applicable Reliability Standards shall mean the requirements and guidelines of NERC, the NPCC and the New England Control Area, including publicly available local reliability requirements of Interconnecting Transmission Owners or other Affected Parties.

At-Risk Expenditure shall mean money expended for the development of the Generating Facility that cannot be recouped if the Interconnection Customer were to withdraw the Interconnection Request for the Generating Facility. At-Risk Expenditure may include, but is not limited to, money expended on: (i) costs of federal, state, local, regional and town permits, (ii) Site Control, (iii) sitespecific design and surveys, (iv) construction activities, and (v) non-refundable deposits for major equipment components. For purposes of this definition, At-Risk Expenditure shall not include costs associated with the Interconnection Studies.

Base Case shall have the meaning specified in Section 2.3 of the Large Generator Interconnection Procedures ("LGIP").

Base Case Data shall mean the Base Case power flow, short circuit, and stability data bases used for the Interconnection Studies by the System Operator, Interconnection Customer, Interconnecting Transmission Owner, or any Affected Party as deemed appropriate by the System Operator in accordance with applicable codes of conduct and confidentiality requirements.

Breach shall mean the failure of a Party to perform or observe any material term or condition of the Standard Large Generator Interconnection Agreement.

Breaching Party shall mean a Party that is in Breach of the Standard Large Generator Interconnection Agreement.

Calendar Day shall mean any day including Saturday, Sunday or a Federal Holiday.

Capacity Capability Interconnection Standard ("CC Interconnection Standard") shall mean the criteria required to permit the Interconnection Customer to interconnect a Generating Facility seeking Capacity Network Resource Interconnection Service or an Elective Transmission Upgrade seeking Capacity Network Import Interconnection Service in a manner that avoids any significant adverse effect on the reliability, stability, and operability of the New England Transmission System, including protecting against the degradation of transfer capability for interfaces affected by the Generating Facility seeking Capacity Network Resource Interconnection Service or an Elective Transmission Upgrade seeking Capacity Network Import Interconnection Service, and in a manner that ensures intra-zonal deliverability by avoidance of the redispatch of other Capacity Network Resources or Elective Transmission Upgrades with Capacity Network Import Interconnection Service, as detailed in the ISO New England Planning Procedures.

Capacity Network Resource ("CNR") shall mean that portion of a Generating Facility that is interconnected to the Administered Transmission System under the Capacity Capability Interconnection Standard.

Capacity Network Resource Capability ("CNR Capability") shall mean the MW quantity associated with CNR Interconnection Service, calculated as described in Section II.48 of the Tariff.

Capacity Network Resource Group Study ("CNR Group Study") shall mean the study performed by the System Operator under Section III.13.1.1.2.3 of the Tariff to determine which resources qualify to participate in a Forward Capacity Auction.

Capacity Network Resource Interconnection Service ("CNR Interconnection Service") shall mean the Interconnection Service selected by the Interconnection Customer to interconnect its Large Generating Facility with the Administered Transmission System in accordance with the Capacity Capability Interconnection Standard. An Interconnection Customer's CNR Interconnection Service shall be for the megawatt amount of CNR Capability. CNR Interconnection Service does not in and of itself convey transmission service.

Cluster Enabling Transmission Upgrade ("CETU") shall mean new significant transmission line infrastructure that consists of AC transmission lines and related terminal equipment having a nominal voltage rating at or above 115 kV or HVDC transmission lines and HVDC terminal equipment that is identified through the Clustering Enabling Transmission Upgrade Regional Planning Study conducted to accommodate the Interconnection Requests for which the conditions identified in Section 4.2.1 have been triggered. The CETU shall be considered part of a Generator Interconnection Related Upgrade and be categorized as Interconnection Facilities or Network Upgrades.

Cluster Enabling Transmission Upgrade Regional Planning Study ("CRPS") shall mean a study conducted by the System Operator under Attachment K, Section II of the Tariff to identify the

Cluster Enabling Transmission Upgrade and associated system upgrades to enable the interconnection of Interconnection Requests for which the conditions identified in Section 4.2.1 have been triggered.

Cluster Interconnection Facilities Study ("CFAC") shall mean an Interconnection Facilities Study performed using Clustering pursuant to Section 4.2.4.

Cluster Interconnection System Impact Study ("CSIS") shall mean an Interconnection System Impact Study performed using Clustering pursuant to Section 4.2.3.

Cluster Participation Deposit shall mean the initial and additional deposit due under Sections 4.2.3.2.2 and 4.2.4.4.

Cluster Entry Deadline shall mean the deadline specified in Section 4.2.3.1.

Clustering shall mean the process whereby a group of Interconnection Requests is studied together for the purpose of conducting the Interconnection System Impact Study and Interconnection Facilities Study and for the purpose of determining cost responsibility for upgrades identified through the Clustering provisions.

Commercial Operation shall mean the status of a Generating Facility that has commenced generating electricity for sale, excluding electricity generated during Trial Operation.

Commercial Operation Date of a unit shall mean the date on which the Generating Facility commences Commercial Operation as agreed to by the Parties pursuant to Appendix E to the Standard Large Generator Interconnection Agreement.

Confidential Information shall mean any confidential, proprietary or trade secret information of a plan, specification, pattern, procedure, design, device, list, concept, policy or compilation relating to the present or planned business of a Party, which is designated as confidential by the Party supplying the information, whether conveyed orally, electronically, in writing, through inspection, or otherwise. Confidential Information shall include, but not be limited to, information that is confidential pursuant to the ISO New England Information Policy.

Contingent Facilities shall mean those unbuilt Interconnection Facilities and Network

Upgrades associated with an Interconnection Request with a higher Queue Position or a transmission project that is planned or proposed for the New England Transmission System upon which the Interconnection Request's costs, timing, and study findings are dependent, and if delayed or not built, could cause a need for restudies of the Interconnection Request or a reassessment of the Interconnection Facilities and/or Network Upgrades and/or costs and timing.

Default shall mean the failure of a Breaching Party to cure its Breach in accordance with Article 17 of the Standard Large Generator Interconnection Agreement.

Dispute Resolution shall mean the procedure for resolution of a dispute between the Parties in which they will first attempt to resolve the dispute on an informal basis.

Distribution System shall mean the Interconnecting Transmission Owner's facilities and equipment used to transmit electricity to ultimate usage points such as homes and industries directly from nearby generators or from interchanges with higher voltage transmission networks which transport bulk power over longer distances. The voltage levels at which distribution systems operate differ among areas.

Distribution Upgrades shall mean the additions, modifications, and upgrades to Interconnecting Transmission Owner's Distribution System at or beyond the Point of Interconnection to facilitate interconnection of the Generating Facility and render the transmission service necessary to effect Interconnection Customer's wholesale sale of electricity in interstate commerce. Distribution Upgrades do not include Interconnection Facilities.

Effective Date shall mean the date on which the Standard Large Generator Interconnection Agreement becomes effective upon execution by the Parties subject to acceptance by the Commission or if filed unexecuted, upon the date specified by the Commission.

Emergency Condition shall mean a condition or situation: (1) that in the judgment of the Party making the claim is likely to endanger life or property; or (2) that, in the case of the Interconnecting Transmission Owner, is likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to the New England Transmission System, Interconnecting Transmission Owner's Interconnection Facilities or any Affected System to which the New England Transmission System is directly connected; or (3) that, in the case of Interconnection Customer, is likely (as determined in a non-discriminatory manner) to cause a material adverse of a directly connected; or (3) that, in the case of Interconnection Customer, is likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or

damage to, the Generating Facility or Interconnection Customer's Interconnection Facilities. System restoration and black start shall be considered Emergency Conditions; provided that Interconnection Customer is not obligated by the Standard Large Generator Interconnection Agreement to possess black start capability.

Engineering & Procurement ("E&P") Agreement shall mean an agreement that authorizes the Interconnection Customer, Interconnecting Transmission Owner and any other Affected Party to begin engineering and procurement of long lead-time items necessary for the establishment of the interconnection in order to advance the implementation of the Interconnection Request.

Environmental Law shall mean Applicable Laws or Regulations relating to pollution or protection of the environment or natural resources.

Federal Power Act shall mean the Federal Power Act, as amended, 16 U.S.C. §§ 791a et seq.

Force Majeure shall mean any act of God, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm or flood, explosion, breakage or accident to machinery or equipment, any order, regulation or restriction imposed by governmental, military or lawfully established civilian authorities, or any other cause beyond a Party's control. A Force Majeure event does not include acts of negligence or intentional wrongdoing by the Party claiming Force Majeure.

Generating Facility shall mean Interconnection Customer's device for the production and/or storage for later injection of electricity identified in the Interconnection Request, but shall not include the Interconnection Customer's Interconnection Facilities.

Governmental Authority shall mean any federal, state, local or other governmental regulatory or administrative agency, court, commission, department, board, or other governmental subdivision, legislature, rulemaking board, tribunal, or other governmental authority having jurisdiction over the Parties, their respective facilities, or the respective services they provide, and exercising or entitled to exercise any administrative, executive, police, or taxing authority or power; provided, however, that such term does not include the System Operator, Interconnection Customer, Interconnecting Transmission Owner, or any Affiliate thereof. Hazardous Substances shall mean any chemicals, materials or substances defined as or included in the definition of "hazardous substances," "hazardous wastes," "hazardous materials," "hazardous constituents," "restricted hazardous materials," "extremely hazardous substances," "toxic substances," "radioactive substances," "contaminants," "pollutants," "toxic pollutants" or words of similar meaning and regulatory effect under any applicable Environmental Law, or any other chemical, material or substance, exposure to which is prohibited, limited or regulated by any applicable Environmental Law.

Initial Synchronization Date shall mean the date upon which the Generating Facility is initially synchronized and upon which Trial Operation begins.

In-Service Date shall mean the date upon which the Interconnection Customer reasonably expects it will be ready to begin use of the Interconnecting Transmission Owner's Interconnection Facilities to obtain back feed power.

Interconnecting Transmission Owner shall mean a Transmission Owner that owns, leases or otherwise possesses an interest in, or a Non-Incumbent Transmission Developer that is not a Participating Transmission Owner that is constructing, a portion of the Administered Transmission System at the Point of Interconnection and shall be a Party to the Standard Large Generator Interconnection Agreement. The term Interconnecting Transmission Owner shall not be read to include the System Operator.

Interconnecting Transmission Owner's Interconnection Facilities shall mean all facilities and equipment owned, controlled, or operated by Interconnecting Transmission Owner from the Point of Change of Ownership to the Point of Interconnection as identified in Appendix A to the Standard Large Generator Interconnection Agreement, including any modifications, additions or upgrades to such facilities and equipment. Interconnecting Transmission Owner's Interconnection Facilities are sole use facilities and shall not include Distribution Upgrades, Stand Alone Network Upgrades or Network Upgrades.

Interconnection Customer shall mean any entity, including a transmission owner or its Affiliates or subsidiaries, that interconnects or proposes to interconnect its Generating Facility with the Administered Transmission System under the Standard Large Generator Interconnection Procedures.

Interconnection Customer's Interconnection Facilities shall mean all facilities and equipment, as identified in Appendix A of the Standard Large Generator Interconnection Agreement, that are located

between the Generating Facility and the Point of Change of Ownership, including any modification, addition, or upgrades to such facilities and equipment necessary to physically and electrically interconnect the Generating Facility to the Administered Transmission System. Interconnection Customer's Interconnection Facilities are sole use facilities.

Interconnection Facilities shall mean the Interconnecting Transmission Owner's Interconnection Facilities and the Interconnection Customer's Interconnection Facilities. Collectively, Interconnection Facilities include all facilities and equipment between the Generating Facility and the Point of Interconnection, including any modification, additions or upgrades that are necessary to physically and electrically interconnect the Generating Facility to the Administered Transmission System. Interconnection Facilities are sole use facilities and shall not include Distribution Upgrades, Stand Alone Network Upgrades or Network Upgrades.

Interconnection Facilities Study shall mean a study conducted by the System Operator, Interconnecting Transmission Owner, or a third party consultant for the Interconnection Customer to determine a list of facilities (including Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades as identified in the Interconnection System Impact Study), the cost of those facilities, and the time required to interconnect the Generating Facility with the Administered Transmission System. The scope of the study is defined in Section 8 of the Standard Large Generator Interconnection Procedures.

Interconnection Facilities Study Agreement shall mean the form of agreement contained in Appendix 4 of the Standard Large Generator Interconnection Procedures for conducting the Interconnection Facilities Study.

Interconnection Feasibility Study shall mean a preliminary evaluation of the system impact and cost of interconnecting the Generating Facility to the Administered Transmission System, the scope of which is described in Section 6 of the Standard Large Generator Interconnection Procedures.

Interconnection Feasibility Study Agreement shall mean the form of agreement contained in Appendix 2 of the Standard Large Generator Interconnection Procedures for conducting the Interconnection Feasibility Study.

Interconnection Request (a) shall mean an Interconnection Customer's request, in the form of Appendix 1 to the Standard Large Generator Interconnection Procedures, in accordance with the Tariff, to: (i) interconnect a new Generating Facility to the Administered Transmission System as either a CNR or a NR; (ii) make a Material Modification to a proposed Generating Facility with an outstanding Interconnection Request; (iii) increase the energy capability or capacity capability of an existing Generating Facility; (iv) make a Material Modification to the design or operating characteristics of an existing Generating Facility, including its Interconnection Facilities, that is interconnected with the Administered Transmission System; (v) commence participation in the wholesale markets by an existing Generating Facility that is interconnected with the Administered Transmission System; or (vi) change from NR Interconnection Service to CNR Interconnection Service. Interconnection Request shall not include: (i) a retail customer interconnecting a new Generating Facility that will produce electric energy to be consumed only on the retail customer's site; (ii) a request to interconnect a new Generating Facility to a distribution facility that is subject to the Tariff if the Generating Facility will not be used to make wholesale sales of electricity in interstate commerce; or (iii) a request to interconnect a Qualifying Facility (as defined by the Public Utility Regulatory Policies Act, as amended by the Energy Policy Act of 2005 and the regulations thereto), where the Qualifying Facility's owner intent is to sell 100% of the Qualifying Facility's output to its interconnected electric utility.

Interconnection Service shall mean the service provided by System Operator and the Interconnecting Transmission Owner, associated with interconnecting the Interconnection Customer's Generating Facility to the Administered Transmission System and enabling the receipt of electric energy capability and/or capacity capability from the Generating Facility at the Point of Interconnection, pursuant to the terms of the Standard Large Generator Interconnection Agreement and, if applicable, the Tariff.

Interconnection Study shall mean any of the following studies: the Interconnection Feasibility Study, the Interconnection System Impact Study, the Interconnection Facilities Study and the Optional Interconnection Study described in the Standard Large Generator Interconnection Procedures. Interconnection Study shall not include a CNR Group Study.

Interconnection Study Agreement shall mean any of the following agreements: the Interconnection Feasibility Study Agreement, the Interconnection System Impact Study Agreement, the Interconnection Facilities Study Agreement, and the Optional Interconnection Study Agreement attached to the Standard Large Generator Interconnection Procedures. Interconnection System Impact Study shall mean an engineering study that evaluates the impact of the proposed interconnection on the safety and reliability of the Administered Transmission System and any other Affected System, the scope of which is described in Section 7 of the Standard Large Generator Interconnection Procedures. The study shall identify and detail the system impacts that would result if the Generating Facility were interconnected without project modifications or system modifications, focusing on Adverse System Impacts, or to study potential impacts, including but not limited to those identified in the Scoping Meeting as described in the Standard Large Generator Interconnection Procedures.

Interconnection System Impact Study Agreement shall mean the form of agreement contained in Appendix 3 of the Standard Large Generator Interconnection Procedures for conducting the Interconnection System Impact Study.

IRS shall mean the Internal Revenue Service.

Large Generating Facility shall mean a Generating Facility having a maximum gross capability at or above zero degrees F of more than 20 MW.

Long Lead Time Facility ("Long Lead Facility") shall mean a Generating Facility or an Elective Transmission Upgrade with an Interconnection Request for Capacity Network Resource Interconnection Service or Capacity Network Import Interconnection Service, respectively, that has, as applicable, elected or requested long lead time treatment and met the eligibility criteria and requirements specified in Schedule 22 or Schedule 25 of Section II of the Tariff..

Loss shall mean any and all losses relating to injury to or death of any person or damage to property, demand, suits, recoveries, costs and expenses, court costs, attorney fees, and all other obligations by or to third parties, arising out of or resulting from another Party's performance, or non-performance of its obligations under the Standard Large Generator Interconnection Agreement on behalf of the Indemnifying Party, except in cases of gross negligence or intentional wrongdoing by the Indemnifying Party.

Major Permits shall be as defined in Section III.13.1.1.2.2.2(a) of the Tariff.

Material Modification shall mean (i) except as expressly provided in Section 4.4.1, those modifications to the Interconnection Request, including any of the technical data provided by the Interconnection Customer in Appendix 1, Attachment A (and Attachment A-1, if applicable) to the Interconnection Request or to the interconnection configuration, requested by the Interconnection Customer that either require significant additional study of the same Interconnection Request and could substantially change the interconnection design, or have a material impact (*i.e.*, an evaluation of the proposed modification cannot be completed in less than ten (10) Business Days) on the cost or timing of any Interconnection Studies or upgrades associated with an Interconnection Request with a later queue priority date; (ii) a change to the design or operating characteristics of an existing Generating Facility, including its Interconnection Facilities, that is interconnected with the Administered Transmission System that may have a significant adverse effect on the reliability or operating characteristics of the New England Transmission System; (iii) a delay to the Commercial Operation Date, In-Service Date, or Initial Synchronization Date of greater than three (3) years where the reason for delay is unrelated to construction schedules or permitting which delay is beyond the Interconnection Customer's control; or (iv) except as provided in Section 3.2.3.4 of the LGIP, a withdrawal of a request for Long Lead Facility treatment; or (v) except as provided in Section 3.2.3.6 of the LGIP, an election to participate in an earlier Forward Capacity Auction than originally anticipated.

Metering Equipment shall mean all metering equipment installed or to be installed at the Generating Facility pursuant to the Standard Large Generator Interconnection Agreement at the metering points, including but not limited to instrument transformers, MWh-meters, data acquisition equipment, transducers, remote terminal unit, communications equipment, phone lines, and fiber optics.

Network Capability Interconnection Standard ("NC Interconnection Standard") shall mean the minimum criteria required to permit the Interconnection Customer to interconnect a Generating Facility seeking Network Resource Interconnection Service or Elective Transmission Upgrade seeking Network Import Interconnection Service in a manner that avoids any significant adverse effect on the reliability, stability, and operability of the New England Transmission System, including protecting against the degradation of transfer capability for interfaces affected by the Generating Facility seeking Network Resource Interconnection Service or Elective Transmission Upgrade seeking Network Import Interconnection Service, as detailed in the ISO New England Planning Procedures.

Network Resource ("NR") shall mean the portion of a Generating Facility that is interconnected to the Administered Transmission System under the Network Capability Interconnection Standard.

Network Resource Capability ("NR Capability") shall mean the MW quantity associated with NR Interconnection Service, calculated as described in Section II.48 of the Tariff.

Network Resource Interconnection Service ("NR Interconnection Service") shall mean the Interconnection Service selected by the Interconnection Customer to interconnect its Generating Facility to the Administered Transmission System in accordance with the Network Capability Interconnection Standard. An Interconnection Customer's NR Interconnection Service shall be solely for the megawatt amount of the NR Capability requested pursuant to Section 3.1 of the LGIP. NR Interconnection Service in and of itself does not convey transmission service.

Network Upgrades shall mean the additions, modifications, and upgrades to the New England Transmission System required at or beyond the Point of Interconnection to accommodate the interconnection of the Large Generating Facility to the Administered Transmission System.

Notice of Dispute shall mean a written notice of a dispute or claim that arises out of or in connection with the Standard Large Generator Interconnection Agreement or its performance.

Optional Interconnection Study shall mean a sensitivity analysis based on assumptions specified by the Interconnection Customer in the Optional Interconnection Study Agreement.

Optional Interconnection Study Agreement shall mean the form of agreement contained in Appendix 5 of the Standard Large Generator Interconnection Procedures for conducting the Optional Interconnection Study.

Party shall mean the System Operator, Interconnection Customer and Interconnecting Transmission Owner or any combination of the above.

Point of Change of Ownership shall mean the point, as set forth in Appendix A to the Standard Large Generator Interconnection Agreement, where the Interconnection Customer's Interconnection Facilities connect to Interconnecting Transmission Owner's Interconnection Facilities.

Point of Interconnection shall mean the point, as set forth in Appendix A to the Standard Large Generator Interconnection Agreement, where the Interconnection Facilities connect to the Administered Transmission System.

Provisional Interconnection Service shall mean Network Resource Interconnection Service provided by the System Operator, and the Interconnecting Transmission Owner, associated with interconnecting the Interconnection Customer's Generating Facility to the Administered Transmission System and enabling the receipt of electric energy capability from the Generating Facility at the Point of Interconnection on a limited and temporary basis, pursuant to the terms of the Provisional Large Generator Interconnection Agreement and, if applicable, the Tariff.

Provisional Large Generator Interconnection Agreement shall mean the Interconnection Agreement for Provisional Interconnection Service established between the System Operator, the Interconnecting Transmission Owner, and the Interconnection Customer. This agreement shall take the form of the Standard Large Generator Interconnection Agreement, modified for provisional purposes.

Queue Position shall mean the order of a valid request in the New England Control Area, relative to all other pending requests in the New England Control Area, that is established based upon the date and time of receipt of such request by the System Operator. Requests are comprised of interconnection requests for Generating Facilities, Elective Transmission Upgrades, requests for transmission service and notification of requests for interconnection to other electric systems, as notified by the other electric systems, that impact the Administered Transmission System. References to a "higher-queued" Interconnection Request shall mean one that has been received by the System Operator (and placed in queue order) earlier than another Interconnection Request, which is referred to as "lower-queued."

Reasonable Efforts shall mean, with respect to an action required to be attempted or taken by a Party under the Standard Large Generator Interconnection Agreement, efforts that are timely and consistent with Good Utility Practice and are otherwise substantially equivalent to those a Party would use to protect its own interests.

Scoping Meeting shall mean the meeting between representatives of the System Operator, Interconnection Customer, Interconnecting Transmission Owner, or any Affected Party as deemed appropriate by the System Operator in accordance with applicable codes of conduct and confidentiality requirements, conducted for the purpose of discussing alternative interconnection options, to exchange information including any transmission data and earlier study evaluations that would be reasonably expected to impact such interconnection options, to analyze such information, and to determine the potential feasible Points of Interconnection.

Site Control shall mean documentation reasonably demonstrating: (a) that the Interconnection Customer is the owner in fee simple of the real property or holds an easement for which new interconnection is sought; (b) that the Interconnection Customer holds a valid written leasehold or other contractual interest in the real property for which new interconnection is sought; (c) that the Interconnection Customer holds a valid written option to purchase or a leasehold interest in the real property for which new interconnection is sought; (d) that the Interconnection Customer holds a duly executed written contract to purchase, acquire an easement, a license or a leasehold interest in the real property for which new interconnection is sought; or (e) that the Interconnection Customer has filed applications for required permits to site on federal or state property.

Stand Alone Network Upgrades shall mean Network Upgrades that are not part of an Affected System that an Interconnection Customer may construct without affecting day-to-day operations of the New England Transmission System during their construction. The System Operator, Interconnection Customer, and Interconnecting Transmission Owner must agree as to what constitutes Stand Alone Network Upgrades and identify them in Appendix A to the Standard Large Generator Interconnection Agreement. If the System Operator, Interconnecting Transmission Owner, and Interconnection Customer disagree about whether a particular Network Upgrade is a Stand Alone Network Upgrade, the System Operator must provide the Interconnection Customer a written technical explanation outlining why the System Operator does not consider the Network Upgrade to be a Stand Alone Network Upgrade within 15 days of its determination.

Standard Large Generator Interconnection Agreement ("LGIA") shall mean the form of interconnection agreement applicable to an Interconnection Request pertaining to a Large Generating Facility, that is included in this Schedule 22 to the Tariff.

Standard Large Generator Interconnection Procedures ("LGIP") shall mean the interconnection procedures applicable to an Interconnection Request pertaining to a Large Generating Facility that are included in this Schedule 22 to the Tariff.

Surplus Interconnection Service shall mean a form of Interconnection Service that allows an Interconnection Customer to use any Unused Capability of Interconnection Service established in an Interconnection Agreement for an existing Generating Facility that has achieved Commercial Operation, such that if Surplus Interconnection Service is utilized the total amount of Interconnection Service at the same Point of Interconnection would remain the same.

Study Case shall have the meaning specified in Sections 6.2 and 7.3 of this LGIP.

System Protection Facilities shall mean the equipment, including necessary signal protection communications equipment, required to protect (1) the New England Transmission System from faults or other electrical disturbances occurring at the Generating Facility and (2) the Generating Facility from faults or other electrical system disturbances occurring on the New England Transmission System or on other delivery systems or other generating systems to which the New England Transmission System is directly connected.

Trial Operation shall mean the period during which Interconnection Customer is engaged in onsite test operations and commissioning of the Generating Facility prior to Commercial Operation.

Unused Capability shall mean: (i) in the case of NR Interconnection Service at an existing, commercial Generating Facility, the MW quantity as determined by the Original Interconnection Customer (as defined in Section 3.3 of the LGIP), not to exceed the existing, commercial Generating Facility's NR Interconnection Service; and (ii) in the case of CNR Interconnection Service at an existing, commercial Generating Facility, for Summer, the Summer CNR Capability minus the latest Summer Qualified Capacity, and for Winter, the Winter CNR Capability minus the latest Winter Qualified Capacity.

ARTICLE 2. EFFECTIVE DATE, TERM AND TERMINATION

2.1 Effective Date. This LGIA shall become effective upon execution by the Parties subject to acceptance by the Commission (if applicable), or if filed unexecuted, upon the date specified by the Commission. System Operator and Interconnecting Transmission Owner shall promptly and jointly file this LGIA with the Commission upon execution in accordance with Section 11.3 of the LGIP and Article 3.1, if required.

2.2 Term of Agreement. This LGIA, subject to the provisions of Article 2.3, and by mutual agreement of the Parties, shall remain in effect for a period of generative years from the Effective Date and shall be automatically renewed for each successive one-year period thereafter.

2.3 Termination Procedures.

- 2.3.1 Written Notice. This LGIA may be terminated by the Interconnection Customer, subject to continuing obligations of this LGIA and the Tariff, after giving the System Operator and Interconnecting Transmission Owner ninety (90) Calendar Days advance written notice, or by System Operator or Interconnecting Transmission Owner notifying the Commission after a Generating Facility retires pursuant to the Tariff, provided that if an Interconnection Customer exercises its right to terminate on ninety (90) Calendar Days, any reconnection would be treated as a new interconnection request; or this LGIA may be terminated by Interconnecting Transmission Owner or System Operator by notifying the Commission after the Generating Facility permanently ceases Commercial Operation.
- 2.3.2 Default. Each Party may terminate this LGIA in accordance with Article 17. Notwithstanding Articles 2.3.1 and 2.3.2, no termination shall become effective until the Parties have complied with all Applicable Laws and Regulations applicable to such termination, including the filing, if applicable, with the Commission of a notice of termination of this LGIA, which notice has been accepted for filing by the Commission. Termination of the LGIA shall not supersede or alter any requirements for deactivation or retirement of a generating unit under ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- 2.4 Termination Costs. If a Party elects to terminate this LGIA pursuant to Article 2.3 above, each Party shall pay all costs incurred (including any cancellation costs relating to orders or contracts for Interconnection Facilities and equipment) or charges assessed by the other Party(ies), as of the date of such Party's(ies') receipt of such notice of termination, that are the responsibility of such Party(ies) under this LGIA. In the event of termination by a Party, all Parties shall use commercially Reasonable Efforts to mitigate the costs, damages and charges arising as a consequence of termination. Upon termination of this LGIA, unless otherwise ordered or approved by the Commission:

- 2.4.1 With respect to any portion of the Interconnecting Transmission Owner's Interconnection Facilities, Network Upgrades, or Distribution Upgrades to the extent covered by this LGIA, that have not yet been constructed or installed, the Interconnecting Transmission Owner shall to the extent possible and with Interconnection Customer's authorization cancel any pending orders of, or return, any materials or equipment for, or contracts for construction of, such facilities; provided that in the event Interconnection Customer elects not to authorize such cancellation, Interconnection Customer shall assume all payment obligations with respect to such materials, equipment, and contracts, and the Interconnecting Transmission Owner shall deliver such material and equipment, and, if necessary, and to the extent possible, assign such contracts, to Interconnection Customer as soon as practicable, at Interconnection Customer's expense. To the extent that Interconnection Customer has already paid Interconnecting Transmission Owner for any or all such costs of materials or equipment not taken by Interconnection Customer, either (i) in the case of overpayment, Interconnecting Transmission Owner shall promptly refund such amounts to Interconnection Customer, less any costs, including penalties incurred by the Interconnecting Transmission Owner to cancel any pending orders of or return such materials, equipment, or contracts, or (ii) in the case of underpayment, Interconnection Customer shall promptly pay such amounts still due plus any costs, including penalties incurred by Interconnecting Transmission Owner to cancel any pending orders of or return such materials, equipment, or contracts. If an Interconnection Customer terminates this LGIA, it shall be responsible for all costs incurred in association with that Interconnection Customer's interconnection, including any cancellation costs relating to orders or contracts for Interconnection Facilities and equipment, and other expenses including any Network Upgrades for which the Interconnecting Transmission Owner has incurred expenses and has not been reimbursed by the Interconnection Customer.
- 2.4.2 Interconnecting Transmission Owner may, at its option, retain any portion of such materials, equipment, or facilities that Interconnection Customer chooses not to accept delivery of, in which case Interconnecting Transmission Owner shall be responsible for all costs associated with procuring such materials, equipment, or facilities.
- 2.4.3 With respect to any portion of the Interconnection Facilities, and any other facilities already installed or constructed pursuant to the terms of this LGIA, Interconnection

Customer shall be responsible for all costs associated with the removal, relocation or other disposition or retirement of such materials, equipment, or facilities.

- 2.5 Disconnection. Upon termination of this LGIA, Interconnection Service shall terminate and, the Parties will take all appropriate steps to disconnect the Large Generating Facility from the Interconnecting Transmission Owner's Interconnection Facilities. All costs required to effectuate such disconnection shall be borne by the terminating Party, unless such termination resulted from a non-terminating Party's Default of this LGIA or such non-terminating Party otherwise is responsible for these costs under this LGIA.
- 2.6 Survival. This LGIA shall continue in effect after termination to the extent necessary to provide for final billings and payments and for costs incurred hereunder, including billings and payments pursuant to this LGIA; to permit the determination and enforcement of liability and indemnification obligations arising from acts or events that occurred while this LGIA was in effect; and to permit each Party to have access to the lands of the other Party(ies) pursuant to this LGIA or other applicable agreements, to disconnect, remove or salvage its own facilities and equipment.

ARTICLE 3. REGULATORY FILINGS

3.1 Filing. The System Operator and Interconnecting Transmission Owner shall jointly file this LGIA (and any amendment hereto) with the appropriate Governmental Authority, if required, in accordance with Section 11.3 of the LGIP. Interconnection Customer may request that any information so provided be subject to the confidentiality provisions of Article 22. If the Interconnection Customer has executed this LGIA, or any amendment thereto, the Interconnecting Transmission Owner with respect to such filing and to provide any information reasonably requested by the System Operator and/or the Interconnecting Transmission Owner needed to comply with applicable regulatory requirements.

ARTICLE 4. SCOPE OF SERVICE

4.1 Interconnection Product Options. Interconnection Customer has selected the following (checked) type(s) of Interconnection Service:

Check: ____ NR for NR Interconnection Service (NR Capability Only)

X CNR for CNR Interconnection Service (CNR Capability and NR Capability)

4.1.1 Capacity Network Resource Interconnection Service (CNR Interconnection Service).

4.1.1.1 The Product. The System Operator and Interconnecting Transmission Owner must conduct the necessary studies and the Interconnecting Transmission Owner and Affected Parties must construct the Network Upgrades needed to interconnect the Large Generating Facility in a manner comparable to that in which all other Capacity Network Resources are interconnected under the CC Interconnection Standard. CNR Interconnection Service allows the Interconnection Customer's Large Generating Facility to be designated as a Capacity Network Resource, to participate in the New England Markets, in accordance with Market Rule 1, Section III of the Tariff, up to the net CNR Capability, or as otherwise provided in Market Rule 1, Section III of the Tariff, on the same basis as all other existing Capacity Network Resources, and to be studied as a Capacity Network Resource on the assumption that such a designation will occur.

4.1.2 Network Resource Interconnection Service (NR Interconnection Service).

4.1.2.1 The Product. The System Operator and Interconnecting Transmission Owner must conduct the necessary studies and Interconnecting Transmission Owner and Affected Parties must construct the Network Upgrades needed to interconnect the Large Generating Facility in a manner comparable to that in which all other Network Resources are interconnected under the NC Interconnection Standard. NR Interconnection Service allows the Interconnection Customer's Large Generating Facility to participate in the New England Markets, in accordance with Market Rule 1, Section III of the Tariff, up to the gross and net NR

Capability or as otherwise provided in Market Rule l, Section III of the Tariff. Notwithstanding the above, the portion of a Large Generating Facility that has been designated as a Network Resource interconnected under the NC Interconnection Standard cannot be a capacity resource under Section III.13 of the Tariff, unless pursuant to a new Interconnection Request for CNR Interconnection Service.

- **4.2 Provision of Service**. System Operator and Interconnecting Transmission Owner shall provide Interconnection Service for the Large Generating Facility at the Point of Interconnection.
- **4.3 Performance Standards**. Each Party shall perform all of its obligations under this LGIA in accordance with Applicable Laws and Regulations, the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, and Good Utility Practice, and to the extent a Party is required or prevented or limited in taking any action by such requirements and standards, such Party shall not be deemed to be in Breach of this LGIA for its compliance therewith. If such Party is the Interconnecting Transmission Owner, then that Party shall amend the LGIA and System Operator, in conjunction with the Interconnecting Transmission Owner, shall submit the amendment to the Commission for approval.
- **4.4 No Transmission Delivery Service**. The execution of this LGIA does not constitute a request for, nor the provision of, any service except for Interconnection Service, including, but not limited to, transmission delivery service, local delivery service, distribution service, capacity service, energy service, or Ancillary Services under any applicable tariff, and does not convey any right to deliver electricity to any specific customer or Point of Delivery.
 - 4.5 Transmission Delivery Service Implications. CNR Interconnection Service and NR Interconnection Service allow the Interconnection Customer's Large Generating Facility to be designated by any Network Customer under the Tariff on the New England Transmission System as a Capacity Network Resource or Network Resource, up to the net CNR Capability or NR Capability, respectively, on the same basis as all other existing Capacity Network Resources and Network Resources interconnected to the New England Transmission System, and to be studied as a Capacity Network Resource or a Network Resource or a Network Resource on the assumption that such a designation will occur. Although CNR Interconnection Service and NR Interconnection Service do not convey a reservation of

transmission service, any Network Customer can utilize its network service under the Tariff to obtain delivery of capability from the Interconnection Customer's Large Generating Facility in the same manner as it accesses Capacity Network Resources and Network Resources. A Large Generating Facility receiving CNR Interconnection Service or NR Interconnection Service may also be used to provide Ancillary Services, in accordance with the Tariff and Market Rule 1, after technical studies and/or periodic analyses are performed with respect to the Large Generating Facility's ability to provide any applicable Ancillary Services, provided that such studies and analyses have been or would be required in connection with the provision of such Ancillary Services by any existing Capacity Network Resource or Network Resource. However, if an Interconnection Customer's Large Generating Facility has not been designated as a Capacity Network Resource or as a Network Resource by any load, it cannot be required to provide Ancillary Services except to the extent such requirements extend to all Generating Facilities that are similarly situated.

CNR Interconnection Service and NR Interconnection Service do not necessarily provide the Interconnection Customer with the capability to physically deliver the output of its Large Generating Facility to any particular load on the New England Transmission System without incurring congestion costs. In the event of transmission constraints on the New England Transmission System, the Interconnection Customer's Large Generating Facility shall be subject to the applicable congestion management procedures for the New England Transmission System in the same manner as other Capacity Network Resources or Network Resources.

There is no requirement either at the time of study or interconnection, or at any point in the future, that the Interconnection Customer's Large Generating Facility be designated as a Capacity Network Resource or as a Network Resource by a Network Service Customer under the Tariff or that the Interconnection Customer identify a specific buyer (or sink). To the extent a Network Customer does designate the Large Generating Facility as either a Capacity Network Resource or a Network Resource, it must do so pursuant to the Tariff.

Once an Interconnection Customer satisfies the requirements for obtaining CNR Interconnection Service or NR Interconnection Service, as long as the Large Generating Facility has not been deemed to be retired, any future transmission service request for delivery from the Large Generating Facility on the New England Transmission System of any amount of capacity capability and/or energy capability will not require that any additional studies be performed or that any further upgrades associated with such Large Generating Facility be undertaken, regardless of whether or not such Large Generating Facility is ever designated by a Network Customer as a Capacity Network Resource or Network Resource, and regardless of changes in ownership of the Large Generating Facility. To the extent the Interconnection Customer enters into an arrangement for long-term transmission service for deliveries from the Large Generating Facility outside the New England Transmission System, or if the unit has been deemed to be retired, such request may require additional studies and upgrades in order for Interconnecting Transmission Owner to grant such request.

4.6 Interconnection Customer Provided Services. The services provided by Interconnection Customer under this LGIA are set forth in Article 9.6 and Article 13.4. Interconnection Customer shall be paid for such services in accordance with Article 11.6.

ARTICLE 5. INTERCONNECTION FACILITIES ENGINEERING, PROCUREMENT, AND CONSTRUCTION

5.1 Options. Unless otherwise mutually agreed to between the Parties, Interconnection Customer shall specify the In-Service Date, Initial Synchronization Date, and Commercial Operation Date as specified in the Interconnection Request or as subsequently revised pursuant to Section 4.4 of the LGIP; and select either the Standard Option or Alternate Option set forth below, and such dates and selected option shall be set forth in Appendix B (Milestones). At the same time, Interconnection Customer shall indicate whether it elects to exercise the Option to Build set forth in Article 5.1.3 below. If the dates designated by Interconnection Customer are not acceptable to Interconnection Customer within thirty (30) Calendar Days. Upon receipt of the notification that Interconnection Customer's designated dates are not acceptable to Interconnecting Transmission Owner, the Interconnection Customer shall notify Interconnecting Transmission Owner within thirty (30) Calendar Days whether it elects to exercise the Option to Build if it has not already elected to exercise the Option to Build. In accordance with Section 8 of the LGIP and unless

otherwise mutually agreed, the Alternate Option is not an available option if the Interconnection Customer waived the Interconnection Facilities Study.

- 5.1.1 Standard Option. The Interconnecting Transmission Owner shall design, procure, and construct the Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades, using Reasonable Efforts to complete the Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades by the dates set forth in Appendix B (Milestones). The Interconnecting Transmission Owner shall not be required to undertake any action which is inconsistent with its standard safety practices, its material and equipment specifications, its design criteria and construction procedures, its labor agreements, and Applicable Laws and Regulations. In the event the Interconnecting Transmission Owner reasonably expects that it will not be able to complete the Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades by the specified dates, the Interconnecting Transmission Owner shall promptly provide written notice to the Interconnection Customer and shall undertake Reasonable Efforts to meet the earliest dates thereafter.
- 5.1.2 Alternate Option. If the dates designated by Interconnection Customer are acceptable to Interconnecting Transmission Owner, the Interconnecting Transmission Owner shall so notify Interconnection Customer within thirty (30) Calendar Days, and shall assume responsibility for the design, procurement and construction of the Interconnecting Transmission Owner's Interconnection Facilities by the designated dates. If Interconnecting Transmission Owner subsequently fails to complete Interconnecting Transmission Owner's Interconnection Facilities by the In-Service Date, to the extent necessary to provide back feed power; or fails to complete Network Upgrades by the Initial Synchronization Date to the extent necessary to allow for Trial Operation at full power output, unless other arrangements are made by the Parties for such Trial Operation; or fails to complete the Network Upgrades by the Commercial Operation Date, as such dates are reflected in Appendix B (Milestones); Interconnecting Transmission Owner shall pay Interconnection Customer liquidated damages in accordance with Article 5.3, Liquidated Damages, provided, however, the dates designated by Interconnection Customer shall be extended day for day for each day that the applicable System Operator refuses to grant clearances to install equipment.

- **5.1.3 Option to Build**. Interconnection Customer shall have the option to assume responsibility for the design, procurement and construction of new Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades on the dates specified in Article 5.1.2. The System Operator, Interconnecting Transmission Owner, and Interconnection Customer must agree as to what constitutes Stand Alone Network Upgrades and identify such Stand Alone Network Upgrades in Appendix A to the LGIA. Except for Stand Alone Network Upgrades, Interconnection Customer shall have no right to construct Network Upgrades under this option.
- **5.1.4** Negotiated Option. If the dates designated by Interconnection Customer are not acceptable to Interconnecting Transmission Owner, the Parties shall in good faith attempt to negotiate terms and conditions (including revision of the specified dates and liquidated damages, the provision of incentives, or the procurement and construction of all facilities other than the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades if the Interconnection Customer elects to exercise the Option to Build under Article 5.1.3). If the Parties are unable to reach agreement on such terms and conditions, then, pursuant to Article 5.1.1 (Standard Option), Interconnecting Transmission Owner's Interconnecting Transmission Owner shall assume responsibility for the design, procurement and construction of all facilities other than the Interconnecting Transmission Owner's Interconnection Customer elects to exercise the Option to Buil facilities other than the Interconnecting Transmission Owner shall assume responsibility for the design, procurement and construction of all facilities and Stand Alone Network Upgrades if the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades if the Interconnection Customer elects to exercise the Option to Build.
- **5.2** General Conditions Applicable to Option to Build. If Interconnection Customer assumes responsibility for the design, procurement and construction of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades,

(1) the Interconnection Customer shall commit in the LGIA to a schedule for the completion of, and provide the System Operator evidence of proceeding with: (a) engineering and design of Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades, (b) procurement of necessary equipment and ordering of long lead time material, and (c) construction of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades;

(2) the Interconnection Customer shall engineer, procure equipment, and construct the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades (or portions thereof) using Good Utility Practice and using standards and specifications provided in advance by the Interconnecting Transmission Owner;

(3) Interconnection Customer's engineering, procurement and construction of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades shall comply with all requirements of law to which Interconnecting Transmission Owner would be subject in the engineering, procurement or construction of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades;

(4) Interconnecting Transmission Owner shall review and approve the engineering design, equipment acceptance tests, and the construction of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades;

(5) prior to commencement of construction, Interconnection Customer shall provide to Interconnecting Transmission Owner any changes to the schedule for construction of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades reflected in Appendix B (Milestones), and shall promptly respond to requests for information from Interconnecting Transmission Owner;

 (6) at any time during construction, Interconnecting Transmission Owner shall have the right to gain unrestricted access to the Interconnecting Transmission Owner's Interconnection
Facilities and Stand Alone Network Upgrades and to conduct inspections of the same;

(7) at any time during construction, should any phase of the engineering, equipment procurement, or construction of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades not meet the standards and specifications provided by Interconnecting Transmission Owner, the Interconnection Customer shall be obligated to remedy deficiencies in that portion of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades;

(8) the Interconnection Customer shall indemnify the Interconnecting Transmission Owner for claims arising from the Interconnection Customer's construction of Interconnecting

Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades under the terms and procedures applicable to Article 18.1 (Indemnity);

(9) the Interconnection Customer shall transfer control of Interconnecting Transmission
Owner's Interconnection Facilities and Stand Alone Network Upgrades to the Interconnecting
Transmission Owner prior to the In-Service Date;

(10) Unless Parties otherwise agree, Interconnection Customer shall transfer ownership of Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to Interconnecting Transmission Owner prior to the In-Service Date;

(11) Interconnecting Transmission Owner shall approve and accept for operation and maintenance the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to the extent engineered, procured, and constructed in accordance with this Article 5.2;

(12) Interconnection Customer shall deliver to Interconnecting Transmission Owner "as built" drawings, information, and any other documents that are reasonably required by Interconnecting Transmission Owner to assure that the Interconnection Facilities and Stand Alone Network Upgrades are built to the standards and specifications required by Interconnecting Transmission Owner; and

(13) Interconnection Customer shall pay Interconnecting Transmission Owner the agreed upon amount of for Interconnecting Transmission Owner to execute responsibilities enumerated to Interconnecting Transmission Owner under this Article 5.2. Interconnecting Transmission Owner shall invoice Interconnection Customer for this total amount to be divided on a monthly basis pursuant to Article 12.

5.3 Liquidated Damages. The actual damages to the Interconnection Customer, in the event the Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades are not completed by the dates designated by the Interconnection Customer and accepted by the Interconnecting Transmission Owner pursuant to subparagraphs 5.1.2 or 5.1.4, above, may include Interconnection Customer's fixed operation and maintenance costs and lost opportunity

costs. Such actual damages are uncertain and impossible to determine at this time. Because of such uncertainty, any liquidated damages paid by the Interconnecting Transmission Owner to the Interconnection Customer in the event that Interconnecting Transmission Owner does not complete any portion of the Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades by the applicable dates, shall be an amount equal to ½ of 1 percent per day of the actual cost of the Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades, in the aggregate, for which Interconnecting Transmission Owner has assumed responsibility to design, procure and construct.

However, in no event shall the total liquidated damages exceed 20 percent of the actual cost of the Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades for which the Interconnecting Transmission Owner has assumed responsibility to design, procure, and construct. The foregoing payments will be made by the Interconnecting Transmission Owner to the Interconnection Customer as just compensation for the damages caused to the Interconnection Customer, which actual damages are uncertain and impossible to determine at this time, and as reasonable liquidated damages, but not as a penalty or a method to secure performance of this LGIA. Liquidated damages, when the Parties agree to them, are the exclusive remedy for the Interconnecting Transmission Owner's failure to meet its schedule.

No liquidated damages shall be paid to Interconnection Customer if: (1) Interconnection Customer is not ready to commence use of the Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades to take the delivery of power for the Large Generating Facility's Trial Operation or to export power from the Large Generating Facility on the specified dates, unless the Interconnection Customer would have been able to commence use of the Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades to take the delivery of power for Large Generating Facility's Trial Operation or to export power from the Large Generating Facility, but for Interconnecting Transmission Owner's delay; (2) the Interconnecting Transmission Owner's failure to meet the specified dates is the result of the action or inaction of the Interconnecting Transmission Owner or any cause beyond Interconnecting Transmission Owner's reasonable control or reasonable ability to cure, including, but not limited to, actions by the System Operator that cause delays and/or delays in licensing, permitting or consents where the Interconnecting Transmission Owner has pursued such licenses, permits or consents in good faith; (3) the Interconnection Customer has assumed responsibility for the design, procurement and construction of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades; or (4) the Parties have otherwise agreed.

- 5.4 Power System Stabilizers. If a Power System Stabilizer is required to be installed on the Large Generating Facility for the purpose of maintaining system stability, the Interconnection Customer shall procure, install, maintain and operate Power System Stabilizers in accordance with the guidelines and procedures established by the System Operator and Interconnecting Transmission Owner, and consistent with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. The System Operator and Interconnecting Transmission Owner reserve the right to reasonably establish minimum acceptable settings for any installed Power System Stabilizers, subject to the design and operating limitations of the Large Generating Facility. If the Large Generating Facility's Power System Stabilizers are removed from service or not capable of automatic operation, the Interconnection Customer shall immediately notify the System Operator and Interconnecting Transmission Owner, or their designated representative. The requirements of this paragraph shall not apply to non-synchronous power production equipment.
- **5.5** Equipment Procurement. If responsibility for construction of the Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades is to be borne by the Interconnecting Transmission Owner, then the Interconnecting Transmission Owner shall commence design of the Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades and procure necessary equipment as soon as practicable after all of the following conditions are satisfied, unless the Parties otherwise agree in writing:
 - **5.5.1** The Interconnecting Transmission Owner has completed the Facilities Study pursuant to the Facilities Study Agreement;
 - **5.5.2** The Interconnecting Transmission Owner has received written authorization to proceed with design and procurement from the Interconnection Customer by the date specified in Appendix B (Milestones); and

- 5.5.3 The Interconnection Customer has provided security to the Interconnecting Transmission Owner in accordance with Article 11.5 by the dates specified in Appendix B (Milestones).
- **5.6 Construction Commencement**. The Interconnecting Transmission Owner shall commence construction of the Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades for which it is responsible as soon as practicable after the following additional conditions are satisfied:
 - **5.6.1** Approval of the appropriate Governmental Authority has been obtained for any facilities requiring regulatory approval;
 - **5.6.2** Necessary real property rights and rights-of-way have been obtained, to the extent required for the construction of a discrete aspect of the Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades;
 - **5.6.3** The Interconnecting Transmission Owner has received written authorization to proceed with construction from the Interconnection Customer by the date specified in Appendix B (Milestones); and
 - 5.6.4 The Interconnection Customer has provided security to Interconnecting Transmission Owner in accordance with Article 11.5 by the dates specified in Appendix B (Milestones).
- **5.7** Work Progress. The Interconnection Customer and the Interconnecting Transmission Owner shall keep each Party informed, by written quarterly progress reports, as to the progress of their respective design, procurement and construction efforts in order to meet the dates specified in Appendix B (Milestones). Any Party may also, at any other time, request a written progress report from the other Parties. If, at any time, the Interconnection Customer determines that the completion of the Interconnecting Transmission Owner's Interconnection Facilities will not be required until after the specified In-Service Date, the Interconnection Customer, upon the System Operator's approval that the change in the In-Service Date will not constitute a Material Modification pursuant to Section 4.4 of the LGIP, will provide written notice to the

Interconnecting Transmission Owner of such later date upon which the completion of the Interconnecting Transmission Owner's Interconnection Facilities will be required.

5.8 Information Exchange. As soon as reasonably practicable after the Effective Date, the Parties shall exchange information regarding the design and compatibility of the Parties' Interconnection Facilities and compatibility of the Interconnection Facilities with the New England Transmission System, and shall work diligently and in good faith to make any necessary design changes.

5.9 Other Interconnection Options.

- 5.9.1 Limited Operation. If any of the Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades are not reasonably expected to be completed prior to the Commercial Operation Date of the Large Generating Facility, System Operator and the Interconnecting Transmission Owner shall, upon the request and at the expense of Interconnection Customer, perform operating studies on a timely basis to determine the extent to which the Large Generating Facility and the Interconnection Customer's Interconnection Facilities may operate prior to the completion of the Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades consistent with Applicable Laws and Regulations, Applicable Reliability Standards, Good Utility Practice, and this LGIA. System Operator and Interconnecting Transmission Owner shall permit Interconnection Customer to operate the Large Generating Facility and the Interconnection Customer's Interconnection Facilities in accordance with the results of such studies.
- 5.9.2 Provisional Interconnection Service. Upon the request of Interconnection Customer, and prior to completion of requisite Interconnection Facilities, Network Upgrades, Distribution Upgrades, or System Protection Facilities, System Operator and the Interconnecting Transmission Owner may execute a Provisional Large Generator Interconnection Agreement or Interconnection Customer may request the filing of an unexecuted Provisional Large Generator Interconnection Service at the discretion of System Operator and Interconnecting Transmission Owner for Provisional Interconnection Service at the discretion of System Operator and Interconnecting Transmission Owner based upon an evaluation that will consider the results of available studies. System Operator and Interconnecting Transmission Owner shall determine, through available studies or additional studies as necessary, whether stability, short circuit, thermal, and/or voltage issues would arise if

Interconnection Customer interconnects without modifications to the Large Generating Facility or the New England Transmission System. System Operator and Interconnecting Transmission Owner shall determine whether any Interconnection Facilities, Network Upgrades, Distribution Upgrades, or System Protection Facilities that are necessary to meet the requirements of NERC, or any applicable Regional Entity for the interconnection of a new, modified and/or expanded Large Generating Facility are in place prior to the commencement of Interconnection Service from the Large Generating Facility. Where available studies indicate that such Interconnection Facilities, Network Upgrades, Distribution Upgrades, and/or System Protection Facilities that are required for the interconnection of a new, modified and/or expanded Large Generating Facility are not currently in place, System Operator will perform a study, at the Interconnection Customer's expense, to confirm the facilities that are required for Provisional Interconnection Service. The maximum permissible output of the Large Generating Facility in the Provisional Large Generator Interconnection Agreement shall be studied and updated each time the conditions assumed in the studies supporting the Provisional Interconnection Service change. Provisional Interconnection Service is an optional procedure and it will not alter the Interconnection Customer's Queue Position and associated cost and upgrade responsibilities. Interconnection Customer assumes all risk and liabilities with respect to changes between the Provisional Large Generator Interconnection Agreement and the Large Generator Interconnection Agreement, including changes in output limits and Interconnection Facilities, Network Upgrades, Distribution Upgrades, and/or System Protection Facilities cost responsibilities.

- 5.10 Interconnection Customer's Interconnection Facilities ("ICIF"). Interconnection Customer shall, at its expense, design, procure, construct, own and install the ICIF, as set forth in Appendix A (Interconnection Facilities, Network Upgrades and Distribution Upgrades).
 - 5.10.1 Large Generating Facility Specifications. Interconnection Customer shall submit initial specifications for the ICIF, including System Protection Facilities, to Interconnecting Transmission Owner at least one hundred eighty (180) Calendar Days prior to the Initial Synchronization Date; and final specifications for review and comment at least ninety (90) Calendar Days prior to the Initial Synchronization Date. Interconnecting Transmission Owner shall review such specifications to ensure that the ICIF are compatible with the technical specifications, operational control, and safety

requirements of the Interconnecting Transmission Owner and comment on such specifications within thirty (30) Calendar Days of Interconnection Customer's submission. All specifications provided hereunder shall be deemed confidential.

- **5.10.2** Interconnecting Transmission Owner's Review. Interconnecting Transmission Owner's review of Interconnection Customer's final specifications shall not be construed as confirming, endorsing, or providing a warranty as to the design, fitness, safety, durability or reliability of the Large Generating Facility, or the ICIF. Interconnection Customer shall make such changes to the ICIF as may reasonably be required by Interconnecting Transmission Owner, in accordance with Good Utility Practice, to ensure that the ICIF are compatible with the technical specifications, operational control, and safety requirements of the Interconnecting Transmission Owner.
- **5.10.3 ICIF Construction**. The ICIF shall be designed and constructed in accordance with Good Utility Practice. Within one hundred twenty (120) Calendar Days after the Commercial Operation Date, unless the Parties agree on another mutually acceptable deadline, the Interconnection Customer shall deliver to the Interconnecting Transmission Owner "as-built" drawings, information and documents for the ICIF, such as: a one-line diagram, a site plan showing the Large Generating Facility and the ICIF, plan and elevation drawings showing the layout of the ICIF, a relay functional diagram, relaying AC and DC schematic wiring diagrams and relay settings for all facilities associated with the Interconnection Customer's step-up transformers, the facilities connecting the Large Generating Facility to the step-up transformers and the ICIF, and the impedances (determined by factory tests) for the associated step-up transformers and the Large Generating Facilities. The Interconnection Customer shall provide Interconnecting Transmission Owner specifications for the excitation system, automatic voltage regulator, Large Generating Facility control and protection settings, transformer tap settings, and communications, if applicable.
- 5.11 Interconnecting Transmission Owner's Interconnection Facilities Construction. The Interconnecting Transmission Owner's Interconnection Facilities shall be designed and constructed in accordance with Good Utility Practice. Upon request, within one hundred twenty (120) Calendar Days after the Commercial Operation Date, unless the Parties agree on another mutually acceptable deadline, the Interconnecting Transmission Owner shall deliver to the

Interconnection Customer the following "as-built" drawings, information and documents for the Interconnecting Transmission Owner's Interconnection Facilities. The appropriate drawings and relay diagrams shall be included in Appendix A of this LGIA.

The System Operator will obtain operational control of the Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades upon completion of such facilities pursuant to the TOA.

- 5.12 Access Rights. Upon reasonable notice and supervision by a Party, and subject to any required or necessary regulatory approvals, a Party ("Granting Party") shall furnish at the incremental cost to another Party ("Access Party") any rights of use, licenses, rights of way and easements with respect to lands owned or controlled by the Granting Party, its agents if allowed under the applicable agency agreement, that are necessary to enable the Access Party solely to obtain ingress and egress to construct, operate, maintain, repair, test (or witness testing), inspect, replace or remove facilities and equipment to: (i) interconnect the Large Generating Facility with the Administered Transmission System; (ii) operate and maintain the Large Generating Facility, the Interconnection Facilities and the New England Transmission System; and (iii) disconnect or remove the Access Party's facilities and equipment upon termination of this LGIA. In exercising such licenses, rights of way and easements, the Access Party shall not unreasonably disrupt or interfere with normal operation of the Granting Party's business and shall adhere to the safety rules and procedures established in advance, as may be changed from time to time, by the Granting Party and provided to the Access Party.
- 5.13 Lands of Other Property Owners. If any part of the Interconnecting Transmission Owner's Interconnection Facilities and/or Network Upgrades is to be installed on property owned by persons other than Interconnection Customer or Interconnecting Transmission Owner, the Interconnecting Transmission Owner shall at Interconnection Customer's expense use Reasonable Efforts, including use of its eminent domain authority, and to the extent consistent with state law, to procure from such persons any rights of use, licenses, rights of way and easements that are necessary to construct, operate, maintain, test, inspect, replace or remove the Interconnecting Transmission Owner's Interconnection Facilities and/or Network Upgrades upon such property. Notwithstanding the foregoing, the Interconnecting Transmission Owner shall not be obligated to exercise eminent domain authority in a manner inconsistent with Applicable Laws and Regulations or when an Interconnection Customer is authorized under Applicable Laws and Regulations to exercise eminent domain on its own behalf.

- **5.14 Permits.** System Operator, Interconnecting Transmission Owner and Interconnection Customer shall cooperate with each other in good faith in obtaining all permits, licenses, and authorizations that are necessary to accomplish the interconnection in compliance with Applicable Laws and Regulations. With respect to this paragraph, Interconnecting Transmission Owner shall provide permitting assistance to the Interconnection Customer comparable to that provided to the Interconnecting Transmission Owner's own, or an Affiliate's generation.
- 5.15 Early Construction of Base Case Facilities. Interconnection Customer may request Interconnecting Transmission Owner to construct, and Interconnecting Transmission Owner shall construct, using Reasonable Efforts to accommodate Interconnection Customer's In-Service Date, all or any portion of any Network Upgrades required for Interconnection Customer to be interconnected to the Administered Transmission System, which are included in the Base Case of the Facilities Study for the Interconnection Customer, and which also are required to be constructed for another Interconnection Customer, but where such construction is not scheduled to be completed in time to achieve Interconnection Customer's In-Service Date. The Interconnection Customer shall reimburse the Interconnecting Transmission Owner for all costs incurred related to early construction to the extent such costs are not recovered from other Interconnection Customers included in the base case.
- 5.16 Suspension. Interconnection Customer reserves the right, upon written notice to Interconnecting Transmission Owner and System Operator, to suspend at any time all work by Interconnecting Transmission Owner associated with the construction and installation of Interconnecting Transmission Owner's Interconnection Facilities and/or Network Upgrades required under this LGIA with the condition that the New England Transmission System shall be left in a safe and reliable condition in accordance with Good Utility Practice and the System Operator's and Interconnecting Transmission Owner's safety and reliability criteria. In such event, Interconnecting Transmission Owner (i) has incurred pursuant to this LGIA prior to the suspension and (ii) incurs in suspending such work, including any costs incurred to perform such work as may be necessary to ensure the safety of persons and property and the integrity of the New England Transmission System during such suspension and, if applicable, any costs incurred in connection with the cancellation or suspension of material, equipment and labor contracts which Interconnecting Transmission Owner cannot reasonably avoid; provided, however, that

prior to canceling or suspending any such material, equipment or labor contract, Interconnecting Transmission Owner shall obtain Interconnection Customer's authorization to do so. Interconnecting Transmission Owner shall invoice Interconnection Customer for such costs pursuant to Article 12 and shall use due diligence to minimize its costs. In the event Interconnection Customer suspends work by Interconnecting Transmission Owner required under this LGIA pursuant to this Article 5.16, and has not requested Interconnecting Transmission Owner to recommence the work required under this LGIA on or before the expiration of three (3) years following commencement of such suspension, this LGIA shall be deemed terminated. The three-year period shall begin on the date the suspension is requested, or the date of the written notice to Interconnecting Transmission Owner and System Operator, if no effective date is specified. A suspension under this Article 5.16 does not automatically permit an extension of the In-Service Date, the Initial Synchronization Date or the Commercial Operation Date. A request for extension of such dates is subject to Section 4.4.5 of the LGIP. Notwithstanding the extensions permitted under Section 4.4.5 of the LGIP, the three-year period shall in no way result in an extension of the In-Service Date, the Initial Synchronization Date or the Commercial Operation Date that exceeds seven (7) years from the date of the Interconnection Request; otherwise, this LGIA shall be deemed terminated.

5.17 Taxes.

- **5.17.1 Payments Not Taxable.** The Parties intend that all payments or property transfers made by any Party for the installation of the Interconnecting Transmission Owner's Interconnection Facilities and the Network Upgrades shall be non-taxable, either as contributions to capital, or as an advance, in accordance with the Internal Revenue Code and any applicable state income tax laws and shall not be taxable as contributions in aid of construction or otherwise under the Internal Revenue Code and any applicable state income tax laws.
- **5.17.2 Representations and Covenants.** In accordance with IRS Notice 2001-82 and IRS Notice 88-129, Interconnection Customer represents and covenants that (i) ownership of the electricity generated at the Large Generating Facility will pass to another party prior to the transmission of the electricity on the New England Transmission System, (ii) for income tax purposes, the amount of any payments and the cost of any property transferred to the Interconnecting Transmission Owner for the Interconnecting
Transmission Owner's Interconnection Facilities will be capitalized by Interconnection Customer as an intangible asset and recovered using the straight-line method over a useful life of twenty (20) years, and (iii) any portion of the Interconnecting Transmission Owner's Interconnection Facilities that is a "dual-use intertie," within the meaning of IRS Notice 88-129, is reasonably expected to carry only a de minimis amount of electricity in the direction of the Large Generating Facility. For this purpose, "de minimis amount" means no more than 5 percent of the total power flows in both directions, calculated in accordance with the "5 percent test" set forth in IRS Notice 88-129. This is not intended to be an exclusive list of the relevant conditions that must be met to conform to IRS requirements for non-taxable treatment.

At Interconnecting Transmission Owner's request, Interconnection Customer shall provide Interconnecting Transmission Owner with a report from an independent engineer confirming its representation in clause (iii), above. Interconnecting Transmission Owner represents and covenants that the cost of the Interconnecting Transmission Owner's Interconnection Facilities paid for by Interconnection Customer will have no net effect on the base upon which rates are determined.

5.17.3 Indemnification for the Cost Consequences of Current Tax Liability Imposed Upon Interconnecting Transmission Owner. Notwithstanding Article 5.17.1, Interconnection Customer shall protect, indemnify and hold harmless Interconnecting Transmission Owner from the cost consequences of any current tax liability imposed against Interconnecting Transmission Owner as the result of payments or property transfers made by Interconnection Customer to Interconnecting Transmission Owner under this LGIA, as well as any interest and penalties, other than interest and penalties attributable to any delay caused by Interconnecting Transmission Owner.

The Interconnecting Transmission Owner shall not include a gross-up for the cost consequences of any current tax liability in the amounts it charges Interconnection Customer under this LGIA unless (i) Interconnecting Transmission Owner has determined, in good faith, that the payments or property transfers made by Interconnection Customer to Interconnecting Transmission Owner should be reported as income subject to taxation or (ii) any Governmental Authority directs Interconnecting Transmission Owner to report payments or property as income subject to taxation; provided, however, that Interconnecting Transmission Owner may require Interconnection Customer to provide security, in a form reasonably acceptable to Interconnecting Transmission Owner (such as a parental guarantee or a letter of credit), in an amount equal to the cost consequences of any current tax liability under this Article 5.17. Interconnection Customer shall reimburse Interconnecting Transmission Owner for such costs on a fully grossed-up basis, in accordance with Article 5.17.4, within thirty (30) Calendar Days of receiving written notification from Interconnecting Transmission Owner of the amount due, including detail about how the amount was calculated.

The indemnification obligation shall terminate at the earlier of (1) the expiration of the ten year testing period, and the applicable statute of limitation, as it may be extended by the Interconnecting Transmission Owner upon request of the IRS, to keep these years open for audit or adjustment, or (2) the occurrence of a subsequent taxable event and the payment of any related indemnification obligations as contemplated by this Article 5.17.

5.17.4 Tax Gross-Up Amount. Interconnection Customer's liability for the cost consequences of any current tax liability under this Article 5.17 shall be calculated on a fully grossedup basis. Except as may otherwise be agreed to by the parties, this means that Interconnection Customer will pay Interconnecting Transmission Owner, in addition to the amount paid for the Interconnection Facilities and Network Upgrades, an amount equal to (1) the current taxes imposed on Interconnecting Transmission Owner ("Current Taxes") on the excess of (a) the gross income realized by Interconnecting Transmission Owner as a result of payments or property transfers made by Interconnection Customer to Interconnecting Transmission Owner under this LGIA (without regard to any payments under this Article 5.17) (the "Gross Income Amount") over (b) the present value of future tax deductions for depreciation that will be available as a result of such payments or property transfers (the "Present Value Depreciation Amount"), plus (2) an additional amount sufficient to permit the Interconnecting Transmission Owner to receive and retain, after the payment of all Current Taxes, an amount equal to the net amount described in clause (1). For this purpose, (i) Current Taxes shall be computed based on Interconnecting Transmission Owner composite federal and state tax rates at the time the payments or property transfers are received and Interconnecting Transmission Owner will be treated as being subject to tax at the highest marginal rates in effect at that time (the "Current Tax Rate"), and (ii) the Present Value Depreciation Amount shall be computed

by discounting Interconnecting Transmission Owner's anticipated tax depreciation deductions as a result of such payments or property transfers by Interconnecting Transmission Owner current weighted average cost of capital. Thus, the formula for calculating Interconnection Customer's liability to Transmission Owner pursuant to this Article 5.17.4 can be expressed as follows: (Current Tax Rate x (Gross Income Amount – Present Value of Tax Depreciation))/(1-Current Tax Rate). Interconnection Customer's estimated tax liability in the event taxes are imposed shall be stated in Appendix A (Interconnection Facilities, Network Upgrades and Distribution Upgrades).

5.17.5 Private Letter Ruling or Change or Clarification of Law. At Interconnection

Customer's request and expense, Interconnecting Transmission Owner shall file with the IRS a request for a private letter ruling as to whether any property transferred or sums paid, or to be paid, by Interconnection Customer to Interconnecting Transmission Owner under this LGIA are subject to federal income taxation. Interconnection Customer will prepare the initial draft of the request for a private letter ruling, and will certify under penalties of perjury that all facts represented in such request are true and accurate to the best of Interconnection Customer's knowledge. Interconnecting Transmission Owner and Interconnection Customer shall cooperate in good faith with respect to the submission of such request.

Interconnecting Transmission Owner shall keep Interconnection Customer fully informed of the status of such request for a private letter ruling and shall execute either a privacy act waiver or a limited power of attorney, in a form acceptable to the IRS, that authorizes Interconnection Customer to participate in all discussions with the IRS regarding such request for a private letter ruling. Interconnecting Transmission Owner shall allow Interconnection Customer to attend all meetings with IRS officials about the request and shall permit Interconnection Customer to prepare the initial drafts of any follow-up letters in connection with the request.

5.17.6 Subsequent Taxable Events. If, within ten (10) years from the date on which the relevant Interconnecting Transmission Owner's Interconnection Facilities are placed in service, (i) Interconnection Customer Breaches the covenant contained in Article 5.17.2, (ii) a "disqualification event" occurs within the meaning of IRS Notice 88-129, or (iii) this LGIA terminates and Interconnecting Transmission Owner retains ownership of the

Interconnection Facilities and Network Upgrades, the Interconnection Customer shall pay a tax gross-up for the cost consequences of any current tax liability imposed on Interconnecting Transmission Owner, calculated using the methodology described in Article 5.17.4 and in accordance with IRS Notice 90-60.

5.17.7 Contests. In the event any Governmental Authority determines that Interconnecting Transmission Owner's receipt of payments or property constitutes income that is subject to taxation, Interconnecting Transmission Owner shall notify Interconnection Customer, in writing, within thirty (30) Calendar Days of receiving notification of such determination by a Governmental Authority. Upon the timely written request by Interconnection Customer and at Interconnection Customer's sole expense, Interconnecting Transmission Owner may appeal, protest, seek abatement of, or otherwise oppose such determination. Upon Interconnection Customer's written request and sole expense, Interconnecting Transmission Owner may file a claim for refund with respect to any taxes paid under this Article 5.17, whether or not it has received such a determination. Interconnecting Transmission Owner reserves the right to make all decisions with regard to the prosecution of such appeal, protest, abatement or other contest, including the selection of counsel and compromise or settlement of the claim, but Interconnecting Transmission Owner shall keep Interconnection Customer informed, shall consider in good faith suggestions from Interconnection Customer about the conduct of the contest, and shall reasonably permit Interconnection Customer or an Interconnection Customer representative to attend contest proceedings.

Interconnection Customer shall pay to Interconnecting Transmission Owner on a periodic basis, as invoiced by Interconnecting Transmission Owner, documented reasonable costs of prosecuting such appeal, protest, abatement or other contest. At any time during the contest, Interconnecting Transmission Owner may agree to a settlement either with Interconnection Customer's consent or after obtaining written advice from nationallyrecognized tax counsel, selected by Interconnecting Transmission Owner, but reasonably acceptable to Interconnection Customer, that the proposed settlement represents a reasonable settlement given the hazards of litigation. Interconnection Customer's obligation shall be based on the amount of the settlement agreed to by Interconnection Customer, or if a higher amount, so much of the settlement that is supported by the written advice from nationally recognized tax counsel selected under the terms of the preceding sentence. The settlement amount shall be calculated on a fully grossed-up basis to cover any related cost consequences of the current tax liability. Any settlement without Interconnection Customer's consent or such written advice will relieve Interconnection Customer from any obligation to indemnify Interconnecting Transmission Owner for the tax at issue in the contest.

5.17.8 Refund. In the event that (a) a private letter ruling is issued to Interconnecting Transmission Owner which holds that any amount paid or the value of any property transferred by Interconnection Customer to Interconnecting Transmission Owner under the terms of this LGIA is not subject to federal income taxation, (b) any legislative change or administrative announcement, notice, ruling or other determination makes it reasonably clear to Interconnecting Transmission Owner in good faith that any amount paid or the value of any property transferred by Interconnection Customer to Interconnecting Transmission Owner under the terms of this LGIA is not taxable to Interconnecting Transmission Owner, (c) any abatement, appeal, protest, or other contest results in a determination that any payments or transfers made by Interconnection Customer to Interconnecting Transmission Owner are not subject to federal income tax, or (d) if Interconnecting Transmission Owner receives a refund from any taxing authority for any overpayment of tax attributable to any payment or property transfer made by Interconnection Customer to Interconnecting Transmission Owner pursuant to this LGIA, Interconnecting Transmission Owner shall promptly refund to Interconnection Customer the following:

(i) any payment made by Interconnection Customer under this Article 5.17
for taxes that is attributable to the amount determined to be non-taxable, together
with interest thereon,

(ii) interest on any amounts paid by Interconnection Customer to
Interconnecting Transmission Owner for such taxes which Interconnecting
Transmission Owner did not submit to the taxing authority, interest calculated in
accordance with the methodology set forth in the Commission's regulations at 18
CFR §35.19a(a)(2)(iii) from the date payment was made by Interconnection
Customer to the date Interconnecting Transmission Owner refunds such payment
to Interconnection Customer, and

(iii) with respect to any such taxes paid by Interconnecting Transmission Owner, any refund or credit Interconnecting Transmission Owner receives or to which it may be entitled from any Governmental Authority, interest (or that portion thereof attributable to the payment described in clause (i), above) owed to the Interconnecting Transmission Owner for such overpayment of taxes (including any reduction in interest otherwise payable by Interconnecting Transmission Owner to any Governmental Authority resulting from an offset or credit); provided, however, that Interconnecting Transmission Owner will remit such amount promptly to Interconnection Customer only after and to the extent that Interconnecting Transmission Owner has received a tax refund, credit or offset from any Governmental Authority for any applicable overpayment of income tax related to the Interconnecting Transmission Owner's Interconnection Facilities.

The intent of this provision is to leave Parties, to the extent practicable, in the event that no taxes are due with respect to any payment for Interconnection Facilities and Network Upgrades hereunder, in the same position they would have been in had no such tax payments been made.

5.17.9 Taxes Other Than Income Taxes. Upon the timely request by Interconnection Customer, and at Interconnection Customer's sole expense, Interconnecting Transmission Owner shall appeal, protest, seek abatement of, or otherwise contest any tax (other than federal or state income tax) asserted or assessed against Interconnecting Transmission Owner for which Interconnection Customer may be required to reimburse Interconnecting Transmission Owner under the terms of this LGIA. Interconnection Customer shall pay to Interconnecting Transmission Owner on a periodic basis, as invoiced by Interconnecting Transmission Owner, Interconnecting Transmission Owner's documented reasonable costs of prosecuting such appeal, protest, abatement, or other contest. Interconnection Customer and Interconnecting Transmission Owner shall cooperate in good faith with respect to any such contest. Unless the payment of such taxes is a prerequisite to an appeal or abatement or cannot be deferred, no amount shall be payable by Interconnection Customer to Interconnecting Transmission Owner for such taxes until they are assessed by a final, non-appealable order by any court or agency of

competent jurisdiction. In the event that a tax payment is withheld and ultimately due and payable after appeal, Interconnection Customer will be responsible for all taxes, interest and penalties, other than penalties attributable to any delay caused by Interconnecting Transmission Owner.

5.18 Tax Status. Each Party shall cooperate with the others to maintain the other Party's(ies') tax status. Nothing in this LGIA is intended to adversely affect any Interconnecting Transmission Owner's tax-exempt status with respect to the issuance of bonds including, but not limited to, Local Furnishing Bonds.

5.19 Modification.

5.19.1 General. Either Interconnection Customer or Interconnecting Transmission Owner may undertake modifications to its facilities. If a Party plans to undertake a modification that reasonably may be expected to affect the other Party's facilities, the facilities of any Affected Parties, or the New England Transmission System, that Party shall provide to the other Parties and any Affected Party: (i) sufficient information regarding such modification so that the other Party(ies) may evaluate the potential impact of such modification prior to commencement of the work; and (ii) such information as may be required by the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. Such information shall be deemed to be confidential hereunder and shall include information concerning the timing of such modifications and whether such modifications are expected to interrupt the flow of electricity from the Large Generating Facility. The Party desiring to perform such work shall provide the relevant drawings, plans, and specifications to the other Party(ies) at least ninety (90) Calendar Days in advance of the commencement of the work or such shorter period upon which the Parties may agree, which agreement shall not unreasonably be withheld, conditioned or delayed. Notwithstanding the foregoing, no Party shall be obligated to proceed with a modification that would constitute a Material Modification and therefore require an Interconnection Request under the LGIP, except as provided under and pursuant to the LGIP.

In the case of Large Generating Facility or Interconnection Customer's Interconnection Facility modifications that do not require Interconnection Customer to submit an Interconnection Request, Interconnecting Transmission Owner shall provide, within thirty (30) Calendar Days (or such other time as the Parties may agree), an estimate of any additional modifications to the New England Transmission System, Interconnecting Transmission Owner's Interconnection Facilities or Network Upgrades necessitated by such Interconnection Customer modification and a good faith estimate of the costs thereof.

- **5.19.2 Standards.** Any additions, modifications, or replacements made to a Party's facilities shall be designed, constructed and operated in accordance with this LGIA and Good Utility Practice.
- 5.19.3 Modification Costs. Interconnection Customer shall not be directly assigned for the costs of any additions, modifications, or replacements that Interconnecting Transmission Owner makes to the Interconnecting Transmission Owner's Interconnection Facilities or the New England Transmission System to facilitate the interconnection of a third party to the Interconnecting Transmission Owner's Interconnection Facilities or the New England Transmission Owner's Interconnection Facilities or the New England Transmission Owner's Interconnection Facilities or the New England Transmission System, or to provide transmission service to a third party under the Tariff, except as provided for under the Tariff or any other applicable tariff. Interconnection Customer shall be responsible for the costs of any additions, modifications, or replacements to the Large Generating Facility or Interconnection Customer's Interconnection Facilities that may be necessary to maintain or upgrade such Interconnection Customer's Interconnection Facilities consistent with Applicable Laws and Regulations, Applicable Reliability Standards or Good Utility Practice.

ARTICLE 6. TESTING AND INSPECTION

6.1 Pre-Commercial Operation Date Testing and Modifications. Prior to the Commercial Operation Date, the Interconnecting Transmission Owner shall test Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades and Interconnection Customer shall test the Large Generating Facility and the Interconnection Customer's Interconnection Facilities to ensure their safe and reliable operation. Similar testing may be required after initial operation. Each Party shall make any modifications to its facilities that are found to be necessary as a result of such testing. Interconnection Customer shall bear the cost of all such testing and

modifications. Interconnection Customer shall generate test energy at the Large Generating Facility only if it has arranged for the delivery of such test energy.

- 6.2 Post-Commercial Operation Date Testing and Modifications. Each Interconnection Customer and Interconnecting Transmission Owner shall at its own expense perform routine inspection and testing of its facilities and equipment in accordance with ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, as may be necessary to ensure the continued interconnection of the Large Generating Facility to the Administered Transmission System in a safe and reliable manner. The Interconnection Customer and Interconnecting Transmission Owner each shall have the right, upon advance written notice, to require reasonable additional testing of the other Party's(ies') facilities, at the requesting Party's expense, as may be in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. The System Operator shall also have the right to require reasonable additional testing of the other Party's (ies') facilities in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, Applicable Reliability Standards, or successor documents.
- **6.3 Right to Observe Testing.** Each Party shall notify the System Operator and other Party(ies) in advance of its performance of tests of its Interconnection Facilities. The other Party(ies) has the right, at its own expense, to observe such testing.
- 6.4 Right to Inspect. Each Party shall have the right, but shall have no obligation to: (i) observe the other Party's(ies') tests and/or inspection of any of its System Protection Facilities and other protective equipment, including Power System Stabilizers; (ii) review the settings of the other Party's(ies') System Protection Facilities and other protective equipment; and (iii) review the other Party's(ies') maintenance records relative to the Interconnection Facilities, the System Protection Facilities and other protective equipment. Each Party may exercise these rights from time to time as it deems necessary upon reasonable notice to the other Parties. The exercise or non-exercise by a Party of any such rights shall not be construed as an endorsement or confirmation of any element or condition of the Interconnection Facilities or the System Protection Facilities or other protective equipment or the operation thereof, or as a warranty as to the fitness, safety, desirability, or reliability of same. Any information that a Party obtains through the exercise of any of its rights under this Article 6.4 shall be governed by Article 22.

ARTICLE 7. METERING

- 7.1 General. Each Party shall comply with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, regarding metering. Interconnection Customer shall bear all reasonable documented costs associated with the purchase, installation, operation, testing and maintenance of the Metering Equipment. Unless the System Operator otherwise agrees, the Interconnection Customer shall be responsible for installing and maintaining compatible metering and communications equipment to accurately account for the capacity and energy being transmitted under this Tariff and to communicate the information to the System Operator. Unless otherwise agreed, such equipment shall remain the property of the Interconnecting Transmission Owner.
- 7.2 Check Meters. Interconnection Customer, at its option and expense, may install and operate, on its premises and on its side of the Point of Interconnection, one or more check meters to check Interconnecting Transmission Owner's meters. Such check meters shall be for check purposes only and shall not be used for the measurement of power flows for purposes of this LGIA, except as provided in Article 7.4 below. The check meters shall be subject at all reasonable times to inspection and examination by Interconnecting Transmission Owner or its designee. The installation, operation and maintenance thereof shall be performed entirely by Interconnection Customer in accordance with Good Utility Practice.
- 7.3 Standards. Interconnecting Transmission Owner shall install, calibrate, and test revenue quality Metering Equipment in accordance with applicable ANSI standards and the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- 7.4 Testing of Metering Equipment. Interconnecting Transmission Owner shall inspect and test all Interconnecting Transmission Owner-owned Metering Equipment upon installation and thereafter as specified in the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. Interconnecting Transmission Owner shall give reasonable notice of the time when any inspection or test shall take place, and Interconnection Customer may have representatives present at the test or inspection. If at any time Metering Equipment is found to be inaccurate or defective, it shall be adjusted, repaired or replaced at Interconnection Customer's expense, in order to provide accurate metering. If Metering Equipment fails to register, or if the measurement made by Metering Equipment during a test varies by more than the values specified

within ISO New England Operating Documents, or successor documents, from the measurement made by the standard meter used in the test, the Interconnecting Transmission Owner shall adjust the measurements, in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

7.5 Metering Data. At Interconnection Customer's expense, metered data shall be telemetered to one or more locations designated by System Operator and Interconnecting Transmission Owner. The hourly integrated metering, established in accordance with ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, used to transmit Megawatt hour ("MWh") per hour data by electronic means and the Watt-hour meters equipped with kilowatt-hour ("kwh") or MWh registers to be read at month's end shall be the official measurement of the amount of energy delivered from the Large Generating Facility to the Point of Interconnection. Instantaneous metering is required for all Generators in accordance with ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

ARTICLE 8. COMMUNICATIONS

- 8.1 Interconnection Customer Obligations. Interconnection Customer shall maintain satisfactory operating communications with the System Operator and Interconnecting Transmission Owner in accordance with applicable provisions of ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- 8.2 Remote Terminal Unit. Prior to the Initial Synchronization Date of the Large Generating Facility, a Remote Terminal Unit, or equivalent data collection and transfer equipment acceptable to the Parties, shall be installed by Interconnection Customer or Interconnecting Transmission Owner at Interconnection Customer's expense, to gather accumulated and instantaneous data to be telemetered to the location(s) designated by System Operator and Interconnecting Transmission Owner through use of a dedicated point-to-point data circuit(s). The communication protocol for the data circuit(s) shall be specified by System Operator and Interconnecting Transmission Owner. All information required by the ISO New England Operating Documents, or successor documents, must be telemetered directly to the location(s) specified by System Operator and Interconnecting Transmission Owner. Each Party will promptly advise the other Party(ies) if it detects or otherwise learns of any metering, telemetry or communications equipment errors or malfunctions that require the

attention and/or correction by the other Party(ies). The Party owning such equipment shall correct such error or malfunction as soon as reasonably feasible.

8.3 No Annexation. Any and all equipment placed on the premises of a Party shall be and remain the property of the Party providing such equipment regardless of the mode and manner of annexation or attachment to real property, unless otherwise mutually agreed by the Parties.

ARTICLE 9. OPERATIONS

- **9.1 General.** Each Party shall comply with applicable provisions of ISO New England Operating Documents, Reliability Standards, or successor documents, regarding operations. Each Party shall provide to the other Party(ies) all information that may reasonably be required by the other Party(ies) to comply with Applicable Laws and Regulations and Applicable Reliability Standards.
- 9.2 Control Area Notification. Before Initial Synchronization Date, the Interconnection Customer shall notify the System Operator and Interconnecting Transmission Owner in writing in accordance with ISO New England Operating Documents, Reliability Standards, or successor documents. If the Interconnection Customer elects to have the Large Generating Facility dispatched and operated from a remote Control Area other than the Control Area in which the Large Generating Facility is physically located, and if permitted to do so by the relevant transmission tariffs and ISO New England Operating Documents, Reliability Standards, or successor documents, all necessary arrangements, including but not limited to those set forth in Article 7 and Article 8 of this LGIA, and remote Control Area generator interchange agreements, if applicable, and the appropriate measures under such agreements, shall be executed and implemented prior to the placement of the Large Generating Facility in the other Control Area for dispatch and operations.
- **9.3** Interconnecting Transmission Owner and System Operator Obligations. Interconnecting Transmission Owner and System Operator shall cause the Interconnecting Transmission Owner's Interconnection Facilities to be operated, maintained and controlled in a safe and reliable manner

and in accordance with this LGIA and ISO New England Operating Documents, Reliability Standards, or successor documents. Interconnecting Transmission Owner or System Operator may provide operating instructions to Interconnection Customer consistent with this LGIA, ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, and Interconnecting Transmission Owner's and System Operator's operating protocols and procedures as they may change from time to time. Interconnecting Transmission Owner and System Operator will consider changes to their operating protocols and procedures proposed by Interconnection Customer.

- 9.4 Interconnection Customer Obligations. Interconnection Customer shall at its own expense operate, maintain and control the Large Generating Facility and the Interconnection Customer's Interconnection Facilities in a safe and reliable manner and in accordance with this LGIA and ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- **9.5** Start-Up and Synchronization. The Interconnection Customer is responsible for the proper start-up and synchronization of the Large Generating Facility to the New England Transmission System in accordance with ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

9.6 Reactive Power and Primary Frequency Response.

9.6.1 Power Factor Design Criteria.

9.6.1.1 Synchronous Generation. Interconnection Customer shall design the Large Generating Facility and all generating units comprising the Large Generating Facility, as applicable, to maintain a composite power delivery at continuous rated power output at the Point of Interconnection with dynamic reactive capability over the power factor range of 0.95 leading to 0.95 lagging, unless the System Operator or Interconnecting Transmission Owner has established different requirements that apply to all synchronous (and non-wind non-synchronous generators as specified in Appendix G, Section A.ii.4 to the LGIA) generators in the Control Area on a comparable basis and in accordance with ISO

New England Operating Documents, Applicable Reliability Standards, or successor documents.

- **9.6.1.2** Non-Synchronous Generation. The power factor design criteria requirements applicable to non-synchronous Generating Facilities shall be as specified in in Appendix G to the LGIA. The Low Voltage Ride-Through Capability requirements applicable to wind and inverter-based Generating Facilities shall be as specified in Appendix G to the LGIA.
- **9.6.2** Voltage Schedules. Once the Interconnection Customer has synchronized the Large Generating Facility to the New England Transmission System, Interconnection Customer shall operate the Large Generating Facility at the direction of System Operator and Interconnecting Transmission Owner in accordance with applicable provisions of the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, regarding voltage schedules in accordance with such requirements.
 - **9.6.2.1 Voltage Regulators.** The Interconnection Customer must keep and maintain a voltage regulator on all generating units comprising a Large Generating Facility in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. All Interconnection Customers that have, or are required to have, automatic voltage regulation shall normally operate the Large Generating Facility with its voltage regulators in automatic operation.

It is the responsibility of the Interconnection Customer to maintain the voltage regulator in good operating condition and promptly report to the System Operator and Interconnecting Transmission Owner any problems that could cause interference with its proper operation.

9.6.2.2 System Protection. The Interconnection Customer shall install and maintain protection systems in accordance with applicable provisions of the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

9.6.3 Payment for Reactive Power.

Interconnection Customers shall be compensated for Reactive Power service in accordance with Schedule 2 of the Section II of the Tariff.

9.6.4 Primary Frequency Response.

Interconnection Customer with an Interconnection System Impact Study that commenced on or after May 15, 2018 shall ensure the primary frequency response capability of its Large Generating Facility by installing, maintaining, and operating a functioning governor or equivalent controls. The term "functioning governor or equivalent controls" as used herein shall mean the required hardware and/or software that provides frequency responsive real power control with the ability to sense changes in system frequency and autonomously adjust the Large Generating Facility's real power output in accordance with the droop and deadband parameters and in the direction needed to correct frequency deviations. Interconnection Customer is required to install a governor or equivalent controls with the capability of operating: (1) with a maximum 5 percent droop and ± 0.036 Hz deadband; or (2) in accordance with the relevant droop, deadband, and timely and sustained response settings from an approved NERC Reliability Standard providing for equivalent or more stringent parameters. The droop characteristic shall be: (1) based on the nameplate capacity of the Large Generating Facility, and shall be linear in the range of frequencies between 59 to 61 Hz that are outside of the deadband parameter; or (2) based on an approved NERC Reliability Standard providing for an equivalent or more stringent parameter. The deadband parameter shall be: the range of frequencies above and below nominal (60 Hz) in which the governor or equivalent controls is not expected to adjust the Large Generating Facility's real power output in response to frequency deviations. The deadband shall be implemented: (1) without a step to the droop curve, that is, once the frequency deviation exceeds the deadband parameter, the expected change in the Large Generating Facility's real power output in response to frequency deviations shall start from zero and then increase (for under-frequency deviations) or decrease (for over-frequency deviations) linearly in proportion to the magnitude of the frequency deviation; or (2) in accordance with an approved NERC Reliability Standard providing for an equivalent or more stringent parameter. Interconnection Customer shall notify System Operator and Interconnecting Transmission Owner that the primary frequency response capability of the Large Generating Facility has been tested and confirmed during commissioning. Once Interconnection Customer has synchronized the Large Generating Facility with the New England Transmission System, Interconnection

Customer shall operate the Large Generating Facility consistent with the provisions specified in Articles 9.6.4.1 and 9.6.4.2 of this Agreement. The primary frequency response requirements contained herein shall apply to both synchronous and non-synchronous Large Generating Facilities.

- **9.6.4.1 Governor or Equivalent Controls.** Whenever the Large Generating Facility is operated in parallel with the New England Transmission System, Interconnection Customer shall operate the Large Generating Facility with its governor or equivalent controls in service and responsive to frequency. Interconnection Customer shall: (1) in coordination with System Operator and Interconnecting Transmission Owner, set the deadband parameter to: (1) a maximum of ± 0.036 Hz and set the droop parameter to a maximum of 5 percent; or (2) implement the relevant droop and deadband settings from an approved NERC Reliability Standard that provides for equivalent or more stringent parameters. Interconnection Customer shall be required to provide the status and settings of the governor or equivalent controls to System Operator and Interconnecting Transmission Owner upon request. If Interconnection Customer needs to operate the Large Generating Facility with its governor or equivalent controls not in service, Interconnection Customer shall immediately notify System Operator and Interconnecting Transmission Owner, and provide both with the following information: (1) the operating status of the governor or equivalent controls (i.e., whether it is currently out of service or when it will be taken out of service); (2) the reasons for removing the governor or equivalent controls from service; and (3) a reasonable estimate of when the governor or equivalent controls will be returned to service. Interconnection Customer shall make Reasonable Efforts to return its governor or equivalent controls into service as soon as practicable. Interconnection Customer shall make Reasonable Efforts to keep outages of the Large Generating Facility's governor or equivalent controls to a minimum whenever the Large Generating Facility is operated in parallel with the New England Transmission System.
- **9.6.4.2 Timely and Sustained Response.** Interconnection Customer shall ensure that the Large Generating Facility's real power response to sustained frequency deviations outside of the deadband setting is automatically provided and shall

begin immediately after frequency deviates outside of the deadband, and to the extent the Large Generating Facility has operating capability in the direction needed to correct the frequency deviation. Interconnection Customer shall not block or otherwise inhibit the ability of the governor or equivalent controls to respond and shall ensure that the response is not inhibited, except under certain operational constraints including, but not limited to, ambient temperature limitations, physical energy limitations, outages of mechanical equipment, or regulatory requirements. The Large Generating Facility shall sustain the real power response at least until system frequency returns to a value within the deadband setting of the governor or equivalent controls. A Commission-approved Reliability Standard with equivalent or more stringent requirements shall supersede the above requirements.

- **9.6.4.3 Exemptions.** Large Generating Facilities that are regulated by the United States Nuclear Regulatory Commission shall be exempt from Articles 9.6.4, 9.6.4.1, and 9.6.4.2 of this Agreement. Large Generating Facilities that are behind the meter generation that is sized-to-load (i.e., the thermal load and the generation are near-balanced in real-time operation and the generation is primarily controlled to maintain the unique thermal, chemical, or mechanical output necessary for the operating requirements of its host facility) shall be required to install primary frequency response capability in accordance with the droop and deadband capability requirements specified in Article 9.6.4, but shall be otherwise exempt from the operating requirements in Articles 9.6.4, 9.6.4.1, 9.6.4.2, and 9.6.4.4 of this Agreement.
- **9.6.4.4 Electric Storage Resources.** Interconnection Customer interconnecting a Large Generating Facility that is an electric storage resource shall establish an operating range in Appendix C of its LGIA that specifies a minimum state of charge and a maximum state of charge between which the electric storage resource will be required to provide primary frequency response consistent with the conditions set forth in Articles 9.6.4, 9.6.4.1, 9.6.4.2, and 9.6.4.3 of this Agreement. Appendix C shall specify whether the operating range is static or dynamic, and shall consider (1) the expected magnitude of frequency deviations in the interconnection; (2) the expected duration that system frequency will remain

outside of the deadband parameter in the interconnection; (3) the expected incidence of frequency deviations outside of the deadband parameter in the interconnection; (4) the physical capabilities of the electric storage resource; (5) operational limitations of the electric storage resource due to manufacturer specifications; and (6) any other relevant factors agreed to by System Operator, Interconnecting Transmission Owner and Interconnection Customer. If the operating range is dynamic, then Appendix C must establish how frequently the operating range will be reevaluated and the factors that may be considered during its reevaluation.

Interconnection Customer's electric storage resource is required to provide timely and sustained primary frequency response consistent with Article 9.6.4.2 of this Agreement when it is online and dispatched to inject electricity to the New England Transmission System and/or receive electricity from the New England Transmission System. This excludes circumstances when the electric storage resource is not dispatched to inject electricity to the New England Transmission System and/or dispatched to receive electricity from the New England Transmission System and/or dispatched to receive electricity from the New England Transmission System. If Interconnection Customer's electric storage resource is charging at the time of a frequency deviation outside of its deadband parameter, it is to increase (for over-frequency deviations) or decrease (for under-frequency deviations) the rate at which it is charging in accordance with its droop parameter. Interconnection Customer's electric storage resource is not required to change from charging to discharging, or vice versa, unless the response necessitated by the droop and deadband settings requires it to do so and it is technically capable of making such a transition.

9.7 Outages and Interruptions.

9.7.1 Outages.

9.7.1.1 Outage Authority and Coordination. The System Operator shall have the authority to coordinate facility outages in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. Each Party may in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, Applicable Reliability Standards, or successor documents, in coordination with

the other Party(ies), remove from service any of its respective Interconnection Facilities or Network Upgrades that may impact the other Party's(ies') facilities as necessary to perform maintenance or testing or to install or replace equipment, subject to the oversight of System Operator in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

- **9.7.1.2 Outage Schedules.** Outage scheduling, and any related compensation, shall be in accordance with the applicable provisions of the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- **9.7.2** Interruption of Service. In accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, the System Operator or Interconnecting Transmission Owner may require Interconnection Customer to interrupt or reduce deliveries of electricity if such delivery of electricity could adversely affect System Operator's or Interconnecting Transmission Owner's ability to perform such activities as are necessary to safely and reliably operate and maintain the New England Transmission System.
- **9.7.3** Under-Frequency and Over Frequency Conditions. Interconnection Customer shall implement under-frequency and over-frequency relay set points for the Large Generating Facility as required by the applicable provisions of ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. Large Generating Facility response to frequency deviations of pre-determined magnitudes, both under-frequency and over-frequency deviations, shall be studied and coordinated with System Operator and Interconnecting Transmission Owner in accordance with ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

9.7.4 System Protection and Other Control Requirements.

9.7.4.1 System Protection Facilities. Interconnection Customer shall, at its expense, install, operate and maintain System Protection Facilities as a part of the Large Generating Facility or the Interconnection Customer's Interconnection Facilities in accordance with the ISO New England Operating Documents, Applicable

Reliability Standards, or successor documents. Interconnecting Transmission Owner shall install at Interconnection Customer's expense, in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, any System Protection Facilities that may be required on the Interconnecting Transmission Owner Interconnection Facilities or the New England Transmission System as a result of the interconnection of the Large Generating Facility and the Interconnection Customer's Interconnection Facilities.

- 9.7.4.2 Each Party's protection facilities shall be designed and coordinated with other systems in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- **9.7.4.3** Each Party shall be responsible for protection of its facilities consistent with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- 9.7.4.4 Each Party's protective relay design shall allow for tests required in Article 6.
- **9.7.4.5** Each Party will test, operate and maintain System Protection Facilities in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- 9.7.5 Requirements for Protection. In accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, and compliance with Good Utility Practice, Interconnection Customer shall provide, install, own, and maintain relays, circuit breakers and all other devices necessary to remove any fault contribution of the Large Generating Facility to any short circuit occurring on the New England Transmission System not otherwise isolated by Interconnecting Transmission Owner's equipment, such that the removal of the fault contribution shall be coordinated with the protective requirements of the New England Transmission System. Such protective equipment shall include, without limitation, a disconnecting device or switch with load-interrupting capability located between the Large Generating Facility and the New England Transmission System at a site selected upon mutual agreement (not to be

unreasonably withheld, conditioned or delayed) of the Parties. Interconnection Customer shall be responsible for protection of the Large Generating Facility and Interconnection Customer's other equipment from such conditions as negative sequence currents, over- or under-frequency, sudden load rejection, over- or under-voltage, and generator loss-of-field. Interconnection Customer shall be solely responsible to disconnect the Large Generating Facility and Interconnection Customer's other equipment if conditions on the New England Transmission System could adversely affect the Large Generating Facility.

- **9.7.6 Power Quality.** A Party's facilities shall not cause excessive voltage flicker nor introduce excessive distortion to the sinusoidal voltage or current waves as defined by ANSI Standard C84.1-1989, in accordance with IEEE Standard 519, or any applicable superseding electric industry standard.
- **9.8** Switching and Tagging Rules. Each Party shall provide the other Party(ies) with a copy of its switching and tagging rules that are applicable to the other Party's activities. Such switching and tagging rules shall be developed on a non-discriminatory basis. The Parties shall comply with applicable switching and tagging rules, as amended from time to time, in obtaining clearances for work or for switching operations on equipment.

9.9 Use of Interconnection Facilities by Third Parties.

- **9.9.1 Purpose of Interconnection Facilities.** Except as may be required by Applicable Laws and Regulations, or as otherwise agreed to among the Parties, the Interconnection Facilities shall be constructed for the sole purpose of interconnecting the Large Generating Facility to the Administered Transmission System and shall be used for no other purpose.
- **9.9.2** Third Party Users. If required by Applicable Laws and Regulations or if the Parties mutually agree, such agreement not to be unreasonably withheld, to allow one or more third parties to use the Interconnecting Transmission Owner's Interconnection Facilities, or any part thereof, Interconnection Customer will be entitled to compensation for the capital expenses it incurred in connection with the Interconnecting Transmission Owner, all third party users, and Interconnection Customer, in accordance with Applicable Laws

and Regulations or upon some other mutually agreed-upon methodology. In addition, cost responsibility for ongoing costs, including operation and maintenance costs associated with the Interconnection Facilities, will be allocated between Interconnection Customer and any third party users based upon the pro rata use of the Interconnection Facilities by Interconnecting Transmission Owner, all third party users, and Interconnection Customer, in accordance with Applicable Laws and Regulations or upon some other mutually agreed-upon methodology. If the issue of such compensation or allocation cannot be resolved through such negotiations, it shall be submitted to the Commission for resolution.

9.10 Disturbance Analysis Data Exchange. The Parties will cooperate with one another in the analysis of disturbances to either the Large Generating Facility or the New England Transmission System by gathering and providing access to any information relating to any disturbance, including information from oscillography, protective relay targets, breaker operations and sequence of events records, and any disturbance information required by the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

ARTICLE 10. MAINTENANCE

- 10.1 Interconnecting Transmission Owner and Customer Obligations. Interconnecting Transmission Owner and Interconnection Customer shall each maintain that portion of its respective facilities that are part of the New England Transmission System and the Interconnecting Transmission Owner's Interconnection Facilities in a safe and reliable manner and in accordance with the applicable provisions of the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- **10.2 Operating and Maintenance Expenses.** Subject to the provisions herein addressing the use of facilities by others, and except for operations and maintenance expenses associated with modifications made for providing interconnection or transmission service to a third party and such third party pays for such expenses, Interconnection Customer shall be responsible for all reasonable expenses including overheads, associated with: (1) owning, operating, maintaining, repairing, and replacing Interconnection Customer's Interconnection Facilities; and (2) operation, maintenance, repair and replacement of Interconnecting Transmission Owner's Interconnection Facilities, Stand Alone Network Upgrades, Network Upgrades and Distribution Upgrades.

ARTICLE 11. PERFORMANCE OBLIGATION

- **11.1** Interconnection Customer's Interconnection Facilities. Interconnection Customer shall design, procure, construct, install, own and/or control the Interconnection Customer's Interconnection Facilities described in Appendix A (Interconnection Facilities, Network Upgrades and Distribution Upgrades) at its sole expense.
- 11.2 Interconnecting Transmission Owner's Interconnection Facilities. Interconnecting Transmission Owner shall design, procure, construct, install, own and/or control the Interconnecting Transmission Owner's Interconnection Facilities described in Appendix A (Interconnection Facilities, Network Upgrades and Distribution Upgrades) at the sole expense of the Interconnection Customer.
- 11.3 Network Upgrades and Distribution Upgrades. Interconnecting Transmission Owner shall design, procure, construct, install, and own the Network Upgrades, and to the extent provided by Article 5.1, Stand Alone Network Upgrades, and Distribution Upgrades described in Appendix A (Interconnection Facilities, Network Upgrades and Distribution Upgrades). The Interconnection Customer shall be responsible for all costs related to Distribution Upgrades. Unless the Interconnecting Transmission Owner elects to fund the capital for the Network Upgrades, they shall be solely funded by the Interconnection Customer.

11.4 Cost Allocation; Compensation; Rights; Affected Systems

- **11.4.1 Cost Allocation.** Cost allocation of Generator Interconnection Related Upgrades shall be in accordance with Schedule 11 of Section II of the Tariff.
- **11.4.2 Compensation.** Any compensation due to the Interconnection Customer for increases in transfer capability to the PTF resulting from its Generator Interconnection Related Upgrade shall be determined in accordance with Sections II and III of the Tariff.
- **11.4.3 Rights.** Notwithstanding any other provision of this LGIA, nothing herein shall be construed as relinquishing or foreclosing any rights, including but not limited to firm transmission rights, capacity rights, transmission congestion rights, or transmission

credits, that the Interconnection Customer shall be entitled to, now or in the future, under any other agreement or tariff as a result of, or otherwise associated with, the transmission capacity, if any, created by the Network Upgrades.

- 11.4.4 Special Provisions for Affected Systems. The Interconnection Customer shall enter into separate related facilities agreements to address any upgrades to the Affected System(s) that are necessary for safe and reliable interconnection of the Interconnection Customer's Generating Facility.
- 11.5 Provision of Security. At least thirty (30) Calendar Days prior to the commencement of the procurement, installation, or construction of a discrete portion of an Interconnecting Transmission Owner's Interconnection Facilities, Network Upgrades, or Distribution Upgrades, Interconnection Customer shall provide Interconnecting Transmission Owner a guarantee, a surety bond, letter of credit or other form of security that is reasonably acceptable to Interconnecting Transmission Owner in accordance with Section 7 of Schedule 11 of the Tariff. In addition:
 - 11.5.1 The guarantee must be made by an entity that meets the creditworthiness requirements of Interconnecting Transmission Owner, and contain terms and conditions that guarantee payment of any amount that may be due from Interconnection Customer, up to an agreedto maximum amount.
 - **11.5.2** The letter of credit must be issued by a financial institution reasonably acceptable to Interconnecting Transmission Owner and must specify a reasonable expiration date.
 - **11.5.3** The surety bond must be issued by an insurer reasonably acceptable to Interconnecting Transmission Owner and must specify a reasonable expiration date.
- 11.6 Interconnection Customer Compensation. If System Operator or Interconnecting Transmission Owner requests or directs Interconnection Customer to provide a service pursuant to Articles 9.6.3 (Payment for Reactive Power), or 13.4.1 of this LGIA, Interconnection Customer shall be compensated pursuant to the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

11.6.1 Interconnection Customer Compensation for Actions During Emergency Condition. Interconnection Customer shall be compensated for its provision of real and reactive power and other Emergency Condition services that Interconnection Customer provides to support the New England Transmission System during an Emergency Condition in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

ARTICLE 12. INVOICE

- **12.1 General.** Each Party shall submit to the other Party(ies), on a monthly basis, invoices of amounts due for the preceding month. Each invoice shall state the month to which the invoice applies and fully describe the services and equipment provided. The Parties may discharge mutual debts and payment obligations due and owing to each other on the same date through netting, in which case all amounts a Party owes to the other Party(ies) under this LGIA, including interest payments or credits, shall be netted so that only the net amount remaining due shall be paid by the owing Party.
- 12.2 Final Invoice. Within six months after completion of the construction of the Interconnecting Transmission Owner's Interconnection Facilities and the Network Upgrades, Interconnecting Transmission Owner shall provide an invoice of the final cost of the construction of the Interconnecting Transmission Owner's Interconnection Facilities and the Network Upgrades and shall set forth such costs in sufficient detail to enable Interconnection Customer to compare the actual costs with the estimates and to ascertain deviations, if any, from the cost estimates. Interconnecting Transmission Owner shall refund to Interconnection Customer any amount by which the actual payment by Interconnection Customer for estimated costs exceeds the actual costs of construction Customer shall pay to Interconnecting Transmission Owner any amount by which the actual payment by Interconnection Customer for estimated costs falls short of the actual costs of construction within thirty (30) Calendar Days of the issuance of such final construction invoice.
- 12.3 Payment. Invoices shall be rendered to the paying Party at the address specified in Appendix F. The Party receiving the invoice shall pay the invoice within thirty (30) Calendar Days of receipt. All payments shall be made in immediately available funds payable to the other Party, or by wire

transfer to a bank named and account designated by the invoicing Party. Payment of invoices by any Party will not constitute a waiver of any rights or claims the other Party(ies) may have under this LGIA.

12.4 Disputes. In the event of a billing dispute between Interconnecting Transmission Owner and Interconnection Customer, Interconnecting Transmission Owner shall continue to provide Interconnection Service under this LGIA as long as Interconnection Customer: (i) continues to make all payments not in dispute; and (ii) pays to Interconnecting Transmission Owner or into an independent escrow account the portion of the invoice in dispute, pending resolution of such dispute. If Interconnecting Transmission Owner may provide notice to Interconnection Customer of a Default pursuant to Article 17. Within thirty (30) Calendar Days after the resolution of the dispute, the Party that owes money to the other Party shall pay the amount due with interest calculated in accord with the methodology set forth in the Commission's Regulations at 18 CFR § 35.19a(a)(2)(iii).

ARTICLE 13. EMERGENCIES

- 13.1 Obligations. Each Party shall comply with the Emergency Condition procedures of the System Operator in accordance with the applicable provisions of the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- 13.2 Notice. Interconnecting Transmission Owner or System Operator as applicable shall notify Interconnection Customer and System Operator or Interconnecting Transmission Owner as applicable, promptly when it becomes aware of an Emergency Condition that affects the Interconnecting Transmission Owner's Interconnection Facilities or the New England Transmission System that may reasonably be expected to affect Interconnection Customer's operation of the Large Generating Facility or the Interconnecting Transmission Owner and System Operator promptly when it becomes aware of an Emergency Condition that affects the Large Generating Facility or the Interconnecting Transmission Owner and System Operator promptly when it becomes aware of an Emergency Condition that affects the Large Generating Facility or the Interconnection Customer's Interconnection Facilities that may reasonably be expected to affect the New England Transmission Owner and System Operator promptly when it becomes aware of an Emergency Condition that affects the Large Generating Facility or the Interconnection Customer's Interconnection Facilities that may reasonably be expected to affect the New England Transmission System or the Interconnecting Transmission Owner's Interconnection Facilities. To the extent information is known, the

notification shall describe the Emergency Condition, the extent of the damage or deficiency, the expected effect on the operation of Interconnection Customer's or Interconnecting Transmission Owner's facilities and operations, its anticipated duration and the corrective action taken and/or to be taken. The initial notice shall be followed as soon as practicable with written notice.

13.3 Immediate Action. Unless, in Interconnection Customer's reasonable judgment, immediate action is required, Interconnection Customer shall obtain the consent of Interconnecting Transmission Owner and System Operator, such consent to not be unreasonably withheld, prior to performing any manual switching operations at the Large Generating Facility or the Interconnection Customer's Interconnection Facilities in response to an Emergency Condition either declared by the Interconnecting Transmission Owner or the System Operator or otherwise regarding the New England Transmission System.

13.4 System Operator's and Interconnecting Transmission Owner's Authority.

13.4.1 General. System Operator or Interconnecting Transmission Owner may take whatever actions or inactions with regard to the New England Transmission System or the Interconnecting Transmission Owner's Interconnection Facilities it deems necessary during an Emergency Condition in order to (i) preserve public health and safety, (ii) preserve the reliability of the New England Transmission System or Interconnecting Transmission Owner's Interconnection Facilities, (iii) limit or prevent damage, and (iv) expedite restoration of service.

System Operator and Interconnecting Transmission Owner shall use Reasonable Efforts to minimize the effect of such actions or inactions on the Large Generating Facility or the Interconnection Customer's Interconnection Facilities. System Operator and Interconnecting Transmission Owner may, on the basis of technical considerations, require the Large Generating Facility to mitigate an Emergency Condition by taking actions necessary and limited in scope to remedy the Emergency Condition, including, but not limited to, directing Interconnection Customer to shut-down, start-up, increase or decrease the real or reactive power output of the Large Generating Facility; implementing a reduction or disconnection pursuant to Article 13.4.2; directing the Interconnection Customer to assist with black start (if available) or restoration efforts; or altering the outage schedules of the Large Generating Facility and the Interconnection Customer's Interconnection Facilities. Interconnection Customer shall comply with all of System Operator's and Interconnecting Transmission Owner's operating instructions concerning Large Generating Facility real power and reactive power output within the manufacturer's design limitations of the Large Generating Facility's equipment that is in service and physically available for operation at the time, in compliance with Applicable Laws and Regulations.

- **13.4.2 Reduction and Disconnection.** System Operator and Interconnecting Transmission Owner may reduce Interconnection Service or disconnect the Large Generating Facility or the Interconnection Customer's Interconnection Facilities when such reduction or disconnection is necessary in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. These rights are separate and distinct from any right of curtailment of the System Operator and Interconnecting Transmission Owner pursuant to the Tariff. When the System Operator and Interconnecting Transmission Owner can schedule the reduction or disconnection in advance, System Operator and Interconnecting Transmission Owner shall notify Interconnection Customer of the reasons, timing and expected duration of the reduction or disconnection. System Operator and Interconnecting Transmission Owner shall coordinate with the Interconnection Customer in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents to schedule the reduction or disconnection during periods of least impact to the Interconnection Customer and the System Operator and Interconnecting Transmission Owner. Any reduction or disconnection shall continue only for so long as reasonably necessary in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents. The Parties shall cooperate with each other to restore the Large Generating Facility, the Interconnection Facilities, and the New England Transmission System to their normal operating state as soon as practicable in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.
- **13.5** Interconnection Customer Authority. In accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents and the LGIA and the LGIP, the Interconnection Customer may take whatever actions or inactions with regard to the Large Generating Facility or the Interconnection Customer's Interconnection Facilities during an

Emergency Condition in order to (i) preserve public health and safety, (ii) preserve the reliability of the Large Generating Facility or the Interconnection Customer's Interconnection Facilities, (iii) limit or prevent damage, and (iv) expedite restoration of service. Interconnection Customer shall use Reasonable Efforts to minimize the effect of such actions or inactions on the New England Transmission System and the Interconnecting Transmission Owner's Interconnection Facilities. System Operator and Interconnecting Transmission Owner shall use Reasonable Efforts to assist Interconnection Customer in such actions.

13.6 Limited Liability. Except as otherwise provided in Article 11.6.1 of this LGIA, a Party shall not be liable to another Party for any action it takes in responding to an Emergency Condition so long as such action is made in good faith and in accordance with the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents.

ARTICLE 14. REGULATORY REQUIREMENTS AND GOVERNING LAW

14.1 Regulatory Requirements. Each Party's obligations under this LGIA shall be subject to its receipt of any required approval or certificate from one or more Governmental Authorities in the form and substance satisfactory to the applying Party, or the Party making any required filings with, or providing notice to, such Governmental Authorities, and the expiration of any time period associated therewith. Each Party shall in good faith seek and use its Reasonable Efforts to obtain such other approvals. Nothing in this LGIA shall require Interconnection Customer to take any action that could result in its inability to obtain, or its loss of, status or exemption under the Federal Power Act or the Public Utility Holding Company Act of 1935, as amended. To the extent that a condition arises that could result in Interconnection Customer's inability to obtain, or its loss of, status or exemption under the Federal Power Act, the Public Utility Holding Company Act of 1935, as amended, or the Public Utility Regulatory Policies Act of 1978, the Parties shall engage in good faith negotiations to address the condition so that such result will not occur and so that this LGIA can be performed.

14.2 Governing Law.

14.2.1 The validity, interpretation and performance of this LGIA and each of its provisions shall be governed by the laws of the state where the Point of Interconnection is located, without regard to its conflicts of law principles.

- 14.2.2 This LGIA is subject to all Applicable Laws and Regulations.
- **14.2.3** Each Party expressly reserves the right to seek changes in, appeal, or otherwise contest any laws, orders, rules, or regulations of a Governmental Authority.

ARTICLE 15. NOTICES

15.1 General. Unless otherwise provided in this LGIA, any notice, demand or request required or permitted to be given by a Party to another Party and any instrument required or permitted to be tendered or delivered by a Party in writing to another Party shall be effective when delivered and may be so given, tendered or delivered, by recognized national courier, or by depositing the same with the United States Postal Service with postage prepaid, for delivery by certified or registered mail, addressed to the Party, or personally delivered to the Party, at the address set out in Appendix F (Addresses for Delivery of Notices and Billings).

A Party may change the notice information in this LGIA by giving five (5) Business Days written notice prior to the effective date of the change.

- **15.2 Billings and Payments.** Billings and payments shall be sent to the addresses set out in Appendix F.
- **15.3** Alternative Forms of Notice. Any notice or request required or permitted to be given by a Party to another Party and not required by this Agreement to be given in writing may be so given by telephone, facsimile or email to the telephone numbers and email addresses set out in Appendix F.
- **15.4 Operations and Maintenance Notice.** Each Party shall notify the other Party(ies) in writing of the identity of the person(s) that it designates as the point(s) of contact with respect to the implementation of Articles 9 and 10.

ARTICLE 16. FORCE MAJEURE

16.1 Force Majeure.

- **16.1.1** Economic hardship is not considered a Force Majeure event.
- **16.1.2** A Party shall not be considered to be in Default with respect to any obligation hereunder (including obligations under Article 4), other than the obligation to pay money when due, if prevented from fulfilling such obligation by Force Majeure. A Party unable to fulfill any obligation hereunder (other than an obligation to pay money when due) by reason of Force Majeure shall give notice and the full particulars of such Force Majeure to the other Party(ies) in writing or by telephone as soon as reasonably possible after the occurrence of the cause relied upon. Telephone notices given pursuant to this Article shall be confirmed in writing as soon as reasonably possible and shall specifically state full particulars of the Force Majeure is reasonably expected to cease. The Party affected shall exercise due diligence to remove such disability with reasonable dispatch, but shall not be required to accede or agree to any provision not satisfactory to it in order to settle and terminate a strike or other labor disturbance.

ARTICLE 17. DEFAULT

17.1 Default.

17.1.1 General. No Breach shall exist where such failure to discharge an obligation (other than the payment of money) is the result of Force Majeure as defined in this LGIA or the result of an act or omission of the other Party(ies). Upon a Breach, the non-Breaching Party shall give written notice of such Breach to the breaching Party. Except as provided in Article 17.1.2, the Breaching Party shall have thirty (30) Calendar Days from receipt of the Breach notice within which to cure such Breach; provided however, if such Breach is not capable of cure within thirty (30) Calendar Days, the Breaching Party shall commence such cure within thirty (30) Calendar Days from receipt of the Breach notice; and, if cured within such time, the Breach specified in such notice shall cease to exist.

17.1.2 Right to Terminate. If a Breach is not cured as provided in this Article, or if a Breach is not capable of being cured within the period provided for herein, the non-Breaching Party(ies) shall have the right to terminate this LGIA by written notice at any time until cure occurs, and be relieved of any further obligation hereunder and, whether or not those Parties terminate this LGIA, to recover from the Breaching Party all amounts due hereunder, plus all other damages and remedies to which they are entitled at law or in equity. The provisions of this Article will survive termination of this LGIA.

ARTICLE 18. INDEMNITY, CONSEQUENTIAL DAMAGES AND INSURANCE

Notwithstanding any other provision of this Agreement, the liability, indemnification and insurance provisions of the Transmission Operating Agreement ("TOA") or other applicable operating agreements shall apply to the relationship between the System Operator and the Interconnecting Transmission Owner and the liability, indemnification and insurance provisions of the Tariff apply to the relationship between the System Operator and the Interconnection Customer and between the Interconnecting Transmission Owner and the Interconnection Customer.

- **18.1** Indemnity. Each Party shall at all times indemnify, defend, and save the other Party(ies) harmless from any and all damages, losses, claims, including claims and actions relating to injury to or death of any person or damage to property, demand, suits, recoveries, costs and expenses, court costs, attorney fees, and all other obligations by or to third parties, arising out of or resulting from the other Party's(ies') action or inactions of their obligations under this LGIA on behalf of the Indemnifying Party, except in cases of gross negligence or intentional wrongdoing by an indemnified Party.
 - **18.1.1 Indemnified Person.** If an Indemnified Person is entitled to indemnification under this Article 18 as a result of a claim by a third party, and the Indemnifying Party fails, after notice and reasonable opportunity to proceed under Article 18.1, to assume the defense of such claim, such Indemnified Person may at the expense of the Indemnifying Party contest, settle or consent to the entry of any judgment with respect to, or pay in full, such claim.

- 18.1.2 Indemnifying Party. If an Indemnifying Party is obligated to indemnify and hold any Indemnified Person harmless under this Article 18, the amount owing to the Indemnified Person shall be the amount of such Indemnified Person's actual Loss, net of any insurance or other recovery.
- 18.1.3 Indemnity Procedures. Promptly after receipt by an Indemnified Person of any claim or notice of the commencement of any action or administrative or legal proceeding or investigation as to which the indemnity provided for in Article 18.1 may apply, the Indemnified Person shall notify the Indemnifying Party of such fact. Any failure of or delay in such notification shall not affect a Party's indemnification obligation unless such failure or delay is materially prejudicial to the Indemnifying Party.

The Indemnifying Party shall have the right to assume the defense thereof with counsel designated by such Indemnifying Party and reasonably satisfactory to the Indemnified Person. If the defendants in any such action include one or more Indemnified Persons and the Indemnifying Party and if the Indemnified Person reasonably concludes that there may be legal defenses available to it and/or other Indemnified Persons which are different from or additional to those available to the Indemnifying Party, the Indemnified Person shall have the right to select separate counsel to assert such legal defenses and to otherwise participate in the defense of such action on its own behalf. In such instances, the Indemnifying Party shall only be required to pay the fees and expenses of one additional attorney to represent an Indemnified Person or Indemnified Persons having such differing or additional legal defenses.

The Indemnified Person shall be entitled, at its expense, to participate in any such action, suit or proceeding, the defense of which has been assumed by the Indemnifying Party. Notwithstanding the foregoing, the Indemnifying Party (i) shall not be entitled to assume and control the defense of any such action, suit or proceedings if and to the extent that, in the opinion of the Indemnified Person and its counsel, such action, suit or proceeding involves the potential imposition of criminal liability on the Indemnified Person, or there exists a conflict or adversity of interest between the Indemnified Person and the Indemnifying Party, in which event the Indemnifying Party shall pay the reasonable expenses of the Indemnified Person, and (ii) shall not settle or consent to the entry of any

judgment in any action, suit or proceeding without the consent of the Indemnified Person, which shall not be reasonably withheld, conditioned or delayed.

- **18.2 Consequential Damages.** Other than the Liquidated Damages heretofore described, in no event shall a Party be liable under any provision of this LGIA for any losses, damages, costs or expenses for any special, indirect, incidental, consequential, or punitive damages, including but not limited to loss of profit or revenue, loss of the use of equipment, cost of capital, cost of temporary equipment or services, whether based in whole or in part in contract, in tort, including negligence, strict liability, or any other theory of liability; provided, however, that damages for which a Party may be liable to the other Party under another agreement will not be considered to be special, indirect, incidental, or consequential damages hereunder.
- **18.3 Insurance.** The Interconnecting Transmission Owner and the Interconnection Customer shall, at their own expense, maintain in force throughout the period of this LGIA, and until released by the other Party(ies), the following minimum insurance coverages, with insurers authorized to do business in the state where the Point of Interconnection is located:
 - 18.3.1 Employers' Liability and Workers' Compensation Insurance providing statutory benefits in accordance with the laws and regulations of the state in which the Point of Interconnection is located.
 - **18.3.2** Commercial General Liability Insurance including premises and operations, personal injury, broad form property damage, broad form blanket contractual liability coverage (including coverage for the contractual indemnification) products and completed operations coverage, coverage for explosion, collapse and underground hazards, independent contractors coverage, coverage for pollution to the extent normally available and punitive damages to the extent normally available and a cross liability endorsement, with minimum limits of One Million Dollars (\$1,000,000) per occurrence/One Million Dollars (\$1,000,000) aggregate combined single limit for personal injury, bodily injury, including death, and property damage.
 - **18.3.3** Comprehensive Automobile Liability Insurance for coverage of owned and non-owned and hired vehicles, trailers or semi-trailers designed for travel on public roads, with a

minimum, combined single limit of One Million Dollars (\$1,000,000) per occurrence for bodily injury, including death, and property damage.

- 18.3.4 Excess Public Liability Insurance over and above the Employers' Liability Commercial General Liability and Comprehensive Automobile Liability Insurance coverage, with a minimum combined single limit of Twenty Million Dollars (\$20,000,000) per occurrence/Twenty Million Dollars (\$20,000,000) aggregate.
- 18.3.5 The Commercial General Liability Insurance, Comprehensive Automobile Insurance and Excess Public Liability Insurance policies shall name the other Party(ies), its parent, associated and Affiliate companies and their respective directors, officers, agents, servants and employees ("Other Party Group") as additional insured. All policies shall contain provisions whereby the insurers waive all rights of subrogation in accordance with the provisions of this LGIA against the Other Party Group and provide thirty (30) Calendar Days advance written notice to the Other Party Group prior to anniversary date of cancellation or any material change in coverage or condition.
- **18.3.6** The Commercial General Liability Insurance, Comprehensive Automobile Liability Insurance and Excess Public Liability Insurance policies shall contain provisions that specify that the policies are primary and shall apply to such extent without consideration for other policies separately carried and shall state that each insured is provided coverage as though a separate policy had been issued to each, except the insurer's liability shall not be increased beyond the amount for which the insurer would have been liable had only one insured been covered. Each Party shall be responsible for its respective deductibles or retentions.
- 18.3.7 The Commercial General Liability Insurance, Comprehensive Automobile Liability Insurance and Excess Public Liability Insurance policies, if written on a Claims First Made Basis, shall be maintained in full force and effect for two (2) years after termination of this LGIA, which coverage may be in the form of tail coverage or extended reporting period coverage if agreed by the Parties.

- **18.3.8** The requirements contained herein as to the types and limits of all insurance to be maintained by the Parties are not intended to and shall not in any manner, limit or qualify the liabilities and obligations assumed by the Parties under this LGIA.
- 18.3.9 Within ten (10) days following execution of this LGIA, and as soon as practicable after the end of each fiscal year or at the renewal of the insurance policy and in any event within ninety (90) days thereafter, each Party shall provide certification of all insurance required in this LGIA, executed by each insurer or by an authorized representative of each insurer.
- 18.3.10 Notwithstanding the foregoing, each Party may self-insure to meet the minimum insurance requirements of Articles 18.3.2 through 18.3.8 to the extent it maintains a self-insurance program, provided that such Party's senior secured debt is rated at investment grade, or better, by Standard & Poor's and that its self-insurance program meets the minimum insurance requirements of Articles 18.3.2 through 18.3.8. For any period of time that a Party's senior secured debt is unrated by Standard & Poor's or is rated at less than investment grade by Standard & Poor's, such Party shall comply with the insurance requirements applicable to it under Articles 18.3.2 through 18.3.9. In the event that a Party is permitted to self-insure pursuant to this Article, it shall notify the other Party(ies) that it meets the requirements to self-insure and that its self-insurance program meets the minimum insurance requirements in a manner consistent with that specified in Article 18.3.9.
- 18.3.11 The Parties agree to report to each other in writing as soon as practical all accidents or occurrences resulting in injuries to any person, including death, and any property damage arising out of this LGIA.

ARTICLE 19. ASSIGNMENT

19.1 Assignment. This LGIA may be assigned by any Party only with the written consent of the other Parties; provided that the Parties may assign this LGIA without the consent of the other Parties to any Affiliate of the assigning Party with an equal or greater credit rating and with the legal authority and operational ability to satisfy the obligations of the assigning Party under this LGIA; and provided further that the Interconnection Customer shall have the right to assign this LGIA,
without the consent of the Interconnecting Transmission Owner or System Operator, for collateral security purposes to aid in providing financing for the Large Generating Facility, provided that the Interconnection Customer will promptly notify the Interconnecting Transmission Owner and System Operator of any such assignment. Any financing arrangement entered into by the Interconnection Customer pursuant to this Article will provide that prior to or upon the exercise of the secured party's, trustee's or mortgagee is assignment rights pursuant to said arrangement, the secured creditor, the trustee or mortgagee will notify the Interconnecting Transmission Owner and System Operator of the date and particulars of any such exercise of assignment right(s), including providing the Interconnecting Transmission Owner with proof that it meets the requirements of Articles 11.5 and 18.3. Any attempted assignment that violates this Article is void and ineffective. Any assignment under this LGIA shall not relieve a Party of its obligations, nor shall a Party's obligations be enlarged, in whole or in part, by reason thereof. Where required, consent to assignment will not be unreasonably withheld, conditioned or delayed.

ARTICLE 20. SEVERABILITY

20.1 Severability. If any provision in this LGIA is finally determined to be invalid, void or unenforceable by any court or other Governmental Authority having jurisdiction, such determination shall not invalidate, void or make unenforceable any other provision, agreement or covenant of this LGIA; provided that if the Interconnection Customer (or any third party, but only if such third party is not acting at the direction of the Interconnecting Transmission Owner) seeks and obtains such a final determination with respect to any provision of the Alternate Option (Article 5.1.2), or the Negotiated Option (Article 5.1.4), then none of these provisions shall thereafter have any force or effect and the Parties' rights and obligations shall be governed solely by the Standard Option (Article 5.1.1).

ARTICLE 21. COMPARABILITY

21.1 Comparability. The Parties will comply with all applicable comparability and code of conduct laws, rules and regulations, as amended from time to time.

ARTICLE 22. CONFIDENTIALITY

22.1 Confidentiality. Confidential Information shall include, without limitation, all information governed by the ISO New England Information Policy, all information obtained from third parties under confidentiality agreements, all information relating to a Party's technology, research and development, business affairs, and pricing, and any information supplied by a Party to another prior to the execution of this LGIA.

Information is Confidential Information only if it is clearly designated or marked in writing as confidential on the face of the document, or, if the information is conveyed orally or by inspection, if the Party providing the information orally informs the Party receiving the information that the information is confidential.

If requested by a Party, the other Party(ies) shall provide, in writing, the basis for asserting that the information referred to in this Article warrants confidential treatment, and the requesting Party may disclose such writing to the appropriate Governmental Authority. Each Party shall be responsible for the costs associated with affording confidential treatment to its information.

- **22.1.1 Term.** During the term of this LGIA, and for a period of three (3) years after the expiration or termination of this LGIA, except as otherwise provided in this Article 22, each Party shall hold in confidence and shall not disclose to any person Confidential Information.
- **22.1.2 Scope.** Confidential Information shall not include information that the receiving Party can demonstrate: (1) is generally available to the public other than as a result of a disclosure by the receiving Party; (2) was in the lawful possession of the receiving Party on a non-confidential basis before receiving it from the disclosing Party; (3) was supplied to the receiving Party without restriction by a third party, who, to the knowledge of the receiving Party after due inquiry, was under no obligation to the disclosing Party to keep such information confidential; (4) was independently developed by the receiving Party without reference to Confidential Information of the disclosing Party; (5) is, or becomes, publicly known, through no wrongful act or omission of the receiving Party or Breach of this LGIA; or (6) is required, in accordance with Article 22.1.7 of the LGIA, Order of Disclosure, to be disclosed by any Governmental Authority or is otherwise required to be disclosed by law or subpoena, or is necessary in any legal proceeding establishing rights

and obligations under this LGIA. Information designated as Confidential Information will no longer be deemed confidential if the Party that designated the information as confidential notifies the other Party(ies) that it no longer is confidential.

- **22.1.3 Release of Confidential Information.** A Party shall not release or disclose Confidential Information to any other person, except to its Affiliates (limited by the Standards of Conduct requirements), subcontractors, employees, consultants, or to parties who may be or are considering providing financing to or equity participation with Interconnection Customer, or to potential purchasers or assignees of Interconnection Customer, on a need-to-know basis in connection with this LGIA, unless such person has first been advised of the confidentiality provisions of this Article 22 and has agreed to comply with such provisions. Notwithstanding the foregoing, a Party providing Confidential Information to any person shall remain primarily responsible for any release of Confidential Information in contravention of this Article 22.
- **22.1.4 Rights.** Each Party retains all rights, title, and interest in the Confidential Information that each Party discloses to the other Party(ies). The disclosure by each Party to the other Party(ies) of Confidential Information shall not be deemed a waiver by a Party or any other person or entity of the right to protect the Confidential Information from public disclosure.
- **22.1.5** No Warranties. By providing Confidential Information, a Party does not make any warranties or representations as to its accuracy or completeness. In addition, by supplying Confidential Information, a Party does not obligate itself to provide any particular information or Confidential Information to the other Party(ies) nor to enter into any further agreements or proceed with any other relationship or joint venture.
- **22.1.6 Standard of Care.** Each Party shall use at least the same standard of care to protect Confidential Information it receives as it uses to protect its own Confidential Information from unauthorized disclosure, publication or dissemination. Each Party may use Confidential Information solely to fulfill its obligations to the other Party(ies) under this LGIA or its regulatory requirements.
- **22.1.7 Order of Disclosure.** If a court or a Governmental Authority or entity with the right, power, and apparent authority to do so requests or requires a Party, by subpoena, oral

deposition, interrogatories, requests for production of documents, administrative order, or otherwise, to disclose Confidential Information, that Party shall provide the other Party(ies) with prompt notice of such request(s) or requirement(s) so that the other Party(ies) may seek an appropriate protective order or waive compliance with the terms of this LGIA. Notwithstanding the absence of a protective order or waiver, the Party may disclose such Confidential Information which, in the opinion of its counsel, the Party is legally compelled to disclose. Each Party will use Reasonable Efforts to obtain reliable assurance that confidential treatment will be accorded any Confidential Information so furnished.

- **22.1.8 Termination of Agreement.** Upon termination of this LGIA for any reason, each Party shall, within ten (10) Calendar Days of receipt of a written request from the other Party(ies), use Reasonable Efforts to destroy, erase, or delete (with such destruction, erasure, and deletion certified in writing to the other Party(ies)) or return to the other Party(ies), without retaining copies thereof, any and all written or electronic Confidential Information received from the other Party(ies).
- **22.1.9 Remedies.** The Parties agree that monetary damages would be inadequate to compensate a Party for the other Party's(ies') Breach of its obligations under this Article 22. Each Party accordingly agrees that the other Party(ies) shall be entitled to equitable relief, by way of injunction or otherwise, if the first Party Breaches or threatens to Breach its obligations under this Article 22, which equitable relief shall be granted without bond or proof of damages, and the receiving Parties shall not plead in defense that there would be an adequate remedy at law. Such remedy shall not be deemed an exclusive remedy for the Breach of this Article 22, but shall be in addition to all other remedies available at law or in equity. The Parties further acknowledge and agree that the covenants contained herein are necessary for the protection of legitimate business interests and are reasonable in scope. No Party, however, shall be liable for indirect, incidental, or consequential or punitive damages of any nature or kind resulting from or arising in connection with this Article 22.
- **22.1.10 Disclosure to the Commission, its Staff, or a State.** Notwithstanding anything in this Article 22 to the contrary, and pursuant to 18 CFR. section 1b.20, if the Commission or its staff, during the course of an investigation or otherwise, requests information from

one of the Parties that is otherwise required to be maintained in confidence pursuant to this LGIA, the Party shall provide the requested information to the Commission or its staff, within the time provided for in the request for information. In providing the information to the Commission or its staff, the Party must, consistent with 18 CFR section 388.112, request that the information be treated as confidential and non-public by the Commission and its staff and that the information be withheld from public disclosure. Parties are prohibited from notifying the other Party(ies) to this LGIA prior to the release of the Confidential Information to the Commission or its staff. The Party shall notify the other Party(ies) to the LGIA when it is notified by the Commission or its staff that a request to release Confidential Information has been received by the Commission, at which time any of the Parties may respond before such information would be made public, pursuant to 18 CFR section 388.112. Requests from a state regulatory body conducting a confidential investigation shall be treated in a similar manner if consistent with the applicable state rules and regulations.

22.1.11 Subject to the exception in Article 22.1.10, any information that a Party claims is competitively sensitive, commercial or financial information under this LGIA ("Confidential Information") shall not be disclosed by the other Party(ies) to any person not employed or retained by the other Party(ies), except to the extent disclosure is (i) required by law; (ii) reasonably deemed by the disclosing Party to be required to be disclosed in connection with a dispute between or among the Parties, or the defense of litigation or dispute; (iii) otherwise permitted by consent of the other Party(ies), such consent not to be unreasonably withheld; or (iv) necessary to fulfill its obligations under this LGIA or as a transmission service provider or a Control Area operator including disclosing the Confidential Information to an RTO or ISO or to a regional or national reliability organization. The Party asserting confidentiality shall notify the other Party(ies) in writing of the information it claims is confidential. Prior to any disclosures of the other Parties' Confidential Information under this subparagraph, or if any third party or Governmental Authority makes any request or demand for any of the information described in this subparagraph, the disclosing Party agrees to promptly notify the other Party(ies) in writing and agrees to assert confidentiality and cooperate with the other Party(ies) in seeking to protect the Confidential Information from public disclosure by confidentiality agreement, protective order or other reasonable measures.

ARTICLE 23. ENVIRONMENTAL RELEASES

23.1 Each Party shall notify the other Party(ies), first orally and then in writing, of the release of any Hazardous Substances, any asbestos or lead abatement activities, or any type of remediation activities related to the Large Generating Facility or the Interconnection Facilities, each of which may reasonably be expected to affect the other Party(ies). The notifying Party shall: (i) provide the notice as soon as practicable, provided such Party makes a good faith effort to provide the notice no later than twenty-four (24) hours after such Party becomes aware of the occurrence; and (ii) promptly furnish to the other Party(ies) copies of any publicly available reports filed with any Governmental Authorities addressing such events.

ARTICLE 24. INFORMATION REQUIREMENTS

- 24.1 Information Acquisition. Subject to any applicable confidentiality restrictions, including, but not limited to, codes of conduct, each Party shall submit specific information regarding the electrical characteristics of their respective facilities to each other as described below and in accordance with Applicable Reliability Standards.
- 24.2 Information Submission by System Operator and Interconnecting Transmission Owner. The initial information submission by System Operator and Interconnecting Transmission Owner shall occur no later than one hundred eighty (180) Calendar Days prior to the Initial Synchronization Date and shall include information necessary to allow the Interconnection Customer to select equipment and meet any system protection and stability requirements, unless otherwise mutually agreed to by the Parties. On a monthly basis Interconnecting Transmission Owner shall provide Interconnection Customer a status report on the construction and installation of Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades, including, but not limited to, the following information: (1) progress to date; (2) a description of the activities since the last report; (3) a description of the action items for the next period; and (4) the delivery status of equipment ordered.
- **24.3** Updated Information Submission by Interconnection Customer. The updated information submission by the Interconnection Customer, including manufacturer information, shall occur no

later than one hundred eighty (180) Calendar Days prior to the Initial Synchronization Date. Interconnection Customer shall submit a completed copy of the Large Generating Facility data requirements contained in Appendix 1 to the LGIP. It shall also include any additional information provided to Interconnecting Transmission Owner and System Operator for the Interconnection Feasibility Study, Interconnection System Impact Study and Interconnection Facilities Study. Information in this submission shall be the most current Large Generating Facility design or expected performance data. Information submitted for stability models shall be compatible with Interconnecting Transmission Owner and System Operator standard models. If there is no compatible model, the Interconnection Customer will work with a consultant mutually agreed to by the Parties to develop and supply a standard model and associated information.

If the Interconnection Customer's data is different from what was originally provided to Interconnecting Transmission Owner pursuant to the Interconnection Study Agreement between Interconnecting Transmission Owner and Interconnection Customer, then the System Operator will review it and conduct appropriate studies, as needed, at the Interconnection Customer's cost, to determine the impact on the New England Transmission System based on the actual data submitted pursuant to this Article 24.3. The Interconnection Customer shall not begin Trial Operation until such studies are completed.

24.4 Information Supplementation. Prior to the Commercial Operation Date, the Parties shall supplement their information submissions described above in this Article 24 with any and all "asbuilt" Large Generating Facility information and "as-tested" performance information that differs from the initial submissions or, alternatively, written confirmation that no such differences exist. The Interconnection Customer shall conduct tests on the Large Generating Facility as required by Good Utility Practice such as an open circuit "step voltage" test on the Large Generating Facility to verify proper operation of the Large Generating Facility's automatic voltage regulator.

Unless otherwise agreed, the test conditions shall include: (1) Large Generating Facility at synchronous speed; (2) automatic voltage regulator on and in voltage control mode; and (3) a five percent change in Large Generating Facility terminal voltage initiated by a change in the voltage regulators reference voltage. Interconnection Customer shall provide validated test recordings showing the responses of Large Generating Facility terminal and field voltages. In the event that direct recordings of these voltages is impractical, recordings of other voltages or currents that mirror the response of the Large Generating Facility's terminal or field voltage are acceptable if

information necessary to translate these alternate quantities to actual Large Generating Facility terminal or field voltages is provided. Large Generating Facility testing shall be conducted and results provided to the Interconnecting Transmission Owner for each individual generating unit in a station.

The Interconnection Customer shall provide the Interconnecting Transmission Owner and System Operator with any information changes due to proposed equipment replacement, repair, or adjustment. Interconnecting Transmission Owner shall provide the Interconnection Customer and System Operator with any information changes due to proposed equipment replacement, repair or adjustment in the directly connected substation or any adjacent Interconnecting Transmission Owner-owned substation that may affect the Interconnection Customer's Interconnection Facilities equipment ratings, protection or operating requirements. The Parties shall provide such information in accordance with Article 5.19 of this Agreement.

ARTICLE 25. INFORMATION ACCESS AND AUDIT RIGHTS

- **25.1** Information Access. Each Party (the "disclosing Party") shall make available to the other Parties information that is in the possession of the disclosing Party and is necessary in order for the other Party(ies) to: (i) verify the costs incurred by the disclosing Party for which the other Party(ies) are responsible under this LGIA; and (ii) carry out its obligations and responsibilities under this LGIA. The Parties shall not use such information for purposes other than those set forth in this Article 25.1 and to enforce their rights under this LGIA.
- **25.2 Reporting of Non-Force Majeure Events.** Each Party (the "notifying Party") shall notify the other Party(ies) when the notifying Party becomes aware of its inability to comply with the provisions of this LGIA for a reason other than a Force Majeure event. The Parties agree to cooperate with each other and provide necessary information regarding such inability to comply, including the date, duration, reason for the inability to comply, and corrective actions taken or planned to be taken with respect to such inability to comply. Notwithstanding the foregoing, notification, cooperation or information provided under this Article shall not entitle the Party receiving such notification to allege a cause for anticipatory Breach of this LGIA.
- **25.3** Audit Rights. Subject to the requirements of confidentiality under Article 22 of this LGIA, each Party shall have the right, during normal business hours, and upon prior reasonable notice to the

other Party(ies), to audit at its own expense the other Party's(ies') accounts and records pertaining to a Party's performance or a Party's satisfaction of obligations under this LGIA. Such audit rights shall include audits of the other Party's(ies') costs, calculation of invoiced amounts, the efforts to allocate responsibility for the provision of reactive support to the New England Transmission System, the efforts to allocate responsibility for interruption or reduction of generation on the New England Transmission System, and each Party's actions in an Emergency Condition. Any audit authorized by this Article shall be performed at the offices where such accounts and records are maintained and shall be limited to those portions of such accounts and records that relate to each Party's performance and satisfaction of obligations under this LGIA. Each Party shall keep such accounts and records for a period equivalent to the audit rights periods described in Article 25.4.

25.4 Audit Rights Periods.

- **25.4.1** Audit Rights Period for Construction-Related Accounts and Records. Accounts and records related to the design, engineering, procurement, and construction of Interconnecting Transmission Owner's Interconnection Facilities and Network Upgrades shall be subject to audit for a period of twenty-four (24) months following Interconnecting Transmission Owner's issuance of a final invoice in accordance with Article 12.2.
- **25.4.2** Audit Rights Period for All Other Accounts and Records. Accounts and records related to a Party's performance or satisfaction of all obligations under this LGIA other than those described in Article 25.4.1 shall be subject to audit as follows: (i) for an audit relating to cost obligations, the applicable audit rights period shall be twenty-four (24) months after the auditing Party's receipt of an invoice giving rise to such cost obligations; and (ii) for an audit relating to all other obligations, the applicable audit rights period shall be twenty-four (24) months after the event for which the audit rights period shall be twenty-four (24) months after the event for which the audit is sought.
- **25.5** Audit Results. If an audit by a Party determines that an overpayment or an underpayment has occurred, a notice of such overpayment or underpayment shall be given to the other Party(ies) together with those records from the audit which support such determination.

ARTICLE 26. SUBCONTRACTORS

- **26.1 General.** Nothing in this LGIA shall prevent a Party from utilizing the services of any subcontractor as it deems appropriate to perform its obligations under this LGIA; provided, however, that each Party shall require its subcontractors to comply with all applicable terms and conditions of this LGIA in providing such services and each Party shall remain primarily liable to the other Party(ies) for the performance of such subcontractor.
- 26.2 Responsibility of Principal. The creation of any subcontract relationship shall not relieve the hiring Party of any of its obligations under this LGIA. The hiring Party shall be fully responsible to the other Party(ies) for the acts or omissions of any subcontractor the hiring Party hires as if no subcontract had been made; provided, however, that in no event shall the Interconnecting Transmission Owner be liable for the actions or inactions of the Interconnection Customer or its subcontractors with respect to obligations of the Interconnection Customer under Article 5 of this LGIA. Any applicable obligation imposed by this LGIA upon the hiring Party shall be equally binding upon, and shall be construed as having application to, any subcontractor of such Party.
- **26.3** No Limitation by Insurance. The obligations under this Article 26 will not be limited in any way by any limitation of subcontractor's insurance.

ARTICLE 27. DISPUTES

27.1 Submission. In the event a Party has a dispute, or asserts a claim, that arises out of or in connection with this LGIA or its performance, such Party (the "disputing Party") shall provide the other Party(ies) with written notice of the dispute or claim ("Notice of Dispute"). Such dispute or claim shall be referred to a designated senior representative of each Party for resolution on an informal basis as promptly as practicable after receipt of the Notice of Dispute by the other Party(ies). In the event the designated representatives are unable to resolve the claim or dispute through unassisted or assisted negotiations within thirty (30) Calendar Days of the other Party's(ies') receipt of the Notice of Dispute, such claim or dispute may, upon mutual agreement of the Parties, be submitted to arbitration and resolved in accordance with the arbitration procedures set forth below. In the event the Parties do not agree to submit such claim or dispute to arbitration, each Party may exercise whatever rights and remedies it may have in equity or at law consistent with the terms of this LGIA.

- **27.2 External Arbitration Procedures.** Any arbitration initiated under this LGIA shall be conducted before a single neutral arbitrator appointed by the Parties. If the Parties fail to agree upon a single arbitrator within ten (10) Calendar Days of the submission of the dispute to arbitration, each Party shall choose one arbitrator who shall sit on a three-member arbitration panel. The arbitrator so chosen by the System Operator shall chair the arbitration panel. In either case, the arbitrators shall be knowledgeable in electric utility matters, including electric transmission and bulk power issues, and shall not have any current or past substantial business or financial relationships with any party to the arbitration (except prior arbitration). The arbitrator(s) shall provide each of the Parties an opportunity to be heard and, except as otherwise provided herein, shall conduct the arbitration in accordance with the Commercial Arbitration Rules of the American Arbitration Association ("Arbitration Rules") and any applicable Commission regulations or RTO rules; provided, however, in the event of a conflict between the Arbitration Rules and the terms of this Article 27, the terms of this Article 27 shall prevail
- 27.3 Arbitration Decisions. Unless otherwise agreed by the Parties, the arbitrator(s) shall render a decision within ninety (90) Calendar Days of appointment and shall notify the Parties in writing of such decision and the reasons therefore. The arbitrator(s) shall be authorized only to interpret and apply the provisions of this LGIA and shall have no power to modify or change any provision of this Agreement in any manner. The decision of the arbitrator(s) shall be final and binding upon the Parties, and judgment on the award may be entered in any court having jurisdiction. The decision of the arbitrator(s) may be appealed solely on the grounds that the conduct of the arbitrator(s), or the decision itself, violated the standards set forth in the Federal Arbitration Act or the Administrative Dispute Resolution Act. The final decision of the arbitrator must also be filed with the Commission if it affects jurisdictional rates, terms and conditions of service, Interconnection Facilities, or Network Upgrades.
- **27.4 Costs.** Each Party shall be responsible for its own costs incurred during the arbitration process and for the following costs, if applicable: (1) the cost of the arbitrator chosen by the Party to sit on the three member panel; or (2) a pro rata share of the cost of a single arbitrator chosen by the Parties.

ARTICLE 28. REPRESENTATIONS, WARRANTIES AND COVENANTS

28.1 General. Each Party makes the following representations, warranties and covenants:

- **28.1.1 Good Standing.** Such Party is duly organized, validly existing and in good standing under the laws of the state in which it is organized, formed, or incorporated, as applicable; that it is qualified to do business in the state or states in which the Large Generating Facility, Interconnection Facilities and Network Upgrades owned by such Party, as applicable, are located; and that it has the corporate power and authority to own its properties, to carry on its business as now being conducted and to enter into this LGIA and carry out the transactions contemplated hereby and perform and carry out all covenants and obligations on its part to be performed under and pursuant to this LGIA.
- **28.1.2 Authority.** Such Party has the right, power and authority to enter into this LGIA, to become a Party hereto and to perform its obligations hereunder. This LGIA is a legal, valid and binding obligation of such Party, enforceable against such Party in accordance with its terms, except as the enforceability thereof may be limited by applicable bankruptcy, insolvency, reorganization or other similar laws affecting creditors' rights generally and by general equitable principles (regardless of whether enforceability is sought in a proceeding in equity or at law).
- **28.1.3** No Conflict. The execution, delivery and performance of this LGIA does not violate or conflict with the organizational or formation documents, or bylaws or operating agreement, of such Party, or any judgment, license, permit, order, material agreement or instrument applicable to or binding upon such Party or any of its assets.
- **28.1.4 Consent and Approval.** Such Party has sought or obtained, or, in accordance with this LGIA will seek or obtain, each consent, approval, authorization, order, or acceptance by any Governmental Authority in connection with the execution, delivery and performance of this LGIA, and it will provide to any Governmental Authority notice of any actions under this LGIA that are required by Applicable Laws and Regulations.

ARTICLE 29. [OMITTED]

ARTICLE 30. MISCELLANEOUS

- **30.1 Binding Effect.** This LGIA and the rights and obligations hereof shall be binding upon and shall inure to the benefit of the successors and assigns of the Parties hereto.
- **30.2** Conflicts. In the event of a conflict between the body of this LGIA and any attachment, appendices or exhibits hereto, the terms and provisions of the body of this LGIA shall prevail and be deemed the final intent of the Parties.
- Rules of Interpretation. This LGIA, unless a clear contrary intention appears, shall be 30.3 construed and interpreted as follows: (1) the singular number includes the plural number and vice versa; (2) reference to any person includes such person's successors and assigns but, in the case of a Party, only if such successors and assigns are permitted by this LGIA, and reference to a person in a particular capacity excludes such person in any other capacity or individually; (3) reference to any agreement (including this LGIA), document, instrument or tariff means such agreement, document, instrument, or tariff as amended or modified and in effect from time to time in accordance with the terms thereof and, if applicable, the terms hereof; (4) reference to any Applicable Laws and Regulations means such Applicable Laws and Regulations as amended, modified, codified, or reenacted, in whole or in part, and in effect from time to time, including, if applicable, rules and regulations promulgated thereunder; (5) unless expressly stated otherwise, reference to any Article, Section or Appendix means such Article of this LGIA or such Appendix of this LGIA, or such Section of the LGIP or such Appendix of the LGIP, as the case may be; (6) "hereunder", "hereof", "herein", "hereto" and words of similar import shall be deemed references to this LGIA as a whole and not to any particular Article or other provision hereof or thereof; (7) "including" (and with correlative meaning "include") means including without limiting the generality of any description preceding such term; and (8) relative to the determination of any period of time, "from" means "from and including", "to" means "to but excluding" and "through" means "through and including".
- **30.4** Entire Agreement. Except for the ISO New England Operating Documents, Applicable Reliability Standards, or successor documents, this LGIA, including all Appendices and Schedules attached hereto, constitutes the entire agreement between the Parties with reference to the subject matter hereof, and supersedes all prior and contemporaneous understandings or agreements, oral or written, between the Parties with respect to the subject matter of this LGIA. Except for the ISO New England Operating Documents, Applicable Reliability Standards, any applicable tariffs, related facilities agreements, or successor documents, there are no other

agreements, representations, warranties, or covenants which constitute any part of the consideration for, or any condition to, any Party's compliance with its obligations under this LGIA.

- **30.5** No Third Party Beneficiaries. This LGIA is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations herein assumed are solely for the use and benefit of the Parties, their successors in interest and, where permitted, their assigns.
- **30.6** Waiver. The failure of a Party to this LGIA to insist, on any occasion, upon strict performance of any provision of this LGIA will not be considered a waiver of any obligation, right, or duty of, or imposed upon, such Party.

Any waiver at any time by a Party of its rights with respect to this LGIA shall not be deemed a continuing waiver or a waiver with respect to any other failure to comply with any other obligation, right, or duty of this LGIA. Termination or Default of this LGIA for any reason by the Interconnection Customer shall not constitute a waiver of the Interconnection Customer's legal rights to obtain an interconnection from the Interconnecting Transmission Owner. Any waiver of this LGIA shall, if requested, be provided in writing.

- **30.7 Headings.** The descriptive headings of the various Articles of this LGIA have been inserted for convenience of reference only and are of no significance in the interpretation or construction of this LGIA.
- **30.8** Multiple Counterparts. This LGIA may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.
- **30.9 Amendment.** The Parties may by mutual agreement amend this LGIA by a written instrument duly executed by the Parties.
- **30.10** Modification by the Parties. The Parties may by mutual agreement amend the Appendices to this LGIA by a written instrument duly executed by all of the Parties. Such amendment shall

become effective and a part of this LGIA upon satisfaction of all Applicable Laws and Regulations.

- **30.11** Reservation of Rights. Consistent with Section 11.3 of the LGIP, Interconnecting Transmission Owner and System Operator shall have the right to make unilateral filings with the Commission to modify this LGIA with respect to any rates, terms and conditions, charges, classifications of service, rule or regulation under section 205 or any other applicable provision of the Federal Power Act and the Commission's rules and regulations thereunder, and Interconnection Customer shall have the right to make a unilateral filing with the Commission to modify this LGIA pursuant to section 206 or any other applicable provision of the Federal Power Act and the Commission's rules and regulations thereunder; provided that each Party shall have the right to protest any such filing by the other Parties and to participate fully in any proceeding before the Commission in which such modifications may be considered. In the event of disagreement on terms and conditions of the LGIA related to the costs of upgrades to such Interconnecting Transmission Owner's transmission facilities, the anticipated schedule for the construction of such upgrades, any financial obligations of Interconnecting Transmission Owner, and any provisions related to physical impacts of the interconnection on Interconnecting Transmission Owner's transmission facilities or other assets, then the standard applicable under Section 205 of the Federal Power Act shall apply only to Interconnecting Transmission Owner's position on such terms and conditions. Nothing in this LGIA shall limit the rights of the Parties or of the Commission under sections 205 or 206 of the Federal Power Act and the Commission's rules and regulations thereunder, except to the extent that the Parties otherwise mutually agree as provided herein.
- **30.12** No Partnership. This LGIA shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties or to impose any partnership obligation or partnership liability upon any Party. No Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Parties.

IN WITNESS WHEREOF, the Parties have executed this LGIA in triplicate originals, each of which shall constitute and be an original effective Agreement between the Parties.

ISO New England Inc. (System Operator)

By: <u>Robert</u> Thier

Robert Ethier Title: Vice President, System Planning Date: 7/29/21

New England Power Company d/b/a National Grid (Interconnecting Transmission Owner) By: _____

Kevin Reardon

Title: Director, Commercial Services Date:

Revolution Wind, LLC (Interconnection Customer)

By: _____

Claus Bøjle Møller

Title: Authorized Person

Date:

By: _____

Michael Auseré

Title: Authorized Person

Date:

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Robert Ethier

Title: Vice President, System Planning

Date:

New England Power Company d/b/a National Grid (Interconnecting Transmission Owner)

By: _

Kevin Reardon Title: Director, Commercial Services

Date: July 29, 2021

Revolution Wind, LLC (Interconnection Customer)

By: _____

Claus Bøjle Møller

Title: Authorized Person

Date:

By: _____

Michael Auseré

Title: Authorized Person

Date:

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By:

Kevin Reardon Title: Director, Commercial Services Date:

Revolution Wind, LLC (Interconnection Customer)

a By:

Claus Bøjle Møller

Title: Authorized Person 07.30.2021 Date: By:

Michael Auseré

Title: Authorized Person

Date: 7.29.2/

Revolution Wind, LLC RIEFSB Docket No. 2021-01 Addendum 3-7 Page 94 of 145

APPENDICES TO LGIA

- Appendix A Interconnection Facilities, Network Upgrades and Distribution Upgrades
- Appendix B Milestones
- Appendix C Interconnection Details
- Appendix D Security Arrangements Details
- Appendix E Commercial Operation Date
- Appendix F Addresses for Delivery of Notices and Billings
- Appendix G Interconnection Requirements for a Wind Generating Plant

APPENDIX A TO LGIA

Interconnection Facilities, Network Upgrades and Distribution Upgrades

1. Interconnection Facilities:

 a. Points of Interconnection and Points of Change of Ownership. The Points of Interconnection shall be where the Interconnecting Transmission Owner's disconnect switches, designated R2-3 for circuit R2, and W1-3 for circuit W1, interconnect to the two tap points in the new six-breaker ring bus in the existing Davisville 115 kV Substation No. 84. See Appendix A-1, which drawing is attached hereto and made part hereof.

The Points of Change of Ownership for the R2 and W1 circuits will be the terminal pads of the 115 kV underground cable terminators in the new six-breaker ring bus in the existing Davisville 115 kV Substation No. 84. See Appendix A-1, which drawing is attached hereto and made part hereof.

The metering point(s) shall be located between the Points of Change of Ownership and disconnect switch designated R2-3 for circuit R2, and W1-3 for circuit W1. See Appendix A-1, which drawing is attached hereto and made part hereof.

- b. Interconnection Customer's Interconnection Facilities (including metering equipment). The Interconnection Customer shall construct, own, operate and maintain:
 - Two (2) 115 kV circuits, each consisting of two single core solid dielectric underground cables per phase with associated cable terminators, connecting the Interconnecting Transmission Owner's Interconnection Facilities to the Interconnection Customer's new onshore 275 kV/115 kV substation ("New Onshore Substation")
 - Two fiber optic cable circuits connecting Interconnecting Transmission Owner's Interconnection Facilities to the New Onshore Substation for two protection systems (circuit R2 and circuit W1 protection systems at New Onshore Substation shall be

compatible with those at Interconnecting Transmission Owner's new six-breaker ring bus)

- iii. Interconnection Customer's new onshore substation comprised of:
 - Two (2) 275 kV/115 kV autotransformers
 - One (1) synchronous condenser with 275 kV step-up transformer
 - One (1) synchronous condenser with 275 kV step-up transformer
 - Two (2) 275 kV variable shunt reactors
 - Two (2) 275 kV fixed shunt reactors
 - Two (2) 275 kV harmonic filter packages that are to be fully compensated with equivalent sized reactors. The filter packages are subject to the completion of a detailed design study that will factor in the results of a harmonic assessment 275 kV switchgear with bus tie
 - 115 kV switchgear with bus tie
- Two (2) 275 kV three core submarine cables approximately 41 and 50 miles each in length
- v. Interconnection Customer's new offshore 275/66 kV substation comprised of:
 - Four (4) 275 kV/66 kV transformers
 - Two (2) 275 kV fixed shunt reactors
 - 275 kV switchgear
 - 66 kV switchgear
- vi. Ninety-four (94) 66 kV three core subsea array cables

See Appendix A-3, which drawing is attached hereto and made part hereof.

- c. Interconnecting Transmission Owner's Interconnection Facilities (including metering equipment). The Interconnection Customer will construct and the Interconnecting Transmission Owner will own, operate and maintain the following:
 - Two (2) cable riser structures to support the cables and cable terminators of the Interconnection Customer's 115 kV circuits (R2 and W1)
 - Bus between the riser structure and the new six-breaker ring bus in existing Davisville 115 kV Substation No. 84
 - iii. Two (2) manually operated disconnect switches rated at

- iv. Six (6) surge arresters
- v. Six (6) combined current transformer/voltage transformer (CT/VT) Metering Units
- vi. Associated open air bus work, control and protection equipment, support structures, civil works, foundations, and other related substation equipment
- vii. ISO New England Operating Procedure No. 18 compliant revenue meter
- viii. Communications equipment (Gateway)

See Appendix A-1, which drawing is attached hereto and made part hereof.

2. Network Upgrades:

- a. Stand Alone Network Upgrades. The Interconnection Customer shall construct, and the Interconnecting Transmission Owner shall own, operate and maintain the Stand Alone Network Upgrades, which consist of the following:
 - The new six-breaker ring bus, which will connect to the existing Davisville 115 kV Substation No. 84, and will be comprised of:
 - Six (6) 115 kV breakers
 - Twelve (12) manually operated disconnect switches
 - Two (2) manually operated disconnect switches
 - Two (2) line traps
 - Six (6) Coupling Capacitor Voltage Transformers ("CCVTs")
 - Two (2) station service voltage transformers
 - Two (2) manually operated disconnect switches (for connections to existing 115 kV/ 34.5 kV transformers)
 - Open air bus work
 - New control building
 - Associated control, protection & communications equipment, AC/DC station service equipment, dead-end/support structures, civil works, foundations and other related substation equipment
 - Two (2) new 115 kV transmission lines, line structures and associated foundations for the G-185S and L-190 line between, but not including double circuit structure GT38/LT98, and the new 115 kV six-breaker ring bus
 - The identified structure numbers are: GT39/LT99, GT40/LT100, GT41, LT101
 - iii. Two (2) new 115 kV transformer supply circuits, structures and associated foundations for the existing transformers #1 and #2 between the line termination

structures at existing Davisville 115 kV Substation No. 84 and the new 115 kV sixbreaker ring bus

• The identified structure numbers are: LR1, LR2, LR3, GR1, GR2, GR3 See Appendix A-2, which drawing is attached hereto and made part hereof.

- b. **Other Network Upgrades**. The Other Network Upgrades, to be constructed, owned, operated and maintained by the Interconnecting Transmission Owner, consist of the following:
 - i. Connection of Lines G185S and L190 at double circuit structure GT38/LT98
 - ii. G185N (Drumrock Kent County) 115 kV
 - Rerate or upgrade G185N line
 , and replace structures as needed
 - iii. K189 (Drumrock Kent County) 115 kV
 - Rerate or upgrade K189 line

and replace structures as needed

iv. G185S/L190, Kent County to Davisville Taps

- Rerate or upgrade G185S-2 (Davisville 185 Tap Kent County) line
 , and replace structures as needed
- Rerate or upgrade L190-3 (Davisville 190 Tap Kent County) line , and replace structures as

needed

- v. G185S/L190, Davisville Taps
 - Rerate or upgrade G185S-3 (Old Baptist Rd Davisville) line

, and replace

structures as needed

• Rerate or upgrade G185S-4 (Old Baptist Rd – Davisville 185 Tap) line

replace structures as needed

• Rerate or upgrade L190-1 (Davisville 190 Tap – Old Baptist Rd) line

, and

, and

replace structures as needed

• Rerate or upgrade L190-2 (Old Baptist Rd – Davisville) line

, and replace

structures as needed

- Install Optical Ground Wire ("OPGW") on each tap
- vi. Drumrock Substation
 - Replace five (5) 115 kV circuit breakers: 7189, 7289, 8772, 8871, 8588
 - Replace disconnect switches 189, 7189, 7189-2, 7289-1, 7289-2
 - As required for breaker and disconnect replacements, associated control and protection equipment, primary equipment, secondary equipment, site preparation, civil work, station service upgrades, support structures, foundations, and other related miscellaneous substation equipment
- vii. G185S Davisville Tap West Kington*
 - Install OPGW on G185S line from Davisville tap point to West Kingstown substation, and replace structures as needed
- viii. L-190 Davisville Tap-Tower Hill rating increase*
 - Rerate or upgrade L190-5 (Tower Hill Davisville 190 Tap) line
 , and replace structures as needed
- ix. G-185S/L-190 Line Protection Upgrades
 - Line Protection Upgrades for the conversion of G-185S from a two terminal line to a three terminal line due to the addition of the new six-breaker ring bus at existing Davisville 115 kV Substation No. 84
 - Line Protection Upgrades for the conversion of L-190 from a two terminal line to a three terminal line due to the addition of the new six-breaker ring bus at existing Davisville 115 kV Substation No. 84
- x. Davisville Substation
 - a. Control & protection upgrades for the 115 kV transformer No. 1 & No. 2 supply circuits from the new six-breaker ring bus at existing Davisville 115 kV Substation No. 84

*The Network Upgrades listed under vii and viii have been identified as Contingent Facilities in this Appendix A.6, below.

3. Distribution Upgrades. None.

4. Affected System Upgrades. The Interconnection System Impact Study for the Interconnection Customer's Large Generating Facility identified the need for the following upgrade on The Connecticut Light & Power Company's part of the system ("Affected System") to accommodate the requested interconnection to the Administered Transmission System: Install redundant 3T 345 kV circuit breaker at the Affected System's Card 11F Substation. Pursuant to Article 11.4.4 of this Agreement, Interconnection Customer is responsible for taking the appropriate actions and entering into the applicable separate related facilities arrangements to effect the above dentified Affected System upgrade.

5. Long Lead Facility-Related Upgrades.

The Interconnection Customer's Large Generating Facility is associated with a Long Lead Facility, in accordance with Section 3.2.3 of the LGIP. Pursuant to Section 4.1 of the LGIP, the Interconnection Customer shall be responsible for the following upgrades in the event that the Long Lead Facility achieves Commercial Operation and obtains a Capacity Supply Obligation in accordance with Section III.13.1 of the Tariff:

Not applicable.

If the Interconnection Customer fails to cause these upgrades to be in-service prior to the commencement of the Long Lead Facility's Capacity Commitment Period, the Interconnection Customer shall be deemed to be in Breach of this LGIA in accordance with Article 17.1, and the System Operator will initiate all necessary steps to terminate this LGIA, in accordance with Article 2.3.

6. Contingent Facilities:

The following Network Upgrades identified as necessary for the interconnection of the Large Generating Facility in this Appendix A.2.b, above, have also been identified as Reliability Transmission Upgrades in the Regional System Plan Project List as RSP #1815 and Asset Condition List as ACR #98, respectively:

- i. G185S Davisville Tap West Kington (ACR #98)
 - Install OPGW on G185S line from Davisville tap point to West Kingstown substation, and replace structures as needed
- ii. L-190 Davisville Tap-Tower Hill rating increase (RSP #1815)
 - Rerate or upgrade L190-5 (Tower Hill Davisville 190 Tap) line
 , and replace structures as needed

Consistent with Section 3.8 of the LGIP and Article 11.4 of this Agreement, the Interconnection Customer shall not be responsible for the costs of the Regional System Plan Project List upgrades unless they are removed from the Project List as Reliability Transmission Upgrades. The Interconnection Customer may need to advance the construction of these upgrades for their completion prior to the Initial Synchronization Date associated with the Large Generating Facility, in which case, the Interconnection Customer shall be responsible for the costs of advancing the construction of the upgrades in accordance with Section 12.2.3 of the LGIP.

7. Post-Forward Capacity Auction Re-study Upgrade Obligations. To be determined.

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APPENDIX B TO LGIA

Milestones

- **1.** Selected Option Pursuant to Article **5.1**: Interconnection Customer selects the Option to Build, Article 5.1.3. Options as described in Articles 5.1.1, 5.1.2, and 5.1.4 shall not apply to this LGIA.
- 2. Milestones and Other Requirements for all Large Generating Facilities: The description and entries listed in the following table establish the required Milestones in accordance with the provisions of the LGIP and this LGIA. The referenced section of the LGIP or article of the LGIA should be reviewed by each Party to understand the requirements of each milestone.

Item	Milestone Description	Responsible	Date	LGIP/LGIA
No.		Party		Reference
1	Provide evidence of	Interconnection	Within 15 BD of	§ 11.3.1.1 of
	continued Site Control to	Customer	final LGIA receipt	LGIP
	System Operator, or			
	\$250,000 non-refundable			
	deposit to Interconnecting			
	Transmission Owner			
2	Provide evidence of one or	Interconnection	Within 15 BD of	§ 11.3.1.2 of
	more milestones specified	Customer	final LGIA receipt	LGIP
	in § 11.3 of LGIP			
3	Commit to a schedule for	Interconnection	Within 15 BD of	§ 11.3.1.2 of
	payment of upgrades	Customer	final LGIA receipt	LGIP
4	Provide refundable deposit	Interconnection	Within 15 BD of	§ 11.3.1.2 of
	to Interconnecting	Customer	final LGIA receipt	LGIP
	Transmission Owner			
5	Provide certificate of	Interconnection	Within 10	§ 18.3.9 of LGIA
	insurance	Customer and	Calendar Days of	
		Interconnecting	execution of LGIA	
		Transmission		
		Owner		
6A	Provide siting approval for	Interconnection		§ 7.5 of LGIP
	Generating Facility and	Customer		

	Interconnection Facilities to		
	Interconnecting		
	Transmission Owner		
6B	Provide siting approval for	Interconnection	
	Interconnecting	Customer	
	Transmission Owner's		
	Interconnection Facilities		
	and Stand Alone Network		
	Upgrades		
7A	Receive Governmental	Interconnection	§ 5.6.1 of LGIA
	Authority approval for any	Customer and/or	
	facilities requiring	Interconnecting	
	regulatory approval	Transmission	
		Owner	
7B	Obtain necessary real	Interconnection	§ 5.6.2 of LGIA
	property rights and rights-	Customer and/or	
	of-way for the construction	Interconnecting	
	of a discrete aspect of the	Transmission	
	Interconnecting	Owner	
	Transmission Owner's		
	Interconnection Facilities		
	and Network Upgrades		
7C	Provide to Interconnecting	Interconnection	§ 5.5.2 and § 5.6.3
	Transmission Owner	Customer	of LGIA
	written authorization to		
	proceed with design,		
	equipment procurement and		
	construction		

7D	Provide System Operator	Interconnection		§ 5.2 of LGIA
	evidence of proceeding with	Customer		
	design, equipment			
	procurement, and			
	construction			
7E	Provide quarterly written	Interconnection	15 Calendar Days	§ 5.7 of LGIA
	progress reports	Customer and	after the end of	
		Interconnecting	each quarter	
		Transmission	beginning the	
		Owner	quarter that	
			includes the date	
			for Milestone 7C	
			and ending when	
			the entire Large	
			Generating	
			Facility and all	
			required	
			Interconnection	
			Facilities and	
			Network Upgrades	
			are in place	
8	Provision of Security to	Interconnection	At least 30	§§ 5.5.3 and 5.6.4
	Interconnecting	Customer	Calendar Days	of LGIA
	Transmission Owner		prior to design,	
	pursuant to Section 11.5 of		procurement and	
	LGIA		construction	
9	Provision of Security	Interconnection	On or before the	§ 5.17.3 of LGIA
	Associated with Tax	Customer	date that	
	Liability to Interconnecting		Interconnection	
	Transmission Owner		Customer pays	

	pursuant to Section 5.17.3		Interconnecting	
	of LGIA		Transmission	
			Owner's final	
			invoice (Milestone	
			22)	
10A	Commit to the ordering of	Interconnection		§ 7.5 of LGIP
	long lead time material for	Customer		
	Network Upgrades			
10B	Commit to ordering of long	Interconnection		§ 5.2 of LGIA
	lead time material for	Customer		
	Interconnecting			
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to be constructed			
	by Interconnection			
	Customer			
11A	Provide initial design,	Interconnection	180 Calendar	§ 5.10.1 of LGIA
	engineering and	Customer	Days prior to	§ 7.5 of LGIP
	specification for		Initial	
	Interconnection Customer's		Synchronization	
	Interconnection Facilities to		Date	
	Interconnecting			
	Transmission Owner			
11B	Provide comments on initial	Interconnecting	Within 30	§ 5.10.1 of LGIA
	design, engineering and	Transmission	Calendar Days of	§ 7.5 of LGIP
	specification for	Owner	receipt	
	Interconnection Customer's			
	Interconnection Facilities			
11C	Provide to Interconnection	Interconnecting		
	Customer standards,	Transmission		
	specifications drawings,	Owner		
	PLSCADD models for			

	Stand Alone Network			
	Upgrades design and			
	specifications, standards			
	and approved vendor lists			
	for procurement and			
	construction of the Stand			
	Alone Network Upgrades			
11D	Provide to Interconnecting	Interconnection		§ 5.2 LGIA
	Transmission Owner initial	Customer		
	design, engineering and			
	specification for			
	Interconnecting			
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to be constructed			
	by the Interconnection			
	Customer			
1				
11E	Provide to Interconnection	Interconnecting	Within 15 BD of	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on	Interconnecting Transmission	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering and specification for	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to be constructed	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to be constructed by the Interconnection	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to be constructed by the Interconnection Customer	Interconnecting Transmission Owner	Within 15 BD of receipt	§ 5.2 of LGIA
11E 12A	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to be constructed by the Interconnection Customer Provide final design,	Interconnecting Transmission Owner Interconnection	Within 15 BD of receipt 90 Calendar Days	§ 5.2 of LGIA § 5.10.1 of LGIA
11E 12A	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to be constructed by the Interconnection Customer Provide final design, engineering and	Interconnecting Transmission Owner Interconnection Customer	Within 15 BD of receipt 90 Calendar Days prior to Initial	 § 5.2 of LGIA § 5.10.1 of LGIA § 7.5 of LGIP
11E 12A	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to be constructed by the Interconnection Customer Provide final design, engineering and specification for	Interconnecting Transmission Owner Interconnection Customer	Within 15 BD of receipt 90 Calendar Days prior to Initial Synchronization	§ 5.2 of LGIA § 5.10.1 of LGIA § 7.5 of LGIP
11E 12A	Provide to Interconnection Customer comments on initial design, engineering and specification for Interconnecting Transmission Owner's Interconnection Facilities and Stand Alone Network Upgrades to be constructed by the Interconnection Customer Provide final design, engineering and specification for Interconnection Customer's	Interconnecting Transmission Owner Interconnection Customer	Within 15 BD of receipt 90 Calendar Days prior to Initial Synchronization Date	§ 5.2 of LGIA § 5.10.1 of LGIA § 7.5 of LGIP

	Interconnecting			
	Transmission Owner			
12B	Provide comments on final	Interconnecting	Within 30	§ 5.10.1 of LGIA
	design, engineering and	Transmission	Calendar Days of	§ 7.5 of LGIP
	specification for	Owner	receipt	
	Interconnection Customer's			
	Interconnection Facilities			
12C	Provide to Interconnecting	Interconnection	60 BD prior to	§ 5.2 of LGIA
	Transmission Owner final	Customer	Milestone 15B	
	design, engineering and			
	specification for			
	Interconnecting			
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to be constructed			
	by the Interconnection			
	Customer			
12D	Provide to Interconnection	Interconnecting	Within 15 BD	§ 5.2 of LGIA
	Customer comments on	Transmission	from receipt	
	final design, engineering	Owner		
	and specification of			
	Interconnecting			
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to be constructed			
	by the Interconnection			
	Customer			
13A	Deliver to Interconnecting	Interconnection	Within 120	§ 5.10.3 of LGIA
	Transmission Owner "as	Customer	Calendar Days of	
	built" drawings,		Commercial	
	information and documents		Operation Date	

	regarding Interconnection			
	Customer's Interconnection			
	Facilities			
13B	Deliver to Interconnecting	Interconnection	Within 120	§ 5.2 of LGIA
	Transmission Owner "as	Customer	Calendar Days	
	built" drawings,		from Commercial	
	information and documents		Operation Date	
	regarding Interconnecting			
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to be constructed			
	by the Interconnection			
	Customer			
14	Provide protective relay	Interconnection	At least 90	§§ 5.10.1 of
	settings to Interconnecting	Customer	Calendar Days	LGIA
	Transmission Owner for		prior to Initial	
	coordination and		Synchronization	
	verification		Date	
15A	Commencement of	Interconnecting	Not applicable	§ 5.6 of LGIA
	construction of	Transmission		
	Interconnection Facilities	Owner		
15B	Commencement of	Interconnection		§ 5.2 of LGIA
	construction of	Customer		
	Interconnecting			
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to be constructed			
	by the Interconnection			
	Customer			
15C	Commencement of	Interconnecting		
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	construction of Network	Transmission		
	Upgrades	Owner		
16	Submit updated data "as	Interconnection	No later than 180	§ 24.3 of LGIA
	purchased"	Customer	Calendar Days	
			prior to Initial	
			Synchronization	
			Date	
17	In Service Date	Interconnection		§ 343.1 and 4.4.5
		Customer		of LGIP, § 5.1 of
				LGIA
18	Initial Synchronization Date	Interconnection		§ 3.4.1, 4.4.4,
		Customer		4.4.5, and 7.5 of
				LGIP
19	Submit supplemental and/or	Interconnection	Prior to	§ 24.4 of LGIA
	updated data – "as built/as-	Customer	Commercial	
	tested"		Operation Date	
20	Commercial Operation Date	Interconnection		§ 3.4.1, 4.4.4,
		Customer		4.4.5, and 7.5 of
				LGIP
21A	Deliver to Interconnection	Interconnecting	If requested,	§ 5.11 of LGIA
	Customer "as built"	Transmission	within 120	
	drawings, information and	Owner	Calendar Days	
	documents regarding		after Commercial	
	Interconnecting		Operation Date	
	Transmission Owner's			
	Interconnection Facilities			
21B	Deliver to Interconnecting	Interconnection	Within 120	§ 5.2 of LGIA
	Transmission Owner "as	Customer	Calendar Days	
	built" drawings,		after Commercial	
	information and documents		Operation Date	
	regarding Interconnecting			
	Transmission Owner's			

	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to be constructed			
	by the Interconnection			
	Customer			
21C	Approve and accept for	Interconnecting	120 Calendar	§ 5.2 of LGIA
	operation and maintenance	Transmission	Days after receipt	
	the Interconnecting	Owner		
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to be constructed			
	by the Interconnection			
	Customer			
22	Provide Interconnection	Interconnecting	Within 6 months	§ 12.2 of LGIA
	Customer final cost	Transmission	of completion of	
	invoices	Owner	construction of	
			Interconnecting	
			Transmission	
			Owner	
			Interconnection	
			Facilities and	
			Network Upgrades	
23	Transfer control of	Interconnection	Prior to In-Service	§ 5.2 of LGIA
	Interconnecting	Customer	Date	
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to			
	Interconnecting			
	Transmission Owner to be			
	constructed by the			
	Interconnection Customer			

24	Transfer ownership of	Interconnection	Prior to In-Service	§ 5.2 of LGIA
	Interconnecting	Customer	Date	
	Transmission Owner's			
	Interconnection Facilities			
	and Stand Alone Network			
	Upgrades to			
	Interconnecting			
	Transmission Owner to be			
	constructed by the			
	Interconnection Customer			
1		1		

3. Milestones Applicable Solely for CNR Interconnection Service and Long Lead Facility Treatment. In addition to the Milestones above, the following Milestones apply to Interconnection Customers requesting CNR Interconnection Service and/or Long Lead Facility Treatment:

Item	Milestone Description	Responsible Party	Date	LGIP/LGIA
No.				Reference
1	If Long Lead Facility, all dates by which	Interconnection	Not	§ 3.2.3 of LGIP
	Critical Path Schedule upgrades will be	Customer	applicable	
	submitted to System Operator (end date			
	for New Capacity Show of Interest			
	Submission)			
2	If Long Lead Facility, dates by which	Interconnection	Not	§ 3.2.3 of LGIP
	Long Lead Facility Deposits will be	Customer	applicable	
	provided to System Operator (each			
	deadline for which New Generating			
	Capacity Resource would be required to			
	provide financial assurance under §			
	III.13.1.9 of the Tariff)			

3	If Long Lead Facility, Capacity	Interconnection	Not	§ 1 and 3.2 of LGIP
	Commitment Period (not to exceed the	Customer	applicable	
	Commercial Operation Date)			
4	Submit necessary requests for	Interconnection	To be	§ 3.2.1.3 of LGIP
	participation in the Forward Capacity	Customer	completed	
	Auction associated with the Generating			
	Facility's requested Commercial			
	Operation Date, in accordance with			
	Section III.13 of the Tariff			
5	Participate in a CNR Group Study	Interconnection	To be	§ 3.2.1.3 of LGIP
		Customer	completed	
6	Qualify and receive a Capacity Supply	Interconnection	To be	§ 3.2.1.3 of LGIP
	Obligation in accordance with Section	Customer	completed	
	III.13 of the Tariff*			
7	Complete a re-study of the applicable	System Operator	To be	§ 3.2.1.3 of LGIP
	Interconnection Study to determine the		completed	
	cost responsibility for facilities and			
	upgrades necessary to accommodate the			
	Interconnection Request based on the			
	results of the Forward Capacity Auction or			
	Reconfiguration Auction or bilateral			
	transaction through which the			
	Interconnection Customer received a			
	Capacity Supply Obligation			

APPENDIX C TO LGIA

Interconnection Details

1. Description of Interconnection:

Interconnection Customer shall install a MW Large Generating Facility, rated at MW gross and 704 MW net, with all studies performed at or below these outputs. The Large Generating Facility comprises MW Siemens wind turbine-generator units that are limited to MW and 1 in an offshore wind farm to be located off the coast of Massachusetts, Lease OCS-A 0486.

The Large Generating Facility shall receive:

Network Resource Interconnection Service for the NR Capability: See below.

Capacity Network Resource Interconnection Service for: (i) the NR Capability at a level not to exceed **MW** gross and 704 MW net for Summer and Winter; and (ii) the CNR Capability at [to be determined] MW for Summer and [to be determined] MW for Winter, which shall not exceed [to be determined] for Summer and [to be determined] for Winter.

2. Detailed Description of Generating Facility and Generator Step-Up Transformer, if applicable:

Generator Data		
Number of Generators		
Manufacturer	Siemens	
Model		
Designation of Generator(s)	N/A	
Excitation System Manufacturer	N/A	

Excitation System Model	N/A		
Voltage Regulator Manufacturer	N/A		
Voltage Regulator Model	N/A		
Generator	Ratings		
Greatest Unit Gross and Net MW Output at			
Ambient Temperature at or above 90 Degrees F			
Greatest Unit Gross and Net MW Output at			
Ambient Temperature at or above 50 Degrees F			
Greatest Unit Gross and Net MW Output at			
Ambient Temperature at or above 20 Degrees F			
Greatest Unit Gross and Net MW Output at			
Ambient Temperature at or above zero Degrees			
F			
Station Service Load For Each Unit			
Overexcited Reactive Power at Rated MVA and			
Rated Power Factor			
Underexcited Reactive Power at Rated MVA			
and Rated Power Factor			
Generator Short Circu	uit and Stability Data		
Generator MVA rating			
Generator AC Resistance	N/A		
Subtransient Reactance (saturated)	N/A		
Subtransient Reactance (unsaturated)	N/A		
Transient Reactance (saturated)	N/A		
Negative sequence reactance	N/A		
Transformer Data			
Number of units			
Self Cooled Rating			
Maximum Rating			

Winding Connection (LV/HV)	
Fixed Taps	
Z1 primary to secondary at self cooled rating	
Z1 primary to tertiary at self cooled rating	N/A
Z1 secondary to tertiary at self cooled rating	N/A
Positive Sequence X/R ratio primary to	
secondary	
Z0 primary to secondary at self cooled rating	
Z0 primary to tertiary at self cooled rating	N/A
Z0 secondary to tertiary at self cooled rating	N/A
Zero Sequence X/R ratio primary to tertiary	
Offshore T	ransformer
Number of units	
Self-cooled Rating	
Winding Connection (LV/HV)	
Winding voltages (LV/HV)	
HV Taps	
Z1 self-cooled rating	
Z1 primary to tertiary at self-cooled rating	N/A
Z1 secondary to tertiary at self-cooled rating	N/A
Positive Sequence X/R ratio	
Z0 self-cooled rating	
Z0 primary to tertiary at self-cooled rating	N/A
Z0 secondary to tertiary at self-cooled rating	N/A
Zero Sequence X/R ratio	53
Interconnection	n Transformer
Number of units	
Self-cooled Rating	
Winding Connection (LV/HV)	
Nominal winding voltages (LV/HV)	
HV Taps	
Z1 self-cooled rating	
Positive Sequence X/R ratio	

Z0 H, L short, at self-cooled rating				
Z0 H, L open, at self-cooled rating				
Z0 L, H open, at self-cooled rating				
Z0 X/R ratio H, L short				
Z0 X/R ratio H, L open				
Z0 X/R ratio L, H open				
Synchron	ous condensers			
Number of Units	1	1		
Manufacturer	TBD	TBD		
Model	TBD	TBD		
F	Ratings			
MVA				
Qmax/Qmin MVAr				
Synchronous condensers transformer				
Number of units				
Self-cooled Rating				
Winding Connection (LV/HV)				
Winding voltages (X/H)				
HV Taps				
Z1 H-L at self-cooled rating				
Positive Sequence X/R ratio				
Z0 H, L open, at self-cooled rating				
Z0 X/R ratio H, L open				

- **3.** Other Description of Interconnection Plan and Facilities:
- I. Studies, Interconnection Facilities, Network Upgrades and/or Associated Equipment
 - A. Construction of Stand Alone Network Upgrades and Interconnecting Transmission Owner's Interconnection Facilities.

Interconnection Customer shall construct the Stand Alone Network Upgrades and the Interconnecting Transmission Owner's Interconnection Facilities, and provide an access road to the Stand Alone Network Upgrades from a public road, on property owned or easements or licenses controlled by Interconnecting Transmission Owner ("SANU Site") adjacent to its Davisville Substation. The Parties shall negotiate and agree upon the terms of access to the SANU Site and any necessary easements, licenses and permits.

B. Transfer of Stand Alone Network Upgrades and Interconnecting Transmission Owner's Interconnection Facilities.

The Stand Alone Network Upgrades and Interconnecting Transmission Owner's Interconnection Facilities to be constructed by Interconnection Customer shall be transferred to Interconnecting Transmission Owner following construction and before test power and pursuant to the terms of an asset purchase agreement and bill of sale that will be negotiated by the Parties.

II. Special Conditions

A. Cost Responsibility

a. General

Pursuant to the terms of this Agreement, and subject to the Tariff, the Interconnection Customer shall be solely responsible for all costs incurred by the Interconnecting Transmission Owner as a result of the Interconnection Facilities, Network Upgrades, and/or services performed in furtherance of its responsibilities under this Agreement, including but not limited to engineering, design, project management, construction and maintenance services. Such costs may differ from the estimated costs and charges illustrated in this Appendix C to this Agreement and the oversight cost value agreed to in Article 5.2(13).

b. Ongoing Charges for Interconnection Facilities, Other Network Upgrades, and Stand Alone Network Upgrades

The Interconnection Customer shall be responsible for a Direct Assignment Facilities Charge ("DAF Charge") in accordance with the Tariff and the formula set forth in Schedule 21 - NEP, Attachment DAF of the OATT as may be in effect from time to time. The Gross Plant Investment, as such term is used for the formula set forth in Schedule 21-NEP, Attachment DAF of the OATT, ("Gross Plant Investment") shall be based on the plant accounting records associated with Interconnecting Transmission Owner's Interconnection Facilities, Other Network Upgrades, and Stand Alone Network Upgrades. The Parties agree that the Gross Plant Investment shall exclude costs associated with Other Network Upgrades in Section 2.B of Appendix A that are also listed Contingent Facilities in Section 6 of Appendix A unless and to the extent that the Interconnection Customer becomes responsible for the cost of advancing the construction of such Contingent Facilities in accordance with Section 12.2.3 of the LGIP. The Parties agree that the Gross Plant Investment will exclude costs associated with assets that do not require ongoing operation and maintenance, such as removal costs associated with upgrades to existing assets. In accordance with the final invoicing provisions contained in Article 12, and cost reconciliation contemplated in Section 3.II.H.d of this Appendix C, the Parties will determine the total Gross Plant Investment associated with Interconnecting Transmission Owner's Interconnection Facilities, Other Network Upgrades, and Stand Alone Network Upgrades. The determination of the Gross Plant Investment for the Other Network Upgrades, Interconnecting Transmission Owner's Interconnection Facilities, and Stand Alone Network Upgrades is subject to the provisions contained in Article 25 of this Agreement. In addition, the Parties agree that if, during the term of this Agreement, the Stand Alone Network Upgrades or Other Network Upgrades are modified, the Gross Plant Investment shall be reduced to reflect such modification.

c. Capital Additions

If the Interconnecting Transmission Owner adds new equipment to the Interconnecting Transmission Owner's Interconnection Facilities, the Other Network Upgrades, or the Stand Alone Network Upgrades in accordance with Good Utility Practice, and in furtherance of its obligation to provide Interconnection Service to Interconnection Customer, the costs associated with such work may be directly assignable to the Interconnection Customer, and the Gross Plant Investment may be modified to reflect such costs if so contemplated by this Agreement and/or the Tariff.

d. Oversight Costs of Stand Alone Network Upgrades and Interconnecting Transmission Owner's Interconnection Facilities.

Interconnecting Transmission Owner's monthly invoices to Interconnection Customer under Article 12 shall contain a separate line item reflecting the monthly amount for Interconnecting Transmission Owner's oversight responsibilities enumerated in Article 5.2 for Stand Alone Network Upgrades and Interconnecting Transmission Owner's Interconnection Facilities. Such line item shall be discontinued once the agreed upon amount in Article 5.2 (13) has been paid in full. The Parties agree that notwithstanding the agreed upon amount described in Article 5.2 (13), Interconnection Customer shall only be responsible for the actual costs incurred by Interconnecting Transmission Owner while providing oversight responsibilities enumerated in Article 5.2 for Stand Alone Network Upgrades and Interconnecting Transmission Owner's Interconnection Facilities. The Parties agree that if Interconnecting Transmission Owner's actual costs deviate from the agreed upon amount contained in Article 5.2(13), any amounts overpaid or underpaid by Interconnection Customer shall be resolved in accordance with the final invoicing procedures detailed in Article 12.

B. Metering, Related Equipment and Protection Requirements

Interconnecting Transmission Owner will own and maintain the revenue meters and Metering Equipment at the Interconnection Customer's expense. Interconnection Customer will own and maintain a remote terminal unit ("RTU") and related equipment ("Telemetering Equipment"). Metering Equipment must conform to the ISO New England Operating Documents in effect and amended from time to time.

Interconnection Customer grants permission to Interconnecting Transmission Owner or Affiliate's (or relevant Affiliate's) personnel to access any and all Interconnection Customer RTU data which is telemetered to Interconnecting Transmission Owner's control room. Interconnecting Transmission Owner agrees not to share this data with its sales and marketing personnel pursuant to applicable FERC rules and regulations. Additionally, the Interconnecting Transmission Owner agrees not to share this data with anyone other than those listed above without the prior written consent of the Interconnection Customer.

If, at any time, any metering equipment is found to be inaccurate by the requirements set forth in ISO New England Operating Procedure No. 18 - Metering and Telemetering Criteria, as further described in Section IX of Operating Procedure No. 18 - Testing, Calibration and Maintenance Standards, Interconnecting Transmission Owner shall cause such metering equipment to be made accurate or replaced at the Interconnection Customer's expense, and meter readings for the period of inaccuracy shall be adjusted so far as the same can be reasonably ascertained in accordance of the Tariff. Tests to evaluate meter inaccuracy shall be made in such manner as may be mutually agreed upon by the Interconnection Customer and Interconnecting Transmission Owner and in accordance with the Tariff.

Interconnecting Transmission Owner and Interconnection Customer shall comply with any reasonable request of the other concerning the sealing of the meters, the presence of a representative of the other Party when the seals are broken and the tests are made, and other matters affecting the accuracy of the measurement of electricity delivered from the Large Generating Facility. If either Interconnecting Transmission Owner or Interconnection Customer believes that there has been a meter failure or stoppage, it shall immediately notify the other Party.

C. Termination Charge

In the event this Agreement is terminated, the Interconnection Customer shall be subject to any financial obligations associated with such termination or that remain in effect post-termination as set forth in the body of this Agreement, including but not limited to Article 2, Article 5.17, Article 17, and Article 18.3. In addition, in the event this Agreement is terminated prior to the end of its original term, the Interconnection Customer agrees that it will be responsible for the DAF Charges sufficient to reimburse the Interconnecting Transmission Owner for all unrecovered costs applicable to facilities installed pursuant to this Agreement as determined in accordance with the formula set forth in Schedule 21 –

NEP, Attachment DAF of the OATT or as contained in an alternative cost recovery mechanism that the FERC may approve in connection with the termination. The Interconnection Customer reserves its right to initiate or participate in a proceeding before the FERC to contest the reasonableness of any of the above charges.

D. Station Service

Interconnection Customer shall be responsible for properly arranging its station service electric requirements, including, auxiliary service or backup service.

E. Regulatory Compliance

Each Party agrees to provide the other Party with notices and copies of all filings, including any applicable FERC filings, pertaining to this Agreement.

F. Generation Reporting

Interconnection Customer shall be responsible for communicating the capacity and energy being transmitted to the System Operator in accordance with Article 7.1 of the Agreement.

G. Losses

The revenue metering equipment shall be compensated internally in order to bidirectionally measure and record the delivery of electricity in a manner that accounts for any energy losses occurring between the Metering Point and the Point of Interconnection both when the Large Generating Facility is delivering energy to the Point of Interconnection and when the Interconnecting Transmission Owner is delivering station service power to the Point of Interconnection for the benefit of the Interconnection Customer (pursuant to the appropriate separate arrangements for station service from the Interconnecting Transmission Owner), consistent with ISO New England Operating Documents, Applicable Reliability Standards, or successor documents or procedures.

H. Payment Schedule and Financial Security Requirements

a. Estimated Cost; Milestone Prepayments

The current total estimated cost, as estimated in good faith as of the Effective Date of this Agreement, to design and install the Other Network Upgrades is

("Total Estimated Cost"). The Total Estimated Cost is an estimate only and shall not limit Interconnection Customer's obligation to pay Interconnecting Transmission Owner for all costs actually incurred by Interconnecting Transmission Owner to design and install the Other Network Upgrades. The Milestone Schedule in Appendix C – Exhibit 2 sets five prepayments (each a "Prepayment" and collectively, the "Prepayments"). The sum of the Prepayments is equal to the Total Estimated Cost as of the Effective Date of this Agreement. Interconnection Customer shall pay each Prepayment to the Interconnecting Transmission Owner as and when contemplated by the Milestone Schedule in Appendix C – Exhibit 2, each such Prepayment to be made by wire transfer in immediately available funds.

The Interconnecting Transmission Owner shall not commence any of the tasks listed in Appendix C - Exhibit 2 of this Agreement until the Interconnecting Transmission Owner has received written notice from Interconnection Customer to proceed with the applicable task(s). Interconnecting Transmission Owner is not obliged to commence any of the tasks listed in Appendix C - Exhibit 2 until such time as it has received the corresponding Prepayment, even if such Prepayment is the subject of a dispute under Article 12.4.

Prepayment amounts may be revised following issuance of any Revision Notice as contemplated in Section H.c below.

b. Implementation Costs Security

At least thirty (30) Calendar Days prior to the commencement of design for Interconnecting Transmission Owner's Interconnection Facilities or the Other Network Upgrades, Interconnection Customer shall provide Interconnecting Transmission Owner with a letter of credit in form and substance complying with the requirements of this Section H of Appendix C of this Agreement ("Section H") and also acceptable to the Interconnecting Transmission Owner, such acceptance not to be unreasonably withheld or delayed (the "Implementation Costs Security"). The initial face amount of the Implementation Costs Security shall be at least equal to the corresponding amount set forth in Appendix C- Exhibit 2. The total face amount of the Implementation Costs Security may be increased or decreased, from time to time, at each Activity/Milestone referred to in Appendix C- Exhibit 2, such total face amount to be at least equal to the "Required Minimum Total Face Amount for Letter of Credit Security" amount specified in Appendix C- Exhibit 2.

Interconnecting Transmission Owner shall have the right to draw upon the Implementation Costs Security (including any revised Implementation Costs Security as contemplated below), any revision, modification or amendment thereof, and any replacement for such Implementation Costs Security, from time to time, in the event that Interconnection Customer fails to meet any of its payment obligations under this Agreement including, without limitation, any failure to pay in full any Prepayment(s) invoiced under this Agreement, or any incurred cost payment invoiced under this Agreement, subject to the restrictions described below, provided such amount is not the subject of billing dispute procedures under Article 12.4. If Interconnection Customer provides Interconnecting Transmission Owner with written notice to proceed with any tasks or Milestones listed in Appendix C - Exhibit 2 of this Agreement and any associated payment obligation is the subject of billing dispute procedures under Article 12, Interconnecting Transmission Owner shall have the right to draw upon the Implementation Costs Security, and request revised Implementation Costs Security, only if the Parties have not resolved their billing dispute within thirty (30) Calendar Days of the billing dispute procedures under Article 12 having been invoked, and only to the extent necessary to fulfill the requirements of the tasks or Milestones specified in Interconnection Customer's notice to proceed. Notwithstanding the foregoing, Interconnecting Transmission Owner shall not have the right to draw upon the Implementation Costs Security for an applicable task or Milestone under this Agreement where Interconnection Customer has not provided written notice to proceed.

Interconnection Customer shall maintain the Implementation Costs Security (including any revised Implementation Costs Security as contemplated below), any revisions, modification or amendment thereof, and any replacement for such Implementation Costs Security, in full force and effect at all times until: (i) Interconnecting Transmission Owner has received payment in full of Interconnecting Transmission Owner's Final Invoice (as such term is defined below), and (ii) Interconnection Customer has delivered the Ongoing Costs Security (as such term is defined below) to Interconnecting Transmission Owner, whichever occurs later.

c. Revised Estimated Costs

Prior to the issuance of the Final Invoice (as such term is defined below), Interconnecting Transmission Owner may determine, from time to time, that the cost to design and install the Other Network Upgrades is anticipated to or will exceed the Total Estimated Cost or any prior Revised Total Estimated Cost and may notify Interconnection Customer that additional security is therefore required (each, a "Revision Notice").

Each Revision Notice will provide a revised total estimated cost to design and install the Other Network Upgrades ("Revised Total Estimated Cost"), taking into account any Prepayments or other payments (including draws upon Implementation Costs Security) made by Interconnection Customer, and any Prepayments or other payments subject to the billing dispute procedures of Article 12. For the avoidance of doubt, Interconnecting Transmission Owner shall not be obligated to provide any such Revision Notice unless it determines that it will require additional security as contemplated herein.

On or before thirty (30) Calendar Days following the date of a Revision Notice, Interconnection Customer shall provide Interconnecting Transmission Owner with a revised Implementation Costs Security Letter of Credit in form and substance complying with the requirements of this Section H and also acceptable to the Interconnecting Transmission Owner, with a revised face amount at least equal to the Revised Total Estimated Cost specified in the applicable Revision Notice less the amount of any Prepayments or other payments paid to Interconnecting Transmission Owner under this Agreement prior to delivery of such revised Implementation Costs Security.

Any Revised Total Estimated Cost is an estimate only and shall not limit Interconnection Customer's obligation to pay Interconnecting Transmission Owner for all costs actually incurred by Interconnecting Transmission Owner to design and install Interconnecting Transmission Owner's Other Network Upgrades.

d. Final Invoice; Payment of Final Balance

The sum of: (i) all Prepayments made by Interconnection Customer to Interconnecting Transmission Owner, (ii) all amounts paid to (and retained by) Interconnecting Transmission Owner pursuant to any draws under the Letter of Credit provided for Implementation Costs Security, and (iii) any other amounts paid by Interconnection Customer to Interconnecting Transmission Owner under this Agreement as reimbursement for costs actually incurred by Interconnecting Transmission Owner to design and install the Other Network Upgrades, shall be referred to as the "Total Paid Amount".

Within six (6) months following the completion of construction, Interconnecting Transmission Owner shall inform Interconnection Customer of the final actual costs to design and install the Other Network Upgrades ("Final Actual Installed Cost") in sufficient detail to enable Interconnection Customer to compare the actual costs with the estimates and to ascertain deviations, if any, from the cost estimates, and of the actual tax gross up amount, if applicable, as calculated by the Interconnecting Transmission Owner in accordance with the formula described in Article 5.17.4 of this Agreement ("Actual Tax Gross Up Amount"), and shall provide Interconnection Customer with a final written invoice ("Final Invoice") for the difference between the Final Actual Installed Cost and the Total Paid Amount ("Final Balance"). Within six (6) months after completion of construction and transfer by Interconnection Customer of Interconnecting Transmission Owner's Interconnection Facilities and Stand-Alone Network Upgrades, Interconnection Customer shall provide a summary of the final cost of such construction and shall set forth such costs in sufficient detail to enable Interconnecting Transmission Owner to compare the actual costs with the estimates and to ascertain deviations, if any, from the cost estimates and of the Actual Tax Gross Up Amount, if applicable. A good faith estimate of the Actual Tax Gross Up Amount and a good faith estimate of the potential future Actual Tax Gross Up Amount are provided at the time of execution of this Agreement in Appendix C Exhibit 1.

On or before thirty (30) Calendar Days following the date of the Interconnecting Transmission Owner's Final Invoice, if the Final Actual Installed Cost exceeds the Total Paid Amount, the Interconnection Customer shall pay the Final Balance to Interconnecting Transmission Owner by wire transfer in immediately available funds; provided that, subject to compliance with Article 12.2 of this Agreement, in the event that the Total Paid Amount exceeds the Final Actual Installed Cost, any such excess amount shall be refunded to Interconnection Customer as an overpayment by wire transfer in immediately available funds, with interest as calculated pursuant to 18 C.F.R. §35.19.

e. Ongoing Costs Security

The Interconnection Customer and Interconnecting Transmission Owner agree that the Final Actual Installed Cost shall be considered a contribution to the capital of a corporation for tax purposes except as otherwise provided under the prevailing tax laws.

On or before the date on which Interconnection Customer pays the Interconnecting Transmission Owner's Final Invoice, Interconnection Customer shall deliver to the Interconnecting Transmission Owner a letter of credit, in form and substance complying with the requirements of this Section H and also acceptable to the Interconnecting Transmission Owner, such acceptance not to be unreasonably withheld or delayed, having a face amount at least equal to the sum of: (i) the total of four (4) months of the DAF charges for which Interconnection Customer is responsible under the terms of the OATT and this Agreement ("DAF Charges"), and (ii) the Actual Tax Gross Up Amount (together, the "Ongoing Costs Security"), if applicable.

Following the date as of which the Interconnection Customer is no longer obligated to pay any DAF Charges pursuant to or in connection with this Agreement or the OATT, Interconnection Customer may cause a one-time reduction in the face amount of the Ongoing Costs Security by an amount equal to the DAF Charges.

Upon or after the termination date of Interconnection Customer's indemnification obligation in accordance with Article 5.17.3 of this Agreement, Interconnection

Customer may cause a one-time reduction in the face amount of the Ongoing Costs Security by an amount equal to the Actual Tax Gross Up Amount, if applicable.

Interconnection Customer shall maintain the Ongoing Costs Security, any revisions, modification or amendment thereof, and any replacement for such Ongoing Costs Security, in full force and effect at all times, provided, however, that Interconnection Customer may terminate the Ongoing Costs Security, any revisions, modification or amendment thereof, and any replacement for such Ongoing Costs Security, only from and after the later of (i) the date as of which Interconnection Customer is no longer obligated to pay any DAF Charges pursuant to or in connection with this Agreement or the OATT, and (ii) the termination date of Interconnection Customer's indemnification obligation in accordance with Article 5.17.3 of this Agreement.

The Interconnecting Transmission Owner shall have the right to draw upon the Ongoing Costs Security provided under this Section H, any revisions, modification or amendment thereof, and any replacement for such Ongoing Costs Security, from time to time, in the event that the Interconnection Customer fails to timely meet any of its obligations under this Agreement, including, without limitation, with respect to (i) payment of DAF Charges, or (ii) payment of, or indemnification of Interconnecting Transmission Owner from and against, the cost consequences of any tax liability imposed upon or against Interconnecting Transmission Owner as the result of payments or property transfers made by or on behalf of Interconnection Customer to Interconnecting Transmission Owner under or in connection with this Agreement, as well as any interest and penalties.

f. Requirements Applicable to Each Letter of Credit

The Interconnection Customer shall be solely responsible for all costs associated with each letter of credit (each, a "Letter of Credit") provided pursuant to this Section H of this Agreement, including, without limitation, the costs of obtaining, maintaining and replacing such Letter of Credit and reimbursement of each Letter of Credit Bank (as such terms are defined below). Each Letter of Credit shall be in a form and substance complying with the requirements of this Section H and also acceptable to the Interconnecting Transmission Owner, such acceptance not to be unreasonably withheld or delayed.

Each Letter of Credit shall be an irrevocable, unconditional, and transferable standby letter of credit issued by a U.S. commercial bank or a U.S. branch of a foreign bank (the "Letter of Credit Bank") provided that the Interconnection Customer is not an affiliate of the Letter of Credit Bank, the Letter of Credit Bank has at least ten billion dollars (\$10,000,000,000) in assets and the Letter of Credit Bank's lowest credit rating is at least A2 from Moody's Investors Service or A from Standard and Poor's Ratings Services ("Letter of Credit Bank Requirement(s)").

If at any time: (i) the Letter of Credit Bank fails to satisfy any Letter of Credit Bank Requirement, or (ii) the Letter of Credit Bank advises that it will not renew the applicable Letter of Credit beyond its current expiration date ("Notice of Cancellation"), then, the Interconnection Customer shall deliver a replacement letter of credit from a bank meeting the Letter of Credit Bank Requirements and the other requirements of this Section H of this Agreement. Such replacement letter of credit shall be delivered to Interconnecting Transmission Owner promptly but in no event later than ten (10) Calendar Days following the date on which the Interconnecting Transmission Owner notifies the Interconnection Customer that the Letter of Credit Bank first fails to satisfy any Letter of Credit Bank Requirement or, in the case of a Notice of Cancellation, thirty (30) Calendar Days prior to the current expiration date of the applicable Letter of Credit. If Interconnection Customer fails to provide such replacement Letter of Credit by the applicable date contemplated by this subsection (f) of Section H (and in compliance with the other requirements of this Section H), Interconnecting Transmission Owner shall have the immediate right to draw the full amount remaining under the applicable existing Letter of Credit.

Any Letter of Credit delivered pursuant to this Section H of this Agreement, as such Letter of Credit may be replaced, revised, modified, or amended, from time to time, as contemplated above, shall serve as security for Interconnection Customer's obligations under this Agreement, including, without limitation and as applicable, capital cost payment responsibilities and obligations relating to design and installation of Interconnecting Transmission Owner's Interconnection Facilities and the Network Upgrades, DAF Charge payment obligations, and with respect to payment of, or indemnification of Interconnecting Transmission Owner from and against, the cost consequences of any tax liability imposed upon or against Interconnecting Transmission Owner as a result of payments or property transfers made by or on behalf of Interconnection Customer to Interconnecting Transmission Owner under or in connection with this Agreement, as well as any interest and penalties.

g. Maintenance of Security

Interconnection Customer shall maintain each Letter of Credit provided under this Section H, any revisions, modification or amendment thereof, and any replacement for such Letter of Credit, in full force and effect at all times; provided, however, that any Letter of Credit, any revision, modification or amendment thereof, and any replacement for such Letter of Credit, may be terminated only if and when termination of the applicable Letter of Credit is expressly permitted by the terms of this Section H.

The Interconnecting Transmission Owner shall have the right to draw upon each Letter of Credit provided under this Section H, any revisions, modification or amendment thereof, and any replacement for such Letter of Credit, from time to time, in the event the Interconnection Customer fails to timely and fully meet any of its obligations under this Agreement or as otherwise permitted or contemplated by this Agreement or the OATT.

h. Remedies

If Interconnection Customer fails to make any payments required under this Appendix C or this Agreement or fails to provide and maintain the security contemplated above, each in the form, amounts, and at the times, required, Interconnecting Transmission Owner may exercise any rights, and pursue any remedies, available to it under this Agreement or the OATT, including, without limitation, Articles 12 and 17 of this Agreement.

i. Payment Due Date; General

If any payment date or other due date specified in this Section H falls on a weekend or a federal bank holiday, then such payment or due date shall be deemed to be the next business day. The face amount of any Letter of Credit represents an estimate only; the actual amount for which the Interconnection Customer is responsible under this Agreement may be different than such estimates. For the avoidance of doubt, Interconnection Customer shall be responsible for any tax obligations Interconnecting Transmission Owner may incur in drawing upon any Letter of Credit.

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APPENDIX C – EXHIBIT 1

Estimated Annual NEP DAF² Charge

Transmission Assets



Estimated Annual NEP DAF Charge

Total Gross Plant Investment (without tax gross up)

Times

Annual Carrying Charge Rate: 5.21%⁶

Equals

Annual NEP DAF Charge

³ These costs are provided for illustrative purposes only and will be adjusted to reflect the final Gross Plant Investment.

⁴ The tax gross up rate used in this illustrative example is the Interconnecting Transmission Owner's 2020 income tax gross up rate of 13.5%. If applicable, the actual tax gross up rate will be those rates that are in existence as of the In-Service Date.

5

⁶ The Annual Carrying Charge Rate shown in this Appendix C, Exhibit 1 is the Interconnecting Transmission Owner's 2019 rate and is provided for illustrative purposes only.

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APPENDIX C – EXHIBIT 2

Schedule of Prepayments and Letter of Credit Face Value

Interconnection Customer's Prepayments and adjustment to the face value of the Implementation Costs Security are due as follows:

Milestone	Cash ⁷	LoC ⁸
	Payment	Face Value
Milestone 4: 5 Business Days after LGIA signing		
30 Calendar Days after Milestone 7C: Notice to proceed with engineering		
1 month prior to Milestone 10A		
Milestone 10A: Notice to proceed with procurement		
of long lead items		
6 months prior to Milestone 15C		
Milestone 15C: Notice to proceed with construction		
phase 1		
Milestone 15C plus 9 months: Notice to proceed with		
construction phase 2		
Milestone 20: Other Network Upgrades In Service		

⁷ As modified from time to time in accordance with Appendix C Section 3.II.H.a

⁸ As modified from time to time in accordance with Appendix C Section 3.II.H.c. The LoC Face Value amounts referred to in this Table refer only to the Implementation Costs Security and not to the required face amount of the Ongoing Costs Security.

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APPENDIX D TO LGIA

Security Arrangements Details

Infrastructure security of the New England Transmission System equipment and operations and control hardware and software is essential to ensure day-to-day New England Transmission System reliability and operational security. The Commission will expect System Operator, Interconnecting Transmission Owners, market participants, and Interconnection Customers interconnected to the New England Transmission System to comply with the recommendations offered by the Critical Infrastructure Protection Committee and, eventually, best practice recommendations from NERC. All public utilities will be expected to meet basic standards for system infrastructure and operational security, including physical, operational, and cyber-security practices.

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APPENDIX E TO LGIA

Commercial Operation Date

This Appendix E is a part of the LGIA between System Operator Interconnecting, Transmission Owner and Interconnection Customer.

[Date]

New England Power Company, d/b/a, National Grid 40 Sylvan Road Waltham, MA 02451 Attn: Director, Commercial Services

Generator Interconnections Transmission Planning Department ISO New England Inc. One Sullivan Road Holyoke, MA 01040-2841

Re: Revolution Wind Large Generating Facility

Dear _____:

On [Date] Revolution Wind, LLC has completed Trial Operation of Unit No. ____. This letter confirms that Revolution Wind, LLC commenced commercial operation of Unit No. ____ at the Large Generating Facility, effective as of [Date plus one day].

Thank you.

[Signature] [Interconnection Customer Representative]

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APPENDIX F TO LGIA

Addresses for Delivery of Notices and Billings Notices:

System Operator:

Generator Interconnections Transmission Planning Department ISO New England Inc. One Sullivan Road Holyoke, MA 01040-2841

With copy to: Billing Department ISO New England Inc. One Sullivan Road Holyoke, MA 01040-2841

Interconnecting Transmission Owner:

New England Power Company Attn: Director, Commercial Services West Wing, Floor 2 40 Sylvan Road Waltham, MA 02451

With copy to: New England Power Company Attn: Transmission Account Manager West Wing, Floor 2 40 Sylvan Road Waltham, MA 02451

Interconnection Customer:

Revolution Wind, LLC 56 Exchange Terrace, Suite 300

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Providence, RI 02903

With copy to: Eversource Energy Service Company Legal Department 107 Selden Street Berlin, CT 06037

Billings and Payments:

System Operator:

Generator Interconnections Transmission Planning Department ISO New England Inc. One Sullivan Road Holyoke, MA 01040-2841

With copy to: Billing Department ISO New England Inc. One Sullivan Road Holyoke, MA 01040-2841

Interconnecting Transmission Owner:

New England Power Company Attn: Transmission Finance West Wing, Floor 2 40 Sylvan Road Waltham, MA 02451

Interconnection Customer:

Revolution Wind, LLC 399 Boylston Street, 12th floor Boston, MA 02116

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With copy to: Eversource Energy Service Company Competitive Transmission and Renewable Markets 107 Selden Street Berlin, CT 06037

Alternative Forms of Delivery of Notices (telephone, facsimile or email):

System Operator:

Facsimile: (413) 540-4203 E-mail: geninterconn@iso-ne.com

With copy to: Facsimile: (413) 535-4024

E-mail: <u>billingdept@iso-ne.com</u>

Interconnecting Transmission Owner:

Facsimile: (781) 296-8088 Email: <u>MyService.NE@nationalgrid.com</u>

Interconnection Customer:

Email: <u>US_legal_notices@orsted.com</u> With copy to: Email: <u>OSWContractManagement@eversource.com</u>

DUNS Numbers:

Interconnection Customer: 117529737

Interconnecting Transmission Owner: 006952881

APPENDIX G TO LGIA

Interconnection Requirements For A Wind and Inverter-Based Generating Facilities

Appendix G sets forth requirements and provisions specific to wind and inverter-based Generating Facilities. All other requirements of this LGIA continue to apply to wind and inverter-based Generating Facility interconnections.

A. Technical Standards Applicable to Wind and Inverter-Based Generating Facility

i. Low Voltage Ride-Through (LVRT) Capability

Wind and inverter-based Generating Facilities shall be able to remain online during voltage disturbances up to the time periods and associated voltage levels set forth in the standard below. The LVRT standard provides for a transition period standard and a post-transition period standard.

Transition Period LVRT Standard

The transition period standard applies to wind generating plants subject to FERC Order 661 that have either: (i) interconnection agreements signed and filed with the Commission, filed with the Commission in unexecuted form, or filed with the Commission as non-conforming agreements between January 1, 2006 and December 31, 2006, with a scheduled in-service date no later than December 31, 2007, or (ii) wind generating turbines subject to a wind turbine procurement contract executed prior to December 31, 2005, for delivery through 2007.

1. Wind generating plants are required to remain in-service during three-phase faults with normal clearing (which is a time period of approximately 4 – 9 cycles) and single line to ground faults with delayed clearing, and subsequent post-fault voltage recovery to prefault voltage unless clearing the fault effectively disconnects the generator from the system. The clearing time requirement for a three-phase fault will be specific to the wind generating plant substation location, as determined by and documented by the System Operator and Interconnecting Transmission Owner. The maximum clearing time the wind generating plant shall be required to withstand for a three-phase fault shall be 9 cycles at a voltage as low as 0.15 p.u., as measured at the high side of the wind generating plant step-up transformer (i.e. the transformer that steps the voltage up to the transmission interconnection voltage or "GSU"), after which, if the fault remains

following the location-specific normal clearing time for three-phase faults, the wind generating plant may disconnect from the transmission system.

- 2. This requirement does not apply to faults that would occur between the wind generator terminals and the high side of the GSU or to faults that would result in a voltage lower than 0.15 per unit on the high side of the GSU serving the facility.
- 3. Wind generating plants may be tripped after the fault period if this action is intended as part of a special protection system.
- 4. Wind generating plants may meet the LVRT requirements of this standard by the performance of the generators or by installing additional equipment (<u>e.g.</u>, Static VAr Compensator, etc.) within the wind generating plant or by a combination of generator performance and additional equipment.
- 5. Existing individual wind generator units that are, or have been, interconnected to the network at the same location at the effective date of the Appendix G LVRT. Standard are exempt from meeting the Appendix G LVRT Standard for the remaining life of the existing generation equipment. Existing individual wind generator units that are replaced are required to meet the Appendix G LVRT Standard.

Post-transition Period LVRT Standard

All wind Generating Facilities subject to FERC Order No. 661 and not covered by the transition period described above , as well as inverter-based Generating Facilities must meet the following requirements:

1. Wind and inverter-based Generating Facilities are required to remain in-service during three-phase faults with normal clearing (which is a time period of approximately 4-9cycles) and single line to ground faults with delayed clearing, and subsequent post-fault voltage recovery to prefault voltage unless clearing the fault effectively disconnects the generator from the system. The clearing time requirement for a three-phase fault will be specific to the wind or inverter-based Generating Facility substation location, as determined by and documented by the System Operator and Interconnecting Transmission Owner. The maximum clearing time the wind or inverter-based Generating Facility shall be required to withstand for a three-phase fault shall be 9 cycles after which, if the fault remains following the location-specific normal clearing time for threephase faults, the wind or inverter-based Generating Facility may disconnect from the transmission system. Wind and inverter-based Generating Facilities shall remain interconnected during such a fault on the transmission system for a voltage level as low as zero volts, as measured at the high voltage side of the wind or inverter-based Generating Facility GSU.

- 2. This requirement does not apply to faults that would occur between the wind or inverterbased Generating Facility terminals and the high side of the GSU.
- 3. Wind and inverter-based Generating Facilities may be tripped after the fault period if this action is intended as part of a special protection system.
- Wind and inverter-based Generating Facilities may meet the LVRT requirements of this standard by the performance of the generators or by installing additional equipment (e.g., Static VAr Compensator) within the wind or inverter-based Generating Facility or by a combination of generator performance and additional equipment.
- 5. Existing individual wind generator units that are, or have been, interconnected to the network at the same location at the effective date of the Appendix G LVRT Standard are exempt from meeting the Appendix G LVRT Standard for the remaining life of the existing generation equipment. Existing individual wind generator units that are replaced are required to meet the Appendix G LVRT Standard.

ii. Power Factor Design Criteria (Reactive Power)

1. A newly interconnecting non-synchronous Generating Facility, and any subsequent modifications thereto, for which the Interconnection System Impact Study commences after October 5, 2016 shall maintain dynamic reactive capability over the power factor range of 0.95 leading to 0.95 lagging, at continuous rated power output, measured at the high-side of the station transformer or at the Point of the Interconnection if there is no station transformer. This power factor range standard shall be dynamic and can be met using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors (provided the use of such capacitors is solely for the purpose of offsetting collector system losses and is found to meet all of the requirements specified in the Interconnection System Impact Study), or a combination of the two.

- 2. A wind Generating Facility, and any subsequent modifications thereto, for which the Interconnection System Impact Study commenced after April 17, 2016 but before October 5, 2016 shall maintain dynamic reactive capability over the power factor range of 0.95 leading to 0.95 lagging, at continuous rated power output, measured at the highside of the station transformer or at the Point of Interconnection if there is no station transformer.
- 3. A wind Generating Facility, and any subsequent modifications thereto, for which the Interconnection System Impact Study commenced before April 17, 2016 shall maintain a power factor within the range of 0.95 leading to 0.95 lagging, measured at the Point of Interconnection as defined in this LGIA, if the Interconnection System Impact Study shows that such a requirement is necessary to ensure safety or reliability. For a wind Generating Facility for which the Interconnection System Impact Study commences before April 17, 2016, the power factor range standard can be met by using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors if agreed to by the System Operator and Interconnecting Transmission Owner, or a combination of the two.
- A non-wind non-synchronous Generating Facility, and any subsequent modifications thereto, for which the Interconnection System Impact Study commenced before October 5, 2016 shall meet the power factor requirements of Article 9.6.1.1 of the LGIA.
- 5. The Interconnection Customer shall not disable power factor equipment while the wind Generating Facility is in operation.
- 6. Wind Generating Facilities shall also be able to provide sufficient additional dynamic voltage support in lieu of the power system stabilizer and automatic voltage regulation at the generator excitation system if the Interconnection System Impact Study shows this to be required for system safety or reliability.

iii. Supervisory Control and Data Acquisition (SCADA) Capability

Wind and inverter-based Generating Facilities shall provide SCADA capability to transmit data and receive instructions from the System Operator and Local Control Center to protect system reliability. The System Operator, Interconnecting Transmission Owner and the wind or inverterbased Generating Facility Interconnection Customer shall determine what SCADA information is essential for the proposed wind or inverter-based Generating Facility, taking into account the size of the plant and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability in its area. PRE-FILED DIRECT TESTIMONY OF MARK ROLL, MARK GARDELLA, LAURA MORSE, SUSAN MOBERG, M. WING GOODALE, AND DREW CAREY

REVOLUTION WIND, LLC Project

RevWind Exhibit 4

PRE-FILED DIRECT TESTIMONY

OF

MARK ROLL, MARK GARDELLA, LAURA MORSE,

SUSAN MOBERG, M. WING GOODALE, AND DREW CAREY

REVOLUTION WIND, LLC
EXECUTIVE SUMMARY

The testimony demonstrates that Revolution Wind, LLC ("Revolution Wind") will avoid or minimize any impacts to the environment, and if any impacts occur, those impacts will be mitigated. The testimony describes the interaction of the Revolution Wind Export Cable – Rhode Island ("RWEC-RI") and Onshore Facilities in North Kingstown, R.I. of Revolution Wind, LLC's approximately 704 megawatt offshore wind farm (the "Project") with certain aspects of the environment, including geology, soils, water quality, fishery resources, essential fish habitat, benthic resources and shellfish, marine mammals and sea turtles, and air quality. The testimony examines potential environmental impacts resulting from all portions of the Project within the jurisdiction of the Energy Facility Siting Board ("EFSB") (those portions of the Project referred to herein as the "Facilities"). Specifically, the testimony discusses potential impacts to the offshore environment resulting from the RWEC-RI and potential impacts to the onshore environment resulting from the Onshore Facilities. No unacceptable harm to the environment will occur, and the Facilities will comply with all applicable regulations. Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Mark Roll, Mark Gardella, Laura Morse, Susan Moberg, M. Wing Goodale, and Drew Carey September 17, 2021 Page 1 of 29

- 1 I. Introduction
- 2 Mark Roll
- 3 Q. Please state your name and business address.
- 4 A. My name is Mark Roll. My business address is 56 Exchange Terrace, Suite 300,
- 5 Providence, Rhode Island 02903.
- 6 Q. Please provide your educational background and professional experience.
- 7 A. My educational background and professional experience are described in detail in the
- 8 Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios Sakellaris, Kristen
- 9 Trudell, and Jason Ross.
- 10 Mark Gardella
- 11 Q. Please state your name and business address.
- 12 A. My name is Mark Gardella. My business address is 107 Selden Street, Berlin,
- 13 Connecticut 06037.
- 14 Q. By whom are you employed and in what capacity?
- 15 A. I am a Manager with Eversource and am Manager of Environmental Offshore Wind.
- 16 Q. What are your principal responsibilities in that position?
- 17 A. I am responsible for managing the environmental offshore wind group as part of the Joint
- 18 Venture with Orsted. I have responsibility for permitting the Joint Venture partnership
- 19 projects in New England and New York and for supervising three staff.
- 20 Q. How long have you worked for Eversource?

Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Mark Roll, Mark Gardella, Laura Morse, Susan Moberg, M. Wing Goodale, and Drew Carey September 17, 2021 Page 2 of 29

1 A. I have worked for Eversource for five years.

2 Q. Describe your educational background and professional experience.

- 3 A. I received my Bachelor of Science from the University of Rhode Island in 1988 and my
- 4 Master of Community Planning from the University of Rhode Island in 1991. Prior to
- 5 joining Eversource, I worked for 25 years as an environmental consultant permitting
- 6 onshore and offshore pipelines and electric transmission lines.

7 Q. Have you ever testified before the EFSB or other siting boards?

8 A. No.

9 Laura Morse

- 10 Q. Please state your name and business address.
- 11 A. My name is Laura Morse. My business address is 399 Boylston Street, 12th Floor,
- 12 Boston, Massachusetts 02116.
- 13 Q. By whom are you employed and in what capacity?
- 14 A. I am a Senior Environment and Permitting Specialist with Orsted.
- 15 Q. What are your principal responsibilities in that position?
- 16 A. I support the Orsted U.S. project portfolio in the development and advancement of its
- 17 protected species monitoring and mitigation plans, strategic research and development,
- 18 and multi-stakeholder collaborations.
- 19 Q. How long have you worked for Orsted?
- 20 A. I have worked for Orsted for four years.

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1	Q.	Describe your educational background and professional experience.
2	A.	I received my B.S. and B.A. from the State University of New York at Buffalo in 1991. I
3		received my master's degree in Coastal Zone Management from Nova Southeastern
4		University in 2016. I have over 25 years of experience as a marine biologist and
5		regulatory specialist, with a focus on marine mammal science, ocean policy, and
6		management. I have worked as a commercial fisheries observer and spent more than two
7		decades working as a Marine Mammal Research Biologist at National Oceanic and
8		Atmospheric Administration ("NOAA") Fisheries Science Centers nationwide.
9	Q.	Have you ever testified before the EFSB or other siting board?
10	A.	No.
11		<u>Susan Moberg</u>
12	Q.	Please state your name and business address.
13	A.	My name is Susan Moberg. My business address is 1 Cedar Street, Suite 400, Providence,
14		Rhode Island 02903.
15	Q.	By whom are you employed and in what capacity?
16	A.	I am a principal with Vanasse Hangen Brustlin, Inc. – or VHB – and am manager of the
17		Energy and Environmental Services group in VHB's Providence office.
18	Q.	What are your principal responsibilities in that position?
19	A.	I am responsible for managing the environmental department in VHB's Providence
20		office, including supervision of eight staff, development or oversight of development of

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1 all environmental documents and permit applications, business development, and 2

management of energy and environmental-related projects.

- 3 How long have you worked for VHB? 0.
- 4 A. I have worked for VHB for 28 years.

5 О. Describe your educational background and professional experience.

6 A. I received my Bachelor of Science from the University of Rhode Island in 1993. My

7 relevant professional experience includes a variety of public and private sector projects in

8 Rhode Island, Massachusetts, Connecticut, and New York, including a number of energy

9 and utility siting and licensing projects for National Grid, Central Hudson Gas & Electric

10 Company, D.E. Shaw Renewable Investments, and the Orsted/Eversource Joint Venture.

11 Other notable permitting and project management experience includes the TF Green

12 Airport Improvement Program Environmental Impact Statement, R.I. Airport

13 Corporation Planning and Environmental Services On-Call contract, R.I. Department of

14 Transportation EPA Consent Decree Support, RIDOT Henderson Bridge Replacement,

15 R.I. Department of Environmental Management Blackstone River Bikeway, Providence

16 Parks Department East Transit Street Boat Ramp, Fidelity Investments Regional Campus

17 in Smithfield, Rhode Island, Misquamicut Club Dune Restoration in Westerly, Rhode

- 18 Island, and the Narragansett Indian Tribe Natural Resource Resiliency Assessment and
- 19 Action Plan. My professional certifications include the following: Professional Wetland
- 20 Scientist from the Society of Wetland Scientists, Certified Professional Soil Scientist

		Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Mark Roll, Mark Gardella, Laura Morse, Susan Moberg, M. Wing Goodale, and Drew Carey September 17, 2021 Page 5 of 29
1		from the Society of Soil Scientists of Southern New England, Certified Floodplain
2		Manager from the Association of State Floodplain Managers, Certified Invasive Species
3		Manager from the R.I. Coastal Resources Management Council, and Licensed Soil
4		Evaluator from the R.I. Department of Environmental Management.
5	Q.	Have you ever testified before the EFSB or other siting boards?
6	A.	Yes, I have testified on numerous occasions before the EFSB and other siting boards,
7		including in the following matters:
8		• SB 2001-1, The Narragansett Electric Company H-17 and G-185N Transmission
9		Line Reconductoring Project;
10		• SB 2003-01, The Narragansett Electric Company E-183 Relocation Project;
11		• SB-2005-01, The Narragansett Electric Company Southern Rhode Island
12		Transmission Project;
13		• SB 2008-02, The Narragansett Electric Company Rhode Island Reliability
14		Project;
15		• SB 2016-01, The Narragansett Electric Company Aquidneck Island Reliability
16		Project;
17		• CT Siting Council Petition No, 1313, Tobacco Valley Solar 26.4 MW Solar
18		Photovoltaic Energy Generation Project; and

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CT Siting Council Docket No 492, Gravel Pit Solar 120 MW Solar Photovoltaic
 Energy Generation Project.

3 <u>M. Wing Goodale</u>

- 4 Q. Please state your name and business address.
- 5 A. My name is M. Wing Goodale, Ph.D. My business address is 276 Canco Road, Portland,

6 Maine 04103.

- 7 Q. By whom are you employed and in what capacity?
- 8 A. I am Senior Science Director at the Biodiversity Research Institute ("BRI").
- 9 Q. What are your principal responsibilities in that position?
- 10 A. I oversee BRI's scientific work, including offshore wind and wildlife research. I support
- 11 and coordinate 25 scientific staff and twelve programs.
- 12 Q. How long have you worked for BRI?
- 13 A. I have worked for BRI for 21 years.
- 14 Q. Describe your educational background and professional experience.
- 15 A. I received my B.A. in biology from Colorado College in 1996. I also have an MPhil from
- 16 the College of the Atlantic in Human Ecology, which I received in 2001, and a Ph.D.
- 17 from the University of Massachusetts ("UMass") at Amherst in environmental
- 18 conservation, which I received in 2018. I was a National Science Foundation IGERT
- 19 fellow in the UMass Offshore Wind Energy Program and am a Switzer Environmental
- 20 Fellow. I have conducted or managed more than 80 conservation biology projects. I was

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		Page 7 of 29
1		the Principal Investigator on a U.S. Department of Energy-funded project that developed
2		a stereo-optic camera system to track birds and bats around wind turbines. Finally, I have
3		served on municipal committees, environmental nonprofit boards, professional boards,
4		and college boards, including the Governor-appointed Maine Board of Environmental
5		Protection.
6	Q.	Have you ever testified before the EFSB or other siting board?
7	A.	No.
8		Drew Carey
9	Q.	Please state your name and business address.
10	A.	My name is Drew Carey. My business address is 513 Eustis Avenue, Newport, Rhode
11		Island 02840.
12	Q.	By whom are you employed and in what capacity?
13	A.	I am the Chief Executive Officer of INSPIRE Environmental.
14	Q.	What are your principal responsibilities in that position?
15	A.	I am responsible for managing the strategic direction of INSPIRE Environmental and
16		providing subject matter expertise in marine ecology and marine geology. I provide
17		technical oversight on development of all environmental surveys, documents and reports,
18		business development, and financial management of our portfolio of clients and projects.
19	Q.	How long have you worked for INSPIRE Environmental?
20	A.	I have worked for INSPIRE and its progenitor, CoastalVision, for 22 years.

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1	Q.	Describe your educational background and professional experience.
2	A.	I received my Bachelor of Science from The Evergreen State College in 1976. I received
3		my Ph.D. in Marine Ecology and Geology from the University of St. Andrews, Scotland,
4		in 1982. I was an Assistant Professor of Earth and Environmental Science and Science in
5		Society at Wesleyan University from 1982 – 1989 and a Senior Program Manager at
6		Science Applications International Corporation from 1991 – 1999. I founded
7		CoastalVision in 1999 and merged it with Germano and Associates in 2015 to form
8		INSPIRE Environmental.
9	Q.	Have you ever testified before the EFSB or other regulatory agencies?
10	A.	I have testified before the Connecticut Energy Siting Board on the Cross Sound Cable,
11		and prepared testimony for the FERC docket and New York State CZMA Coastal
12		Consistency review on the Broadwater LNG project. I have also testified in a New York
13		State Article VII Settlement hearing on the South Fork Wind Farm project.
14	Q.	Please explain briefly the purpose of this testimony.
15	A.	The purpose of this testimony is to describe the impact analysis of the RWEC-RI and
16		Onshore Facilities on certain aspects of the environment including geology, soils, water
17		quality, fishery resources, essential fish habitat, benthic resources and shellfish, marine
18		mammals and sea turtles, and air quality. We will cross reference to other testimony,
19		including the overview panel for discussion of the construction techniques for the
20		RWEC-RI and Onshore Facilities. The testimony for this panel will show that Revolution

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1		Wind will avoid or minimize any impacts; if impacts occur, those impacts will be
2		mitigated; no unacceptable harm to the environment will occur; and the Onshore
3		Facilities and RWEC-RI will comply with all applicable regulations.
4	Q.	How is this testimony organized?
5	А.	The testimony is organized as follows: Section I is the introduction. Section II is the
6		analysis for the RWEC-RI. Section III is the analysis for the Onshore Facilities. As we
7		mentioned above, each analysis will address geology, soils, water quality, fishery
8		resources, essential fish habitat, benthic resources and shellfish, marine mammals and sea
9		turtles, and air quality.
10	Q.	Will you be sponsoring any proposed addenda to the testimony?
11	А.	Yes, we are sponsoring the following addenda:
12		• Addendum 4-1: Curriculum Vitae of Mark Gardella
13		• Addendum 4-2: Curriculum Vitae of Laura Morse
14		• Addendum 4-3: Curriculum Vitae of Susan Moberg
15		• Addendum 4-4: Curriculum Vitae of M. Wing Goodale, Ph.D.
16		• Addendum 4-5: Curriculum Vitae of Drew Carey, Ph.D.

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1 **II.** <u>RWEC-RI</u>

Q. Please explain whether the RWEC-RI will impact any geological resources in R.I. State Waters?

A. Yes. The RWEC-RI will temporarily impact geological resources during sea floor
preparations and cable installation. Such impact will be limited to the immediately
surrounding area. The installation of the RWEC-RI is described in the overview panel's
prefiled testimony submitted herewith, and we refer you to that testimony.

8

9 Once the RWEC-RI is installed, Revolution Wind does not anticipate any impacts to 10 geological resources during operation because the RWEC-RI does not have any 11 maintenance requirements unless there is the unlikely event of a fault or failure. Also, 12 given that Revolution Wind will use horizontal directional drilling – or HDD – to make 13 landfall at Quonset Point, cable exposure due to nearshore currents and erosion is 14 improbable. Nevertheless, to the extent any maintenance of the RWEC-RI needs to be 15 performed during operations, the work will be executed so as to avoid or minimize 16 impacts. Finally, as you will hear throughout this testimony, decommissioning will be 17 similar to installation. Also, as we will continue to state, all work associated with the RWEC-RI will be done in compliance with all applicable laws, regulations, permits, and 18 19 approvals.

20 Q. How will the RWEC-RI affect water quality?

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16	Q.	How will Revolution Wind address water quality?
15		extent.
14		water quality resulting from the RWEC-RI are expected to be short lived and limited in
13		Waters for greater than 4.5 hours. As demonstrated by these modeling results, impacts on
12		Predicted concentrations greater than 100 mg/L are not expected to persist in R.I. State
11		concentrations are expected to return to ambient within approximately 26 hours.
10		69.7 hours. In most locations (> 75% of the affected area within R.I. State Waters),
9		background (> 0 mg/L) are not expected to persist in any given location for greater than
8		cable installation activities, predicted suspended sediment concentrations above
7		mg/L are not expected to persist in R.I. State Waters for greater than 13.8 hours. For
6		to ambient within approximately 16 hours. Predicted concentrations greater than 100
5		75% of the affected area within R.I. State Waters) concentrations are expected to return
4		anticipated to persist in any given location for more than 46 hours. In most locations (>
3		predicted suspended sediment concentrations above background (> 0 mg/L) are not
2		resulting from RWEC-RI installation activities. For seabed preparation activities, the
1	А.	Potential impacts on water quality were evaluated by modeling sediment suspension

A. Water quality will be addressed through compliance with two key permits that will be
issued by the R.I. Department of Environmental Management ("RIDEM") and for which
Revolution Wind has applied: a water quality certificate and a dredging permit. Both of
these permits are exempt from the Energy Facility Siting Act ("EFSA"). In addition, any

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vessels involved with the RWEC-RI will handle materials and waste properly and in
 compliance with all applicable laws, regulations, permits, and approvals, and Revolution
 Wind's Emergency Response Plan and Oil Spill Response Plan.

4 Q. Will fishery resources be affected by the RWEC-RI?

5 A. The cables that make up the RWEC-RI are sited to either avoid or minimize any adverse

6 impacts to fishing activities and the biological resources on which such activities rely,

7 including the sensitive habitats that provide important fish spawning and nursery areas.

8 During construction, any impacts to fishery resources will be limited to the short

9 construction window and will be temporary and localized. Revolution Wind has

10 coordinated with RIDEM and NOAA National Marine Fisheries Service ("NMFS")

11 regarding time of year restrictions in State Waters. Based on the coordination conducted

12 to date with RIDEM and NOAA NMFS, in general, offshore site preparation and

13 installation of the RWEC-RI north of the Convention on the International Regulations for

14 Preventing Collisions at Sea ("COLREGS") line of demarcation will occur between the

15 day after Labor Day and February 1. Revolution Wind also will coordinate with RIDEM

16 and NOAA NMFS regarding work within this window to ensure impacts to winter

17 flounder, whelk, quahog spawning, and Alewife, Blueback Herring, and American Shad

18 spawning and emigration are minimized.

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1 During operations, the primary approach that Revolution Wind will take to avoid adverse 2 impacts to fishing activities and biological resources, while also ensuring protection of 3 the cables, is to bury the Revolution Wind Project's export cables to a target burial depth 4 of 4-6 feet (1.2-1.8 meters) beneath the existing surface of the seabed. In areas where 5 target burial depth cannot be achieved, Revolution Wind is considering multiple forms of cable protection, including concrete mattresses, fronded mattresses, rock bags, and/or 6 7 rock berms. Accordingly, no impacts will occur during operations except in limited areas 8 of cable protection or in the unlikely event of non-routine maintenance. Revolution Wind 9 will address the possibility of fishing "hangs" on cable protection by having the overall 10 surface of concrete mattresses be smooth and with tapered edges, which are designed to 11 allow mobile fishing gear to ride over the cable and mattress to limit the potential for 12 snagging. Also, rock berms can be designed to have a smooth over-trawlable profile (e.g., 13 1:3 slope) and rock grading specified to minimize impact to mobile fishing gear. The 14 location of any cable protection installed will be provided to NOAA's Office of Coast Survey after installation is completed so that they may be marked on nautical charts. To 15 16 summarize briefly – fishermen will be able to fish along the RWEC-RI route. 17

In addition, as described further below, the siting of the RWEC-RI avoids documented
Submerged Aquatic Vegetation ("SAV").

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1		Finally, Revolution Wind has applied for a Category B Assent from the R.I. Coastal
2		Resources Management Council ("CRMC") under that agency's regulatory program,
3		which includes the Ocean Special Area Management Plan ("OSAMP"). Under the
4		OSAMP, Revolution Wind will be required to provide mitigation that may include
5		compensation for any temporary and/or localized impacts to fisheries user groups during
6		any phase of the Facilities' life. Again, as Revolution Wind has stated previously,
7		decommissioning will be similar to installation.
8	Q.	Are you familiar with the term "Essential Fish Habitat" ("EFH")?
9	A.	Yes.
10	Q.	What is EFH?
11	A.	EFH is defined under federal law as those waters and substrate necessary to fish for
12		spawning, breeding, feeding, or growth to maturity.
13	Q.	Will the RWEC-RI impact EFH?
14	A.	Yes; however, the spatial extent of EFH that may be impacted by the RWEC-RI is very
15		small relative to the amount of similar habitat available to marine species in the region.
16		Any potential impacts will be temporary and reversible, as natural processes will return to
17		pre-construction conditions except in limited areas of cable protection as described above
18		and in the overview panel's prefiled testimony. In some cases, cable protection is
19		expected to benefit certain species that prefer hard bottom habitat. In addition, pelagic
20		species, which are the fish that live in the pelagic zone that is neither close to the bottom

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1		nor close to shore, will be far less affected, to the extent that there are any temporary or
2		localized impacts, by the RWEC-RI. In comparison, demersal or benthic species live on
3		or near the bottom and may have limited, temporary disturbance during the short-term
4		construction and decommissioning phases. No activities associated with the construction,
5		operation, or decommissioning of the RWEC-RI will have any population level effects on
6		any species.
7	Q.	What effect, if any, will the RWEC-RI have on benthic habitats and shellfish?
8	A.	Similar to what has been described with EFH, the RWEC-RI will not have any
9		population level effects on benthic resources or shellfish. As stated in this testimony and
10		in the overview panel's testimony, the activity associated with construction and
11		decommissioning of the RWEC-RI will be limited and temporary and, thus, any
12		corresponding impacts will be limited and temporary. Revolution Wind focuses first on
13		avoiding any impacts and, if impacts cannot be entirely avoided, then on minimizing and
14		mitigating any impacts.
15		
16		The cables that make up the RWEC-RI are sited either to avoid or minimize any adverse
17		impacts to benthic resources and shellfish to the extent practicable. During construction
18		and decommissioning, benthic resources and shellfish are expected to experience
19		temporary impacts from sediment suspension and deposition. Most marine species have

20 some degree of tolerance to higher concentrations of suspended sediments because

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1	storms, currents, and other natural processes result in increased turbidity. None of the
2	impacts are expected to result in population-level effects on benthic species, due to the
3	limited scale and intensity of activities associated with the construction and installation of
4	the RWEC-RI and the availability of similar habitat in the surrounding area.
5	
6	Revolution Wind also will utilize HDD to avoid documented SAV near the Project's
7	landfall location. The proposed HDD exit pits will be located approximately 845 feet
8	(257.56 m) east of the SAV identified during a September 2020 survey. Revolution Wind
9	will conduct a preconstruction SAV survey to identify any new or expanded SAV beds.
10	Should SAV be identified proximate to the HDD exit pits, the Facilities' design will be
11	refined to avoid impacts to SAV to the extent practicable.
12	
13	Indirect impacts to any nearby SAV resulting from cable installation would be associated
14	with sediment resuspension and subsequent deposition during cable burial and HDD exit
15	pit excavation. Detailed sediment transport modeling has been performed to predict the

16 volume of sediment resuspension, concentration of sediments in the water column during

construction activities, the extent of this sediment plume from the location of activity,

- 18 and the spatial distribution of sediment deposition depths from the activity. The results of
- 19 this model aid in assessing the potential impacts on SAV as a result of increased turbidity
- 20 (sediment resuspension) and sediment deposition. The modeled maximum sediment

17

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deposition resulting from installation activities is below the values that would result in
 mortality.

3

4 Increased total suspended solids in the water column have the potential to block 5 photosynthetically active radiation levels. However, turbidity levels resulting from 6 Revolution Wind Project activities are expected to be short-lived and not likely to have a 7 direct effect on SAV photosynthesis or productivity. In addition, Revolution Wind will 8 avoid in-water construction near SAV during the peak SAV growing season (i.e., July to 9 September), which will minimize potential effects due to increased turbidity and 10 sediment deposition associated with cable installation and excavation of the HDD exit 11 pits. Potential impacts on water quality were evaluated by modeling sediment suspension 12 resulting from RWEC-RI installation activities. For seabed preparation activities, the 13 predicted suspended sediment concentrations above background (> 0 mg/L) are not 14 anticipated to persist in any given location in the Landfall Area for greater than 70.3 hours. In most locations (> 75% of the affected Landfall Area) concentrations return to 15 16 ambient within approximately 6 hours. Predicted concentrations greater than 100 mg/L 17 do not persist in waters at the Landfall Area for greater than 70.2 hours. 18 0. Is RWEC-RI expected to potentially impact marine mammals and sea turtles? 19 A. Construction of the RWEC-RI may result in temporary impacts to marine mammals and

20 sea turtles. During RWEC-RI construction, temporary impacts to marine mammals and

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1	sea turtles could potentially result from seafloor disturbance, habitat alteration, sediment
2	suspension/deposition, lighting, noise, and vessel traffic. Densities of marine mammals
3	and sea turtles are anticipated to be lower in State Waters compared to further offshore in
4	federal waters, naturally minimizing the likelihood of these potential impacts occurring.
5	
6	Seafloor disturbances associated with installation of the RWEC-RI may impact marine
7	mammals and sea turtles by disrupting potential benthic prey species in the immediate
8	area around the cable route. Marine mammals and sea turtles in the area would likely be
9	transiting in search of prey species, which may occasionally be benthic species.
10	Installation of the RWEC-RI will temporarily alter the existing habitat and may
11	temporarily displace these benthic organisms.
12	
13	Underwater noise generated by impulsive and/or vibratory piling for installation works at
14	the landfall location is considered the predominant impact that could result in potential
15	behavioral impacts on marine mammals and sea turtles because the source levels
16	produced by impact pile driving are above the regulatory thresholds established by
17	NOAA. However, some marine mammal species show a preference for deeper waters and
18	are less likely to occur in shallower State Waters of the RWEC-RI, which will reduce the
19	risk for potential impacts from underwater noise at the landfall location. Use of impulsive
20	and/or vibratory piling at the landfall location also will be limited to a duration of a few

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1		days. Additionally, the relatively low sound levels produced during installation make it
2		likely this noise will be masked by other nonproject-related sounds in the region,
3		diminishing the likelihood that marine mammals and sea turtles would be exposed solely
4		to vibratory and/or impulsive hammer noises resulting in behavioral impacts. For those
5		few individuals that may perceive the underwater noise, they might experience short-term
6		disruption of communication or echolocation from auditory masking; behavior
7		disruptions; or limited, localized, and temporary displacement from areas around the
8		landfall location. Further, Revolution Wind will operate its vessels so as to avoid any
9		strikes to marine mammals and sea turtles. Moreover, due to the comparatively low
10		species densities in the area of the RWEC-RI, and the implementation of avoidance
11		measures, there is a low risk of impacts. Finally, certain permitting agencies, such as the
12		NMFS and BOEM, will regulate Revolution Wind's encounters with marine mammals
13		and sea turtles, and Revolution Wind will comply with Project permits.
14	Q.	Will the RWEC-RI impact waterbirds, such as common loon, sea ducks, wintering
15		waterfowl, and colonial nesting waterbirds?
16	A.	While the area within which the RWEC-RI will be located is used by a variety of
17		waterbirds, the cable laying activities will cause only temporary disturbance in a
18		localized area and is highly unlikely to result in population-level impacts on any species
19		of waterbird. Cable laying activity for the RWEC-RI, as described in the overview panel,
20		is expected to take approximately eight months. If displaced by cable installation

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1	activities, birds will likely only need to fly a very short distance to alternate foraging
2	locations. While some waterbird species do breed on islands in Narragansett Bay, cable
3	installation activities within State Waters and north of the COLREGS line will occur
4	between Labor Day and February 1, well outside the waterbird breeding season, which is
5	typically May – August. Of note, while species dependent, birds are generally mobile
6	during winter months, adjusting their foraging and roosting locations based on food
7	availability, season, weather, and other factors. This contrasts with the breeding period,
8	when bird movements are necessarily limited to the proximity of the nesting colony and
9	brooding areas. Therefore, temporary disturbances that cause the birds to avoid particular
10	areas during winter are much less likely to have impacts on the population than those
11	same activities carried out during the breeding season.
12	
13	It is important to provide the context that the RWEC-RI passes through an area of
14	Narragansett Bay that experiences existing boat traffic, and the activities of the cable-
15	laying vessel are not expected to significantly increase displacement of waterbirds above
16	existing levels. Therefore, cable-laying activities alone are unlikely to change the existing
17	distribution of birds. Furthermore, all vessels 65 feet in length or greater will comply with
18	10 knot speed restriction, and vessel speed during actual cable laying will generally be
19	between 0–0.5 knots. At these speeds, risk of collisions is low, and birds will have ample

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- 1 time to leave the area where construction is occurring, likely without significant
- 2 expenditure of energy.

3 Q: Will the RWEC-RI impact the resources that waterbirds, such as common loon, sea 4 ducks, wintering waterfowl, and colonial nesting waterbirds rely on?

- 5 A: While disruptions on the seafloor resulting from cable installation activities could impact
- 6 prey bases of marine birds, the small footprint of disturbance relative to the large expanse
- 7 of similar habitat available in the broader region will allow birds to access comparable

8 prey species outside the disturbance area associated with the RWEC-RI.

- 9 Q. Will the RWEC-RI affect horseshoe crab populations?
- A. Horseshoe crabs may be present in the area year-round. However, cable-laying, occurring
 between the day after Labor Day and February 1, will avoid the critical spawning season
 that occurs in late spring and early summer.
- 13 Q. Will the RWEC-RI affect Rhode Island's air quality?

14 A. Yes, the RWEC-RI will benefit air quality because it is bringing clean, renewable energy

- 15 to Rhode Island, reducing the State's reliance on fossil fuels. While vessels involved in
- 16 the various phases of the RWEC-RI will have some air emissions, they will be minor,
- 17 short term, and will be vastly outweighed by the benefits of the Project. The Project is
- 18 required to comply with federal Outer Continental Shelf ("OCS") air permit
- 19 requirements, though air emissions from sources in Narragansett Bay and onshore fall
- 20 outside the OCS air permit area and do not require a permit.

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1	Q.	Would you please summarize your view whether the RWEC-RI complies with the
2		standard to do no unacceptable harm to the environment and with all other
3		applicable environmental regulatory requirements?
4	A.	The RWEC-RI will not present an unacceptable harm to the environment. Revolution
5		Wind is committed to complying with all applicable laws, regulations, permits, and
6		approvals. Revolution Wind first will avoid any impacts to the environment. To the
7		extent that impacts cannot be avoided, the RWEC-RI is expected to have only minor,
8		temporary, and localized impacts that will be minimized, mitigated, and monitored.
9	III.	Onshore Facilities
10	Q.	Let's now switch to reviewing the Onshore Facilities. Please briefly describe what
11		the Revolution Wind Onshore Facilities are and how they will interact with the
12		environment.
13	A.	As the overview panel describes in their testimony, the Onshore Facilities are the
14		Landfall Work Area, Onshore Transmission Cable, Onshore Substation ("OnSS"),
15		Interconnection Right of Way ("ROW"), The Narragansett Electric Company ("TNEC")
16		ROW, and Interconnection Facility ("ICF"). All work related to Onshore Facilities is
17		focused on avoiding or minimizing any impacts; if impacts occur, those impacts will be
18		mitigated; no unacceptable harm to the environment will occur; and the Facilities will
19		comply with all applicable laws, regulations, permits, and approvals. As with the RWEC

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the Onshore Facilities are subject to the authority of the CRMC Category B Assent 1 2 process under the CRMC's regulations in the "Redbook," including for the review of 3 work in tidal waters, on coastal features, and in or near coastal wetlands; CRMC's Rules 4 and Regulations Governing the Protection and Management of Freshwater Wetlands in 5 the Vicinity of the Coast for activities in or near freshwater wetlands; and the RIPDES program for a General Permit for Stormwater Discharges Associated with Construction 6 7 Activity. As with the RWEC-RI, impacts from the Onshore Facilities are expected to be 8 minimal and temporary and therefore will not rise to the level of unacceptable harm to 9 the environment.

10 Q. Please describe the Onshore Facilities' impact with the geology and soils.

11 Overall construction activities for the Onshore Facilities will have little to no impacts to A. 12 the naturally occurring surficial geology because the vast majority of construction will 13 occur in previously developed areas where the geology and soils are already disturbed, 14 such as roadways, parking lots, and a landfill, known locally as the "Camp Avenue Dump 15 Site." All earth disturbance will be conducted in compliance with the RIPDES General 16 Permit for which Revolution Wind has applied and which will include a soil erosion and sediment control plan and weekly monitoring of the work areas until soils are stabilized. 17 Any sediment movement will be indirect and short term. There will be no impact on 18 19 geological resources during operations and maintenance.

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In addition, best management practices and industry standard construction techniques such as filter socks, straw bales, siltation fencing, re-establishment of vegetation, and dust control measures will be used to avoid or mitigate any short- or long-term effects of disturbed soils, and all techniques and devices used will be monitored throughout construction. Given the use of a soil erosion and sediment control plan, as well as industry standard best management practices, no adverse impacts related to soils are anticipated. Decommissioning, as with other activities, will be similar to construction.

8

Q. Will the Onshore Facilities affect water quality?

9 A. No, the Onshore Facilities will not affect water quality. This is based on a number of 10 factors. One, there are no surface waters within the Onshore Facilities' footprint; so no 11 surface waters will be impacted from Onshore Facilities. Two, any discharge of 12 sediments will be controlled. Three, all equipment used for construction activities will be 13 properly maintained and operated to avoid any impacts, including in the unlikely event of 14 a spill or release. Four, temporary drainage changes will occur, and a soil erosion and sediment control plan and the use of best management plans will minimize and mitigate 15 16 any impact. Five, no fill in a floodplain will occur except for minor amounts from the 17 OnSS, and no compensation for loss of such flood storage is required under State or federal regulations. Finally, no impacts to groundwater are anticipated during 18 19 construction, operation and maintenance, or decommissioning of the Onshore Facilities.

- 20 **Q.**
 - Will vegetation be altered by the Onshore Facilities?

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1	A.	The Onshore Facilities will be located in mostly previously disturbed areas. Construction
2		at the Landfall Work Area and the Onshore Transmission Cable route will require only
3		incidental vegetation clearing in landscaped areas proximate to these activities. At the
4		OnSS and ICF, including the Interconnection ROW and the TNEC ROW, vegetation
5		clearing will be required to construct these Facilities. Although these properties have
6		been altered previously by earth moving, sufficient time has elapsed to allow substantial
7		regrowth of trees and shrubs. Clearing in these areas will be kept to the minimum
8		necessary to construct the Facilities and will occur with appropriate erosion and sediment
9		control measures. Where possible, existing vegetation will remain to provide vegetated
10		screening. As noted above, CRMC will review the work in or near freshwater and coastal
11		wetlands during its Category B Assent review.
12		
13		Field surveys for rare species identified populations of sickle-leaved golden aster within a
14		pine barren present within the OnSS and ICF parcels. Sickle-leaved golden aster is a
15		species of State concern, versus threatened or endangered, and is not subject to protection
16		under the federal Endangered Species Act.
17		
18		The sickle-leaved golden aster will be protected during construction through the
19		following measures:

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1		a. The Facilities avoid the areas of sickle-leaved golden aster that were
2		mapped during the referenced field surveys.
3		b. Although the Facilities completely avoid direct and indirect (e.g., drainage
4		patterns, shade from buildings, etc.) disturbance of the mapped
5		populations of the aster, the species is one that colonizes exposed soil
6		areas. Over time, these areas may become vegetated and stabilized if not
7		periodically disturbed. Revolution Wind will consult with CRMC as
8		needed on appropriate conservation measures to protect this species.
9	Q.	Is it expected that the construction, operations, and decommissioning activities of
10		the Onshore Facilities will affect wildlife?
11	A.	The Onshore Facilities will be primarily in developed areas, so wildlife is not expected to
12		be impacted. Because of the use of developed areas, habitat conservation in those areas is
13		not a factor. There will be some conversion of forested habitat to shrub habitat within the
14		Interconnection ROW and the TNEC ROW and loss of forested areas associated with the
15		OnSS and ICF. As described in the Environmental Report at p. 200, clearing and
16		vegetation management will total up to 3.3 acres within the OnSS parcels and up to 2.8
17		acres within the ICF parcel. Cumulatively, approximately 5.5 acres of formerly forested
18		areas will be managed as ROW. Within these ROW areas, periodic management of
19		vegetation will promote meadow and shrub cover, which have been documented as
20		declining habitat types in New England. Transmission line ROWs represent one of the

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1		few consistent sources of shrubland vegetation in the northeastern United States. Some
2		studies show that the transmission line ROWs are critical to many mammals and
3		sustainably support populations of breeding birds, including many that are experiencing
4		population declines due to loss of shrubland habitat. These habitat conversions will be
5		reviewed by CRMC through its review of Revolution Wind's application for a Category
6		B Assent and Application to Alter a Freshwater Wetland. Invasive species management
7		also will be employed.
8		
9		Because most onshore construction activities will occur during the day over the
10		construction period, indirect impacts on wildlife, including from lighting, will be short
11		term and negligible. During operations, nighttime lighting at the OnSS and ICF will be
12		limited to as-needed, episodic task lighting and safety/security lighting. All lighting will
13		be dark sky-compliant consistent with the Quonset Development Corporation
14		requirements. These lighting design measures will minimize impact to onshore birds and
15		bats that may use habitats proximate to the OnSS and ICF.
16	Q.	Will the Onshore Facilities have any impact on Rhode Island's air quality?
17	A.	The Facilities will benefit Rhode Island's air quality. As we said when discussing the
18		RWEC-RI, the Project overall will reduce the region's reliance on fossil fuels that
19		contribute to climate change and air pollution. Any air emissions from construction
20		equipment or during maintenance will be negligible and short term.

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1 Q. Will the Onshore Facilities be built on any contaminated properties?

2 A. Yes, much of the area where the Onshore Facilities will be located is within the Ouonset 3 Business Park that is the former Davisville Naval Air Station. The Davisville Naval Air 4 Station operated between the 1940s and 1970s during an era when disposal of waste 5 materials was unregulated. As a result, many contaminants and waste materials were released into the environment. Some of the contaminated areas where the Onshore 6 7 Facilities will be located are controlled and protected by environmental land use 8 restrictions ("ELURs") and associated soil management plans that are part of RIDEM's 9 regulatory program to limit exposure to contamination. Revolution Wind will follow all 10 ELURs on any sites used for its Onshore Facilities, including project specific soil and 11 groundwater management plans. For example, the "Camp Avenue Dump Site," which is 12 a regulated waste site, will be used for the OnSS. The Camp Avenue Dump Site is also a 13 Formerly Used Defense Site that is managed by the U.S. Army Corps of Engineers. 14 Importantly, RIDEM noted in its Advisory Opinion that the Facilities will not affect the 15 previously implemented site closure. Revolution Wind will consult with the RIDEM 16 Office of Land Revitalization and Sustainable Materials Management, the Quonset Development Corporation, and the U.S. Army Corps of Engineers on the development of 17 the Facilities-specific soil and groundwater management plan. 18 19 Will any of the Onshore Facilities negatively affect the contaminated properties that **Q**.

20 have ELURs and soil management plans?

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1	A.	No, as RIDEM stated in its advisory opinion, none of the Onshore Facilities will affect
2		the sites in RIDEM's program that have ELURs and soil management plans. Again,
3		Revolution Wind will follow the ELURs and soil management plans and, where waste
4		materials are encountered during construction that require removal, Revolution Wind will
5		remove and dispose of this waste at licensed disposal facilities, which will improve the
6		condition of these properties.
7	Q.	Would you please summarize your view whether the Onshore Facilities comply with
8		the standard to do no unacceptable harm to the environment and with all other
9		applicable environmental regulatory requirements?
10	A.	The Onshore Facilities will not present an unacceptable harm to the environment. As
11		described in this testimony, construction, operations and maintenance, and
12		decommissioning will be done in accordance with all applicable laws, regulations,
13		permits, and approvals. Any impacts will either be avoided or minimized through
14		mitigation and monitored as necessary. Moreover, as RIDEM noted, it appears that
15		Revolution Wind will meet and comply with all RIDEM and CRMC requirements for
16		each permit that is exempt from the EFSA.
17	IV.	Conclusion
18	Q.	Does this conclude your testimony?

19 A. Yes.

Mark Gardella, MCP

Manager Environmental Offshore Wind

Professional History Eversource AECOM Environment ENSR Consulting and Engineering Vanasse Hangen Brustlin

Education B.S. University of Rhode Island M.C.P. University of Rhode Island

Technical Specialties Wetlands, & Land Use Permitting Wetland Delineation and Functional Assessment FERC Licensing Inland and Coastal Waterfront Permitting Wetland Delineation, Environmental Permitting and Impact Assessment

Professional

Registrations/Associations Society of Wetland Scientists OSHA 40-Hour Health and Safety Certification (HAZWOPER) 48-hr. U.S. Army Corps of Engineers Wetland Delineator Certification Training

Experience

Atlantic Grid Development, LLC, Atlantic Wind Connection. Project Director/ Manager overseeing the initial siting, route engineering, cable design, and onshore civil and offshore marine geophysical and geotechnical surveys and installation associated with an approximately 350 mile high voltage direct current (HVDC) submarine cable from northern New Jersey to Virginia that will bring power from Atlantic Wind Farms to shore to be built in phases over a 10 year period. Responsibilities include preparation of components of the Bureau of Ocean Energy and Management (BOEM) General Assessment Plan (GAP) and federal and state permits to be filed following the guidelines for complying with the geological and geophysical surveys, hazard surveys, and archaeological survey information requirements of BOEM's renewable energy regulations at 30 CFR Part 285 and federal and state permitting agencies.

Northeast Energy Direct Project, Tennessee Gas Pipeline Company, Natural Resource Surveys & Permitting, Pennsylvania, New York, Massachusetts, Connecticut, New Hampshire. Project Director/ Manager overseeing the development of a 420 mile; 36-inch loop pipeline from Pennsylvania to New England. Project involves preparation of the FERC application, multiple crossings of major (100+ foot wide) waterbodies as well as Horizontal Directional Drill crossings. AECOM's scope of work is estimated at over \$50 million as part of this \$6 billion expansion project to being Marcellus gas to New England. Coordinating with FERC and other federal, state and local agencies regarding the Project. Currently preparing state permit applications in PA, NY, MA, CT, and NH for wetland and waterbody crossings, erosion control and hydrostatic testing.

Connecticut Expansion Project, Tennessee Gas Pipeline Company, Natural Resource Surveys & Permitting, New York, Massachusetts and Connecticut. Project Director/ Manager overseeing the development of three sections of 36-inch pipeline looping totaling 13 miles in NY, MA, can CT. Major activities include preparation of an EENF, DEIR and currently preparing a FEIR in compliance with MEPA regulations for the MA component and supporting the Article 97 permit for crossing state lands in Sandisfield. Coordinating with FERC and other federal, state and local agencies regarding the Project. Currently preparing the USACE Section 404 permit application, Section 401 WQCs applications in NY, MA, and CT and local permits in preparation for a construction start of February 2016.

Deepwater Wind, Block Island Wind Farm Project, Rhode Island. Project Director/Manager overseeing the initial siting, substation design and permitting, route engineering, cable design, and onshore civil and offshore marine geophysical and geotechnical surveys and installation associated with submarine cables for a 30 MW Wind Park off the southeast coast of Block Island, Rhode Island. Deepwater Wind Block Island, LLC (Deepwater Wind), a wholly owned subsidiary of Deepwater Wind Holdings, LLC, proposes to develop the Block Island Wind Farm (Wind Farm or BIWF), an approximately 30 megawatt (MW) offshore wind farm located approximately 3 miles southeast of Block Island, Rhode Island. The Wind Farm is expected to consist of five (5), six (6) MW wind turbine generators (WTGs), a submarine cable (approximately 2.3nm) interconnecting the WTGs ("Inter-Array Cable") and a 34.5-kV transmission cable connecting the northernmost WTG to an interconnection point on Block Island ("Export Cable") (submarine section is approximately 4.8 nm).

National Grid, 345 kV Electric Transmission Line, Rhode Island. - Prepared federal, state, and local permit applications and environmental documentation for the Rhode Island Energy Facilities Siting Board for a 5.1 mile 345 kV electric transmission line beginning at the Kent County Substation in Warwick along Route 4 to North Kingstown for the Narragansett Electric Company. Responsibilities included project management, preparation of permit applications, mitigation plans, visual assessments, construction drawings, budgeting and public hearing presentations.

Northeast Utilities, NEEWS Project. Project Director overseeing the initial Siting and Routing Study, subsequent field surveys, Municipal Consultation Filings, and other State regulatory filings for Northeast Utilities for new and modified electric transmission lines in southern New England. NEEWS is a comprehensive long-term electric transmission construction plan that addresses multiple related electrical reliability issues arising in Massachusetts, Connecticut, and Rhode Island. These coordinated improvements will address five primary deficiencies with respect to the southern New England electric transmission system and will include the following four projects: The Greater Springfield Reliability Project; The Rhode Island Reliability Project; The Interstate Reliability Project; The Central Connecticut Reliability Project. The projects consist of refurbishment, re-conductoring, new 115 kV and 345kV electric transmission lines and substation upgrades across southern New England.

Northeast Upgrade Project, Tennessee Gas Pipeline Company, Natural Resource Surveys & Permitting, Pennsylvania & New Jersey. Project Manager overseeing the development of a 38 mile; 30-inch loop pipeline in Pennsylvania and New Jersey. Project involves multiple open cut crossings of major (100+ foot wide) waterbodies as well as Horizontal Directional Drill crossings. Coordinated with FERC and other federal, state and local agencies regarding the Project. Prepared state permit applications in PA and NJ for wetland and waterbody crossings, erosion control and hydrostatic testing

Iroquois Gas Transmission, Eastchester Extension, Project Manager for a 34-mile, 24-inch natural gas pipeline from Northport, Long Island to Hunts Point, New York in Long Island Sound including two new compressor stations and modifications to three existing facilities. AECOM provided siting, oversight of marine surveys, environmental surveys, preparation of FERC documentation, federal and state environmental permits, and coordination for Iroquois Gas Transmission Company. Mr. Gardella managed routing evaluations, impact analysis, and construction mitigation requirements. He managed field surveys including wetland delineation; rare, threatened, and endangered species surveys; cultural resource surveys; sediment analysis; and offshore geophysical surveys. He also directed preparation of permit applications including a Section 404/10 application with the U.S. Army Corps of Engineers, Section 401 Water Quality Certificate with the NYDEC, Coastal Zone Consistency Determination with the NY Department of State and other local wetland and shoreline development permits.

Ramapo Expansion Project, Spectra Energy, New York, Project Director for a 4.9 mile, 42-inch natural gas pipeline replacement project for Spectra Energy along an existing mainline in Ramapo, New York, including new compressor stations in Stony Point and Southeast, New York and modifications to two existing facilities in Hanover, NJ and Brookfield, CT. ENSR provided siting, oversight of wetland and endangered species surveys, preparation of FERC documentation, federal and state environmental permits, and construction inspection for Spectra Energy.

Iroquois Gas Transmission, Eastern Long Island Extension, Project Manager for a 29-mile, 24-inch natural gas pipeline from Iroquois' existing mainline in Long Island Sound to eastern Long Island, including a new compressor station and modifications to two existing facilities. Provided siting, oversight of marine surveys, environmental surveys, preparation of FERC documentation, federal and state environmental permits, and coordination for Iroquois Gas Transmission Company.

Florida Power and Light, Long Island Offshore Wind Project, New York. Task Manager managing the offshore marine surveys for a 140 MW Wind Park off the south shore of Long Island. The Project consisted of forty 3.6 MW wind turbines and an electric substation platform located approximately 3.6 miles offshore. This project involved field studies for avian, fisheries, benthic, visual, noise and cultural resource assessments that are being directed and/or performed by ENSR. The US Army Corps of Engineers (USACE) application was submitted and agency/public comments have been received and addressed. An internal Scoping Document addressing the studies/evaluations for the EIS was developed. The Project was transferred from the USACE to Minerals Management Services as per the 2005 Energy Act prior to being cancelled.

Canadian Superior, Deepwater Port Application and Permitting, Project Director overseeing the preparation of the Liberty Natural Gas License Application to the U.S. Coast Guard for this offshore LNG development project off the coast of New Jersey. This project involves the management of the DWP license application, managing and directing offshore field surveys, the development of the environmental report to support the DWP license application, the development of the environmental report to support the FERC license application, and the management of various other permits (EPA-air, EPA-water, Corps of Engineers, etc.) and tasks (water discharge modeling, air modeling, impingement/entrainment analysis, etc.).

Cross Hudson Project, Environmental Management & Construction Plan (EM&CP), Cross Hudson Corporation. Project Manager responsible for the preparation of the EM&CP for an 8 mile; 345 kV electric cable from the PSE&G Bergen Station in Ridgefield, NJ to the ConEd West 49th Street Substation in NY City including a section of cable beneath the Hudson River.

Western Leg Project, Iroquois Gas Transmission, Pennsylvania, New York, Project Director overseeing the feasibility study for a proposed 270 mile natural gas pipeline from Ellisburg, PA to Pleasant Valley, NY. *Millenium Connector, Iroquois Gas Transmission, Pennsylvania, New York*. Project Director overseeing the feasibility study for a proposed 81 mile natural gas pipeline from Milford, PA to Pleasant Valley, NY.

300 Line Project, Tennessee Gas Pipeline Company, Natural Resource Surveys & Permitting, Pennsylvania & New Jersey. Project Director overseeing the development of a 128 mile; 24-inch loop pipeline in Pennsylvania and New Jersey. Project involves multiple open cut crossings of major (100+ foot wide) waterbodies as well as Horizontal Directional Drill crossings. Coordinated with FERC and other federal, state and local agencies regarding the Project. Prepared state permit applications in PA and NJ for wetland and waterbody crossings, erosion control and hydrostatic testing.

Northeast Passage Project, El Paso Corporation, 400-mile Pipeline. Project Manager overseeing the preparation of an initial siting a feasibility study, subsequent field surveys, and permit applications for a 400-mile natural gas pipeline in New York and Pennsylvania. The initial assessment focused primarily on mapping of environmental constraints and sensitive features and providing an alternatives analysis to determine a preferred route of the pipeline. ENSR provided field surveys, preparation of FERC documentation, and coordination for El Paso Corporation.

Brookhaven Lateral Project, Iroquois Gas Transmission System, L.P. A Project Director for Iroquois Gas Transmission System L.P, ("Iroquois") with the filing of an application for a Certificate of Public Convenience and Necessity with the Federal Energy Regulatory Commission under Section 7 of the Natural Gas Act to construct, operate, own and modify facilities in Suffolk County, Long Island, New York. Iroquois' proposed Brookhaven Lateral Project would provide natural gas to a proposed new 350 megawatt power plant ("Energy Center") in Brookhaven, New York. The Brookhaven Project involved the siting of a 21.06-mile, 24-inch outside diameter ("OD") lateral pipeline and associated aboveground facilities. Specific tasks completed included environmental field surveys for wetlands as well as threatened and endangered species, preparation of a FERC Environmental Report analyzing the project and its potential impacts as well as participating in local outreach meetings and open houses.

El Paso Corporation, Blue Atlantic Transmission System, Project Manager for the US component of a 700+ mile natural gas pipeline from Nova Scotia to the New York/New Jersey area for El Paso Corporation. Provided siting, oversight of marine surveys, environmental surveys, preparation of FERC documentation, MMS ROW application, federal and state environmental permits, and coordinating focus groups and symposiums to address the concerns of commercial fishing groups that may be affected by the installation of an offshore pipeline.

WhiteCap Energy System. Project Manager for a 130-mile, 36-inch natural gas pipeline in Lake Michigan from Illinois to Wisconsin. Provided siting, oversight of marine surveys in support of a FERC application including both an ER and applicant prepared DEA, agency and NGO consultation, and local, state, and federal environmental permit approvals.

North Atlantic Pipeline Project. Project Manager for a 190-mile, 42-inch natural gas pipeline from the Gulf of Maine on the U.S.-Canadian border to Rockingham County, New Hampshire. Provided siting, oversight of marine surveys in support of an MMS application, preparation of FERC documentation and environmental permits, and coordination.

Viking Voyageur Pipeline Project. Project Manager for an 800+ mile pipeline project in Minnesota, Wisconsin, and Illinois. ENSR provided siting, biological and cultural resource field surveys, FERC ER preparation, permitting support and coordination for the joint TransCanada and NSP Power project. Managed the environmental aspects through the implementation plan phase. Prepared the FERC 7C applications, involving extensive routing evaluations, biological resources evaluations and impact assessment and agency coordination/public outreach. Coordinated field evaluations including wetland delineation activities, waterbody evaluations, and rare threatened and endangered species surveys. Coordinated the impact assessments of various waterbody-crossing methods on aquatic resources including native trout fisheries. Managed 9 wetland crews that identified and characterized 1,500 wetlands and 300 water bodies.

Canal Lateral Project, Massachusetts. Project Manager responsible for FERC, combined MEPA EIR/Cape Cod Commission DRI and other federal, state, and local wetland permits, field work, preparation, and production of an Environmental Report and applicant prepared DEA for a 4.0- mile Algonquin Gas Transmission pipeline in Bourne and Sandwich Massachusetts. This project involved providing power to Canal Station Unit No. 2 and included preparing necessary approvals including an Environmental Management and Construction and ROW restoration plans and contingency plans for a Horizontal Directional Drill of the Cape Cod Canal.

Brookfield Compressor Station. Project Manager for a new compressor station in Brookfield, Connecticut for Iroquois Gas Transmission System. Responsible for FERC and other federal, state and local permits, including expert witness testimony before the Connecticut Siting Council.

Middletown Lateral Project, Connecticut. Prepared technical information and managed reporting for an 8.4 mile Algonquin natural gas pipeline, including FERC documentation, USACOE (Sections 10 and 404), CT 401 Water Quality, and Office of Long Island Sound Structures and Dredging Permit. The project included the Horizontal Directional Drill of the Connecticut River and associated Contingency Plans.

36-Inch Pipeline Looping Project, Connecticut. Provided project management, field survey protocols, delineated wetlands, conducted habitat assessments and prepared reports and permit applications, and construction inspection for an 8.9 mile pipeline looping project for Algonquin Gas Transmission Company.

E-System Replacement, Connecticut. Provided project management, field survey protocols, delineated wetlands, conducted habitat assessments, prepared reports and permit applications and construction inspection (Connecticut) for a 7.5 mile pipeline replacement project for Algonquin Gas Transmission Company.

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Laura J. Morse 44 Deer Pond Road East Falmouth, MA 02536 857.310.8616 | LAURM@orsted.com

Laura is an Environmental Manager with Orsted supporting the U.S. Market and global portfolio as a strategic advisor. She has over 25 years of experience as a marine biologist and regulatory specialist, with a focus on marine mammal science, ocean policy and management. She has broad expertise in range of environmental laws and permitting requirements applicable to offshore energy development at federal, state and local levels. She spent the first decade of her career working in North Atlantic waters as both a commercial fisheries observer and right whale biologist. She has since worked worldwide on all ocean basins on a variety of projects supporting directed marine science research for federal agencies and academic institutions as well as resource mitigation, monitoring and advisement for multiple maritime industries and the US Navy.

Laura currently supports the Orsted U.S. project portfolio in development and advancement of their protected species monitoring and mitigation plans and strategic research and development initiatives as well as multi-stakeholder collaborations. Laura developed and initiated the Ocean Wind ECO-PAM project, an innovative North Atlantic Right whale research collaboration with Rutgers University, Woods Hole Oceanographic Institution and the University of Rhode Island and she led on advancing Orsted's industry leading data sharing agreement with NOAA.

EDUCATION

Master's 2016, NOVA Southeastern University; Coastal Zone Management. Thesis Title: Increasing Shipping Traffic through the Bering Strait: Challenges of International Policy in a Rapidly Changing Climate and Managing Impacts to Regional Cetacean Populations

B.S. & B.A. 1991, State University of New York at Buffalo. Biology and Anthropology

PROFESSIONAL EXPERIENCE

Senior Environment and Permitting Specialist – Offshore Wind, (2017 to present), Ørsted Offshore North America, Boston MA

Environmental Engineer - Oil and Gas , (2012 to 2016), Shell Exploration and Production; Anchorage Alaska .

MMPA Permit Analyst, (2010 to 2012) NOAA/NMFS; Office of Protected Resources, Permits, Conservation and Education Division, Silver Spring MD

Marine Mammal Research Biologist, (1995-2016), NOAA Fisheries Science Centers, Nationwide.
Survey Scientist, (2007), NOAA Alaska Fisheries Science Center, Seattle WA

Seasonal Field Biologist (1994-2016) Multiple Organizations; Nationwide and Global

Fisheries Observer, (1994-1997), Manomet Observatory, East Coast

MANAGED PROJECTS

- NOAA-Orsted Wind Power North America LLC; Data Sharing Memorandum of Agreement
- ECO-PAM: Ecosystem and Passive Acoustic Monitoring. 2020-23. Rutgers University (Dr. Joe Brodie); Woods Hole Oceanographic Institution (Dr. Mark Baumgartner); University of Rhode Island (Dr. Jim Miller)
- Assessing environmental and biological drivers of North Atlantic right whale abundance and distribution in New York and the Southern New England shelf. 2021-2022. Stonybrook University (Dr. Lesley Thorn and Dr. Joe Warren)

PANEL PRESENTER/WORKSHOPS

- NYSERDA State of the Science : Conference Organization Committee 2018, 2020
- NYSERDA State of the Science Marine Mammal Workshop: Co-Lead
- International Offshore Wind Partnership Forum: 2018-2021
- AWEA Offshore Windpower Summit: 2020-2021
- North Atlantic Right Whale Consortium Speaker: 2020; 2021
- American Wind Wildlife Institute: 2019
- NOAA Environmental Data Management Workshop, 2021

SELECTED PUBLICATIONS and PRESENTATIONS

Beasley, I., Pollock, K., Jefferson, T., Arnold, P., Morse, L., Yim, S., Lor, K., and Marsh, H. 2013. Likely future extirpation of another Asian river dolphin: The critically endangered population of the Irrawaddy dolphin in the Mekong River is small and declining. Marine Mammal Science, 29(3), E226-E252.

Berchok, C., Keating, J., Crance, J., Klink, H., Klink, K., Ljungblad, D., Moore, S., Morse L., Scattorin, F., and Clapham, P. 2009. Right whale gunshot calls detected during the 2008 North Pacific right whale survey. Poster presentation. Abstracts of the Eighteenth Biennial Conference on the Biology of Marine Mammals, October 12-16, 2009, Quebec City, Canada.

Berchok, C., Crance, J., and Morse, L. 2010. Humpback Song and Ship Noise Impact: A Passive Acoustic Study January-March 2009, Samana Bay, Dominican Republic. Final Report to FUNDEMAR.

Frick, M.G., C.K. Slay, C. A. Quinn, A. Windham-Reid, P.A. Duley, C.M. Ryder, and L.J. Morse 2000. Aerial Observations of Courtship Behavior in Loggerhead Sea Turtles (Caretta caretta) from Southeastern Georgia and Northeastern Florida. Journal of Herpetology. 34(1):153-158.

Ireland, D., Broker, K., Sa Filippo, V., Brzuzy, L., and Morse, L. 2015. Adaptive Management Approach to Oil and Gas Activities in Areas Occupied by Pacific Walrus. Abstract submitted to 2016 Ocean Sciences Meeting.

Morse, L. 2020. In the path of North Atlantic right whales: Perspectives of an offshore wind developer. Presentation at the 2020 North Atlantic Right Whale Consortium.

Morse, L. 2015. Increasing Shipping Traffic thru the Bering Strait and Bering Sea Region and the Risks to Fin and Humpback Whales. Abstracts of the 21st Biennial Conference on the Biology of Marine Mammals.

Morse, L., Gedamke, J., Tsuda, Y., and Ensor, P. 2011. The results of the 2007/2008 International Whaling Commission-Southern Ocean Whale and Ecosystem Research (IWC-SOWER) Cruise: Passive Acoustic Research. Abstracts of the 19th Biennial Conference on the Biology of Marine Mammals.

Morse, L., Norris, T., Azzara, A., and Pack, A. 2008. First Recordings of Humpback Whale songs in the Northern Mariana Islands Abstracts of the 2008 Animal Acoustic Communication Conference.

Norris, T., Morse, L. and Barlow, J. 2001. Sounds recorded from blue and humpback whales off northern Peru. In: Abstracts of the XIV th biennial Conference of Marine Mammalogy.

Norris, T., Azzara, A., Morse, L., Fulling, G., Yack, T., Thorson, P., and Rivers, J. 2007. Acoustic detections of fourteen species of cetaceans off the Northern Mariana Islands: Results of an acoustic and visual line-transect survey in the western North Pacific. Abstracts of the XVII biennial Conference of Marine Mammalogy.

Norris, T., Morse, L., Yack T., and Hom-Weaver, C.A. 2008. Boing! Goes the Minke Whale: Acoustic detections of boings during a winter-spring survey indicate distribution, occurrence and reproductive behaviors of minke whales off the Northern Mariana Islands in the western North Pacific Ocean. Abstracts of the 2008 Animal Acoustic Communication Conference.

Sekiguchi, K., Olavarria, C., Morse, L., Olson, P., Ensor, P., Matsuoka, K., Pitman, R., Findlay, K. and Gorter, U. 2006. The spectacled porpoise (Phocoena dioptrica) in Antarctic waters. J. Cetacean Res. Manage. 8(3):265-271.

Slay, C., Kraus, S., Knowlton, A., Hamilton, P., Conger, L., Morse, L., and Windham-Reid, A. 1999. Early Warning System 1994-1999. Aerial surveys to reduce ship/whale collisions in the North Atlantic Right Whale calving ground. Final Report: Submitted to U.S. Dept. of Commerce, NOAA/NMFS Contract # 50WCNF706010PW.

Smultea, M.; Silber, G.; Wilson, S.; Morse, L.; Fertl, D., and Steckler, D. 2019. Review of specific night vision technologies for cetacean detection. Abstracts of the World Marine Mammal Conference, Barcelona 2019.

Steckler, D.; Donlan, P.; Morse L.; Smultea M. 2019. New technology instantly shares sightings and protects North Atlantic right whales in real-time. Abstracts of the World Marine Mammal Conference, Barcelona 2019.

Stafford, K.M., Rankin, S., Ljungblad, D., Tsuda, Y., Morse, L., Clark, C.W., and Kato, H. 2014. Acoustic studies during IWC-SOWER Antarctic cruises 1996-2009. J. Cetacean Res. Manage.

ADVISORY FUNCTIONS

- Co-Chair: NYSERDA Marine Mammal Workgroup (2020 to present).
- Steering Committee Member, NYSERDA State of the Science Conference (2018 to present).
- Team Member, NYSERDA Environmental Technical Workgroup and Specialists Committees- (2017 to present).
- Group Member, Massachusetts EEA Fisheries and Habitat Workgroups (2017 to present).
- Advisory Panel Member: North Pacific Research Board (2016-2018)

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Susan Moberg, PWS, CFM

Principal\Manager of Energy and Environmental Sciences

Susan is a leader of VHB's Energy Services Division and Manager of VHB's Providence office environmental permitting team. She has expertise in environmental site assessments, wetland delineation, soil analysis, and environmental permitting with a particular emphasis on the energy sector and the coastal environment. Susan has expertise in managing large complex projects requiring diverse skill sets.

28 years of professional experience

Revolution Wind Farm Project

Susan is VHB's Project Manager for Revolution Wind LLC's Revolution Wind Farm Project. The 704 megawatt (MW) wind farm is proposed on the Outer Continental Shelf (OCS) in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0486 approximately 20 miles south of the coast of Rhode Island. Susan is managing all aspects of federal, state and local permitting and licensing for the project including the BOEM Construction and Operations Plan (COP), US Army Corps of Engineers (USACE) Individual Permit, Environmental Protection Agency (EPA) OCS Air Permit, Federal Aviation Administration (FAA) Notice of Proposed Construction and Department of Defense (DoD) consultation, National Marine Fisheries Service consultations, RI Energy Facility Siting Board Application for a Major Energy Facility, RI Coastal Resources Management Council (CRMC) Coastal Zone Management Consistency Certification, CRMC Category B Assent application, CRMC Freshwater Wetlands Permit application, CRMC/RI Department of Environmental Management (RIDEM) Dredge Permit application, RIDEM Water Quality Certification, RIDEM RI Pollutant Discharge Elimination System authorization and Quonset Development Corporation (QDC) Development Plan Review application.

Under Susan's direction, VHB performed onshore studies including wetland and rare species surveys, bat acoustic surveys, Phase I Environmental Site Assessment and Subsurface Investigation, acoustic assessments, coastal and riverine floodplain modeling, land surveying, soil and sediment analysis, socio-economic and environmental justice studies, land entitlement due diligence and engineering design services. Susan manages a team of 14 subconsultants providing subject matter expertise in terrestrial and marine archaeological assessment, underwater acoustic modeling, air permitting and emissions inventory, marine mammal impact modeling, offshore avian and bat risk assessment, habitat mapping and characterization, essential fish habitat, commercial and recreational fisheries, navigational risk assessment, visual impact and historic resource visual effect assessment, unexploded ordnance detection and mapping, and electric and magnetic field assessment.

Central Hudson H-SB Rebuild, Kingston, NY PSC Docket 17-T-0816

Serving as Project Manager, Susan Supervised comprehensive environmental survey and permitting services for a 23-mile long transmission line rebuild project. This project included an Article VII application filed with the NYSPSC in 2017, as well as state and federal permitting efforts. VHB is responsible for comprehensive environmental analyses, permit applications, development of EM&CP, and post-construction support. Although Susan was



Education

BS, Soil and Water Science, University of Rhode Island, 1993

Registrations/Certifications

Professional Wetland Scientist, 2003

Professional Soil Scientist, 1997

Licensed Soil Evaluator RI, 2000

Certified Floodplain Manager, 2013

Invasive Species Manager RI, 2009

Affiliations/Memberships

Society of Wetland Scientists

Society of Soil Scientists of Southern New England

Association of State Floodplain Managers called on to provide pre-filed testimony in PSC Docket 17-T-0816, she was not called on to testify in the PSC hearings.

South Fork Wind Farm, Offshore Montauk Point, NY PSC Docket 18-T-0604

For the Deepwater Wind South Fork Wind Farm, Susan contributed to the preparation of the project's COP submitted to the BOEM and Assisted with the preparation of the Article VII application submitted to the NY Public Service Commission. Susan performed a quality assurance/quality control (QA/QC) review of the COP and prepared several amendments to the COP survey plan for various survey activities planned on the outer continental shelf. Susan supervised the development of an Acoustic Analysis for the proposed onshore substation, as well as supervising the review and analysis of various potential cable landfall locations and potential cable routes to the proposed substation. Route analysis included a review for sensitive receptors including wetlands, rare species, and land use, as well as potential use conflicts including tourism, transportation and noise impacts. Although Susan was called on to provide pre-filed testimony in PSC Docket 18-T-0604, she was not called on to testify in the PSC hearings.

Gravel Pit Solar, East Windsor, CT CT Siting Council Docket No. 492

Susan is VHB's Project Manager for the proposed 120 MW solar photovoltaic development in the Town of East Windsor. As part of the project, Sue managed VHB's efforts to prepare a property boundary and topographic survey, develop a layout for the solar facility, develop grading and drainage plans and prepare an Application for a Certificate of Environmental Compatibility and Public Need for submission to the Connecticut Siting Council (CSC). In addition to the site plans and drainage analysis, the CSC application included a wetland delineation of the 730-acre project site, vernal pool surveys, surveys for rare, threatened and endangered species, wildlife and breeding bird surveys, a Phase 1a/1b cultural resource survey, an acoustical analysis, an aviation analysis, a carbon debt analysis, visual simulations and development of a landscaping plan. As part of the project, Susan attended various meetings with Town of East Windsor officials, and organized and presented at two noticed public open meetings. Susan performed consultation with the CT Department of Energy and Environmental Protection (CT DEEP) Natural Diversity Database program and the CT State Historic Preservation Office. Susan provided expert testimony at two CSC hearings and responded to interrogatories from the CSC and the Department of Agriculture. CSC approval of the application was issued in February 2021.

Tobacco Valley Solar Farm, Simsbury, CT CT Siting Council Petition No. 1313

Susan is VHB's Project Manager for the 26.4 MW solar photovoltaic development in the Town of Simsbury. As part of the project, Sue managed VHB's efforts to prepare a property boundary and topographic survey, develop a layout for the solar facility, develop grading and drainage plans and prepare a Petition for a Declaratory Ruling from the CSC. In addition to the site plans and drainage analysis, the CSC application included a wetland delineation of the 290-acre project site, vernal pool surveys, surveys for rare, threatened and endangered species, wildlife and breeding bird surveys, a Phase 1a/1b cultural resource survey, an acoustical analysis, an aviation analysis, a carbon debt analysis, visual simulations and development of a landscaping **p**lan. As part of the project, Susan attended various

meetings with Town of Simsbury officials, project abutter meetings, and organized and presented at two noticed public open meetings. Susan performed consultation with the CT DEEP Natural Diversity Database program and the CT State Historic Preservation Office. Susan provided expert testimony at three CSC hearings and responded to over 200 interrogatories from the CSC, the Town of Simsbury, the Department of Agriculture and Project abutters who were Parties to the CSC proceeding. The project was unanimously approved by the CSC in March 2019.

National Grid, Rhode Island Reliability Project, Rhode Island EFSB Docket SB 2008-02

Susan managed VHB's licensing, permitting, and engineering contract with National Grid on the Rhode Island Reliability Project, a 24-mile transmission line improvement project. The project involved six Rhode Island municipalities and involves reconstruction of existing facilities within the right-of-way, which included an existing 345 kV line and two 115 kV transmission lines, and construction of a new 345 kV transmission line. Improvements to West Farnum Substation, Hartford Avenue, Drumrock and Kent County Substation were also planned. Susan oversaw the preparation of the Energy Facility Siting Board (EFSB) Environmental Report, state and federal wetland permit applications, various plans and graphics to support local planning and zoning applications, state and local traffic permit applications, and local stormwater/erosion control applications. Susan provided expert testimony regarding the project impacts during the EFSB evidentiary hearings, and was cross-examined by counsel from the RI Attorney General's office and project interveners.

National Grid, Aquidneck Island Reliability Project, Rhode Island EFSB Docket SB 2016-01

Susan served as VHB's Project Manager for the National Grid Aquidneck Island Reliability Project (AIRP). The project was proposed to improve electric reliability on Aquidneck Island, which routinely experienced brown-outs and black-outs in the summer time. The project involved the reconstruction of four miles of 69 kV transmission line and upgrading the voltage to 115 kV, construction of a new substation in Newport, reconstruction of a substation in Middletown, modifications to a substation in Portsmouth, improvement of approximately 30 miles of distribution line, and retirement of five substations in Middletown and Newport. VHB provided environmental, engineering and aviation permitting support. VHB prepared and filed the Environmental Report with the RI EFSB, and prepared federal, state and local environmental permits applications. Permits for the project were received in 2017.

Narragansett Electric, E-183 Transmission Line Relocation Project, Providence and East Providence, RI

ESFB Docket SB 2003-01

Susan assisted The Narragansett Electric Company with the preparation of permit applications for the relocation of 6,200 linear feet of 115 kV transmission line through Providence and East Providence, RI. Permitting efforts included Coastal Resources Management Council, Army Corps of Engineers, and Rhode Island Energy Facility Siting Board (EFSB) applications. This highly controversial project included the design of a wetland restoration plan for the bank of a tidally influenced river, and expert testimony at a series of EFSB hearings spanning a 12-month timeframe. Additional services provided included topographic survey and photo simulation.

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M. Wing Goodale, Ph.D. Biodiversity Research Institute (BRI) Office Telephone: 207-839-7600 x219; Cell: 207-807-8750 Email: wing_goodale@briloon.org

BRI Position:	Senior Science	Director – Support and coordinate 25 scientific staff and 12 programs	
	Research focused on offshore wind energy development and wildlife.		
UMaine Positions:			
	Adjunct Faculty Adjunct Researc	, School of Marine Sciences ch Professor, Advanced Structures & Composites Center	
Education:			
	2018	PhD, UMass Amherst, Environmental Conservation	
	2001	MPhil, College of the Atlantic, Human Ecology	
	1996	BA, Colorado College, Biology	
Fellowships			
renowsinps.	2016	Fellow Switzer Foundation	
	2013/2014	Associate/Fellow, UMass National Science Foundation IGERT, Offshore Wind Energy Program	
	2005	National Fellow, Explorers Club	
Selected Boards:			
	2021-present	Co-Chair Maine Offshore Wind Roadmap, Env. & Wildlife Working Grp.	
	2021-present	Research Advisor for the Responsible Offshore Science Alliance (ROSA)	
	2019-present	Committee Member, Maine Audubon PACE	
	2010-2014	Board of Directors, Casco Bay Estuary Partnership	
	2006-2013	Board Member, Maine Board of Environmental Protection	
	2006-2008	Committee Member, Falmouth Conservation Commission	
	2004-2005	Chair, Membership Committee, Waterbirds Society	
	2002-2005	Board of Directors, Natural Resources Council of Maine	
BRI Employment			
DRI Employment.	2020-present	Senior Science Director	
	2016-2020	Senior Deputy Director, Center for Ecology & Conservation Research Director	
	2009-2016	Deputy Director, Conservation Biologist	
	2005-2009	Senior Research Biologist, Coastal Bird Program Director	
	2001-2005	Research Biologist	

Recent Renewable Energy Related Work Experience:

2013-present	Support permitting of multiple offshore wind energy projects on the US Atlantic Outer Continental Shelf (project manager and lead scientist)
2018-present	Support state agencies and onshore wind developers identify and complete bird and bat mitigations measures (project manager and lead scientist)
2017	University of Maine, Support permitting and outreach related to Maine Aqua Ventus (project manager and lead scientist)
2016	Pacific Northwest National Laboratory, Field testing of a thermal stereo-optic camera system to track birds and bats (project manager)
2016, 2014	Maine Coastal Program, Analysis of boat survey data (project manager)
2014-2015	Support environmental non-governmental organization develop offshore wind and wildlife policies and information
2014	Department of Energy, Stereo-optic high definition imaging: A new technology to understand bird and bat avoidance of wind turbines (principle investigator)
2011-2013	U.S. Fish and Wildlife Service , Red-throated loon, gannet, and scoter satellite tracking in the mid- Atlantic (project manager)
2013	Great Lakes Commission, Pelagic Bird Survey Phase II, Data Analysis and Delivery Project (co- project manager)
	Maine Sea Grant, Developing wildlife monitoring capabilities for weather buoys in the Gulf of Maine (project manager)
	U.S. Fish and Wildlife Service, Management of satellite telemetry data for Sea Duck Joint Venture and U.S. Fish and Wildlife Service (project manager)
2009-2013	Private and public foundations (Maine Community Foundation, Oak Foundation, Davis Foundation, An Environmental Trust Inc, Maine Outdoor Heritage Fund), Wildlife Science and Marine Wind Energy Initiative (project manager)
2012	Maryland Department of Natural Resources, High definition aerial surveys and boat-based surveys of wildlife in the mid-Atlantic Wind Energy Areas (co-project manager)
2011	U.S. Department of Energy, Mid-Atlantic bird, marine mammal, and turtle surveys within Wind Energy Areas (co-project manager)

Field Research Experience2010-2012Saw-whet owl banding, BRI

2010-2012	Saw-whet owl banding, BKI
2002-2008	Various Songbird surveys, BRI
2002-2008	Various bird mercury studies, BRI
2006-2008	Contaminants in Maine birds studies, BRI
2001-2008	Wildlife web-cameras, BRI
1999-2000	Herring gull feeding study, College of the Atlantic
1990-1998	Various seasonal bird studies in Maine, New York, California, Hawaii, Costa Rica, Mexico

Publicly Available Offshore Wind Related Publications:

2020	Stenhouse, I. J., A. M. Berlin, A. T. Gilbert, M. W. Goodale , C. E. Gray, W. A. Montevecchi, L. Savoy, and C. S. Spiegel. 2020. Assessing the exposure of three diving bird species to offshore wind areas on the U.S. Atlantic Outer Continental Shelf using satellite telemetry. <i>Div. and Dist.</i> n/a. doi: 10.1111/ddi.13168
	Goodale, M.W. and A. Milman. 2020. Assessing cumulative exposure of Northern Gannets to offshore wind farms. <i>Wildlife Society Bulletin</i> 44: 252-259
2019	Goodale, M.W., A. Milman. 2019. Assessing the cumulative exposure of wildlife to offshore wind energy development. <i>Journal of Environmental Management</i> 235:77-83
	Goodale , M.W., A. Milman, and C. Griffin. 2019. Assessing the cumulative adverse effects of offshore wind energy development on seabird foraging guilds along the East Coast of the United States. <i>Environmental Research Letters</i> . <u>https://doi.org/10.1088/1748-9326/ab205b</u>
2018	Epsilon and Associates. Vineyard Wind Draft Construction and Operation Plan. https://www.boem.gov/Vineyard-Wind-Cop-Vol-II/
	Goodale , M.W., 2018. Doctoral Dissertations. Cumulative Adverse Effects of Offshore Wind Energy Development on Wildlife, vol. 1343 Environmental Conservation. University of Massachusetts. <u>https://scholarworks.umass.edu/dissertations_2/1343</u>
2017	Spiegel, C. S., A.M. Berlin, A.T. Gilbert, C.O. Gray, W.A. Montevecchi, I.J. Stenhouse, S.L. Ford, G.H. Olsen, J.L. Fiely, L. Savoy, M.W. Goodale , and C. M. Burke. 2017. Determining Fine- scale Use and Movement Patterns of Diving Bird Species in Federal Waters of the Mid-Atlantic United States Using Satellite Telemetry. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-069
	Adams, E., Burns, S., Dorr C., Duron M., Gilbert A., Goodale M.W., Moratz R., and Robinson M. 2017. Stereo-Optic High Definition Imaging: A New Technology to Understand Bird and Bat Avoidance of Wind Turbines: Final Technical Report. DOE: DE-EE0006803
2016	Goodale , M. W. and I. J. Stenhouse. 2016. A conceptual model for determining the vulnerability of wildlife populations to offshore wind energy development. <i>Human-Wildlife Interactions</i> 10:53-61 (1)
2015	Williams, K., E. Adams, E. Connelly, A. Gilbert, W. Goodale , C. Gray, S. Johnson, I. Stenhouse, and J. Tash. 2015. Estimating Costs Associated with Executing the New York State Offshore Wind Wildlife Research Plan. A report submitted to NYSERDA (1)
2014	Goodale, M. W. and A. Milman. 2014. REVIEW PAPER: Cumulative adverse effects of offshore wind energy development on wildlife. <i>Journal of Environmental Planning and Management</i> . DOI: 10.1080/09640568.2014.973483
	[NYSERDA] New York State Energy Research and Development Authority. 2014. A Preliminary Goals Document for Wildlife and Marine Wind Energy Environmental Assessments Offshore of New York State. NYSERDA Report 14-48. Prepared by Wing Goodale and Kate Williams (Biodiversity Research Institute)
	[NYSERDA] New York State Energy Research and Development Authority. 2014. NYSERDA Environmental Research Program Plan Research Area 3: Marine Wind and Wildlife. NYSERDA Report 14-49, prepared by the Biodiversity Research Institute. Portland, ME. Retrieved from nyserda.ny.gov/publications.
	Goodale , M. W., I. Stenhouse, and K. Williams. 2014. Reducing the Adverse Effects of Offshore Wind Development on Waterbirds in the Great Lakes: A Proposed Four-Step Approach. Report BRI 2014-23. Report to the Great Lakes Commission, Ann Arbor, Michigan. 72 pp.

2009 **Goodale** W. and T. Divoll. 2009. Birds, Bats and Coastal Wind Farm Development in Maine: A Literature Review. Biodiversity Research Institute, Gorham, Maine.

Offshore Wind and Wildlife Lectures and Presentations

"Offshore wind in Maine"

- Camden Public Library, February 2021
- Maine Governor's Energy Office, February & March 2021

"Floating offshore wind and wildlife"

• AFloat, October 2020

"Offshore wind and wildlife: ecology and policy"

- UMaine Darling Marine Lab, August 2016
- College of the Atlantic, February 2015
- UMass Amherst, January 2015, September 2016

"Cumulative adverse effects of offshore wind energy development on wildlife"

- NYSERDA State of the Science conference, November 2020
- NYSERDA State of the Science conference, November 2018
- UMass REU seminar, July 2015
- Gulf of Maine Seabird Working Group, April 2014
- UMass IGERT seminar, March 2014
- UMass ECO seminar, 2014

"Offshore wind energy and birds"

- Waterbirds society, August 2015
- Great Lakes Commission, May 2014
- Northeastern Migratory and Monitoring Network, March 2011, 2012
- Northeastern Fish and Wildlife Conference, April 2010 (discussion group)
- Maine Coastal Waters Conference, October 2009 (poster)
- Gulf of Maine Seabird Working Group, August 2009
- Maine Public Television, Maine Watch, May 2009
- Ocean Energy Task Force, May 2009

"Offshore wind in Puerto Rico"

- Delft University, Netherlands, May 2013
- Prospective developers, San Juan, Puerto Rico, March 2013

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DREW CAREY | Chief Executive Officer

Education

Ph.D, Geology and Marine Ecology, University of St. Andrews, Scotland, 1983 B.Sc., Geology and Biological Oceanography, The Evergreen State College, 1976

Areas of Specialization

Sediment Profile Imaging Benthic Ecology/Sedimentology Environmental Monitoring Marine Policy Statistics & Sampling Design Contaminated Sediment Management Dredged Material Management & Monitoring Confined Aquatic Disposal Management Environmental Impact Assessment Ecological Risk Assessment Environmental Mediation

Professional Affiliations

American Society of Limnology and Oceanography Marine Technology Society American Association of Petroleum Geologists Geological Society of America Coastal and Estuarine Research Federation Western Dredging Association

Employment History

2018-present - CEO, INSPIRE Environmental 2015-2018 - Managing Partner, INSPIRE Environmental, LLC, Newport, RI 2004-2016 - Managing Partner, DAMOSVision, Newport, RI 1999-2015 - Founding Partner and Principal Scientist, CoastalVision, LLC, Newport, RI 1991-1999 - Senior Scientist and Program Manager, Science Applications International Corporation, Newport, RI 1982-1989 – Assistant Professor, Earth & **Environmental Sciences and Science in** Society, Wesleyan University, Middletown, CT 1982 - Research Associate, Marine Sciences Research Center, SUNY, at Stony Brook 1977 - Survey Associate, Department of Agriculture and Fisheries, Aberdeen, Scotland



EXPERIENCE SUMMARY

Dr. Carey is an international expert in the assessment of environmental impacts on marine ecosystems. Dr. Carey specializes in benthic ecology, sedimentology, fisheries monitoring, and marine policy. Dr. Carey has led coastal assessments and data collection in nearshore and deep-water environments worldwide for over 30 years. He has extensive experience in benthic seafloor characterization, preparation of Construction and Operation Plans and monitoring for offshore wind energy projects. He has served as a senior technical lead for marine assessments (benthic, EFH, fish, lobster, geological) for nine offshore wind projects in the United States, including Block Island Wind, South Fork Wind, Skipjack Wind, Bay State Wind, Ocean Wind, Sunrise Wind, and Revolution Wind for Orsted U.S.; Empire State for Equinor, and the NYSERDA Master Plan.

Dr. Carey is an expert in design and interpretation of marine habitat mapping. He has led over 50 projects in New England that integrate high resolution acoustic mapping (multibeam, side-scan sonar, subbottom profiling) with innovative ground-truth data collection (SPI/PV imaging) to provide physical and biological habitat information. He led an assessment of habitat classification schemes for the Northeast Regional Ocean Council (NROC) and helped develop CMECS (2012). This broad experience with habitat assessment and knowledge of the geological and biological conditions in NE Atlantic waters led directly to INSPIRE's successful approach to EFH habitat mapping for South Fork Wind, RevWind, Skipjack Wind, Sunrise Wind and Ocean Wind.

Dr. Carey has extensive familiarity with stakeholder engagement and management programs, recently applying his expertise to the Block Island Wind Farm and South Fork Wind public engagement. He led the development of a 10-year planning document for the Long Island Sound Study: Sound Vision and leading the revision of the Long Island Sound Comprehensive Conservation and Management Plan. Dr. Carey provided facilitation for the Narragansett Bay Summit, the Partnership for Narragansett Bay, the 2007 National Estuary Program national meeting and the 2004 RI Sea Grant Science Symposium. He was a senior technical lead for the Dredged Material Disposal Site Designation EIS in Long Island Sound, supporting the Corps of Engineers and EPA. He is the program manager for the Disposal Area Monitoring System (DAMOS), the Historic Area Remediation Site (HARS) and the facilitator for the New England Regional Dredging Team since 2005.



Prior to INSPIRE, Dr. Carey formed CoastalVision, LLC, the Joint Ventures DAMOSVision and WaterVision and collaborated with Germano & Associates on marine assessments. Prior to CoastalVision, Dr. Carey was a Senior Scientist at Science Applications International Corporation (SAIC) from 1991-1999. Dr. Carey prepared technical documents, led database development, presented results at public meetings, and designed and managed monitoring activities and field investigations of marine dredged material and waste disposal sites for environmental assessment of coastal areas. He led business development for an innovative ocean imaging instrument (Laser Line Scan System) and received a public service award for his work on surveying after the TWA Flight 800 crash. Prior to SAIC, Dr. Carey was an Assistant Professor at Wesleyan University where he conducted scientific research on marine ecology, sediment transport and developed a curriculum in Marine Ecology, Coastal Geology, Ocean Policy, Law of the Sea, and Ocean Resources.

PROFESSIONAL EXPERIENCE

Dr. Carey is a Senior Technical Advisor for Marine Environmental Permitting for **Orsted U.S.**'s Block Island Wind, South Fork Wind, Skipjack Wind, Ocean Wind, Sunrise Wind, and Revolution Wind. Dr. Carey has supported the development of marine work plans and designed and conducted numerous technical studies including benthic seafloor characterization surveys, EFH habitat mapping, cable routing, eelgrass survey, hardbottom habitats, finfish trawl surveys, lobster surveys, EMF measurement, suspended sediment impacts from cable installation, geophysical desktop studies, fisheries data collection and NEPA documentation. Dr. Carey collaborated with marine archeologists presenting seafloor mapping and seismic data to representatives of Native tribes, commercial fishermen and stakeholders.

Dr. Carey was the Program Manager and Senior Technical lead for assessment and remediation support to **Trident Seafoods**, the world's largest seafood processor. For Trident, Dr. Carey managed SPI, acoustic, coring and hydrodynamic studies of seafood waste deposits in Alaska.

Dr. Carey was a Senior Technical Advisor for **Atlantic Wind Connection's** effort to install a submarine cable system to provide a backbone transmission line for the mid-Atlantic states. Dr. Carey conducted desktop geological and benthic resource studies, designed benthic habitat surveys and contributed to cable routing design.

Dr. Carey has been a Senior Technical lead for a wide variety of site assessment projects including baseline environmental surveys of oil and gas leases in the Gulf of Mexico, RI/FS investigations in San Francisco Bay, Melbourne, Australia, River Clyde, Scotland, Hudson River, and Ontario, Canada.

From 1991-1999 and 2005- present, Dr. Carey has served as the technical and program manager of the Disposal Area Monitoring System (DAMOS) Program of the New England District of the U.S. Army Corps of Engineers. He successfully managed over 85 work orders and delivered 160 reports as final or draft products. He is currently the technical studies manager, responsible for oversight of project design and data interpretation of dredged material disposal site investigations.

For the DAMOS Program, Dr. Carey developed expertise in designing and managing monitoring of dredged material disposal sites. Dr. Carey managed all of SAIC's activities in the DAMOS Program including field data collection, data analysis, report preparation, technical support, and public outreach. His efforts led to the first demonstration of the Laser Line Scan System for an environmental application and leadership on the development of UV-Hyperspectral imaging. His expertise in dredged material management includes monitoring of open-water sites, in-channel Confined Aquatic Disposal (CAD) cells, design and evaluation of cap integrity, and assessment of potential environmental impacts of disposal site placement.

From 1991 to the present, Dr. Carey has served as a technical manager supporting EPA New England and New York, the New England and New York Districts of the Army Corps of Engineers, on issues related to environmental assessment. He has provided services to develop NEPA sampling design for sediment, lobsters, finfish and fishing activities, Quality Assurance Project Plans (QAPP), public outreach and GIS data management. He authored reports on finfish resource and fishing activities. He led a bioturbation workshop for the NY District



that developed a clear consensus among a regional scientific panel on the impact of biological activity on dredged material placement. He has served as the Program Manager for the New York District's monitoring of the HARS site since 2010 including acoustic, geochemical and biological characterization of the seafloor at the site.

Dr. Carey led a team that supported the Long Island Sound Study revision of the 1994 Comprehensive Conservation and Management Plan (CCMP) for Long Island Sound. The themes and principles developed in the SoundVision project were the starting point for this legally-binding plan development.

Dr. Carey led the analysis of SPI data for habitat mapping of the Milford Haven Waterway, Wales, UK. The study established a protocol for utilization of SPI data to conduct habitat mapping with facies models in nearshore environments and apply those results to the EUNIS habitat classification scheme (Carey et al., 2014).

Dr. Carey led a team that supported the Habitat Working Group of NROC to evaluate the feasibility of coordinating habitat mapping initiatives in New England. CoastalVision developed a framework, an inventory of initiatives and successfully integrated the results into a creative visual synthesis to inform managers and scientists of the common ground between initiatives (Shumchenia et al., 2014).

Dr. Carey worked with Connecticut Fund for the Environment and Save the Sound to review fifteen years of program activities and budget allocations of the Long Island Sound Study (LISS) and develop a series of workshops to lead the LISS Citizens Advisory Committee in the development of a SoundVision Five Year Strategic Plan. Dr. Carey facilitated workshops and discussions and co-drafted the Strategic Plan. This process produced a final synthesis based on input from a wide range of participants that includes a set of integrated goals with desired results, steps to achieve those results, as well as an outreach strategy that can be implemented by all participating stakeholder groups.

Dr. Carey led an effort to conduct a habitat classification feasibility study for the Massachusetts Office of Coastal Zone Management. The team performed GIS-based analysis of several large benthic datasets, helped to develop habitat digitizer tools, performed benthic habitat classifications under each of four different classification schemes, and authored a project report. The following three objectives were met in this project: 1) apply each of four preselected habitat classification frameworks to the coastal and ocean environment in northern Massachusetts, 2) evaluate the relative strengths and weaknesses of each framework, and 3) make recommendations on the adoption of a framework for Massachusetts that will be useful to resource managers, stakeholders and scientists.

Dr. Carey has been the facilitator for the New England Regional Dredging Team since 2005 and facilitated several sessions of the National Dredging Team meetings in May 2006 and October 2007. Dr. Carey was a co-facilitator for the 2006 USEPA/USACE "Managing Sediments in the Watershed Workshop" in Portland, OR. He worked with a team of eight professional facilitators to develop breakout session designs, facilitated plenary sessions and supervised the facilitation team.

Dr. Carey facilitated the 2004 RI Sea Grant Science Symposium and edited a synthesis of the State of Science on Nutrients in Narragansett Bay (Carey et al., 2005).

Dr. Carey conducted two assessments of human uses and resource distribution in Buzzards Bay for Massachusetts Coastal Zone Management (Carey and Haley, 2002; Colburn, Carey and Haley, 2002). One study involved developing a database, GIS data layers and PDF maps from inshore trawl data and the other study involved developing a survey instrument and conducting a survey of recreational and commercial fishing use of Buzzards Bay.

Dr. Carey supported Germano & Associates and the Dredged Material Management Office (DMMO) of San Francisco in their effort to conduct a performance evaluation of sediment screening guidelines for wetland restoration in San Francisco Bay. He led workshops, facilitated meetings and provided expert review of the design and development of a database and statistical assessment of sediment screening guidelines based on dredged material test results (Germano & Associates, 2004).



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Dr. Carey supported NOAA Fisheries to develop a manual of procedures employed by Northeast Regional staff to review proposed dredging and dredged material disposal projects. The manual is intended to help streamline the process of review by providing internal guidance and external awareness of the review process and best management practices employed to minimize impacts on protected fisheries resources.

Dr. Carey supported the State of Connecticut in the development of a Dredged Material Management Plan (DMMP) through compilation and review of the current state of regulations and practice of dredged material management, assessment of alternatives to open-water disposal and definition of research needs. This effort involved review of CWA and MPRSA criteria and requirements as they apply to disposal in Long Island Sound and recommendations for the process to develop a DMMP (Carey, 1998).

Dr. Carey supported Germano and Associates and the U.S. Army Engineer Research and Development Center (ERDC) Coastal Ecology group to develop guidelines for measurement of rates and effects of dredging-induced sedimentation on early life stages of fish, shellfish and submerged aquatic vegetation (Germano and Carey, 2005).

Dr. Carey was responsible for all aquatic disposal site determinations for the Massachusetts Coastal Zone Management Dredged Material Management Plan. Dr. Carey supported the Maguire Group in designation of the Buzzard's Bay Disposal Site Environmental Impact Report, Data Management and Aquatic Disposal Alternatives for Salem, Gloucester, New Bedford and Fall River Designated Port Authorities. This involves 404(b)(1) guidance for disposal site selection and analysis of all available environmental information including detailed analysis of potential fisheries impacts. Dr. Carey designed and led public workshops and team screening meetings on aquatic site selection.

Dr. Carey directed a disposal site evaluation process for the Coastal Resource Management Council of Rhode Island (CRMC). The CRMC is charged with designating disposal sites in Narragansett Bay to receive clean dredged material from marinas and yacht clubs. The effort included field studies and data review based on 404(b)(1) guidelines and an assessment of the potential biological and physical oceanographic implication for disposal at two proposed sites in Narragansett Bay. He supported CRMC in development of a scope and technical review of the hydrographic data collection and circulation modeling study of Quonset and Davisville channels for potential deepening (Berger/Maguire 2004).

Dr. Carey supported EVS Environment Consultants on the development of the Massachusetts Ocean Resources Information System (MORIS) for Massachusetts Coastal Zone Management. He was responsible for identification of aquaculture and other MORIS-related data sources and local coordination with industry and academic participants.

Dr. Carey teamed with Fara Courtney to develop an inventory and metadata database of human resources and management considerations for a Gloucester Harbor Resource Characterization for Massachusetts Coastal Zone Management. He was responsible for the database development and metadata structure.

Dr. Carey supported the Governors' Stakeholder Committee on Port Development of Quonset Point, RI. Working with MIDI, Normandeau Associates and Applied Sciences Associates, he prepared material on dredging requirements and disposal options for various port development proposals. Dr. Carey worked on a team that provided information on potential environmental impacts of designs developed by the stakeholders committee and made presentations to the committee on several related subjects including fisheries impacts.

Dr. Carey directed post-processing of Laser Line Scan Images collected in support of the US Navy's efforts to locate and identify debris and remains from the TWA Flight 800 crash investigation. His efforts led to the development of an innovative GIS-based database with a simple point-and-click interface. Dr. Carey served as press liaison for SAIC during the TWA flight investigation. Dr. Carey and his team were presented with "Award for Excellence in Public Service Crystal Eagle" from SAIC for their work (Saade and Carey 1996).



For EPA Region I and ERL-N, Dr. Carey designed and directed two surveys of historical waste container disposal sites in Massachusetts Bay. Each survey integrated a precision navigation system with side-scan sonar and remotely operated vehicles (ROV) to locate, categorize, and inspect hazardous and low-level waste containers. He developed Quality Assurance documents, technical documents, and presented results at public meetings including one of the first publications of the use of GIS in seafloor studies (Carey et al. 1992).

For a US AID-sponsored program in Tunisia in 1995, Dr. Carey developed and directed a field demonstration of advanced survey technologies for ecological assessment of the Gulf of Gabes, Tunisia. Dr. Carey made public presentations of the results in Tunisia and led the development of a proposed program for the improved planning and management of the Tunisian coastal zone. He has also served as a technical liaison for survey efforts in Hong Kong, Italy and New Zealand.

From 1989 to 1990 Dr. Carey managed and developed programs in science education at the Thames Science Center. He led development of innovative software, data collection, and research management programs designed to promote environmental education. He co-wrote five proposals and managed two NSF-sponsored projects. He is an experienced project manager with excellent personnel and communication skills.

Between 1982 and 1989 Dr. Carey was Assistant Professor of Earth & Environmental Sciences and Science in Society at Wesleyan University. During his seven years teaching and conducting research at Wesleyan University, Dr. Carey developed an advanced seminar in ocean policy and law of the sea including case studies of hearings on the New York Bight, Long Island Sound, Georges Bank, and the Gulf of Maine. His scientific investigations identified potential complications in surveys for chlorinated hydrocarbons, demonstrated high nitrogen uptake in bulk deposit-feeders, and helped pioneer the study of animal-flow interactions.

From June 1985 to August 1986 and from January 1987 to August 1987 Dr. Carey was a Guest Investigator in the Coastal Research Center and Chemistry Department of the Woods Hole Oceanographic Institution. He investigated bioaccumulation of polyaromatic hydrocarbons in deposit-feeding enteropneusts. Dr. Carey developed a protocol for assessing differential uptake of combusted hydrocarbons versus weathered hydrocarbons and investigated mixed function oxygenase activity in enteropneusts. After conducting GC-MS analysis of organic extractions from sediments and tissues, he identified potential complications for analysis of polychlorinated hydrocarbons (Carey and Farrington, 1989).

In 1982, Dr. Carey teamed with scientists at the Marine Sciences Research Center, SUNY at Stony Brook to develop experimental investigation of the impact of resuspended sediments in Long Island Sound on bivalve growth and physiology. He worked with Dr. Rhoads, Yale University, to develop innovative experimental chambers to assess environmental conditions in Long Island Sound.

Dr. Carey designed and led an underwater ecological survey in 1979 of the Isle of May, Scotland, for the Nature Conservancy Council, Scotland. He led a 4-member scuba team for a two-week intensive *in situ* observation and quantitative baseline ecological assessment.

In 1977 Dr. Carey served as a Survey Associate for the Department of Agriculture and Fisheries, Scotland, for a deep-sea benthic survey, Wyville-Thompson Ridge. He was responsible for managing all aspects of benthic sampling design, sample collection, and preliminary identification. The survey was successfully conducted under extreme weather conditions in the North Sea requiring careful coordination of equipment and staff.

In 1976 Dr. Carey surveyed the benthic communities in St. Andrews Bay, Scotland revising community structure maps and discovering several taxonomic groups previously unreported from the area (hemichordata, phoronida and aplacophora).



EXPERT TESTIMONY

Dr. Carey has provided expert testimony, both written and in person for several clients including:

Orsted U.S. 2019-2020. South Fork Wind Article VII Settlement

Dr. Carey provided testimony on potential benthic, finfish and shellfish effects of installation of a submerged export cable from the South Fork Wind project to potential landings on Long Island, New York. He prepared responses to requests for information and a benthic monitoring plan as part of the Joint Proposal for the Settlement.

Save the Sound 2006-7. Broadwater Energy LLC, Testimony to FERC and NY DOS.

Dr. Carey reviewed the Broadwater LNG Project Draft Environmental Impact Statement and Resource Reports for Save the Sound. Review included preparation of expert testimony for the FERC docket and for the State of New York CZMA Consistency determination. He supported Save the Sound staff in review of all applicable federal and state laws and regulations and participated in a briefing of New York Department of State. Dr. Carey reviewed all of the resource reports relevant to the environmental analysis (geological, biological, threatened and endangered species, cumulative impacts and alternatives). He documented numerous problems with the document, conducted an alternatives analysis and identified several viable alternatives that were not considered in the DEIS which led to the denial of the project by NYDOS on Coastal Consistency grounds.

Office of the Governor of Rhode Island 2003. Channel Deepening, Quonset, Rhode Island

Dr. Carey was asked by the Governor's Office to provide expert review and guidance on a project proposal to deepen the channel to Quonset Point. The state was concerned that circulation in the environmentally sensitive areas surrounding the channel might be affected by changes in channel geometry. Dr. Carey led a panel of federal and state agencies that developed and reviewed a work plan to collect oceanographic data and conduct circulation modeling to assess the potential changes in circulation. The Governor's office requested that Dr. Carey manage and review the contractor's efforts and produce a report evaluating the results. The oceanographic results were used in conjunction with Mt. Hope Bay results to evaluate conditions that led to a fish kill in Greenwich Bay.

Private Client 2001-2. Shoreline Protection

Dr. Carey worked with a private client to prepare a Category B Assent for shoreline protection and improvement on a private island in Narragansett Bay for submission to the Coastal Resource Management Council of Rhode Island (CRMC). Dr. Carey evaluated storm surge potential and the geological context of the island. The successful approach provided a novel method to re-use and augment existing shore materials to provide a naturalistic shore protection system. Dr. Carey provide expert witness testimony for the successful CRMC hearing.

Cummings and Lockwood 2000. Cross Sound Electric Cable, Testimony before Connecticut Energy Siting Board.

Dr. Carey prepared expert testimony based on review of environmental assessment documents prepared to support an application to route an underwater electric cable across Long Island Sound. Dr. Carey's testimony reviewed scientific data and technical reports related to jet plow cable placement and burial on benthic resources including oysters. He reviewed the geological and biological resource reports associated with the application and provided detailed expert review and assessment of the adequacy of the data and consideration of alternative cable routes. The client reached an out of the hearing settlement with the applicant.

Port Development Environmental Assessment, Governors' Stakeholder Committee on Port Development of Quonset Point, RI. 1998-1999. Dr. Carey prepared material on dredging requirements and disposal options for various port development proposals. He worked on potential environmental impacts and potential habitat mitigation of designs developed by the stakeholders committee and provided expert witness presentations to the committee on several related subjects including geological and fisheries impacts.



WORKSHOPS

- Teacher, Environmental Forensics: Urban Ports & Harbors Sediment Assessments in Complex Systems, International Society of Environmental Forensics Workshop, Baltimore, MD, September 26-27, 2006
- Teacher, Environmental Forensics: Focus on Harbors and Sediment Assessments, International Society of Environmental Forensics Workshop, Honolulu, HI, April 20-21, 2006
- Leader, Café Conversation: Mapping for Managers: Bridging the Gap Between Data and Information, Presented at: Coastal Zone 09, Boston, MA, July 19-23, 2009
- Co-Leader, Short Course: Aquatic Site Characterization: Survey Methods, Sampling Techniques, & Limitations, Presented at Dredging 2012, San Diego, CA, October 22, 2012
- State of the Science: Wildlife and Offshore Wind Energy Development. November 13-14, 2018, Woodbury, NY. Presented results of BIWF demersal trawl and ventless trap studies; panel on fish habitats.
- Synthesis of the Science: Offshore Wind and Fisheries. October 13, 14, 15, 30, 2020. Panel and Breakouts on Benthic Habitats and Demersal Finfish and Shellfish. RODA/NOAA/BOEM. Online.
- State of the Science: Wildlife and Offshore Wind Energy Development. November 16-20, 2020, online. Benthic habitats.

SELECTED PUBLICATIONS AND REPORTS

- Wilber, D.H., Brown, L.B., Griffin, M., DeCelles, G. R. and D.A. Carey. In press. Demersal fish and invertebrate catches relative to construction and operation of North America's first offshore wind farm. ICES Journal of Marine Science.
- Wilber, D.H., Brown, L.B., Griffin, M., DeCelles, G. R. and D.A. Carey. In press. Offshore wind farm effects on flounder and gadid dietary habits and condition on the northeastern US coast. Marine Eco. Prog. Series
- Wilber, D. H., Read, L.B., Griffin M., and D.A. Carey. 2021. Block Island Wind Farm Demersal Fish Trawl Survey, Synthesis Report – Years 1 to 7, October 2012 through September 2019. Prepared by INSPIRE Environmental, Newport, RI for Deepwater Wind Block Island, LLC, Providence, RI. 103 pp. ++ Appendices.
- Carey, D.A., D.H. Wilber, L.B. Read, M.L. Guarinello, M. Griffin, and S. Sabo. 2020. Effects of the Block Island Wind Farm on coastal resources: Lessons learned. Oceanography 33(4):70–81, https://doi.org/ 10.5670/oceanog.2020.407.
- Degraer S., D.A. Carey, J. Coolen, Z. Hutchison, F. Kerckhof, B. Rumes, J. Vanaverbeke. 2020. Offshore wind farms as Artificial Reefs. Oceanography Special Issue Understanding the Effects of Offshore Wind Energy Development on Fisheries.
- Guarinello, M.L. and D.A. Carey. 2020. Multi-modal Approach for Benthic Impact Assessments in Moraine Habitats: a Case Study at the Block Island Wind Farm. Estuaries and Coasts. https://doi.org/10.1007/s12237-020-00818-w
- Wilber, D. H., Read, L.B., Griffin M., and D.A. Carey. 2020. Block Island Wind Farm Ventless Trap Lobster Survey Synthesis Report 2013-2018. Prepared by INSPIRE Environmental, Newport, RI for Deepwater Wind Block Island, LLC, Providence, RI. 62 pp. + Appendices
- Sabo, S., Murphy, A., and D. Carey. 2020. Block Island Wind Farm Recreational Boating Survey Post-Construction Year 2019 Annual Report and Project Synthesis. Prepared by INSPIRE Environmental, Newport, RI for Deepwater Wind Block Island, LLC, Providence, RI. 43 pp. + Appendices.
- Carey, D.A., D.F. Doolittle, and K. Smith. 2019. Forward Scouting: Use of Sediment Profile Imaging in Conjunction with Multibeam Echosounder Mapping for Offshore Wind Cable Routes and Site Characterization. Offshore Technology Conference, Houston TX, 6-9, May 2019. 8 pp.
- INSPIRE Environmental. 2018. Ichthyoplankton and Zooplankton Assessment– Jet Plow Entrainment Report. Prepared for CH2M and Deepwater Wind South Fork, LLC. Submitted April 2018.



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- INSPIRE Environmental. 2018. Sediment Profile Imaging and Benthic Survey Report in Support of the Fugro South Fork Wind Farm and Export Cable, South Fork COP Survey. Prepared for Fugro Marine GeoServices, Inc. and Deepwater Wind South Fork, LLC. Submitted January 2018.
- Griffin, M., L. Reed, and D.A. Carey. 2018. Block Island Wind Farm Ventless Trap Lobster Survey Annual Report, May through October 2017. Prepared by INSPIRE Environmental, Middletown, RI. Prepared for Deepwater Wind Block Island, LLC, Providence, RI, 56 pp.
- Wilber, D., D.A. Carey, and M. Griffin. 2018. Flatfish habitat use near North America's first offshore wind farm. Journal of Sea Research, 139: 24-32.
- INSPIRE Environmental. 2017. Pre-Construction Sediment Profile and Plan View Imaging Benthic Assessment Report. Prepared by INSPIRE Environmental, Middletown, RI. Prepared for CH2M and Deepwater Wind South Fork, LLC, Providence, RI, 58 pp + Appendices. Submitted February 2018.
- Wilber, D., D.A. Carey, L. Read, and M. Griffin. 2017. Block Island Wind Farm Demersal Fish Trawl Survey Annual Report, October 2015 through September 2016. Prepared by INSPIRE Environmental, Middletown, RI. Prepared for Deepwater Wind Block Island, LLC, Providence, RI, 102 pp.
- Guarinello, M., D. Carey, and L. Read. 2017. Hard Bottom Post-Construction Surveys, Year 1 Draft Report. Year 1 Report for 2016 Summer Post-Construction Surveys to Characterize Potential Impacts and Response of Hard Bottom Habitats to Anchor Placement at the Block Island Wind Farm (BIWF). Prepared by INSPIRE Environmental, Middletown, RI. Prepared for Deepwater Wind Block Island, LLC, Providence, RI, 29 pp.
- Sturdivant, S. K. and D.A. Carey. 2017. Baseline Seafloor Assessment Survey for the Proposed Expansion of the Massachusetts Bay Disposal Site September/October 2015. DAMOS Contribution No. 201. U.S. Army Corps of Engineers, New England District, Concord, MA, 105 pp.
- Hopkins, A.D., S.K. Sturdivant, and D.A. Carey. 2017. Monitoring Surveys at the Central Long Island Sound Disposal Site, December 2013, January 2014, and August 2014. DAMOS Contribution No. 197. U.S. Army Corps of Engineers, New England District, Concord, MA, 108 pp.
- Wilber, D., D.A. Carey, A. Lipsky, K. Longley, L. Read, and M. Griffin. 2016. Block Island Wind Farm Demersal Fish Trawl Survey Annual Report, October 2014 through September 2015. Prepared by INSPIRE Environmental, Middletown, RI, Seaplan, Providence, RI, and TerraStat, Snohomish, WA. Prepared for Deepwater Wind Block Island, LLC, Providence, RI, 86 pp.
- Guarinello, M., D. Carey, and L. Read. 2016. Hard Bottom Baseline and Post-Construction Surveys, Year 0 Final Report. Year 0 Report for 2015 Baseline and 2016 Post-Construction Surveys to Characterize Potential Impacts and Response of Hard Bottom Habitats to Anchor Placement at the Block Island Wind Farm (BIWF). Prepared by INSPIRE Environmental, Middletown, RI. Prepared for Deepwater Wind Block Island, LLC, Providence, RI, 26 pp.
- DAMOSVision. 2015. Final Data Report for the July 2015 High-Accuracy, Multibeam Bathymetric Survey of the Historic Area Remediation Site (HARS). Prepared under Contract No. W912DS-13-D-0007 TO #0002 by DAMOSVision, Newport, RI. Submitted to New York District, U.S. Army Corps of Engineers, New York, NY, 13 pp.
- Shumchenia, E., M. Guarinello, D.A. Carey, A. Lipsky, J. Greene, L. Mayer, M. Nixon, and J. Weber. 2014. Inventory and comparative evaluation of seabed mapping, classification and modeling activities in the Northwest Atlantic, USA to support regional ocean planning. Journal of Sea Research, 2014, <u>doi:10.1016/j.seares.2014.09.010.</u>
- Carey, D.A., M. Hahn, J.D. Germano, D.I. Little, and B. Bullimore. 2014. Marine Habitat Mapping of the Milford Haven Waterway, Wales, UK: Comparison of Facies Mapping and EUNIS Classification for Monitoring Sediment Habitats in an Industrialized Estuary. Journal of Sea Research, 2014, <u>doi:10.1016/j.seares.2014.09.012</u>.



- Carey, D. A., D. Wilber, A. Lipsky, K. Longley, L. Read, and J.A. Szczepanski. 2013. Block Island Wind Farm Demersal Fish Trawl Survey Annual Report, September 2012 through August 2013. Report prepared for Deepwater Wind, Providence, RI.
- Carey, D.A. 2013. Benthic Disturbance. In: Biology and Ecology of Long Island Sound Chapter 6 of "Long Island Sound: Prospects for the Urban Sea", Springer Series on Environmental Management, Latimer, J. M. A. Tedesco, R. L. Swanson, C. Yarish, P. E. Stacey, and C. Garza eds. Springer Science, 918 p.
- Carey, D.A., K. Hickey, C. Wright, and M. Esten. 2012. Brenton Reef Historical Disposal Site Surveys 2007 and 2009. Contribution 187, U.S. Army Corps of Engineers, New England District, Concord, MA. 80 pgs.
- Germano, J.D., D.C. Rhoads, R.M. Valente, D. Carey, and M. Solan. 2011. The use of Sediment Profile Imaging (SPI) for environmental impact assessments and monitoring studies: Lessons learned from the past four decades. Oceanography and Marine Biology: An Annual Review 49: 247-310.
- Valente, R.M., L.B. Read, M. Evans Esten, and D.A. Carey. 2011. Results of The August 2010 Sediment-Profile Imaging and Sediment Toxicity Survey at the Historic Area Remediation Site. Prepared under Contract No. W912WJ-09-D-0003 by DAMOSVision, Newport, RI. Submitted to New York District, U.S. Army Corps of Engineers, New York, NY, 121 pp.
- Myre, P.M., L.B. Read, D.A. Carey. 2010. Using Statistical Techniques to Investigate Diagenesis of Capped Dredged Material Sediment Deposits in Long Island Sound. Submitted to Journal of Soils and Sediments.
- Myre, P.L., A.R. Bailey, D.A. Carey, T.C. Hoffman, and A. Agrawal. 2010. MPA Monitoring Information Management System User Needs Assessment. Final Report, April 2010. MPA Monitoring Enterprise, California Ocean Science Trust, Oakland, CA. (http://monitoringenterprise.org/documents.php)
- CoastalVision and Germano & Associates. 2010. Sediment Profile & Plan View Imaging Report: Evaluation of Sediment and Benthos Characteristics along Potential Cable Routes and Turbine Locations for the Proposed Block Island Wind Farm. Report prepared for Deepwater Wind, Providence, RI.
- Carey, D.A., C. Wright, and M.E. Esten. 2010. Geological and Geophysical Desktop Study for Rhode Island Sound Wind Farm. Report prepared for Deepwater Wind, Providence, RI.
- Carey, D.A., John Ryther, Jr, and C. Wright. 2010. Eelgrass and Seafloor Condition Survey for Landfall Sites in Narragansett and Block Island, Rhode Island. Report prepared for Deepwater Wind, Providence, RI.
- Carey, D.A., J.D. Germano, and D. Trimm. 2009. Habitat Impact Assessment for Offshore Energy Projects: High Time to Abandon 19th Century Technology. EnergyOcean 2009, Rockport ME.
- Germano, J., P. Myre, L. Read, D.A. Carey. 2008. Review/Synthesis of Historical Environmental Monitoring Data Collected at the San Francisco Deep Ocean Disposal Site (SF-DODS) in Support of EPA Regulatory Decision to Revise the Site's Management and Monitoring Plan. Submitted by Germano & Associates to US EPA Region 9, San Francisco, CA. 92 pp.
- Valente, R.M., D.C. Rhoads, P.M. Myre, L.B. Read, and D.A. Carey. 2007. Evaluation of Field Bioaccumulation as a Monitoring Tool. DAMOS Contribution 174, New England District U.S. Army Corps of Engineers, Concord, MA.
- Valente, R.M., D.A. Carey, M.E. Esten, C.R. Woods, and G.A. Berman. 2007. Application of Four Candidate Habitat Classification Schemes for Coastal and Marine Environments in Massachusetts. Submitted by CoastalVision to the Executive Office of Environmental Affairs, Massachusetts Office of Coastal Zone Management.
- Carey, D.A., R.A. Valente, M.E. Esten, T.A. Wilbur, D. Sampson, S. Ackerman, K.H. Ford, M. Carullo, R. Glenn, C. Woods, G. Berman, and P. Neubert. 2007. Between a Rock and a Sponge: Applying benthic habitat mapping schemes to seafloor mapping data. 18th Biennial Conference of the Estuarine Research Federation, Providence, RI.



- Germano, J.D., L.B. Read, P.M. Myre, R.M. Valente, D.C. Rhoads, M. Solan, and D.A. Carey. Through a Glass Darkly: Comparing results from Sediment-Profile Images (SPI) and Grab Samples. Report submitted to New England District U.S. Army Corps of Engineers, Concord, MA.
- Tenore, K.R., R.N. Zajac, J. Terwin, F. Andrade, J. Blanton, W. Boynton, D. Carey, R. Diaz, A.F. Holland, E. Lopez-Jamar, P. Montagna, F. Nichols, R. Rosenberg, H. Queiroga, M. Sprung, and R. Whitlatch. 2006. Characterizing the role benthos plays in large coastal seas and estuaries: A modular approach. Journal of Experimental Marine Biology and Ecology, v. 330: 392-402.
- Carey, D.A., D. Lewis, S. Wolf, M. Greenblatt, and T.J. Fredette. 2006. Long term stability of capped dredged material disposal mounds: Stamford New Haven North and Cap Site 2 in Long Island Sound. Proceedings of the 26th Annual Western Dredging Association Technical Conference, San Diego, CA. Https://westerndredging.org/index.php/information/proceedings-presentations/category/43-26th-annualweda-conference?download=395:13-carey-long-term-stability-of-capped-dredged-material-disposal-mounds
- Wright, C. and D.A. Carey. 2006. Monitoring Survey at the Buzzards Bay Disposal Site at Cleveland East Ledge, June 2005. DAMOS Contribution 170, New England District U.S. Army Corps of Engineers, Concord, MA.
- Germano, J.D. and D.A. Carey. 2005. Rates and effects of sedimentation in the context of dredging and dredged material placement. DOER Technical Notes Collection (ERDC TN-DOER-E19), U.S. Army Engineer Research and Development Center, Vicksburg, MS.
- Carey, D.A., A. Desbonnet, A.B. Colt, and B.A. Costa-Pierce (eds.). 2005. State of Science on Nutrients in Narragansett Bay: Findings and Recommendations from the Rhode Island Sea Grant 2004 Science Symposium.
- Carey, D.A., B.A. Costa-Pierce, and A. Desbonnet. 2005. State of science knowledge on nutrients in Narragansett Bay – process and synthesis. 18th Biennial Conference of the Estuarine Research Federation, October 16-20, Norfolk, VA.
- Germano and Associates. 2004. Performance Evaluation of Existing Sediment Screening Guidelines for Wetland Restoration in San Francisco Bay. Final report submitted to the Port of Oakland.
- Berger-Maguire Joint Venture. 2004. Quonset-Davisville Port Baseline Data Studies: Circulation Final Report. Submitted to State of Rhode Island Office of the Governor.
- Solan, M., J.D. Germano, D.C. Rhoads, C. Smith, E. Michaud, D. Parry, F. Wenzhofer, B. Kennedy, C. Henriques, E. Battle, D. Carey, L. Iocco, R. Valente, J. Wilson, and R. Rosenberg. 2003. Towards a greater understanding of pattern, scale, and process in marine benthic systems: a picture is worth a thousand worms. In: Special Issue, ed., Solan, M, Germano, J.D., Raffaelli, D.G., Warwick, R.M. Benthic Dynamics: In Situ Surveillance of the Sediment-Water Interface. Journal of Experimental Marine Biology and Ecology, v.285-286:313-338.
- Carey, D.A., D.C. Rhoads, and B. Hecker. 2003. Use of Laser Line Scan for assessment of response of benthic habitats and demersal fish to seafloor disturbance. In: Special Issue, ed., Solan, M, Germano, J.D., Raffaelli, D.G., Warwick, R.M. Benthic Dynamics: In Situ Surveillance of the Sediment-Water Interface. Journal of Experimental Marine Biology and Ecology, v.285-286:435-452.
- Carey, D.A. and N. Haley. 2002. Buzzards Bay Disposal Site Report. Massachusetts Division of Marine Fisheries Trawl Data Analysis. Report submitted to the Massachusetts Executive Office of Environmental Affairs, Coastal Zone Management, Boston, MA.
- Colburn, L.L., D.A. Carey, and N. Haley. 2002. Buzzards Bay Disposal Site Report. Competing Site Use Assessment. Report submitted to the Massachusetts Executive Office of Environmental Affairs, Coastal Zone Management, Boston, MA.
- USACE and USEPA 2001. Fishing Activities Questionnaire and Interview Interim Report. Long Island Sound Dredged Material Disposal EIS. D.A. Carey principal author.



- USACE and USEPA 2001. Analysis of Connecticut Department of Environmental Protection Trawl Data for Long Island Sound. Long Island Sound Dredged Material Disposal EIS. D.A. Carey and N. Haley principal authors.
- Carey, D.A., N. Haley, V. Malkoski, D. Simpson, and A. Wilbur. 2001. Long-term impacts of physical disturbance of estuarine benthos. 16th Biennial Conference of the Estuarine Research Federation, St. Petersburg, FL.
- SAIC. 2001. Monitoring at the New London Disposal Site 1992-1998: Volume I. DAMOS Cont. 128. U.S. Army Corps of Engineers, New England District, Concord, MA. (lead author of synthesis).
- Waddell, E.V., P. Hamilton, D.A. Carey, J.T. Morris, C. Kincaid, and W. DeLeo. 2001. Observations of Physical Oceanographic Conditions at the New London Disposal Site, 1997-1998. DAMOS Cont. 130. U.S. Army Corps of Engineers, New England District, Concord, MA.
- SAIC. 2001. Monitoring at the New London Disposal Site 1992-1998: Volume II Seawolf Mound. DAMOS Cont. 132. U.S. Army Corps of Engineers, New England District, Concord, MA. (lead author of synthesis).
- Rhoads, D.C., D. Carey, and J. Scott. 1999. REMOTS uv-imaging spectrometer: Coastal Ocean Processes Symposium; a tribute to William D. Grant, Technical Report WHOI-99-04, Woods Hole Oceanographic Institution, Woods Hole, MA., 189 (Abstract).
- Carey, D.A. 1999. Dredged Material Management Program in Long Island Sound. Dredging and the Environment Workshop sponsored by the LISS and Save the Sound, March 19, 1999.
- Carey, D.A. 1999. Information on coastal issues in a flexible, accessible form: Tools for Decision-making. Coastal Geotools Conference, Charleston, S.C., April 1999.
- Murray, P.M., D.A. Carey, T.J. Fredette, and J.H. Ryther, Jr. 1998. Isolation of contaminated sediments in disposal cells: short- and long-term benefits for Boston Harbor. American Geophysical Union presented at AGU Spring Meeting, May 26-29, 1998, Boston, MA.
- Carey, D.A. 1998. Long Island Sound Dredged Material Management Approach. A study report prepared for the State of Connecticut, Department of Environmental Protection, Office of Long Island Sound Programs, Hartford, CT. 189 p., separate appendices.
- USACE. 1998. Dredged Material Disposal Site Evaluation Report: Long Island Sound, Connecticut and New York. Prepared by ENSR and SAIC for U.S. Army Corps of Engineers, New England District, Concord, MA. (principal author with M. Gerath, D. Rhoads and E. Powers).
- Carey, D.A., D.C. Rhoads, and B. Hecker. 1998. Response of Benthos to Sedimentary Disturbance in Long Island Sound: A Twenty-Five Year Record. Belle W. Baruch Organism-Sediment Symposium, October 23-25, 1998.
- Fredette, T.J. and D.A. Carey. 1998. Benthic Response Monitoring as a Dredged Material Management Tool. Belle W. Baruch Organism-Sediment Symposium, October 23-25, 1998.
- Rhoads, D.C. and D.A. Carey. 1998. REMOTS UV-Imaging Spectrometer. Belle W. Baruch Organism-Sediment Symposium, October 23-25, 1998.
- Murray, P. M., H. Saffert, C. Seidel, and D. Carey. 1998. Dredged Material Management Plan Preliminary Aquatic and Near-Shore Alternative Disposal Site Analysis. SAIC Rep 447. Report submitted to the Massachusetts Coastal Zone Management Program.
- Saffert, H.L., P.M. Murray, D.A, Carey, and T.J. Fredette. 1998. Investigations of Background Contaminant Levels in Western Long Island Sound. Submitted to New England District (NAE) US Army Corps of Engineers, Concord, MA and Proceedings of the Long Island Sound Research Conference, November 1998, SUNY Purchase, Purchase, NY.
- Rhoads, D.C. and D.A. Carey. 1997. Capping dredged materials in the New York Bight: Evaluation of the effects of bioturbation: Science Applications International Corporation Report 374 and Report #39 of the New York Mud Dump Site Studies prepared for the New York District of the U.S. Army Corps of Engineers, N.Y., N.Y., 30 pgs.



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- Carey, D.A., T.J. Fredette, J.T. Morris, and P.M. Murray. 1997. Subaqueous capping in New England: Wise Use of Dredged Materials. Beneficial Use of Dredged Materials Conference, Baltimore, MD.
- Carey, D.A., T.J. Fredette, D.C. Rhoads. 1997. Response of benthic communities to dredged material disposal: Twenty-year record from Long Island Sound. 14th Biennial Estuarine Research Federation International Conference. Oct. 12-16, 1997, Providence, RI. Abstracts volume: pg. 29.
- Saffert, H.L., D.A. Carey, E. Thomas. 1997. Applying micropaleontological techniques for environmental monitoring: A capping demonstration project of dredged sediment from the Royal River at Portland Disposal Site, ME. 14th Biennial Estuarine Research Federation International Conference. Oct. 12-16, 1997, Providence, RI. Abstracts volume: pg. 160.
- Saade, E.J. and D.A. Carey. 1996. Laser Line Scan system operations during the TWA Flight 800 search effort. In OCEANS '96. MTS/IEEE. 'Prospects for the 21st Century'. Conference Proceedings DOI: 10.1109/OCEANS.1996.566724
- Morris, J.T., T.J. Fredette, D.A. Carey. 1996. Long-term management of the subaqueous disposal of contaminated dredged material: A study of the Central Long Island Sound Disposal Site. Proceedings of the Third Biennial Long Island Sound Research Conference. Oct 16, 1996, Groton, CT. pp: 45-52.
- SAIC. 1995. Sediment Capping of Subaqueous Dredged Material Disposal Mounds: An Overview of the New England Experience. SAIC Report No. SAIC-90/7573&C84. DAMOS Contribution 95, New England District U.S. Army Corps of Engineers, Concord, MA.
- Inglin, David C., Thomas J. Fredette, and Drew A. Carey. 1995. DAMOS database interface: a tool for managing dredged material disposal sites. Coastal Zone: Proceedings of the Symposium on Coastal and Ocean Management, pp. 365-366.
- Murray, P., D.A. Carey, and T.J. Fredette. 1994. Chemical flux of pore water through sediment caps. In: McNair, E.D. Jr., ed. Dredging '94: proceedings of the second international conference on dredging and dredged material placement,1994. November 13-16, Lake Buena Vista, FL. New York, NY: American Society of Civil Engineers, 1994: Vol. 2: 1008-1016.
- Silva, A.J., H.G. Brandes, C.J. Uchytil, T.J. Fredette, and D.A. Carey 1994. Geotechnical analysis of capped dredged material mounds. In: McNair, E.D. Jr., ed. Dredging '94: proceedings of the second international conference on dredging and dredged material placement, 1994 November 13-16, Lake Buena Vista, FL. New York, NY: American Society of Civil Engineers, 1994: Vol. 1: 410-419.
- Fredette, T.J., P.G. Kullberg, D.A. Carey, J.D. Germano, and R. Morton. 1993. Twenty-five years of dredged material disposal site monitoring in Long Island Sound: A Long-term perspective pp. 153-161. In: Van Patten, M.S. (ed) Long Island Sound Research Conference Proceedings, University of Connecticut Sea Grant, Pub. No. CT-SG-93-03, Storrs, CT.
- Carey, D.A. and T.J. Fredette. 1993. Use of Laser Line Scan System (LLSS) to locate and assess hazardous waste containers and geological features in Massachusetts Bay. GSA Abstracts with Programs, 1993, p. 128.
- Murray, P.M., D.A. Carey, J.H. Parker, and T.J. Fredette. 1993. Grain size distribution at the Massachusetts Bay disposal site inferred from acoustic impedance: Assessing anthropogenic and natural sedimentary microenvironments. GSA Abstracts with Programs, 1993, p. 128.
- Mooradian, G., J. Eggert, E. Saade, and D. Carey. 1993. High resolution high search-rate underwater imaging using laser-line scanning. 1993 Meeting of IRIS Specialty Group on Active Systems, Naval Postgraduate School, Monterey, CA, Nov 2, 1993.
- Carey, D.A., D. Keith, J. Schoenherr, P. Matthias and D. Tomey. 1992. Construction of a Regional Relational/GIS database in support of ocean disposal issues in Massachusetts Bay. Oceans '92, Marine Technology Society, Washington, D.C.
- Fredette, T.J., P.M. Murray, and D.A. Carey 1992. Subaqueous containment of contaminated dredged sediments: Trace metal results of sediment cores from "capped" disposal mounds. <u>Eos</u>, Trans. Am. Geophys. Union, v. 73, p.163.



- Fredette, T.J., J.D. Germano, D.A. Carey, J. Charles, and P.G. Kullberg. 1992. Chemical stability of capped dredged material disposal mounds in Long Island Sound, USA. Chemistry and Ecology. 7:173-194.
- Sumeri, A., T.J. Fredette, P.G. Kullberg, J.D. Germano, D.A. Carey, and P. Pechko. 1991. Sediment chemistry profiles in capped dredged material disposal deposits: results from three US Army Corps of Engineers offices. Proceedings of the WEDA twenty-fourth annual dredging seminar, Las Vegas, NV. pp. 161-187.
- Muramoto, J. and D.A. Carey 1991. A review of studies of metal and organic contaminants in sediments and biota of the New York Bight Apex and Mud Dump Site. SAIC Report 91/7602&251.
- Carey, D.A. and L.M. Mayer 1990. Nutrient uptake by a deposit feeding enteropneust: Nitrogenous sources. Marine Ecology Progress Series. 63:79-84.
- Carey, D.A. and J.R. Farrington 1989. Polycyclic aromatic hydrocarbons in *Saccoglossus kowalewski* (Agassiz). Estuarine, Coastal and Shelf Science. 29:97-113.
- Carey, D.A. 1989. Fluorometric detection of tracer particles used to study animal-particle dynamics. Limnology and Oceanography. 34: 630-635.
- Carey, D.A. 1987. Sedimentologic effects and paleoecologic implications of the tube-building polychaete *Lanice conchilega* (Pallas). Sedimentology, 34: 49-66.
- Carey, D.A. 1983. Particle resuspension in the benthic boundary layer induced by flow around polychaete tubes. Canadian Journal of Fisheries and Aquatic Sciences. 40 (Suppl. I): 301-308.
- Baker, E., H. Bokuniewicz, F. Bohlen, D.A. Carey, B. d'Anglejan, R. Gibbs, W. Lavelle, P. McCall, T. Nelson, M. Nichols, and C. Olson. 1983. Report of the working group on physical processes, pp. 11-26, <u>In</u>: Burns, R.E. and Schubel, J.R. Proceedings of the second pollutant transfer by particulates workshop. Special Report 52, Marine Science Research Center, State University of New York, Stony Brook, NY.

PRE-FILED DIRECT TESTIMONY OF KENNETH BOWES, DEMETRIOS SAKELLARIS, WILLIAM H. BAILEY, PH.D., AND KATHERINE PALMQUIST, PH.D.

REVOLUTION WIND, LLC Project

RevWind Exhibit 5

PRE-FILED DIRECT TESTIMONY

OF

KENNETH BOWES, DEMETRIOS SAKELLARIS,

WILLIAM H. BAILEY, PH.D., AND KATHERINE PALMQUIST, PH.D.

REVOLUTION WIND, LLC

EXECUTIVE SUMMARY

This testimony describes the onshore and offshore exposures to electric and magnetic fields ("EMF") from the parts of Revolution Wind, LLC's approximately 704 megawatt offshore wind farm (the "Revolution Wind Project") that are within the jurisdiction of the Energy Facility Siting Board ("EFSB") and assesses potential effects of EMF on marine life and persons. Specifically, this testimony reviews EMF from the Revolution Wind Project's export cables within Rhode Island State Waters and from the Revolution Wind Project's underground onshore transmission cables and interconnections. The testimony also addresses the section of the Rhode Island Department of Environmental Management's advisory opinion to the EFSB on EMF. Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Joint Testimony of Kenneth Bowes, Demetrios Sakellaris, William H. Bailey, Ph.D., and Katherine Palmquist, Ph.D. September 17, 2021 Page 1 of 18

- 1 I. Introduction
- 2 Kenneth Bowes
- 3 Q. Please state your name and business address.
- 4 A. My name is Kenneth Bowes. My business address is 56 Prospect Street, Hartford,
- 5 Connecticut.
- 6 Q. Please provide your educational background and professional experience.
- 7 A. My educational background and professional experience are described in detail in the
- 8 Pre-Filed Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios Sakellaris,
- 9 Kristen Trudell, and Jason Ross.

10 **Demetrios Sakellaris**

- 11 Q. Please state your name and business address.
- 12 A. My name is Demetrios Sakellaris. My business address is 56 Prospect Street, Hartford,
- 13 Connecticut.
- 14 Q. Please provide your educational background and professional experience.
- 15 A. My educational background and professional experience are described in detail in the
- 16 Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios
- 17 Sakellaris, Kristen Trudell, and Jason Ross.
- 18 William H. Bailey, Ph.D.
- 19 Q. Please state your name and business address.
- 20 A. My name is William H. Bailey. My business address is 17000 Science Drive, Suite 200,
- 21 Bowie, Maryland.

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1	Q.	By whom a	are you	employed	and in	what	capacity?
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2 A. I am employed by Exponent at 17000 Science Drive, Bowie, Maryland 20715.

3 Q. What are your main responsibilities in that position?

- 4 I am a Principal Scientist at Exponent, an international multi-disciplinary engineering and
- 5 scientific research consulting firm. I work primarily in the practices that specialize in
- 6 exposure assessment and health and environmental sciences. My work involves
- 7 reviewing, analyzing, and conducting research. One of the areas in which I have done a
- 8 great deal of work over my career relates to potential biological and health effects of
- 9 electrical facilities, including terrestrial transmission lines, submarine cables, substations,

10 and electrified railroad lines.

- 11 Q. How long have you worked for Exponent?
- 12 A. I have worked for Exponent for twenty years.

13 Q. Describe your educational background and professional experience.

14 A. I received a B.A. from Dartmouth College in 1966. I received an M.B.A. from the

15 University of Chicago in 1969. I received a Ph.D. in Neuropsychology from the City

- 16 University of New York in 1975. In 1977, I completed two years of postdoctoral training
- 17 in neurochemistry at The Rockefeller University in New York under a fellowship from
- 18 the National Institutes of Health. I have over 35 years of experience in assessing
- 19 exposures to electromagnetic fields with a wide range of frequencies from alternating
- 20 current, direct current, and radiofrequency sources, as well as their interactions with the

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1		environment and organisms. In the last 15 years a good amount of my work has involved
2		the assessment of electric- and magnetic-field exposures from submarine cables and
3		interactions with marine life. I have published and presented numerous scientific papers
4		on these topics.
5	Q.	Have you ever testified before the EFSB or other siting board?
6	A.	Yes. I have testified before the EFSB and many other siting boards in the United States
7		and Canada.
8		Katherine Palmquist, Ph.D.
9	Q.	Please state your name and business address.
10	A.	My name is Katherine Palmquist, Ph.D. My business address is 15375 SE 30 th Place,
11		Suite 250, Bellevue, Washington 98007.
12	Q.	By whom are you employed and in what capacity?
13	A.	I am a Senior Managing Scientist in the Ecological Sciences practice at Exponent.
14	Q.	What are your principal responsibilities in that position?
15	A.	I am responsible for heading up projects that assess ecological impacts caused by
16		different anthropogenic stressors, requiring use of established ecological risk assessment
17		approaches.
18	Q.	How long have you worked for Exponent?
19	A.	I have worked for Exponent for 14 years.
20	Q.	Describe your educational background and professional experience.

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1	A.	I received my Bachelor of Science and Bachelor of Arts from Washington State
2		University in 2003. I received my doctoral degree in toxicology from Oregon State
3		University in 2007. In my professional capacity, I have worked at numerous marine and
4		terrestrial sites to assess the potential effects of chemical and physical stressors on
5		resident species.
6	Q.	Have you ever testified before the EFSB or other administrative agencies?
7	A.	Yes, I have previously testified before the R.I. Coastal Resources Management Council
8		with respect to interactions of electric and magnetic fields ("EMF") from the export
9		cables of the Block Island Wind Farm on marine species.
10	Q.	Briefly explain the purpose of this testimony.
11	A.	This testimony describes the scope of our work and main conclusions for Revolution
12		Wind, LLC's ("Revolution Wind") approximately 704 megawatt offshore wind farm (the
13		"Revolution Wind Project"). Our work was to describe the onshore and offshore
14		exposures to EMF ¹ from the Revolution Wind Project and assess potential effects on
15		marine life and persons.
16	Q.	How is this testimony organized?

¹ The generic term "electromagnetic field" is sometimes abbreviated as EMF but we do not use electromagnetic field here to refer to fields with extremely-low-frequencies, which include the power frequency of 60 Hertz. At this frequency the electric and magnetic field are evaluated separately. We do this to avoid confusion with higher frequency fields, such as from mobile phones, that have tightly coupled electric and magnetic fields.

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1	А.	The testimony is organized as follows: Section I is the Introduction. Section II is the
2		review of electric and magnetic fields from the Revolution Wind Project's export cables
3		within R.I. State Waters. Section III is the review of magnetic fields from the Revolution
4		Wind Project's underground onshore transmission cables and interconnections.
5	Q.	Are you sponsoring any addenda in connection with your testimony?
6	А.	Yes, we are sponsoring the following addenda:
7		• Addendum 5-1: Curriculum Vitae of William H. Bailey, Ph.D.
8		• Addendum 5-2: Curriculum Vitae of Katherine Palmquist, Ph.D.
9	Q.	Are you familiar with Revolution Wind's EFSB Application and the Environmental
10		Report submitted in support of the Application?
11	A.	Yes.
12	Q.	Briefly describe what EMF is.
13	А.	Electric fields result from the electric charge (or voltage) applied to electrical conductors
14		and equipment and are measured in units of volts per meter (V/m). Magnetic fields are
15		produced by the movement of electricity (or current) such as through a wire or object.
16		Magnetic field levels are measured as magnetic flux density in units called milligauss
17		("mG").
18	Q.	On behalf of Revolution Wind, what work has Exponent performed?
19	A.	Exponent's work involved several aspects. Exponent modeled the 60-Hertz (Hz)
20		magnetic-field and induced electric-field levels of the submarine export cable during

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1		operation at 715 megawatts ("MW") ² and assessed how certain marine species may or
2		may not detect these electric and magnetic fields. Exponent also measured magnetic field
3		levels along the route of onshore cables to the onshore substation ("OnSS") from existing
4		sources and modeled the 60-Hz magnetic field that will be present around proposed
5		underground cables from the shore landing to the OnSS, and between the OnSS and the
6		Interconnection Facility ("ICF"). In addition, Exponent modeled the magnetic field from
7		the proposed overhead transmission lines between the ICF, and the Davisville Substation
8		and out to the boundary of these Combined Facilities. ³ Exponent also submitted a review
9		of the current independent scientific research pertaining to EMF and human health as
10		requested under EFSB Rule 1.6(f)(3).
11	II.	Review of Electric and Magnetic Fields from the Revolution Wind Project's Export
12		Cables Within R.I. State Waters ("RWEC-RI")
13	Q.	What type of cables will RWEC-RI use – alternating current ("AC") or direct
14		current ("DC")?
15	A.	The RWEC-RI both under the seabed and underground onshore will carry 60-Hz
16		AC and thus be the source of 60-Hz AC magnetic fields.
	_	

17 Q. Briefly describe the difference between AC and DC electricity.

² The 715 MW value assumed for modeling is slightly higher than the nameplate capacity of approximately 704 MW, as specified in the Power Purchase Agreements and approved by Rhode Island Public Utilities Commission.

³ The Combined Facilities include the OnSS, ICF, underground lines, overhead tie-in line, overhead transmission line, and double circuit transmission line.

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1	А.	AC electricity in North America oscillates magnitude and direction in a continuous cycle
2		that repeats 60 times per second, i.e., at 60 Hz as it flows through conductors. DC
3		electricity flows through conductors in one direction only and at a relatively constant
4		level. For example, the electricity delivered by a battery is DC while the electricity
5		delivered by a wall outlet is AC. The frequency of the electricity determines the dominant
6		frequency of the electric and magnetic fields around AC sources -60 Hz $-$ and DC
7		sources – 0 Hz.
8	Q.	What was the purpose of Exponent's modeling of the submarine portion of the
9		RWEC-RI?
10	A.	The purpose was to describe the magnetic fields associated with the operation of the
11		submarine export cables across a range of current flows supplied from the offshore wind
12		turbines and compare these magnetic field levels and electric fields induced by the
13		magnetic fields to reported thresholds of detection or other responses of marine species in
14		R.I. State Waters.
15	Q.	Explain briefly how fish, invertebrates, and sharks detect EMF.
16	A.	Over eons, some species of fish, invertebrates, and sharks have evolved sensory
17		capabilities to detect common environmental cues like the static geomagnetic field of
18		earth and low frequency (approximately 10 Hz or less) AC bioelectric fields (i.e., fields
19		generated by fish and other marine species). The former are used to guide long-distance

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migration and the latter are an aid to detection of prey. A species' ability to detect EMF is
highly dependent on both the frequency of the electric or magnetic field and its strength.

3 Q. Please explain the modeling methodology that Exponent used to calculate the

4 magnetic field from the submarine portion of the RWEC-RI?

5 A. Three-dimensional models of the RWEC-RI export cables were used to calculate 60-Hz

6 magnetic and electric fields at 715 MW using the commercial software package

7 COMSOL MultiPhysics Version 5.5. The models took into account configurations that

8 varied in burial depth, cable spacing, and current flow on cables. The models produced

9 cable- and site-specific estimates of EMF levels for Exponent's assessment including the

10 effect of the helical twist of the conductors on the calculated magnetic field.

11 Q. What did Exponent's evaluation of the submarine cables of the RWEC-RI show?

12 A. Exponent's evaluation showed that the highest magnetic field from the RWEC-RI export

13 cables at 3.3 feet (1 meter) above the seabed will be 6.3 milligauss (mG) or less at

14 average loading and less than 8.4 mG at peak loading. At a height of 3.3 feet (1 meter)

above the seabed, the electric field induced by the magnetic field is calculated to be 0.2

16 millivolts per meter (mV/m) or less, and even lower within representative marine species

17 (e.g., dogfish and sturgeon). These levels are conservative because they assume a shallow

18 burial depth for the cables of 3.3 feet (1 meter), whereas the proposed target burial depth

19 for the RWEC-RI is deeper at 4 to 6 feet (1.2 to 1.8 meters). These calculated values also

20 overestimate the field levels that would be measured during operation because they do

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8	Q.	Would you explain whether these field levels affect fish species that may be found in
7		then assessed.
6		their sensory organs. The biological health/fitness implications of EMF detection were
5		frequency of 60 Hz to be detected by marine organisms, given the frequency limits of
4		The calculated fields were analyzed to determine if the field levels were high enough at a
3		
2		sheathing around the cables. ⁴
1		not account for the attenuation of the magnetic field from the conductors by metallic

9 **R.I. State Waters?**

10 In general, fish species can be divided into two groups based on their ability to detect A. 11 EMF. The first group includes magnetosensitive species, which as reported in the 12 scientific literature, can detect or use the static (0 Hz) geomagnetic field of the earth for 13 presumed navigational purposes. An example is the American lobster. Multiple studies report that this species can detect the magnetic field of magnets or other static magnetic-14 15 field sources, including direct current submarine cables. This species is not reported to be 16 electrosensitive. Both a series of field studies conducted with crabs at sites of 60-Hz AC 17 cables and laboratory studies of lobsters indicate that neither weak nor strong AC

⁴ Exponent prepared analyses for the Construction and Operation Plan that assumed an RWEC-RI output of 880 MW and did not include the effect of the twist on the calculated magnetic fields.

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1 magnetic fields (up to 2,000 mG) are barriers to large crustaceans' exploration or 2 movement. 3 4 The second group includes electrosensitive species (mostly elasmobranchs) that have 5 evolved specialized receptors capable of detecting electric fields in the natural 6 environment; these receptors are attuned to bioelectric signals emitted by prey in the 7 frequency range between 0 and 10 Hz. Electrosensitive elasmobranchs include sharks, 8 rays, and dogfish; sturgeon exhibit a similar electrosensitivity. However, as the source 9 frequency increases to 60 Hz, these species cease to respond to electric fields unless the 10 intensity is significantly greater. 11 12 Published literature on magnetosensitive and electrosensitive species, including those in 13 the Revolution Wind Project Area, were assessed, and it is clear that the reported sensory 14 capabilities of these magnetosensitive and electrosensitive fish species do not include 60 15 Hz; this is not unexpected, given that 60-Hz fields do not naturally occur in the 16 environment. For instance, a study commissioned by the Bureau of Ocean Energy 17 Management ("BOEM") called the "Renewable Energy in situ Power Cable 18 Observation," comprising three years of observations of energized and de-energized 60-19 Hz cables off California, showed no significant differences in the behavior or distribution 20 of more than 40 fish species whether the cables were energized or not (Love et al., 2016).
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1	A study of the Horns Rev Offshore Wind Farm reported by Leonhard et al. in 2011 found
2	that pre-and post-operational data collected over 10 years [50-Hz cables] near the
3	Denmark site indicate "no general significant changes in the abundance or distribution
4	patterns of pelagic and demersal fish," including species similar to those expected to
5	inhabit the Revolution Wind Project Area, such as various flatfish species. In addition,
6	controlled laboratory studies conducted by Richardson et al. (1976), Armstrong et al.
7	(2015), and Orpwood et al. (2015) support the conclusion that EMF produced by 50- to
8	75-Hz AC cables do not alter the behavior of magnetosensitive fish species, indicating
9	that the higher frequency of AC cables (50/60 Hz) EMF are not easily detected by
10	magnetosensitive migratory fish species. Overall, we have found that general statements
11	about the capability of fish to detect EMF in the environment (i.e., the 0-Hz geomagnetic
12	field or the 0-10 Hz bioelectric fields of fish) provide no useful information and can be
13	misleading unless the frequency and strength of the fields are taken into consideration.
14	
15	Exponent also compared 60-Hz magnetic-field levels and the associated induced electric-
16	field levels in seawater to reported behavioral thresholds of representative
17	electrosensitive species expected to inhabit the Revolution Wind Project Area. For
18	sturgeon, which may traverse the Revolution Wind Project Area, studies report a
19	threshold for electric fields of 20 mV/m at 50 Hz that produced minor changes to
20	sturgeon orientation, as well as increased search and foraging behaviors near the power

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1		source. While the extraordinary sensitivity of elasmobranchs to very weak electric fields
2		is well known, it should be emphasized that this sensitivity diminishes with frequency
3		and virtually disappears above 20 Hz. These studies support the assessment that 60-Hz
4		EMF fields associated with the buried Revolution Wind Project cables likely would not
5		easily be detectable, if at all, by sturgeon or resident elasmobranchs. See Appendix Q1
6		"Revolution Wind Farm Offshore Electric- and Magnetic-Field Assessment" to
7		Construction & Operations Plan, Revolution Wind Farm, for additional detail.
8	Q.	Have you reviewed the advisory opinion submitted by the R.I. Department of
9		Environmental Management ("RIDEM") to the EFSB that addressed electric and
10		magnetic fields from the RWEC-RI export cables on marine life?
11	A.	Yes.
12	Q.	What type of magnetic fields did RIDEM's advisory opinion on marine life address?
13	A.	RIDEM states that, "Revolution Wind is proposing to install up to two high voltage
14		alternating current (AC) submarine export cables" (p. 5) and recognizes that these cables
15		will be a source of AC magnetic fields. RIDEM further advises that "DC and AC cables
16		should not be considered comparable, as fish may perceive static and alternating
17		
		magnetic fields differently (Rommel & McCleave, 1973b" (p. 9).
18		magnetic fields differently (Rommel & McCleave, 1973b" (p. 9).
18 19		RIDEM's advisory opinion, however, relies almost solely on studies of DC magnetic

20 fields, including those produced by DC submarine cables (Hutchison et al. (2018);

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1		Hutchison et al. (2020b); Putman et al. (2015); Kirschvink et al. (1986; Gill (2005);
2		Kuznetsov (1999; Scott et al. (2018)) to support of the conclusion that "[w]hat can be
3		stated for certain is there will be impacts to marine species from the [AC] magnetic field
4		generated by the cable[s]." RIDEM is mistaken here. As RIDEM itself states, DC and
5		AC cables should not be considered comparable, and so its reliance on literature
6		concerning impacts to species from DC cables should not be given any weight.
7	Q.	Is there any issue with relying on studies of DC magnetic fields for an evaluation of
8		the RWEC-RI AC submarine export cables?
9	A.	Yes, as we stated, the RWEC-RI export cables will carry AC electricity and be the source
10		of AC magnetic and induced electric fields. In our opinion, RIDEM should not have
11		relied on studies of DC magnetic fields as the basis for its opinion about the effects of AC
12		magnetic fields. The only study RIDEM did cite that assessed AC magnetic fields
13		(Taormina et al. 2020) found no behavioral effects in lobsters exposed to 225 μ T [2,250
14		mG] 50-Hz AC magnetic fields, which are about 260 times greater than the projected
15		magnetic field above the RWEC-RI operating at maximum operating capacity.
16		Moreover, RIDEM failed to consider the evidence that the ability of some species to
17		detect weak DC magnetic fields, DC electric fields, or slowly varying AC electric fields
18		(< 10 Hz) does not covey the ability to detect and react to 60-Hz magnetic and electric
19		fields at the levels projected around the RWEC export cables.

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1	Q.	Does the scientific literature cited by RIDEM support the advisory opinion
2		that AC electric or magnetic fields can cause potential behavioral changes to
3		sea turtles?
4	A.	No. Nowhere in the literature that RIDEM cites do the authors assess or even
5		discuss AC submarine cables or AC magnetic fields. The Putnam et al. (2015)
6		study cited by RIDEM examined the orientation behavior of loggerhead sea
7		turtles to the DC geomagnetic field. RIDEM mistakenly relied upon this research
8		on DC fields to draw conclusions about 60-Hz AC fields.
9	Q.	What is your opinion on RIDEM's statement that "Some of these protected
10		species are also vulnerable to risk of disruption of navigation or possible
11		stranding caused by cable-introduced electromagnetic fields (Kirschvink et
12		al., 1986)"?
13	A.	Here again, the RIDEM characterization of the science is not relevant because it is
14		focused on DC geomagnetic fields. The Kirschvink et al. (1986) study did not
15		discuss submarine cables or AC magnetic fields. RIDEM further opined that "
16		cetaceans (whales, dolphins, and porpoises) may be susceptible to EMF-related
17		navigational disruptions and behavioral changes (Gill, 2005; Kuznetsov, 1999),"
18		but the two studies cited discuss the detection of DC magnetic fields, not AC
19		magnetic fields. All together, the studies cited by RIDEM do not suggest that 60-
20		Hz AC fields would have the same effects as DC magnetic fields. Further, given

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the large migratory ranges of marine mammals (and sea turtles) and their habit of
 air breathing, it is unlikely that these species will interact with the limited area
 directly above the RWEC-RI.

Q. Please summarize the results of your comparison of the calculated EMF levels from the RWEC-RI cables to the levels reported in the scientific literature that cause behavioral responses in the species expected to be in the area of the Revolution Wind Project?

8 A. Certainly. First, data from field surveys conducted at 60-Hz AC submarine cable sites 9 demonstrate that behavior and distribution of large crustaceans are unaffected by these 10 magnetic fields. Second, observations of cephalopod distributions at the same 60-Hz AC 11 cable sites also indicate that these species are not affected by the presence of AC EMF. 12 Third, magnetic-field levels calculated for RWEC-RI are below thresholds at which 13 laboratory and field studies reported behavioral changes in magnetosensitive fish species. 14 Fourth, elasmobranchs (sharks, rays and skates) are not expected to detect the magnetic 15 fields at the levels generated by the 60-Hz AC submarine cables. Finally, calculated 16 electric fields associated with Revolution Wind Project cables are below the published 17 detection thresholds of electrosensitive fish and elasmobranchs. We also note that RIDEM did not address any of the literature about what EMF frequencies species are able 18 19 to detect. Simply put, any EMF from the RWEC-RI will likely be below reported or

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1		theoretical thresholds for perception by marine species in the area and, therefore, have no
2		negative effects on the biological health/fitness implications on the populations.
3 4 5	III.	<u>Review of Magnetic Fields from the Revolution Wind Project's Underground</u> Onshore Transmission Cables and Interconnections
5 6	Q.	How did Exponent assess the magnetic field associated with the operation of the
7		underground onshore transmission and interconnection cables that will connect the
8		RWEC-RI at landfall to the Davisville Substation?
9	A.	We developed models of the duct banks in which the underground cables will be installed
10		between the joint transition bay at the shore landing and the new OnSS and used
11		COMSOL MultiPhysics Version 5.5 to calculate the magnetic fields from the Onshore
12		Transmission Cables for average and peak loading. COMSOL also was used to calculate
13		the magnetic field from the underground Interconnection Cables between the OnSS and
14		the ICF. The magnetic fields from the proposed overhead transmission lines between the
15		ICF, and the Davisville Substation (out to the boundary of the Combined Facilities) were
16		calculated by SUBCALC, software developed by the Electric Power Research Institute.
17	Q.	What did Exponent's evaluation of the onshore transmission cables show?
18	A.	For the underground onshore transmission cables installed under roadways the calculated
19		magnetic-field level directly at average loading diminished quickly to 4.1 mG at 25 feet.
20		The underground interconnection cables installed between the OnSS and the ICF are so
21		far from the nearest residence (approximately 400 ft. distant) that the magnetic field is

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calculated to be less than 1 mG. Slightly higher magnetic fields were calculated at peak
 cable loadings.

3 Q. What features, if any, of the Revolution Wind Project's design serve to minimize 4 magnetic fields from the proposed offshore and onshore cables?

5 A. The bundling of the three conductors close together in each offshore cable in a helical 6 twist and metallic sheathing serve to minimize the magnetic field. For short segments of 7 the export cables that cannot be buried beneath the seabed, protective concrete mattresses 8 or rock berms will be laid to protect the cables from damage, and this will limit the access 9 of fish species to the highest magnetic fields at the cable surface. For the onshore cables, 10 the optimization of the placement and phasing of the onshore transmission cables and the 11 configuration of the onshore interconnection cables in a trefoil configuration are design 12 features well known as effective methods of reducing magnetic fields. These features 13 reduce magnetic fields at the cables where the field is highest and cause the magnetic 14 field to diminish more quickly with distance than other common designs.

Q. In your expert capacity, do you have an opinion to a reasonable degree of scientific
 certainty whether the magnetic fields associated with the Revolution Wind Project
 both offshore and onshore exceed recommended levels of exposure of the general
 public?

A. We do and, no, the magnetic fields during operation were calculated to be about 100times lower than the lowest exposure guideline recommended by the World Health

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- 1 Organization and therefore, as stated in the advisory letter from the R.I. Department of
- 2 Health, adverse health effects and biological effects of EMF exposure are not anticipated.
- 3 Q. Does this conclude your testimony?
- 4 A. Yes.

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Exponent® Engineering & Scientific Consulting

William H. Bailey, Ph.D.

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Professional Profile

Dr. Bailey specializes in applying state-of-the-art assessment methods to environmental and occupational health issues. His 30 years of training and experience include laboratory and epidemiologic research, health risk assessment, and comprehensive exposure analysis. Dr. Bailey has investigated exposures to alternating current, direct current, and radiofrequency electromagnetic fields, 'stray voltage', and electrical shock, as well as to a variety of chemical agents and air pollutants. He is particularly well known for his research on potential effects of electromagnetic fields on the environment and health and has served as an advisor to numerous state, federal, and international agencies. Currently, he is involved in research on exposures to marine life from submarine cables, respiratory exposures to ultrafine- and nanoparticles, and EMF and RF exposure guidelines.

Dr. Bailey has been a visiting scientist at the Cornell University Medical College and has lectured at Rutgers University, the University of Texas (San Antonio), and the Harvard School of Public Health. He was formerly Head of the Laboratory of Neuropharmacology and Environmental Toxicology at the New York State Institute for Basic Research, Staten Island, New York, and an Assistant Professor and NIH postdoctoral fellow in Neurochemistry at The Rockefeller University in New York.

Academic Credentials & Professional Honors

Ph.D., Neuropsychology, City University of New York, 1975

M.B.A., University of Chicago, 1969

B.A., Dartmouth College, 1966

Sigma Xi

The Institute of Electrical and Electronics Engineers/International Committee on Electromagnetic Safety (Subcommittee 3, Safety Levels with Respect to Human Exposure to Fields (0 to -3 kHz) and Subcommittee 4, Safety Levels with Respect to Human Exposure to Radiofrequency Fields (3 kHz to 3 GHz)

Elected member of the Committee on Man and Radiation (COMAR) of the IEEE Engineering in Medicine and Biology Society, 1998-2001

Academic Appointments

Visiting Scientist, Department of Pharmacology, Cornell University Medical College, New York, NY, 1986-2012 Visiting Scientist, The Jackson Laboratory, Bar Harbor, ME, 1984-1985

Head, Laboratory of Neuropharmacology and Environmental Toxicology, NYS Institute for Basic Research in Developmental Disabilities, Staten Island, NY, 1983-1987

Assistant Professor, The Rockefeller University, New York, NY, 1976-1983

Postdoctoral Fellow, Neurochemistry, The Rockefeller University, New York, NY, 1974-1976

Dissertation Research, The Rockefeller University, New York, NY, 1972-1974

CUNY Research Fellow, Dept. of Psychology, Queens College, City University of New York, Flushing, NY, 1969-1971

Clinical Research Assistant, Department of Psychiatry, University of Chicago; Psychiatric Psychosomatic Inst., Michael Reese Hospital, and Illinois State Psychiatric Inst, Chicago, IL, 1968-1969

Teaching Appointments

Lecturer, University of Texas Health Science Center, Center for Environmental Radiation Toxicology, San Antonio, TX, 1998

Lecturer, Harvard School of Public Health, Office of Continuing Education, Boston, MA, 1995, 1997

Lecturer, Rutgers University, Office of Continuing Education, New Brunswick, NJ, 1991-1995

Adjunct Assistant Professor, Queens College, CUNY, Flushing, NY, 1978

Lecturer, Queens College, CUNY, Flushing, NY, 1969-1974

Prior Experience

President, Bailey Research Associates, Inc., 1991-2000

Vice President, Environmental Research Information, Inc., 1987-1990

Head of Laboratory of Environmental Toxicology and Neuropharmacology, New York State Institute for Basic Research, 1983-1987

Assistant Professor, The Rockefeller University, 1976-1983

Professional Affiliations

The Health Physics Society (Affiliate of the International Radiation Protection Society)

Society for Risk Analysis

International Society of Exposure Analysis

New York Academy of Sciences

American Association for the Advancement of Science (Life Time Member)

Society for Neuroscience/International Brain Research Organization

Bioelectromagnetics Society

The Institute of Electrical and Electronics Engineers (Life Member)

The Institute of Electrical and Electronics Engineers Engineering in Medicine and Biology Society

Conseil International des Grands Réseaux Électriques

Publications

Bailey WH, Cotts B, Dopart PJ. Wireless 5G radiofrequency technology - An overview of small cell exposures, standards and science. IEEE Access. 2020 Aug; 8:140792-140797. doi:0.1109/ACCESS.2020.3010677.

IEEE International Committee on Electromagnetic Safety Technical Committee 95. Bailey WH, Bodemann R, Bushberg J, Chou C-K, Cleveland R, Faraone A, Foster KR, Gettman KE, Graf K, Harrington T, Hirata A, Kavet R, Keshvari J, Klauenberg BJ, Legros A, Maxson DP, Osepchuk JM, Reilly JP, Tell RA, Thansandote A, Yamazaki K, Ziskin MC, Zollman PM. Synopsis of IEEE Std C95.1[™]-2019 "IEEE Standard for Safety Levels With Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz. IEEE Access. 2019 Dec; 7(1):171346-171356. doi: 10.1109/ACCESS.2019.2954823.

Bailey WH, Williams AL, Leonhard MJ. Exposure of laboratory animals to small air ions: a systematic review of biological and behavioral studies. Biomed Eng Online. 2018 Jun 5;17(1):72. doi: 10.1186/s12938-018-0499-z

Schmiedchen K, Petri AK, Driessen S, Bailey WH. Systematic review of biological effects of exposure to static electric fields. Part II: Invertebrates and plants. Environ Res. 2018 Jan;160:60-76. doi: 10.1016/j.envres.2017.09.013. Epub 2017 Oct 3.

Petri AK, Schmiedchen K, Stunder D, Dechent D, Kraus T, Bailey WH, Driessen S. Biological effects of exposure to static electric fields in humans and vertebrates: A systematic review. Environ Health 2017 Apr 17; 16(1):41. doi: 10.1186/s12940-017-0248-y.

Bailey WH. Review of epidemiology of electromagnetic fields, Martin Röösli, Editor. Health Physics 2015; 109:606-607.

Chang ET, Adami H-O, Bailey WH, Boffetta P, Krieger RI, Moolgavkar SH, Mandel JS. Validity of geographically modeled environmental exposure estimates. Crit Rev Toxicol 2014 May; 44:450-466. doi: 10.3109/10408444.2014.902029.

Alexander DD, Bailey WH, Perez V, Mitchell ME, Su S. Air ions and respiratory function outcomes: A comprehensive review. J Negat Results Biomed 2013 Sep 9; 12(1):14. doi: 10.1186/1477-5751-12-14.

Perez V, Alexander DD, Bailey WH. Air ions and mood outcomes: A review and meta-analysis. BMC Psychiatry 2013 Jan 15; 13(1):29. doi: 10.1186/1471-244X-13-29.

Bailey WH, Johnson GB, Bishop J, Hetrick T, Su S. Measurements of charged aerosols near +/- 500 kV DC transmission lines and in other environments. IEEE Transactions on Power Delivery 2012; 27:371-379.

Shkolnikov YP, Bailey WH. Electromagnetic interference and exposure from household wireless networks. 2011 IEEE Symposium on Product Compliance Engineering (PSES), October 1-5, 2011.

Kavet R, Bailey WH, Bracken TD, Patterson RM. Recent advances in research relevant to electric and magnetic field exposure guidelines. Bioelectromagnetics 2008; 29:499-526.

Bailey WH, Wagner M. IARC evaluation of ELF magnetic fields: Public understanding of the 0.4µT exposure metric. Journal of Exposure Science and Environmental Epidemiology 2008; 18:233-235.

Bailey WH, Erdreich L. Accounting for human variability and sensitivity in setting standards for electromagnetic fields. Health Physics 2007; 92:649-657.

Bailey WH, Nyenhuis JA. Thresholds for 60-Hz magnetic field stimulation of peripheral nerves in human subjects. Bioelectromagnetics 2005; 26:462-468.

Bracken TD, Senior RS, Bailey WH. DC electric fields from corona-generated space charge near AC transmission lines. IEEE Transactions on Power Delivery 2005; 20:1692-1702.

Bailey WH. Dealing with uncertainty in formulating occupational and public exposure limits. Health Physics 2002; 83:402-408.

Bailey WH. Health effects relevant to the setting of EMF exposure limits. Health Physics 2002; 83:376-386.

Kavet R, Stuchly MA, Bailey WH, Bracken TD. Evaluation of biological effects, dosimetric models, and exposure assessment related to ELF electric- and magnetic-field guidelines. Applied Occupational and Environmental Hygiene 2001; 16:1118-1138.

Bailey WH. ICNIRP recommendation for limiting public exposure to 4 Hz-1 kHz electric and magnetic fields. Health Physics 1999; 77:97-98.

Bailey WH. Principles of risk assessment with application to current EMF risk communication issues. In: EMF Risk Perception and Communication. Repacholi MH, Muc AM (eds), World Health Organization, Geneva, 1999.

De Santo RS, Bailey WH. Environmental justice tools and assessment practices. Proceedings, American Public Transit Association, 1999.

Bailey WH, Su SH, Bracken TD. Probabilistic approach to ranking sources of uncertainty in ELF magnetic field exposure limits. Health Physics 1999; 77:282-290.

Bailey WH. Field parameters. Proceedings, EMF Engineering Review Symposium, Status and Summary of EMF Engineering Research. Bracken TD and Montgomery JH (eds), Oak Ridge National Laboratory, Oak Ridge, TN, April 28-29, 1998.

Bailey WH. Policy implications. Proceedings, EMF Engineering Review Symposium, Status and Summary of EMF Engineering Research. Bracken TD and Montgomery JH (eds), Oak Ridge National Laboratory, Oak Ridge, TN, April 28-29, 1998.

Bailey WH. Probabilistic approaches to deriving risk-based exposure guidelines: Application to extremely low frequency magnetic fields. In: Non-Ionising Radiation. Dennis JA and Stather JW (eds), Special Issue of Radiation Protection Dosimetry 1997; 72:327-336.

Bailey WH, Su SH, Bracken TD, Kavet R. Summary and evaluation of guidelines for occupational exposure to power frequency electric and magnetic fields. Health Physics 1997; 73:433-453.

Bracken TD, Senior RS, Rankin RF, Bailey WH, Kavet R. Magnetic field exposures in the electric utility

industry relevant to occupational guideline levels. Applied Occupational and Environmental Hygiene 1997; 12:756-768.

Blondin J-P, Nguyen D-H, Sbeghen J, Goulet D, Cardinal C, Maruvada P-S, Plante M, and Bailey WH. Human perception of electric fields and ion currents associated with high voltage DC transmission lines. Bioelectromagnetics 1996; 17:230-241.

Bailey WH, Charry JM. Acute exposure of rats to air ions: Effects on the regional concentration and utilization of serotonin in brain. Bioelectromagnetics 1987; 8:173-181.

Bailey WH, Charry JM. Measurement of neurotransmitter release and utilization in selected brain regions of rats exposed to dc electric fields and atmospheric space charge. Proceedings, 23rd Hanford Life Sciences Symposium, Interaction of Biological Systems with Static and ELF Electric and Magnetic Fields, 1987.

Pavildes C, Aoki C, Chen J-S, Bailey WH, Winson J. Differential glucose utilization in the parafascicular region during slow-wave sleep, the still-alert state and locomotion. Brain Research 1987; 423:399-402.

Bailey WH, Charry JM. Behavioral monitoring of rats during exposure to air ions and DC electric fields. Bioelectromagnetics 1986; 7:329-339.

Charry JM, Shapiro MH, Bailey WH, Weiss JM. Ion-exposure chambers for small animals. Bioelectromagnetics 1986; 7:1-11.

Charry JM, Bailey WH. Regional turnover of norepinephrine and dopamine in rat brain following acute exposure to air ions. Bioelectromagnetics 1985; 6:415-425.

Bracken TD, Bailey WH, Charry JM. Evaluation of the DC electrical environment in proximity to VDTs. Journal of Environmental Science and Health Part A 1985; 20:745-780.

Gross SS, Levi R, Bailey WH, Chenouda AA. Histamine modulation of cardiac sympathetic responses: A physiological role. Federation Proceedings 1984; 43:458.

Gross SS, Guo ZG, Levi R, Bailey WH, Chenouda AA. 1984. Release of histamine by sympathetic nerve stimulation in the guinea pig heart and modulation of adrenergic responses. Circulation Research 1984; 54:516-526.

Dahl D, Bailey WH, Winson J. Effect of norepinephrine depletion of hippocampus on neuronal transmission from perforant pathway through dentate gyrus. Journal of Neurophysiology 1983; 49:123-135.

Guo ZG, Gross SS, Levi R, Bailey WH. Histamine: Modulation of norepinephrine release from sympathetic nerves in guinea pig heart. Federation Proceedings 1983; 42:907.

Bailey WH. Biological effects of air ions on serotonin metabolism: Fact and fancy. pp. 90-120. In: Conference on Environmental Ions and Related Biological Effects. Charry JM (ed), American Institute of Medical Climatology, Philadelphia, PA, 1982.

Weiss JM, Goodman PA, Losito BG, Corrigan S, Charry JM, Bailey WH. Behavioral depression produced by an uncontrollable stressor: Relationship to norepinephrine, dopamine, and serotonin levels in various regions of rat brain. Brain Research Reviews 1981; 3:167-205.

Weiss JM, Bailey WH, Pohorecky LA, Korzeniowski D, Grillione G. Stress-induced depression of motor activity correlates with regional changes in brain norepinephrine but not in dopamine. Neurochem Res. 1980; 5:9-22.

Bailey WH. Ion-exchange chromatography of creatine kinase isoenzymes: A method with improved specificity and sensitivity. Biochemical Medicine 1980; 24:300-313.

Bailey WH, Weiss JM. Evaluation of a 'memory deficit' in vasopressin-deficient rats. Brain Research 1979; 162:174-178.

Bailey WH, Weiss JM. Effect of ACTH 4-10 on passive avoidance of rats lacking vasopressin (Brattleboro strain). Hormones and Behavior 1978; 10:22-29.

Pohorecky LA, Newman B, Sun J, Bailey WH. Acute and chronic ethanol injection and serotonin metabolism in rat brain. Journal of Pharmacology and Experimental Therapeutics 1978; 204:424-432.

Koh SD, Vernon M, Bailey WH. Free-recall learning of word lists by prelingual deaf subjects. Journal of Verbal Learning and Verbal Behavior 1971; 10:542-574.

Book Chapters

Cotts B, Graf K, Bailey WH, Murphy P. Electromagnetic interference considerations for electrical power systems. In The Power Grid: Smart, Secure, Green and Reliable. D'Andrade B (ed), Academic Press, New York, NY 2017.

Bailey WH. Principles of risk assessment and their limitations. In: Risk Perception, Risk Communication and its Application to EMF Exposure. Matthes R, Bernhardt JH, Repacholi MH (eds), International Commission on Non-Ionizing Radiation Protection, Oberschleissheim, Germany, 1998.

Bailey WH. Biological responses to air ions: Is there a role for serotonin? pp. 151-160. In: Air Ions: Physical and Biological Aspects. Charry JM and Kavet R (eds). CRC Press, Boca Raton, FL, 1987.

Weiss JM, Bailey WH, Goodman PA, Hoffman LJ, Ambrose MJ, Salman S, Charry JM. A model for neurochemical study of depression. pp. 195-223. In: Behavioral Models and the Analysis of Drug Action. Spiegelstein MY, Levy A (eds), Elsevier Scientific, Amsterdam, 1982.

Bailey WH. Mnemonic significance of neurohypophyseal peptides. pp. 787-804. In: Changing Concepts of the Nervous System. Morrison AR, Strick PL (eds), Academic Press, New York, NY, 1981.

Bailey WH, Weiss, JM. Avoidance conditioning and endocrine function in Brattleboro rats. pp 371-395. In: Endogenous Peptides and Learning and Memory Process. Martinez JL, Jensen RA, Messing RB, Rigter H, McGaugh JL (eds), Academic Press, New York, NY, 1981.

Weiss JM, Glazer H, Pohorecky LA, Bailey WH, Schneider L. Coping behavior and stress-induced behavioral depression: Studies of the role of brain catecholamines. pp. 125-160. In: The Psychobiology of the Depressive Disorders: Implications for the Effects of Stress. Depue R (ed), Academic Press, New York, NY, 1979.

Technical Reports

Snyder DB, Bailey WH, Palmquist K, Cotts BRT, Olsen KR. Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Sterling, VA. OCS Study BOEM 2019-049, August 2019.

Normandeau, Exponent, Tricas T, Gill A. Effects of EMFs from undersea power cables on elasmobranchs and other marine species. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Pacific OCS Region, Camarillo, CA. OCS Study BOEMRE 2011-09, May 2011.

Jardini JA, et al. Electric field and ion current environment of HVDC overhead transmission lines. Report of Joint Working Group B4/C3/B2.50, CIGRE, August 2011.

Johnson GB, Bracken TD, Bailey WH. Charging and transport of aerosols near AC transmission lines: A literature review. EPRI, Palo Alto, CA, 2003.

Bailey WH. Probabilistic approach to ranking sources of uncertainty in ELF magnetic-field exposure limits. In: Evaluation of Occupational Magnetic Exposure Guidelines, Interim Report, EPRI Report TR-111501, 1998.

Bracken TD, Bailey WH, Su SH, Senior RS, Rankin RF. Evaluation of occupational magnetic-field exposure guidelines; Interim Report. EPRI Report TR-108113, 1997.

Bailey WH, Weil DE, Stewart JR. HVDC Power Transmission Environmental Issues Review. Oak Ridge National Laboratory, Oak Ridge, TN, 1996.

Bailey WH. Melatonin responses to EMF. Proceedings, Health Implications of EMF Neural Effects Workshop, Report TR-104327s, EPRI, 1994.

Bailey WH. Recent neurobiological and behavioral research: Overview of the New York State powerlines project. In: Power-Frequency Electric and Magnetic Field Research, EPRI, 1989.

Bailey WH, Bissell M, Dorn CR, Hoppel WA, Sheppard AR, Stebbings, JH. Comments of the MEQB Science Advisors on Electrical Environment Outside the Right of Way of CU-TR-1, Report 5. Science Advisor Reports to the Minnesota Environmental Quality Board, 1986.

Bailey WH, Bissell M, Brambl RM, Dorn CR, Hoppel WA, Sheppard AR, Stebbings JH. A health and safety evaluation of the +/- 400 KV powerline. Science Advisor's Report to the Minnesota Environmental Quality Board, 1982.

Charry JM, Bailey WH, Weiss JM. Critical annotated bibliographical review of air ion effects on biology and behavior. Rockefeller University, New York, NY, 1982.

Bailey WH. Avoidance behavior in rats with hereditary hypothalamic diabetes insipidus. Dissertation, City University of New York, 1975.

Invited Presentations

Chou CK, Petersen R, Foster K, Hirata A, Ziskin M, Reilly JP, Tell R, Faraone A, Klauenberg BJ, Kavet R, Graf K, Cleveland R, Thansandote A, Bushberg J, Bailey W, Osepchuk J, Legros A, Yamazaki K, Bodemann R. Revision of IEEE Standards C95.1-2005 and C95.6-2002. BioEM2018 - Joint Annual Meeting of The Bioelectromagnetics Society and the European BioElectromagnetics Association, Piran, Portorož, Slovenia, June 29, 2018.

Bailey WH. Thresholds for peripheral nerve stimulation by ELF magnetic fields in humans. Presentation at Bundesamt für Strahlenschutz Workshop on Action and Perception Thresholds of Static and ELF Magnetic and Electric Fields and Contact Currents in Humans, Munich, Germany, October 26-27, 2016.

Bailey WH. Update on scientific developments regarding extremely low frequency and radiofrequency fields and health. Committee on Man and Radiation (COMAR) of the IEEE Engineering in Medicine and Biology Society, January 11, 2016.

Bailey WH. Measurements of charged aerosols around DC transmission lines and other locations. International Committee on Electromagnetic Safety TC95/ Subcommittee 3: Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0 - 3 kHz, December 2011.

Bailey WH, Erdreich LS. Human sensitivity and variability in response to electromagnetic fields: Implications for standard setting. International Workshop on EMF Dosimetry and Biophysical Aspects Relevant to Setting Exposure Guidelines. International Commission on Non-Ionizing Radiation Protection, Berlin, March 2006.

Bailey WH. Research-based approach to setting electric and magnetic field exposure guidelines (0-3000 Hz). IEEE Committee on Electromagnetic Safety, December 2005.

Bailey WH. Conference Keynote Presentation. Research supporting 50/60 Hz electric and magnetic field exposure guidelines. Canadian Radiation Protection Association, Annual Conference, Winnipeg, June 2005.

Bailey WH. Scientific methodology for assessing public health issues: A case study of EMF. Canadian Radiation Protection Association, Annual Conference, Public Information for Teachers, Winnipeg, June 2005.

Bailey WH. Assessment of potential environmental effects of electromagnetic fields from submarine cables. Connecticut Academy of Science and Engineering, Long Island Sound Bottomlands Symposium: Study of Benthic Habitats, July 2004.

De Santo RS, Coe M, Bailey WH. Environmental justice assessment and the use of GIS tools and methods. National Association of Environmental Professionals, 27th Annual Conference, Dearborn, MI, June 2002.

Bailey WH. Applications to enhance safety: Research to understand and control potential risks. Human Factors and Safety Research, Volpe National Transportation Systems Center/Dutch Ministry of Transport, Cambridge, MA, November 2000.

Bailey WH. EMF health effects review. EMF Exposure Guideline Workshop, Brussels Belgium, June 2000.

Bailey WH. Dealing with uncertainty when formulating guidelines. EMF Exposure Guideline Workshop, Brussels Belgium, June 2000.

Bailey WH. Field parameters: Policy implications. EMF Engineering Review Symposium, Status and Summary of EMF Engineering Research, Charleston, SC, April 1998.

Bailey WH. Principles of risk assessment: Application to current issues. Symposium on EMF Risk Perception and Communication, World Health Organization, Ottawa, Canada, August 1998.

Bailey WH. Current guidelines for occupational exposure to power frequency magnetic fields. EPRI EMF Seminar, New Research Horizons, March 1997.

Bailey WH. Methods to assess potential health risks of cell telephone electromagnetic fields. IBC Conference — Cell Telephones: Is there a Health Risk? Washington, DC, June 1997.

Bailey WH. Principles of risk assessment and their limitations. Symposium on Risk Perception, Risk Communication and its Application to EMF Exposure, International Commission on Non-Ionizing Radiation Protection, Vienna, Austria, October 1997.

Bailey WH. Probabilistic approach for setting guidelines to limit induction effects. IEEE Standards Coordinating Committee 28: Non-Ionizing Radiation, Subcommittee 3 (0-3 kHz), June 1997.

Bailey WH. Power frequency field exposure guidelines. IEEE Standards Coordinating Committee 28: Non-Ionizing Radiation, Subcommittee 3 (0-3 kHz), June 1996.

Bailey WH. Epidemiology and experimental studies. American Industrial Hygiene Conference, Washington, DC, May 1996.

Bailey WH. Review of 60 Hz epidemiology studies. EMF Workshop, Canadian Radiation Protection Association, Ontario, Canada, June 1993.

Bailey WH. Biological and health research on electric and magnetic fields. American Industrial Hygiene Association, Fredrickton, New Brunswick, Canada, October 1992.

Bailey WH. Electromagnetic fields and health. Institute of Electrical and Electronics Engineers, Bethlehem, PA, January 1992.

Bailey WH, Weiss JM. Psychological factors in experimental heart pathology. Visiting Scholar Presentation, National Heart Lung and Blood Institute, Bethesda, MD, March 1977.

Presentations

Bailey WH, Robinson RJ, Johnson G. Modeled deposition of charged particles in the respiratory tract. Presentation accepted for BioEM 2020, Joint Annual Meeting of The Bioelectromagnetics Society and the European BioElectromagnetics Association, Oxford, UK June 2020. Abstract, pp. 263-266.

Williams AI, Bailey WH. Toxicologic assessment of air ion exposures in laboratory animals. Poster presentation at 53rd Annual Meeting of the Society of Toxicology, Phoenix, AZ, March 26, 2014.

Perez V, Alexander DD, Bailey WH. Air ions and mood outcomes: A review and meta-analysis. Poster presentation at the American College of Epidemiology, Chicago, IL, September 8-11, 2012.

Shkolnikov Y, Bailey WH. Electromagnetic interference and exposure from household wireless networks. Product Safety Engineering Society Meeting, San Diego, CA, October 2011.

Nestler E, Trichas T, Pembroke A, Bailey W. Will undersea power cables from offshore wind projects affect sharks? North American Offshore Wind Conference & Exhibition, Atlantic City, NJ, October 2010.

Nestler E, Pembroke A, Bailey W. Effects of EMFs from undersea power lines on marine species. Energy Ocean International, Ft. Lauderdale, FL, June 2010.

Pembroke A, Bailey W. Effects of EMFs from undersea power cables on elasmobranchs and other marine species. Windpower 2010 Conference and Exhibition, Dallas, TX, 2010.

Bailey WH. Clarifying the neurological basis for ELF guidelines. Workshop on Practical Implementation of ELF and RF Guidelines. The Bioelectromagnetics Society 29th Annual Meeting, Kanazawa, Japan, June 2007.

Sun B, Urban B, Bailey W. AERMOD simulation of near-field dispersion of natural gas plume from accidental pipeline rupture. Air and Waste Management Association: Health Environments: Rebirth and Renewal, New Orleans, LA, June 2006.

Bailey WH, Johnson G, Bracken TD. Method for measuring charge on aerosol particles near AC transmission lines. Joint Meeting of The Bioelectromagnetics Society and The European BioElectromagnetics Association, Dublin Ireland, June 2005.

Bailey WH, Bracken TD, Senior RS. Long-term monitoring of static electric field and space charge near

AC transmission Lines. The Bioelectromagnetics Society, 26th Annual Meeting, Washington, DC, June 2004.

Bailey WH, Erdreich L, Waller L, Mariano K. Childhood leukemia in relation to 25-Hz and 60-Hz magnetic fields along the Washington DC — Boston rail line. Society for Epidemiologic Research, 35th Annual Meeting, Palm Desert CA, June 2002. American Journal of Epidemiology 2002; 155:S38.

Erdreich L, Klauenberg BJ, Bailey WH, Murphy MR. Comparing radiofrequency standards around the world. Health Physics Society 43rd Annual Meeting, Minneapolis, MN, July 1998.

Bracken TD, Senior RS, Rankin RF, Bailey WH, Kavet R. Relevance of occupational guidelines to utility worker magnetic-field exposures. Second World Congress for Electricity and Magnetism in Biology and Medicine, Bologna, Italy, June 1997.

Weil DE, Erdreich LS, Bailey WH. Are 60-Hz magnetic fields cancer causing agents? Mechanisms and Prevention of Environmentally Caused Cancers, The Lovelace Institutes 1995 Annual Symposium, La Fonda, Santa Fe, NM, October 1995.

Bailey WH. Neurobiological research on extremely-low-frequency electric and magnetic fields: A review to guide future research. Sixteenth Annual Meeting of the Bioelectromagnetics Society, Copenhagen, Denmark, June 1994.

Blondin J-P, Nguyen D-H, Sbeghen J, Maruvada PS, Plante M, Bailey WH, Goulet D. The perception of DC electric fields and ion currents in human observers. Annual Meeting of the Canadian Psychological Association, Penticton, British Columbia, Canada, June 1994.

Erdreich LS, Bailey WH, Weil DE. Science, standards and public policy challenges for ELF fields. American Public Health Association 122nd Annual Meeting, Washington, DC, October 1994.

Bailey WH, Charry JM. Particle deposition on simulated VDT operators: Influence of DC electric fields. 10th Annual Meeting of the Bioelectromagnetics Society, June 1988.

Charry JM, Bailey WH. Contribution of charge on VDTs and simulated VDT operators to DC electric fields at facial surfaces. 10th Annual Meeting of the Bioelectromagnetics Society, June 1988.

Bailey WH, Charry, JM. Dosimetric response of rats to small air ions: Importance of relative humidity. EPRI/DOE Contractors Review, November 1986. Charry JM, Bailey WH, Bracken TD (eds). DC electric fields, air ions and respirable particulate levels in proximity to VDTs. International Conference on VDTs and Health, Stockholm, Sweden, June 12-15 1986.

Charry JM, Bailey WH. Air ion and DC field strengths at 10⁴ ions/cm³ in the Rockefeller University Small Animal Exposure Chambers. EPRI/DOE Contractors Review, November 1985.

Charry JM, Bailey WH. DC Electrical environment in proximity to VDTs. 7th Annual Meeting of the Bioelectromagnetics Society, June 1985.

Bailey WH, Collins RL, Lahita RG. Cerebral lateralization: Association with serum antibodies to DNA in selected bred mouse lines. Society for Neuroscience, 1985.

Kavet R, Bailey WH, Charry JM. Respiratory neuroendocrine cells: A plausible site for air ion effects. Seventh Annual Meeting of The Bioelectromagnetics Society, June 1985.

Bailey WH, Charry JM. Measurement of neurotransmitter release and utilization in selected brain regions of rats exposed to DC electric fields and atmospheric space charge. 23rd Hanford Life Sciences Symposium, Richland, WA, October 1984.

Bailey WH, Charry JM, Weiss JM, Cardle K, Shapiro M. Regional analysis of biogenic amine turnover in rat brain after exposure to electrically charged air molecules (air ions). Society for Neuroscience, 1983.

Bailey WH. Biological effects of air ions: Fact and fancy. American Institute of Medical Climatology Conference on Environmental Ions and Related Biological Effects, October 1982.

Goodman PA, Weiss JM, Hoffman LJ, Ambrose MJ, Bailey WH, Charry, JM. Reversal of behavioral depression by infusion of an A2 adrenergic agonist into the locus coeruleus. Society for Neuroscience, November 1982.

Charry JM, Bailey WH. Biochemical and behavioral effects of small air ions. Electric Power Research Institute Workshop, April 1981.

Bailey WH, Alsonso DR, Weiss JM, Chin S. Predictability: A psychologic/ behavioral variable affecting stress-induced myocardial pathology in the rat. Society for Neuroscience, November 1980.

Salman SL, Weiss JM, Bailey WH, Joh TH. Relationship between endogenous brain tyrosine hydroxylase and social behavior of rats. Society of Neuroscience, November 1980.

Bailey WH, Maclusky S. Appearance of creatine kinase isoenzymes in rat plasma following myocardial injury produced by isoproterenol. Fed Assoc Soc Exp Biol, April 1978.

Bailey WH, Maclusky S. Appearance of creatine kinase isoenzymes in rat plasma following myocardial injury by isoproterenol. Fed Proc 1978; 37:889.

Bailey WH, Weiss JM. Effect of ACTH 4-10 on passive avoidance of rats lacking vasopressin (Brattleboro strain). Eastern Psychological Association, April 1976.

Advisory Appointments

National Institute of Environmental Health Sciences, National Toxicology Program, Participation in research study to update Level of Concern categories to better integrate evidence for toxicity and extent of human exposure, 2017

Bundesamt für Strahlenschutz - Federal Office for Radiation Protection. Summarize recent research and recommend research direction on magnetic field stimulation of peripheral nerves, 2016

Federal Office for Radiation Protection - Germany, Technical input to assessment of static and ELF exposures to public from updating national transmission network, 2016

RWTH Aachen University. Workshop on human perception thresholds in static electric fields from high-voltage direct current (HVDC) transmission lines, 2015

ZonMw - Netherlands Organization for Health Research and Development, 2012; 2007-2008, reviewer for National Programme on EMF and Health

US Bureau of Ocean Energy Management, Regulation and Enforcement, 2009-2010

Canadian National Collaborating Centre for Environmental Health, reviewer of Centre reports, 2008

Island Regulatory and Appeals Commission, province of Prince Edward Island, Canada, 2008

National Institute of Environmental Health Sciences/ National Institutes of Health, Review Committee, Neurotoxicology, Superfund Hazardous Substances Basic Research and Training Program, 2004

National Institute of Environmental Health Sciences, Review Committee Role of Air Pollutants in Cardiovascular Disease, 2004

Working Group on Non-Ionizing Radiation, Static and Extremely Low-Frequency Electromagnetic Fields, International Agency for Research on Cancer, 2000-2002

Working Group, EMF Risk Perception and Communication, World Health Organization, 1998-2005

Member, International Committee on Electromagnetic Safety, Subcommittee 3 - Safety Levels with Respect to Human Exposure to Fields (0 to 3 kHz) and Subcommittee 4 - Safety Levels with Respect to Human Exposure (3kHz to 3GHz), Institute of Electrical and Electronics Engineers (IEEE), 1996-present

Invited participant, National Institute of Environmental Health Sciences, EMF Science Review Symposium: Clinical and In Vivo Laboratory Findings, 1998

Working Group, EMF Risk Perception and Communication, International Commission on Non-Ionizing Radiation Protection, 1997

U.S. Department of Energy, RAPID EMF Engineering Review, 1997

Oak Ridge National Laboratory, 1996

American Arbitration Association International Center for Dispute Resolution, 1995-1996

U.S. Department of Energy, 1995

National Institute for Occupational Safety and Health, 1994-1995

Federal Rail Administration, 1993-1996

U.S. Forest Service, 1993

New York State Department of Environmental Conservation, 1993

National Science Foundation

National Institutes of Health, Special Study Section - Electromagnetics, 1991-1993

Maryland Public Service Commission and Maryland Department of Natural Resources, Scientific Advisor on health issues pertaining to HVAC Transmission Lines, 1988-1989

Scientific advisor on biological aspects of electromagnetic fields, Electric Power Research Institute, Palo Alto, CA, 1985-1989

U.S. Public Health Service, NIMH: Psychopharmacology and Neuropsychology Review Committee, 1984

Consultant on biochemical analysis, Colgan Institute of Nutritional Science, Carlsbad, CA, 1982-1983

Behavioral Medicine Abstracts, Editor, animal behavior and physiology, 1981-1983

Consultant on biological and behavioral effects of high-voltage DC transmission lines, Vermont Department of Public Service, Montpelier, VT, 1981-1982

Scientific advisory committee on health and safety effects of a high-voltage DC transmission line,

Minnesota Environmental Quality Board, St. Paul, MN, 1981-1982

Consultant on biochemical diagnostics, Biokinetix Corp., Stamford, CT, 1978-1980

Editorships & Editorial Review Boards

Associate Editor, Non-Ionizing Radiation, Health Physics, 1996-present

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Exponent® Engineering & Scientific Consulting

Katherine Palmquist, Ph.D.

Senior Managing Scientist | Ecological & Biological Sciences 15375 SE 30th Place, Suite 250 | Bellevue, WA 98007 (425) 519-8778 tel | kpalmquist@exponent.com

Professional Profile

Dr. Palmquist has a strong interdisciplinary background in environmental toxicology, biology, and ecology. She has expertise in ecological risk assessment and natural resource damage assessment (NRDA) at large complex sites in multiple states and is experienced in assessing the risks of various chemicals (e.g., PAHs, metals, hydrophobic insecticides, and PCBs) to plants, birds, fish, and invertebrates. As part of this work, Dr. Palmquist has used innovative approaches to define baseline conditions and quantify reductions in ecological services while also assessing the relative importance of other stressors as causal factors. Dr. Palmquist has significant work experience with power company clients, including assessment of potential injury to ecological resources and threatened and endangered species following wildland fires. She has also published on the effects of wildfires on stream ecosystems and watershed functions. In addition, Dr. Palmquist has also conducted ecological assessments of proposed submarine power cables at a number of offshore wind farm sites, with particular focus on possible effects of EMF exposure to resident fish and large invertebrate species in complex marine habitats.

Dr. Palmquist also has work experience in the field of pesticide toxicity and risk to non-target organisms. She has conducted pesticide registration work in both the United States and in the European Union and has authored several papers on the susceptibility of non-target invertebrates to insecticides. In addition, Dr. Palmquist has been retained on cases involving the contamination of food and other consumer products by various pest species. As part of this work, she has conducted inspections of products, reviewed the efficacy of pest control procedures, and constructed infestation timelines.

Academic Credentials & Professional Honors

Ph.D., Toxicology, Oregon State University,

- B.S., Entomology, Washington State University,
- B.A., Communications, Washington State University,

Society of Environmental and Molecular Toxicology (current member)

International Advisory Panel

CIGRE (International Council on Large Electric Systems), Convener and Lead of Working Group C3.17: Interactions between Wildlife and Emerging Renewable Energy Sources and associated Insulated Cables)

Licenses and Certifications

OSHA Hazardous Waste Operations and Emergency Response 40-hour certification, 2007; 8-hour refresher (2008-2019)

Professional Affiliations

Society of Environmental and Molecular Toxicology (current member)

CIGRE (International Council on Large Electric Systems)

Publications

KR Palmquist is also published under KR Johnson.

Snyder DB, Bailey WH, Palmquist K, Cotts BRT, Olsen KR. Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Sterling, VA. OCS Study BOEM 2019-049, August 2019.

Palagyi T, Rice AN, Palmquist K. Use of passive acoustic monitoring to track marine mammals at offshore windfarm sites. Technical paper. CIGRE Symposium, Aalborg Denmark. June 4–7, 2019.

Palmquist KR, Sparacio T. Integrating industry surface water mitigation into preexisting, large-scale mitigation efforts. World Environmental and Water Resources Congress 2019: Watershed Management, Irrigation and Drainage, and Water Resources Planning and Management. pp. 258–263.

Palmquist KR, Deardorff TL. The effects of wildfire on stream ecosystems in the western United States: magnitude, persistence and factors affecting recovery. World Environmental and Water Resources Congress; pp. 389–396. 2016.

Deardorff TL, Palmquist KR, Shaller PJ, Shrestha PL. Western Wildfires and the Mississippi Delta: Lessons Learned About Ecosystem Management from Attempts to Control Mother Nature. World Environmental and Water Resources Congress; pp. 372–378. 2016.

Gard N, Palmquist KR. Wildfire Litigation in the Western United States: Technical Challenges in Assessment of Natural Resource Damages. ABA Section of Environment, Energy, and Resources. Superfund and Natural Resource Damages Litigation Newsletter. Vol. 11. No. 2. 2016.

Palmquist K, Fairbrother A, Salatas J. Pyrethroid insecticides: Use, environmental fate, and ecotoxicology. INTECH Open Access Publisher, 2012.

Palmquist KR, Fairbrother A, Salatas J, Guiney PD. Environmental fate of pyrethroids in urban and suburban stream sediments and the appropriateness of Hyalella azteca model in determining ecological risk. Integrated Environmental Assessment and Management 2011; 7(3):325-335.

Palmquist KR, Jenkins JJ, Jepson PC. Effects of dietary esfenvalerate exposure on three aquatic insect species representing different functional feeding groups. Environmental Toxicology and Chemistry 2008; 27(8):8-14.

Palmquist KR, Jenkins JJ, Jepson PC. Impact of aquatic insect life stage and emergence strategy on sensitivity to esfenvalerate exposure. Environmental Toxicology and Chemistry 2008; 27(8):1-7.

Palmquist KR, Jenkins JJ, Jepson PC. Clutch morphology and timing of exposure impact the susceptibility of aquatic insect eggs to esfenvalerate. Environmental Toxicology and Chemistry 2008;

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27(8):52-59.

Johnson KR, Jepson PC, and Jenkins JJ. Esfenvalerate-induced case-abandonment adversely impacts *Brachycentrus americanus* behavior and survival. Environmental Toxicology and Chemistry 2008; 27(2):397-403.

Johnson JD, Johnson KR. Hybrid poplar genotype affects attack incidence by the Poplar-and-Willow Borer (*Cyptorhynchus lapathi*). Western Journal of Applied Forestry 2003; 18:276-280.

Reports

U.S. EPA. Integrated Science Assessment (ISA) For Lead (Final Report, Jul 2013). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/075F, 2013.

Duncan J, Hinchcliffe A, Palmquist K. Lot 5: Evidence of potential long term effects in (aquatic and terrestrial) invertebrates after short term pulsed exposure. Exponent report prepared for European Food Safety Authority, August 2009.

Brown K, Tomlinson J, Duncan J, Hinchcliffe A, Palmquist K. Lot 4: Critical comparison of available and potential higher tier testing approaches for the risk assessment of plant protection products, considering at least field and semi-field experimental designs, extrapolation from dose-response relationships, and increased dosages (aquatic and terrestrial). Exponent report prepared for European Food Safety Authority, August 2009.

Presentations

Palmquist K, Sparacio T, Goodfellow W. Habitat remediation strategies for mitigating salinity inputs to freshwater system, at the Society of Environmental Toxicology and Chemistry (SETAC) 40th Annual Meeting, Toronto, Canada. November 3-7, 2019.

Palagyi T, Rice AN, Palmquist K. Use of passive acoustic monitoring to track marine mammals at offshore windfarm sites. Eco-design and environmental concerns, the environmental aspects (planet). CIGRE Symposium, Aalborg Denmark. June 7, 2019.

Palmquist KR, Sparacio T. Integrating industry surface water mitigation into preexisting, large-scale mitigation efforts. World Environmental & Water Resources Congress. Pittsburgh, PA. May 20, 2019.

Palmquist KR, Ma J, Kierski M, Morrison AM. Proactive Assessment of Relative Ecological Risk in Wildfire Prone Areas. EPRI Environmental Aspects of Transmission and Distribution International Workshop. London, England. March 12-13, 2019.

Palmquist KR. Big Data or Bad Data? Potential Concerns with Using Publicly Available Monitoring Data to Define Ecological Baseline Before a Fire, at the Wildland Fire Litigation 12th Annual Conference, Coronado, CA, April 27-29, 2018.

Palmquist KR, Morrison AM, Edwards M. Addressing White Hat Bias - Lessons from Environmental Litigation, at the SETAC 38th Annual Meeting, Minneapolis, MN, November 12-16, 2017.

Palmquist KR. Overcoming the Pitfalls of Published Science Practical Strategies for Litigation, at the Wildland Fire Litigation 11th Annual Conference, Coronado, CA, April 21-23, 2017.

Palmquist KR, Ginn TC, Boehm PD, Morrison AM. Addressing spatial data gaps in deep-sea benthic sediment sampling following a large-scale oil spill. Ninth International Conference on Remediation and Management of Contaminated Sediments January 9, 2019.

Palmquist K, Deardorff TL. 2016. The Effects of Wildfire on Stream Ecosystems in the Western United States: Magnitude, Persistence and Factors Affecting Recovery. World Environmental and Water Resources Congress. Palm Beach, FL.

Deardorff TL, Palmquist K, Shaller PJ, Shrestha PL. 2016. Western Wildfires and the Mississippi Delta: Lessons Learned About Ecosystem Management from Attempts to Control Mother Nature. World Environmental and Water Resources Congress. Palm Beach, FL.

Kashuba R, Menzie C, Cerreto K, Palmquist K, Kessel C. Challenges in deriving causal relationships from field observational data: A case study in West Virginia headwaters. Presented at the Session: Bayesian Networks and Other Probabilistic Methods Applied to Ecological Risk, at the Society for Risk Analysis (SRA) 2014 Annual Meeting, Denver, CO, December 10, 2014.

Kashuba R, Cerreto K, Palmquist K, Kessel C, Menzie C. Cautions for deriving causal relationships and water quality benchmarks from field observational data: A case study in West Virginia headwaters. Presented at the Session: Assessing Contaminant Effects in Multi-stress Ecosystems, at the Society of Environmental Toxicology and Chemistry (SETAC) North America 35th Annual Meeting, Vancouver, BC, Canada, November 9-13, 2014.

North America 31st Annual Meeting, Portland, OR, November 7-11, 2010.

Palmquist K, Fairbrother A, Salatas J, Guiney P. Environmental fate of pyrethroids in urban stream sediments and the appropriateness of Hyalella azteca model in determining ecological risk. Presented at the Session: Pyrethroids in the environment - Part 3, at the Society of Environmental Toxicology and Chemistry (SETAC) North America 31st Annual Meeting, Portland, OR, November 7-11, 2010.

Palmquist KR, Jenkins JJ, Jepson PC. Impact of aquatic insect life stage and emergence strategy on sensitivity to esfenvalerate exposure. Presented at the Pacific Branch Society of Environmental Chemistry and Toxicology Meeting and at the North American Benthological Society Meeting, 2008.

Johnson KR, Jenkins JJ, Jepson PC. Clutch morphology and the timing of exposure impact the susceptibility of aquatic insect eggs to esfenvalerate. Presented at the Society of Environmental Chemistry and Toxicology 28th Annual Meeting, 2007.

Johnson KR, Jenkins JJ, Jepson PC. Use of multiple life stages in assessing Cinygmula sp. mayfly nymph sensitivity to esfenvalerate. Presented at the Pacific Northwest Branch Society of Environmental Chemistry and Toxicology Meeting, Port Townsend, WA, and presented at the Pacific Branch Entomological Society of America 91st Annual Meeting, Portland, OR, 2007.

Johnson KR. Pesticide sub-lethal effects in non-target aquatic organisms. Presented at Washington State University Pesticide Re-certification short courses, Lacey & Vancouver, WA, 2007.

Johnson KR, Jenkins JJ, Jepson PC. Esfenvalerate and chlorpyrifos differentially affect native Pacific Northwest aquatic insects. Presented at the American Chemical Society 232nd Annual Meeting, San Francisco, CA, 2006.

Johnson KR, Jenkins JJ, Jepson PC. Life stage influences Pacific Northwest aquatic insect susceptibility to esfenvalerate. Presented at the North American Benthological Society 54th Annual Meeting, Anchorage, AK, 2006.

Johnson KR, Jenkins JJ, Jepson PC. Esfenvalerate induces case-leaving in the Pacific Northwest caddisfly Brachycentrus americanus. Presented at the Society of Environmental Toxicology and Chemistry 26th Annual Meeting, Baltimore, MD, 2005.

Johnson KR, Jenkins JJ, P.C. Jepson. Esfenvalerate and chlorpyrifos differentially affect native Pacific

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Northwest aquatic insects. Presented at the American Chemical Society 232nd Annual Meeting, San Francisco, CA, 2006.

Johnson KR, Jenkins JJ, Jepson PC. Life stage influences Pacific Northwest aquatic insect susceptibility to esfenvalerate. Presented at the North American Benthological Society 54th Annual Meeting, Anchorage, AK, 2006.

Johnson KR, Jenkins JJ, Jepson PC. Esfenvalerate induces case-leaving in the Pacific Northwest caddisfly Brachycentrus americanus. Presented at the Society of Environmental Toxicology and Chemistry 26th Annual Meeting, Baltimore, MD, 2005.

Project Experience

Extensive experience in Natural Resource Damage Assessment (NRDA) conducted in both terrestrial and aquatic environments, focusing on injury to plants, birds, invertebrates, and both demersal and pelagic fish, following a large-scale oil spill. This involved multiple complex sites and habitats, potentially impacted by a number of interacting stressors.

Conducted NRDAs and ecological risk assessments for legacy mining sites in the western United States, including evaluation of potential effects on fish, aquatic invertebrates, birds and plants. As a part of the processes, compensatory restoration plans were reviewed and evaluated for appropriateness.

Assessed possible impacts to ecological resources following a high-severity wildfire, including loss of mature forest and impacts to critical habitats for resident endangered species.

Evaluated multiple sites and properties for potential impacts to environmental and ecological resources following a large wildfire in California.

Developed a series of mitigation project options to offset salinity inputs to a freshwater system, incorporating multiple stakeholder concerns while assessing ancillary ecological benefits of developed projects.

Assessed impacts to marine benthic invertebrate communities from both physical and chemical stressors at shipyard sites in San Diego, California, utilizing a number of benthic community indices.

Reviewed possible ecological impacts of operating submarine AC cables on coastal and marine species in support of the permitting and review process for a number of proposed offshore wind facilities off the US Atlantic coast. Assessment included potential behavioral and population-level impacts to benthic resources, resident finfish species, sharks and rays, and marine mammals and sea turtles, as well as threatened or endangered species.

Conducted aquatic impact assessment for operations of a proposed DC submarine transmission cable in Lake Champlain. Assessment utilized site-specific magnetic field calculations and focused on a number of species of interest, including fish of special concern to the states of Vermont and New York, and considered potential impacts of cable operation on species' behavior and life history, including key anadromous species.

Assessed potential operating impacts of a DC transmission line with a proposed route through Lake Erie, with particular attention to the potential effects on endangered and anadromous fish species. Effects on physiological homeostasis, behavior, development, and migration were addressed and assessed for each species.

Inspection of food product alleged to be infested with various stored product pest insects, followed by review of warehouse pest control procedures and development of infestation timelines based on plaintiffs' claims. The use of statistically and scientifically defensible assessment methods for guiding sampling and

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analysis methods.

Conducted an inspection of a consumer product for a confidential client to determine the source of customer-observed infestation. Correct species identification allowed client to pinpoint supply-chain issues.

Evaluated available invertebrate community data associated with a NRDA site in the Midwest United States, and provided an independent re-analysis of the data. This evaluation incorporated a number of variables, including physio-chemical characteristics, microhabitat characteristics, and watershed-scale data.

Contributed to a NRDA evaluation located at an East Coast refinery site. This included reviewing benthic invertebrate and fish community data for comparison to historical biological data collected at multiple time points at the same site to assess long-term population trends.

Designed a preliminary ecological risk assessment plan for a landfill site in Washington State. Evaluated and selected appropriate ecological receptors and determined proximity of the site in relation to threatened/endangered species habitats.

Prepared sampling and analysis plans as part of a multi-phase site investigation for two remote sites with former mining and smelting activities. Key sampling efforts addressed soil, sediment, and surface water chemistry data, as well as freshwater macroinvertebrate diversity and abundance.

Oversaw and managed the field sampling associated with a complex lead-contaminated site in California. This required coordination and cooperation with outside consultants, management of large amounts of data (200+ samples per day), and onsite lead analysis via x-ray fluorescence. Performed onsite evaluation of day-to-day conditions and adapted sampling program accordingly.

PRE-FILED DIRECT TESTIMONY OF MARK ROLL, MARK GARDELLA, AND DANIEL FORREST

REVOLUTION WIND, LLC Project

RevWind Exhibit 6

PRE-FILED DIRECT TESTIMONY

OF

MARK ROLL, MARK GARDELLA, AND DANIEL FORREST

REVOLUTION WIND, LLC

EXECUTIVE SUMMARY

Revolution Wind, LLC's ("Revolution Wind") approximately 704 megawatt offshore wind farm (the "Revolution Wind Project") will avoid or minimize any potential impacts of the Facilities to archaeological resources. This testimony describes the impact of the Revolution Wind Export Cable – Rhode Island ("RWEC-RI") and Onshore Facilities of Revolution Wind on certain aspects of marine and terrestrial archaeological resources. The testimony examines potential impacts resulting from all portions of the Project within the jurisdiction of the Energy Facility Siting Board ("EFSB") (those portions of the Project referred to herein as the "Facilities") with respect to marine and terrestrial archaeological resources and demonstrates Revolution Wind Facilities' conformance with the relevant EFSB requirements. Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Mark Roll, Mark Gardella, and Daniel Forrest September 17, 2021 Page 1 of 11

1	I.	Introduction
2		Mark Roll
3	Q.	Please state your name and business address.
4	А.	My name is Mark Roll. My business address is 56 Exchange Terrace, Suite 300,
5		Providence, Rhode Island 02903.
6	Q.	Please provide your educational background and professional experience.
7		My educational background and professional experience are described in detail in the
8		Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios
9		Sakellaris, Kristen Trudell, and Jason Ross.
10		Mark Gardella
11	Q.	Please state your name and business address.
12	A.	My name is Mark Gardella. My business address is 107 Selden Street, Berlin,
13		Connecticut 06037.
14	Q.	Please provide your educational background and professional experience.
15	A.	My educational background and professional experience are described in detail in the
16		Pre-Filed Direct Testimony of Mark Roll, Mark Gardella, Laura Morse, Susan Moberg,
17		M. Wing Goodale, and Drew Carey.
18		Daniel Forrest
19	Q.	Please state your name and business address
20	A.	My name is Daniel Forrest. My business address is 217 Montgomery Street, Suite 1100,

21 Syracuse, New York 13202.

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1	Q.	By whom are you employed and in what capacity?
2	A.	I am a Senior Project Manager and Cultural Resources Practice Leader for Offshore
3		Wind at Environmental Design & Research, Landscape Architecture, Engineering &
4		Environmental Services, D.P.C. ("EDR").
5	Q.	What are you principal responsibilities in that position?
6	A.	I am responsible for oversight of cultural resources surveys and assessments conducted in
7		support of State and federal permitting for offshore wind projects and their associated
8		onshore facilities. I also serve as the primary point of contact for Native American Tribal
9		coordination, State historic preservation office consultations, and federal consultations
10		under Section 106 of the National Historic Preservation Act ("NHPA").
11	Q.	How long have you worked for EDR?
12	A.	I have worked the field of archaeology and historic preservation for 29 years and with
13		EDR for approximately 2 months.
14	Q.	Describe your educational background and professional experience.
15	A.	I received a Bachelor of Arts degree in Anthropology and Philosophy from the University
16		of Connecticut in 1993. I completed my undergraduate archaeological field school in
17		1992 (Mashantucket Pequot Tribal Nation Reservation, Connecticut). I enrolled in the
18		graduate anthropology program at the University of Connecticut in 1997 and completed
19		my course work for a Ph.D. degree in 2000. My course work included North American
20		Prehistory, Northeastern Archaeology, Analytical Methods (archaeology), Human
21		Osteology, Geomorphology, Geoarchaeology, Anthropological Theory, Archaeological

18	Q.	Have you ever testified before the EFSB or other siting board?
17		transportation and energy infrastructure.
16		and Rhode Island requiring State and federal permitting, with a primary focus on
15		supervised archaeological surveys and excavations for over 60 projects in Connecticut
14		2021, immediately prior to accepting my current position with EDR. I have conducted or
13		Manager at the Public Archaeology Laboratory (Pawtucket, RI) from 2015 through June
12		appointed State Historic Preservation Officer in 2013. I served as the Senior Operations
11		appointed Deputy State Historic Preservation Officer in 2012, and subsequently
10		(Archaeologist) at the Connecticut State Historic Preservation Office in 2009, was
9		Director from 1998-2009. I accepted a position as National Register Specialist
8		Archaeology Survey Team (Storrs, CT), serving as Senior Archaeologist & Field
7		and 1994-2009, I was employed as a professional archaeologist at the Public
6		2001 to pursue a professional career in cultural resource management. From 1992-1993
5		Mashantucket Pequot Tribal Nation Reservation. I withdrew from the Ph.D. program in
4		investigator for the Sandy Hill Site, an early Holocene settlement on the present-day
3		area of research was Northeastern North American Prehistory, and I served as the lead
2		Paleolithic Archaeology (Wallertheim, Rhineland-Palatinate, Germany). My principal
1		Theory, and Human Evolution, and graduate archaeological field school in Middle

19 A. No.

20 Q: Please explain briefly the purpose of this testimony.

1	A:	The purpose of this testimony is to describe the marine and terrestrial archaeological
2		resource surveys performed for the Project.
3	Q.	How is this testimony organized?
4	А.	The testimony is organized as follows: Section I is the introduction. Section II is the
5		cultural resources assessments for the Facilities. Section III is the conclusion.
6	Q:	Will you be sponsoring any proposed addenda to the testimony?
7	A:	Yes, we are sponsoring the following addendum:
8		• Addendum 6-1: Curriculum Vitae of Daniel Forrest.
9	II.	Cultural Resources Assessments for Facilities
10	Q.	What work was performed for the Facilities?
11	А.	Revolution Wind engaged SEARCH, Inc. to conduct a marine archaeological survey for
12		the RWEC-RI and engaged The Public Archaeology Laboratory ("PAL") to conduct a
13		terrestrial archaeological resource survey of the Onshore Facilities, including the onshore
14		portion of the landfall work area, onshore transmission cable, onshore substation
15		("OnSS"), and interconnection facility ("ICF").
16	Q.	What is a marine archaeological survey?
17	A.	A marine archaeological survey identifies buried archaeological sites in areas of potential
18		sediment disturbance.
19		
20		The marine archaeological survey conducted for Revolution Wind included archival
21		research of previously reported submerged archaeological sites, geology, and databases

1	containing information on verified or potential shipwrecks in the vicinity of the RWEC-
2	RI. Qualified marine archaeologists with SEARCH, meeting the qualifications
3	established by the Bureau of Ocean Energy Management ("BOEM"), reviewed
4	geophysical data characterizing areas of anticipated Project impacts to the seabed.
5	Qualified marine archaeologists must meet the Secretary of the Interior's Professional
6	Qualifications Standards (48 FR 44738-44739) and have experience in conducting and
7	interpreting HRG (geophysical) surveys, per BOEM's Guidelines for Providing
8	Archaeological and Historic Property Information Pursuant to 30 CFR Part 585 (2017;
9	hereafter "BOEM guidelines"). Geophysical data reviewed by SEARCH included
10	subbottom profilers to characterize buried sediments, side-scan sonar, and multibeam
11	echosounder to identify potential resources exposed on the seafloor, and marine
12	gradiometers to identify magnetic anomalies consistent with shipwrecks or other historic
13	resources containing ferrous metals.
14	
15	The results of the geophysical survey were followed by an archaeological geotechnical
16	survey to collect core samples of potentially intact terrestrial sediments for analyses.
17	Coring locations were selected in coordination with Native American Tribal
18	representatives to ensure features of concern to the Native American Tribes were
19	appropriately analyzed. Radiocarbon dating of organic sediments and preserved floral
20	remains was used to assist in the reconstruction of ancient environmental conditions,

1		determine the evolution of the former terrestrial landscape, and refine the age estimates
2		for progressive submergence of the Project area following the last ice age.
3		
4		The marine archaeological survey of the Project was conducted in accordance with the
5		R.I. Historical Preservation and Heritage Commission's ("HPHC") Performance
6		Guidelines and Standards for Archaeology (RIHPHC, 2015) and BOEM guidelines. This
7		technical study has been submitted to BOEM for the evaluation of potential impacts to
8		support BOEM's review under Section 106 of the NHPA.
9	Q.	What is a terrestrial archaeological resource survey?
10	A.	Similar to the marine archaeological survey, a terrestrial archaeological resource survey
11		identifies buried archaeological sites in areas of potential ground disturbance.
12		
13		The terrestrial archaeological assessment of the proposed Onshore Facilities conducted
14		for Revolution Wind included background research on the reported archaeological
15		resources in the vicinity on the Onshore Facilities, historic cartographic research, and
16		review of local histories to reconstruct past land uses that could be associated with
17		archaeological sites. PAL conducted an intensive archaeological survey of the Onshore
18		Facilities in accordance with the HPHC's Performance Guidelines and Standards for
19		Archaeology (RIHPHC, 2015). These guidelines establish a phased approach to
20		identification and evaluation of archaeological resources. This technical study has been
1		submitted to BOEM for the evaluation of potential impacts to support BOEM's review
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2		under Section 106 of the NHPA.
3	Q.	Please describe briefly the process that BOEM and HPHC will undertake to assess
4		archaeological resources.
5	A.	The Section 106 NHPA process "requires Federal agencies to take into account the
6		effects of their undertakings on historic properties and afford the [Advisory Council on
7		Historic Preservation] a reasonable opportunity to comment on such undertakings." 36
8		CFR § 800.1[a]. Through the Section 106 process, BOEM will consult with relevant
9		stakeholders, including State Historic Preservation Officers and Native American Tribes.
10		
11		Additionally, Rhode Island State agency permits and authorizations will be required for
12		the Facilities, and the Antiquities Act of Rhode Island, R.I. Gen. Laws § 42-45.1-1 et seq.
13		("Antiquities Act"), requires all State agencies, departments, institutions, commissions,
14		and all Rhode Island municipalities to cooperate with the HPHC in the preservation,
15		protection, excavation, and evaluation of specimens and sites. HPHC has promulgated
16		regulations implementing the Antiquities Act, which, in part, establish an advisory
17		process to review State-supported undertakings for potential effects to archaeological or
18		cultural resources. See 530-RICR-10-00-1.5. Undertakings that are subject to compliance
19		with Section 106 of the NHPA, such as the Project, satisfy the requirements of the
20		Antiquities Act by adhering to federal regulations located at 36 CFR Part 800. See 30-
21		RICR-10-00-1.14C. As previously noted, Revolution Wind has submitted to BOEM

- technical studies that evaluate potential impacts to marine and terrestrial archaeological
 resources to support BOEM's Section 106 consultations.
- 3

Q. Please summarize the results of the marine archaeological resource survey

4 conducted for Revolution Wind with respect to the RWEC-RI.

5 A. The RWEC-RI will be sited to avoid or minimize impacts to potential submerged cultural 6 sites and paleolandforms to the extent practicable. Two submerged features representing 7 potentially intact elements of ancient terrestrial landscapes (paleolandforms) were 8 identified within the survey limits in R.I. State Waters. Three potential shipwrecks sites 9 were also identified during the geophysical surveys of RWEC-RI. SEARCH has 10 recommended 50-meter avoidance buffers around each potential shipwreck site. If 11 Facilities-related seabed disturbance within the limits of paleolandforms or shipwrecks 12 and associated avoidance buffers cannot be avoided, additional investigations will be 13 conducted to assist in detailed delineation of the feature boundaries, assess the affected 14 feature's cultural significance, and, if warranted, support evaluation of design options to 15 avoid or minimize impacts. Any avoidance and mitigation actions needed for cultural 16 resources will be developed through the National Environmental Policy Act and Section 17 106 consultations with BOEM as the lead federal agency, as well as HPHC and Native 18 American Tribes.

19

20 Native American Tribal representatives were involved, and will continue to be involved,
21 in marine survey protocol design, execution of the surveys, and interpretation of the

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1		results. A plan for vessels will be developed prior to construction to identify no-
2		anchorage areas to avoid documented sensitive resources. An Unanticipated Discovery
3		Plan (UDP) also will be implemented that will include stop-work and notification
4		procedures to be followed if a potentially significant archaeological resource is
5		encountered during construction.
6	Q.	Please summarize the results of the terrestrial archaeological resource survey
7		conducted for Revolution Wind.
8	A.	The Onshore Facilities are generally sited in an area already extensively disturbed. With
9		respect to the OnSS and ICF, both background research and geotechnical investigations
10		indicated the former Camp Avenue Dump Site and the adjacent lands where these
11		Facilities components will be sited have been subject to pervasive ground disturbance.
12		The intensive (locational) survey performed by PAL was conducted in coordination with
13		Native American Tribes and under an archaeological permit issued by the HPHC. PAL
14		identified two intact Native American archaeological sites along the margins of the
15		former dump. Both sites pre-date European colonization of the region based on the
16		cultural materials recovered. The OnSS has been redesigned to minimize impacts to
17		these sites and the Project is further evaluating any additional steps to avoid the sites. A
18		significant majority of the larger site will be avoided by the current Facilities design, with
19		only a small portion that may be potentially affected by access road construction or
20		associated grading. Based on current Facilities designs, some of the smaller site may be

21 impacted by Facilities construction. The Facilities will implement a UDP and Site

1		Avoidance and Protection Plan developed in consultation with HPHC and Native
2		American Tribes and approved by BOEM to minimize risks to new discoveries and site
3		areas that can be avoided. Mitigation of potential impacts to the sections of both sites that
4		cannot be feasibly be avoided will be addressed through the Section 106 consultations.
5		HPHC and affected Native American Tribes will be parties to the consultations. A UDP
6		will also be implemented that will include stop-work and notification procedures to be
7		followed if a potentially significant archaeological resource is encountered during
8		construction.
9	Q.	Will any above-ground historic resources be affected by the Facilities?
10	A.	No physical impacts to above-ground historic resources will occur as a result of Facilities
11		construction. A portion of the proposed buried cable alignment for the RWEC-RI
12		intersects the historic Quonset Point Naval Air Station. No historic buildings or structures
13		associated with the former naval facilities will be affected by the installation of the buried
14		cable ducts or associated Facilities elements. The construction of the buried utilities will
15		not affect the existing character or historic setting of the former naval air station.
16		Analyses of the potential visual impacts caused by the OnSS and ICF indicate minimal
17		visibility of the Facilities from all identified historic properties. No adverse impacts to
18		above-ground historic properties are anticipated.
19	Q:	Does the panel have an opinion to a reasonable degree of certainty regarding any
20		impacts to marine archaeological resources from the RWEC-RI?

1	A:	Yes, we do. The RWEC-RI will be sited to avoid or minimize impacts to potential
2		submerged cultural sites and paleolandforms to the extent practicable. Mitigation actions
3		needed for submerged cultural resources will be developed through Section 106
4		consultation with BOEM as the lead federal agency, HPHC and Native American Tribes.
5	Q:	Does the panel have an opinion to a reasonable degree of certainty regarding any
6		impacts to terrestrial archaeological resources from the Onshore Facilities?
7	A:	Yes, we do. Portions of two pre-contact Native American sites may be impacted by the
8		Onshore Facilities at or in the vicinity of the Camp Avenue Dump Site. The remaining
9		sections of the affected sites will be protected during construction to minimize the risk of
10		inadvertent damage. Mitigation actions necessary to address the portions of the two sites
11		that cannot be feasibly avoided will be developed through Section 106 consultations with
12		BOEM as the lead federal agency, HPHC, and Native American Tribes. Also, as noted
13		above, the above-ground historic resources will not be affected by the Onshore Facilities
14		and, therefore, the Facilities conform to the relevant requirements regarding above-
15		ground historic resources.
16	III.	Conclusion

- 17 Q. Does this conclude your testimony?
- 18 A. Yes.

Revolution Wind, LLC RIEFSB Docket No. 2021-01 Addendum 6-1 Page 1 of 1

Daniel Forrest

Cultural Resources Practice Leader Offshore Wind & New England

Daniel Forrest serves as EDR's Cultural Resources Practice Leader for Offshore Wind and the New England Region. Dan has more than 25 years of experience in in cultural resource management (CRM). He has a BA in Anthropology and Philosophy from the University of Connecticut, where he also completed graduate studies in their Archaeology and Anthropology department. Included in his professional experience prior to joining EDR, Dan served as the State Historic Preservation Officer (SHPO) for the State of Connecticut. He has particular expertise in complex consultations regarding the identification, evaluation, and treatment of historic properties. Other areas of expertise include Pre-Contact Native American archaeology, lithic technology, and geoarchaeology.

Dan provides clients with senior strategic advice, planning, and technical support for projects requiring review under Sections 106 and 110 of the National Historic Preservation Act (NHPA), the National Environmental Policy Act (NEPA), and Section 4(f) of the Department of Transportation Act. As a consultant, he has managed dozens of cultural resources survey, planning, and mitigation projects for major projects in the areas of offshore wind, transportation, electrical transmission, telecommunications, housing, and civil engineering. As Connecticut SHPO, he managed all operations of both Connecticut Office of the Arts and the State Historic Preservation Office, directed the operations of four state historic museums, and developed statewide preservation policy in coordination with a broad range of local, state, and federal stakeholders.

Project Experience

Revolution Wind Farm, Section 106 & Cultural Resources Strategic Oversight, Offshore, MA, RI - Technical oversight and strategic consulting for cultural resources assessments, Section 106 of the NHPA, SHPO, and Tribal consultation for a proposed 880-MW offshore wind farm located off the coast of southern New England. Served as client's point-of-contact and lead with Bureau of Ocean Energy Management (BOEM) staff and stakeholders for marine archaeological assessment, terrestrial archaeological assessment, historic resources effects analysis, and proposed mitigation strategies.

South Fork Wind Farm, Section 106 & Cultural Resources Strategic Oversight,, Offshore, NY/New England – Technical oversight and strategic consulting for cultural resources assessments, Section 106 of the NHPA, SHPO and Tribal consultation for a proposed 132-megawatt offshore wind farm located off the coast of southern New England. Served as client's point-of-contact and lead with BOEM staff and stakeholders for marine archaeological assessment, terrestrial archaeological assessment, historic resources effects analysis, and proposed mitigation strategies.

Sunrise Wind, Section 106 & Cultural Resources Strategic Oversight, Offshore NY/New England – Technical oversight and strategic consulting for cultural resources assessments, Section 106 of the NHPA, SHPO, and Tribal consultation for a proposed 880-MW offshore wind farm located off the coast of Southern New England. Served as client's point-of-contact and lead with BOEM staff and stakeholders for marine archaeological assessment, terrestrial archaeological assessment, and historic resources effects analysis.

Skipjack Wind Farm, Section 106 & Cultural Resources Strategic Oversight, Offshore, MD, DE – Technical oversight and strategic consulting for cultural resources assessments, Section 106 of the NHPA, SHPO, and Tribal consultation for a proposed 120-MW offshore wind farm located off the coast of Delaware and Maryland. Served as client's point-ofcontact and lead with BOEM staff and stakeholders for marine archaeological assessment, terrestrial archaeological assessment, and historic resources effects analysis.



Education

- Graduate Studies Program,
 Archaeology/Anthropology,
 University of Connecticut,
 Mansfield, CT, 1998-2001
- Bachelor of Arts, Archaeology and Philosophy, University of Connecticut, Mansfield, CT, 1993

Professional Affiliations

- American Cultural Resources
 Association
- Business Network for Offshore Wind

Employment History

- Cultural Resources Practice Leader Offshore Wind & New England, Environmental Design & Research, Landscape Architecture, Engineering, and Environmental Services, D.P.C., Syracuse, NY, 2021-present
- Senior Operations Manager, Public Archaeology Laboratory, Inc., Pawtucket, RI, 2015-2021
- State Historic Preservation Officer (SHPO) and Director of Arts and Historic Preservation, State of Connecticut, Hartford, CT, 2013-2015
- Deputy State Historic Preservation Officer (SHPO) and Staff Archaeologist, State of Connecticut, Hartford, CT, 2009-2013

PRE-FILED DIRECT TESTIMONY OF GORDON PERKINS AND KENNETH BOWES

REVOLUTION WIND, LLC Project

RevWind Exhibit 7

PRE-FILED DIRECT TESTIMONY OF

GORDON PERKINS AND KENNETH BOWES REVOLUTION WIND, LLC

EXECUTIVE SUMMARY

This testimony describes Environmental Design & Research, D.P.C.'s ("EDR") Visual Resource Assessment for the parts of Revolution Wind, LLC's approximately 704 megawatt offshore wind farm (the "Project") that are within the jurisdiction of the Energy Facility Siting Board ("EFSB"). The testimony describes EDR's visual resources assessment for the Project's onshore facilities and export cables within Rhode Island waters and summarizes the findings of such assessment including that there are no expected impacts to the visual resources of Rhode Island from the Project's export cables within state waters and that any visibility of the Project's onshore facilities will be minimal.

Revolution Wind, LLC RIEFSB Docket No. 2021-01 In re Revolution Wind, LLC Application to Construct a Major Energy Facility Pre-Filed Direct Testimony of Kenneth Bowes and Gordon Perkins September 17, 2021 Page 1 of 11

I.	<u>Introduction</u>
	Kenneth Bowes
Q.	Please state your name and business address.
A.	My name is Kenneth Bowes. My business address is 56 Prospect Street, Hartford,
	Connecticut.
Q.	Please provide your educational background and professional experience.
А.	My educational background and professional experience are described in detail in the
	Pre-Filed Direct Testimony of Kenneth Bowes, Kellen Ingalls, Mark Roll, Demetrios
	Sakellaris, Kristen Trudell, and Jason Ross.
	Gordon Perkins
Q.	Please state your name and business address.
A.	My name is Gordon William Perkins, Certified Geographic Information Systems
	Professional. My business address is 217 Montgomery Street, Suite 1100, Syracuse, NY
	13202.
Q.	By whom are you employed and in what capacity?
A.	I am a Senior Project Manager with Environmental Design & Research, D.P.C or EDR
	- and am manager of the Visualization Services Group.

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18 Q. What are your principal responsibilities in that position?

- 19 A. I am responsible for managing the visualization department in EDR's offices including
- 20 supervision of seven staff, developing or overseeing development of all visualization

1 products such as viewshed analysis, visual simulations, field review, visibility analyses, 2 and the development of visual impact assessment and visual resource assessment reports. 3 Q. How long have you worked for EDR? 4 I have been with EDR for approximately 13 years. Α. 5 Describe your educational background and professional experience. Q. 6 A. I received a Bachelor of Science Degree in Landscape Architecture from the State 7 University of New York College of Environmental Science and Forestry in 2001, and I 8 am a Certified Geographic Information Systems Professional. I have 21 years of 9 professional experience, focusing primarily on visualization and visual impact 10 assessment. In particular, I have extensive expertise in two-dimensional ("2-D") and 11 three-dimensional ("3-D") visualization tools, photography, calibrated simulation 12 methodology, and documentation of the visual environment. I have worked for several 13 design and consulting firms and currently serve as Visualization Services Leader at EDR. 14 Since 2001, I have participated in the development of visual impact assessments for 15 multiple offshore wind projects as well as multiple subsea and subterranean cables, 16 transmission lines, substations, and converter stations. 17 **Q**. Have you ever testified before the Energy Facility Siting Board in Rhode Island 18 ("EFSB") or other siting boards? 19 Yes, I have testified before the EFSB and other siting boards, including the following A. 20 matters: 21 • RI SB 2008-02 The Narragansett Electric Company ("TNEC") Rhode Island Reliability

22 Project;

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1		• RI SB 2015-06 Clear River Energy Center Power Plant;
2		• CT Siting Council Petition No. 1313 Tobacco Valley Solar 26.4 MW Solar
3		Photovoltaic Energy Generation Project;
4		• NYSDPS Case No. 11-T-0068 - National Grid - Mohican to Battenkill 115kV;
5		• NYSDPS Case No. 13-T-0292 - West Point Power Partners;
6		• NYSDPS Case No. 06-T-0650 - New York Regional Interconnection;
7		• NYSDPS Case No. 09-T-0049 - Upstate NY Power Corp;
8		• NYSDPS Case No. 17-F-0282 - Alle-Catt Wind Energy, LLC;
9		• NYSDPS Case No. 18-F-0262 - High Bridge Wind, LLC; and
10		• MD PSC Case No. 9629 - Skipjack Offshore Energy, LLC.
11	Q.	Will you be sponsoring any addenda to this testimony?
12	A.	Yes, we are sponsoring the following addendum:
13		Addendum 7-1: Curriculum Vitae of Gordon William Perkins.
14	Q.	Are you familiar with Revolution Wind, LLC's ("Revolution Wind") EFSB
15		Application and the Environmental Report submitted in support of the
16		Application?
17	A.	Yes.
18	Q.	Please explain briefly the purpose of this testimony.
19	A.	The purpose of this testimony is to describe the Visual Resource Assessment that EDR
20		performed for Revolution Wind for the onshore facilities in North Kingstown, R.I. (the
21		"Onshore Facilities") and the export cables within Rhode Island State Waters ("RWEC-

1		RI") associated with its approximately 704 megawatt offshore wind farm (the "Project").
2		The work included identifying visually sensitive resources and potential visibility of
3		certain facilities from those resources. I assisted with the sections of the Application to
4		the EFSB regarding potential effects to visual resources.
5	Q:	How is this testimony organized?
6	A:	The testimony is organized as follows: Section I is the Introduction. Section II is the
7		description of the EDR's Visual Resources Assessment of Revolution Wind's onshore
8		facilities and the RWEC-RI and a summary of the findings of such Assessment.
9	II.	Visual Resources Assessment of Revolution Wind's onshore facilities
10	Q.	What work did you perform at EDR for Revolution Wind?
11	А.	EDR completed a Visual Resources Assessment for the above-ground components of the
12		Onshore Facilities, including the Onshore Substation ("OnSS") and Interconnection
13		Facility ("ICF"), as well as the RWEC-RI.
14	Q.	What is a Visual Resources Assessment?
15	A.	A Visual Resources Assessment inventories the range of potentially affected visual
16		resources within a defined radius of the proposed action. It then evaluates the degree of
17		potential visibility and provides a summary of the potential visual impacts to these
18		resources resulting from the action.
19	Q.	Please explain the Visual Resources Assessment that you did for Revolution Wind.
20	A.	The Visual Resources Assessment defined the visual character of the Project visual study
21		area, inventoried and evaluated the existing visual resources and viewer groups within the

visual study area, described the appearance of the visible components of the proposed

1	Project, documented existing views within the visual study area, evaluated potential
2	Project visibility within the visual study area, and assessed the potential effects on visual
3	resources associated with the proposed Project. To complete this, we first identified a
4	visual study area that included all areas within three miles of the Onshore Facilities. This
5	study area included approximately 30.5 square miles within North Kingstown and small
6	portions of Warwick and East Greenwich, as well as a part of Narragansett Bay, all
7	located in Rhode Island. Within this study area, the existing environment was inventoried
8	using landcover data from the United States Geological Survey National Landcover
9	Database. This data helped to identify landscape types that were similar in visual
10	characteristics. Open water is the most prevalent landscape type within the visual study
11	area due to the presence of Narragansett Bay. Narragansett Bay makes up approximately
12	35 percent of the visual study area and includes portions of the West Passage of the Bay,
13	Mill Creek, Fishing Cove, Wickford Harbor, and Bissel Cove.
14	
15	Developed land comprises the second largest proportion of the visual study area, making
16	up approximately 30 percent of the total area. This landscape type is primarily comprised
17	of industrial land associated with the Quonset Business Park, Quonset Point Naval Air
18	Station, the Quonset Davisville Business Park, and other commercial and industrial areas
19	within North Kingstown. Developed areas also include dense suburban residential
20	developments located north and west of the business parks along the State Route 403, US
21	Route 1, and Davisville Road corridors within the Visual Resource Assessment. Open

1	views within this landscape type are generally limited by the presence of foreground
2	buildings and vegetation.
3	Forest, open space, wetlands, beach and agricultural land collectively make up the
4	remaining smaller portions of the Visual Resource Assessment.
5	
6	EDR's Visual Resource Assessment also included researching and identifying visually
7	sensitive resources that have been recognized by national, state, or local governments,
8	organizations, and/or Native American Tribes. These sites are given some level of
9	protection or recognition and avoiding or minimizing impacts to these sites is an
10	important consideration during project planning and design. This inventory determined
11	that the visual study area includes ninety-five (95) visually sensitive resources.
12	
13	To determine the geographic areas of potential visibility of the Project, EDR used a lidar-
14	based viewshed analysis. This analysis considers the height of proposed above-ground
15	Project components, along with a digital surface model representing ground level
16	elevations, vegetation, and structures present in the visual study area. A geographic
17	information systems (GIS) analysis of these data was conducted to determine whether a
18	direct line of sight would be available from ground level vantage points to the Project. If
19	a direct line of sight is available, the position is coded as visible. Heights used in the
20	viewshed calculations were based on sample points of the major above-ground equipment
21	included in the design plans for the Onshore Facilities.

22

1		EDR also conducted a line of sight cross section analysis to determine the degree of
2		potential visibility from specific visually sensitive resources, including Wickford Historic
3		District, Wickford Harbor/Wickford Village State Scenic Area, Narragansett Bay, and
4		Quonset Point Naval Air Station.
5	Q	After conducting the Visual Resource Assessment, did you make findings on any
6		visual impacts from the RWEC-RI and Onshore Facilities.
7	A:	Yes. The viewshed analysis results suggested that approximately 15% of the visual study
8		area could have some level of Project visibility. The greatest potential for Project
9		visibility occurs on portions of Narragansett Bay in the foreground (0.5 to 1.5 miles) and
10		middle ground (1.5 to 3 miles) distance zones. This visibility is largely the result of
11		available long-distance views over open water, unencumbered by foreground features
12		such as vegetation and buildings. The viewshed analysis also indicates potential visibility
13		in the immediate vicinity of the Project onshore facilities (within the near foreground
14		zone). This generally includes discrete views between buildings and along portions of
15		private and public roads within the Quonset Point Business Park. However, the viewshed
16		analysis assumes a 50-foot clearing zone along these roads suggesting the viewshed
17		analysis result may present a conservative assessment of visibility that ignores roadside
18		screening vegetation. Small areas of visibility were also indicated in the vicinity of
19		Callahan Road, north of the Project onshore facilities and along the immediate shoreline
20		of Wickford Harbor and the Village of Wickford. In the western portion of the visual
21		study area, the viewshed analysis indicated no potential visibility beyond the limits of the
22		Project onshore facilities.

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1	The line-of-sight cross sections illustrated that the OnSS and ICF are substantially
2	screened from view from Wickford, and the only potentially visible Project component
3	would be the proposed interconnection transmission structures associated with the ICF.
4	All of the lightning masts and lower-level Project features are completely screened by
5	existing structures and vegetation. It is likely that the visibility of the transmission
6	structures will be imperceptible from the Village of Wickford at a distance of 1.5 miles
7	because the structures will have a relatively narrow profile and because only the upper 10
8	feet of the proposed structures are indicated as having potential visibility.
9	
10	From Narragansett Bay and Quonset Point Naval Air Station, only a small portion of the
11	top of the proposed transmission structures are likely to have potential visibility due to
12	screening provided by the structures and vegetation adjacent to the Project onshore
13	facilities. As discussed previously, at a distance of approximately 1.5 miles, the
14	potentially visible portions of the Project will likely be imperceptible due to their narrow
15	profile. It is important to note the existing context within the identified potential views of
16	the onshore facilities. The Quonset Point Business Park hosts a number of large industrial
17	manufacturing facilities along with a working port on the waterfront. From each of the
18	visually sensitive viewing locations indicated as having potential visibility of the onshore
19	facilities, the industrial and commercial uses associated with the Quonset Point Business
20	Park generally compose the foreground or near-foreground of the view. As such, even
21	where views of the proposed onshore facilities are available, the existing infrastructure
22	present in the view will likely distract the viewer from the very small portions of the

1		proposed facilities that are potentially visible. This mitigating factor is likely to further
2		reduce the potential visibility and visual effects resulting from the operation of the
3		onshore facilities.
4	Q:	Based on the EDR's Visual Resource Assessment, please summarize your findings
5		on any visual impacts resulting from the construction of the RWEC-RI and
6		Onshore Facilities?
7		The RWEC-RI export cable will be constructed over a short period of time and is
8		designed to be buried underground, minimizing potential impacts to surrounding areas.
9		Because the construction of the onshore transmission cable will occur over a relatively
10		short period of time and will occur within public roads and ROWs utilizing relatively
11		light construction equipment, no significant visual impacts are anticipated. Construction
12		of the onshore facilities will occur adjacent to the existing Davisville Substation, in lots
13		surrounded by mature trees. Construction activities associated with the onshore facilities
14		are expected to take approximately one year and includes clearing and grading,
15		excavation, the installation of foundations, and construction of the facilities. None of the
16		identified visually sensitive resources within the 3-mile visual study area will experience
17		adverse visual impacts.
18		
19		However, the construction will likely be visible to residential neighborhoods immediately
20		adjacent to the onshore facilities and therefore may result in short-term visual impacts.

- 21 Construction of the onshore facilities will typically involve work during daylight hours
- 22 and the installation of temporary security and safety lighting at night. As a result, it is

1		anticipated that lighting associated with construction activities would result in short term
2		impacts to visual resources. Construction of the OnSS will result in increased vehicular
3		traffic patterns. It is anticipated that short term impacts will result from increased traffic
4		during the construction and decommissioning phase of the OnSS.
5	Q.	Based on the EDR's Visual Resource Assessment, please summarize your findings
6		on any visual impacts resulting from the operation of RWEC-RI and the Onshore
7		Facilities?
8	A.	There are no expected long-term impacts to the visual resources of Rhode Island from the
9		RWEC-RI. The landfall work area and onshore transmission cable are sited primarily
10		within a public right of way in a commercial area. There are no expected long-term
11		impacts to visual resources associated with these facilities. Locating the OnSS next to the
12		existing Davisville Substation limits perceived changes in land use and scenic quality. In
13		addition, given that the OnSS has been proposed in an area intended for industrial
14		development, there are no expected visual impacts with this intended land use. The
15		onshore facilities' layout has been designed to accommodate various setbacks from roads,
16		residences, private properties, wetlands and cultural resources. In near-foreground areas,
17		such as Camp Avenue, the Visual Resource Assessment concluded that visual impacts
18		could occur at residences closest to the OnSS and ICF. However, it is expected that these
19		impacts are likely to be very localized due to the prevalence of existing vegetative buffers
20		surrounding the OnSS and ICF. Additionally, the access road to the OnSS and ICF will
21		benefit from a landscape treatment that is consistent with residential landscape vegetation

1		and materials. In conclusion, any visual impacts from the onshore facilities during
2		operations will be localized.
3	Q:	Based on the EDR's Visual Resource Assessment, please summarize your findings
4		on any visual impacts resulting from the decommissioning of RWEC-RI and the
5		Onshore Facilities?
6	A:	Impacts during decommissioning are expected to be the same as during construction.
7	Q:	Have you read the Advisory Opinion from the Statewide Planning Program?
8	A:	Yes
9	Q:	Do you agree with that Advisory Opinion?
10	A:	Yes, I agree that any visual impacts from the onshore facilities will be localized and will
11		not result in visual impacts to the identified public visually sensitive resources.
12	Q.	In your expert capacity, do you have an opinion to a reasonable degree of certainty
13		regarding the RWEC-RI and Onshore Facilities' impact to visual resources?
14	А.	I do. As I summarized above, visibility of the onshore facilities will be minimal. In areas
15		where there is no visibility, no visual impacts will occur. Visual resources with potential
16		visibility of the onshore facilities are located sufficiently distant, and only negligible to
17		minimal visual effects to these resources are expected. In areas where visual impacts
18		could occur (residences nearby the OnSS entry road), it is anticipated that the use of
19		vegetative mitigation would successfully reduce and minimize these impacts.
20	Q.	Does this conclude your testimony?
21	A.	Yes.

Revolution Wind, LLC RIEFSB Docket No. 2021-01 Addendum 7-1 Page 1 of 4

EDR



Education

- Bachelor of Landscape Architecture, Ecology Emphasis, State University of New York College of Environmental Science and Forestry, 2001
- Associate of Arts, Keystone College, La Plume, PA, 1998

Certifications

- Certified Geographic Information Systems Professional (GISP)
- Federal Aviation Association, Unmanned Aerial Vehicle (UAV)
 Pilot Certification for Commercial
 Flights

Professional Affiliations

- Member, Alliance for Clean
 Energy New York
- Member, American Wind Energy Association

Employment History

- Division Manager, Visualization, Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C., Syracuse, NY, 2020-present
- Senior Project Manager, Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C., Syracuse, NY, 2016-2020

Gordon Perkins, GISP Division Manager, Visualization

Gordon is a Division Manager, Visualization, with 20 years of professional experience. Gordon is one of the leading expert consultants in Visualization and Visual Impact Assessment in the Northeast and is well known in the renewable energy industry. Gordon has extensive expertise in the technical methodologies associated with visual impact assessment, visual resource assessment, and scenic landscape assessment.

As a Division Manager with EDR, Gordon's responsibilities include the ongoing evaluation and development of our technical methodologies used in visual impact assessment, including new techniques in data collection, processing and analysis, and 3-D modeling. Gordon is also responsible for assigning, scheduling and coordinating assistance from the in-house multi-disciplined team of professionals. He remains hands-on throughout the project, overseeing and advising the EDR Team as needed, as well as providing quality assurance.

Project Experience

Sunrise Wind Farm Project, Visual Impact Assessment, Offshore MA/RI- Completed the visual assessment associated with state renewable energy development bid process and provided technical oversight of all visual impact studies including field photography and survey, visual simulation, and preparation of the visual assessment report.

Revolution Wind Farm, Visual Impact Assessment, Offshore MA/RI- This project includes the on-going preparation of a visual impact assessment associated with an offshore wind farm located off the coasts of Massachusetts and Rhode Island. Senior project manager responsible for technical oversight of all visual impact studies including field photography and survey, visual simulation, and preparation of the visual assessment report.

South Fork Wind Farm, Visual Impact Assessment, Offshore MA/RI- This project involved a visual impact assessment associated with an offshore wind farm located approximately 19 miles off the coast of Block Island Rhode Island. Served as senior project manager and provided technical oversight for field photography and survey, curvature of the earth calculations, viewshed methodology, simulations, and report production. Also provided graphic support for public outreach and education efforts.

Skipjack Wind Farm, Visual Impact Assessment, Offshore DE- This project includes a full visual impact assessment associated with an offshore wind farm located off the coast of Delaware and Maryland. Provided project management and technical oversight for field photography and survey, curvature of the earth calculations, viewshed methodology, simulations, and report production. Also provided graphic support for public outreach and education efforts.

Icebreaker Wind Project, Erie County, Cleveland, OH- This project included Visual Impact Assessment for a proposed 20 megawatt (MW) offshore wind project in Lake Erie. Obtained photographs, assisted with preparation of visual simulations, and oversaw production of Visual Impact Assessment Report.

NYSERDA Offshore Wind Master Plan – Completed a Visibility Threshold Study for the New York State Offshore Wind Masterplan to determine the potential visual impact threshold for the placement of offshore wind energy area nominations. The study included an analysis of past weather data to predict prevailing conditions and visibility, visual simulations, and a compendium report.

Galloo Island Wind Project, Jefferson County, NY- Prepared Visual Impact Assessment and technique support for proposed 30-turbine wind energy facility located on an island in Lake Ontario. **Block Island Wind Farm, Block Island, RI**- This project involved a proposed 30 MW wind farm facility located in the Atlantic Ocean, 3 miles off the coast of Block Island. Provided preliminary visual simulations and involved in on-going research associated with daytime and nighttime visibility thresholds of offshore turbines. Also involved in studies associated with the public acceptance of offshore wind farms.

Long Island Offshore Wind Park (LIOWP), Long Island, NY- Prepared visual simulations of the Long Island Offshore Wind Park (LIOWP) Project, a proposed 140-megawatt offshore wind power project. Provided daytime simulations of the project from multiple locations on the southern Long Island shoreline. As a sub consultant to ENSR, EDR performed photographic and survey fieldwork and detailed computer modeling to develop realistic simulations of the proposed wind farm. EDR also participated in public outreach meetings and workshops concerning the project.

Cape Wind Offshore Wind Farm, Nantucket Sound, MA- Created survey accurate visual simulations for America's first offshore wind proposal. Completed daytime and, first in the industry nighttime visual simulations, depicting a 420-megawatt wind farm. Provided fieldwork oversight and photography from critical points throughout Cape Cod and the Islands.

BOEM Offshore Visualizations for the MA/RI WEA- *Prior to EDR*, Created over 500 surveys accurate visual simulations depicting the BOEM wind energy areas in Massachusetts and Rhode Island. Used digital imaging techniques to depict four seasons and four times of day from each viewpoint. Contracted survey and meteorological experts to produce predictive visibility models.

Tobacco Valley Solar Farm, Simsbury, CT- Completed an abbreviated visual assessment for a 26-megawatt solar facility and created a mitigation plan which included vegetative screening, project setbacks from residential properties, and alternative fencing materials. Also testified before the Connecticut Siting Council and participated in settlement negotiations with the Town of Simsbury.

Canisteo Wind Farm, Steuben County, NY- Developed a Visual Impact Assessment (VIA) under Article 10 Regulations, for a 122-turbine project. The Visual Impact Assessment Report evaluated potential project visibility within the study area, identified key views, and assessed visual impacts associated with the proposed wind power project. Also completed a Visual Impact Assessment for the associated transmission line under Article VII regulations.

Alle-Catt Wind Farm, Allegany, Cattaraugus, and Wyoming Counties, NY- Developed a Visual Impact Assessment (VIA) under Article 10 Regulations for a 117-turbine project. The Visual Impact Assessment Report evaluated potential project visibility within the study area, identified key views, and assessed visual impacts associated with the proposed wind power project.

Hardscrabble Wind Power Project, Towns of Fairfield, Norway, & Little Falls in Herkimer County, NY- Developed viewshed maps and created visual simulations for the Visual Impact Assessment (VIA) for a 61-turbine project. Assisted with preparation of the Visual Impact Assessment Report which evaluated potential project visibility within the study area, identified key views, and assessed visual impacts associated with the proposed wind power project.

Maple Ridge Wind Farm, Lewis County, NY- Assisted in the completion of a visual analysis for a 320-megawatt wind farm in upstate New York. Completed field verification (balloon study), visual simulations, viewshed analysis, and nighttime impact assessment.

Jordanville Wind Power Project, Towns of Stark & Warren in Herkimer County, NY- Developed viewshed maps and created visual simulations for the Visual Impact Assessment (VIA) for a proposed 150 MW, 75-turbine project. The VIA report described visible components of the proposed project, defined the visual character of the study area, and inventoried and evaluated visual resources and viewer groups. The study also evaluated potential project visibility within the study area, identified key views, and assessed visual impacts associated with the proposed wind power project.

Cohocton Wind Power Project, Town of Cohocton in Steuben County, NY- Prepared visual simulations for the Visual Impact Assessment (VIA) for an 82 MW, 41-turbine project. Assisted with preparation of the Visual Impact Assessment Report which evaluated potential project visibility within the study area, identified key views, and assessed visual impacts associated with the proposed wind power project.

Marble River Wind Farm, Towns of Clinton & Ellenburg in Clinton County, NY- Created visual simulations for the Visual Impact Assessment (VIA) for a 200 MW, 109-turbine project. Assisted with preparation of the Visual Impact Assessment Report which evaluated potential project visibility within the study area, identified key views, and assessed visual impacts associated with the proposed wind power project.

Dairy Hills Wind Farm, Towns of Castile, Covington, Perry, & Warsaw in Wyoming County, NY- Conducted visual field work and created visual simulations for a 160 MW, 80-turbine project. Assisted with preparation of the Visual Impact Assessment Report that described the appearance of visible components of the proposed project, defined the visual character of the study area, and inventoried and evaluated visual resources and viewer groups. The study also evaluated potential project visibility within the study area, identified key views, and assessed visual impacts associated with the proposed wind power project.

Jamestown Board of Public Utilities Power Plant & Operations Center, Jamestown, NY- Prepared visual simulations for a 40 MW clean-coal power-generating plant and operations center. Visual impacts of the project were assessed by creating computer models of the proposed facilities and computer-assisted visual simulations of potential impacts as viewed from representative viewpoints. Assisted with preparation of Visual Impact Assessment Report that evaluated project visibility and visual impact on sensitive receptors and identified mitigation options, which included recommendations regarding design and siting, the color and texture of built materials, and lighting.

Clear River Energy Center & Burrillville Interconnection Project, Burrillville, RI - Prepared a visual impact assessment for a proposed 900 MW natural gas generating plant and interconnection transmission line. Visual impacts of the project were assessed by creating computer models of the proposed facilities and computer-assisted visual simulations of potential impacts as viewed from representative viewpoints. Provided expert witness testimony before the Rhode Island Energy Facilities Siting Board.

Southern Rhode Island Transmission Project, East Greenwich, RI- Completed photography and field verification for a 7.3mile 115kV transmission line and associated substation. Created visual simulations representing realistic and accurate right-ofway clearing and proposed improvements. Provided expert witness testimony before the Rhode Island Energy Facilities Siting Board.

Flat Rock Transmission Line, Lewis County, NY- Preformed viewshed mapping, line of sight cross sections and field verification for visual impact assessment of a 10-mile, 230 kV transmission line. Also prepared eight photo simulations of the proposed project.

New York Regional Interconnect, New York State- Coordinated field operations for over 1000 visual resources over a 190Mile (570 Square Mile) Study area. Team leader in the selection and production of simulation for over 75 viewpoints. Provided expert witness testimony before the Public Service Commission of New York State.

Empire Newsprint Recycling & Power Plant, Rensselaer County, NY- Created an architecturally detailed 3-D model and photo simulations of a proposed power plant (including cooling tower and stack plumes) and an associated 345 kV transmission line. Also assisted with fieldwork involving photo documentation of existing views. Simulations were part of a Visual Impact Assessment for the proposed project, prepared as part of the PSC Article VII application.

New York State Statewide Wireless Network- Developed visual simulations for the Generic Visual Impact Assessment (GVIA) included as an appendix of the DEIS prepared for the siting of wireless communications towers throughout New York State. The report defined landscape similarity zones and viewer groups, identified sensitive resources/receptors, supervised the development of visual simulations, and participated in the preparation of the GVIA report.

Tompkins County Public Safety Communications System, Tompkins County, NY- Developed viewshed maps and visual simulations for Visual Impact Assessment component of the Draft Environmental Impact Statement (DEIS) prepared for the siting of nine new towers for wireless communications.

Bushkill Communications Tower, Town of Bushkill, PA- Conducted fieldwork and prepared viewshed maps and visual simulations to evaluate the visibility and visual impact of a proposed wireless communication facility. The focus of the evaluation was the project's potential impact on the Delaware Water Gap National Recreation Area. Analytical results were used by the project developer in negotiations with National Park Service.

Kaal Rock Connector, City of Poughkeepsie, NY- Prepared a Visual Assessment for three design alternatives associated with a multiuse trail connection on the Historic Hudson River. Completed simulations for the three concept designs and designed a rating system to determine the design with the greatest visual appeal. Completed an abbreviated visual assessment report to assist regulators in decision-making.

Hudson River Proposed Anchorage Areas, NY- Prepared animated fly-through videos using drone footage and 3D overlays from Yonkers to Poughkeepsie, New York to demonstrate the visual effects of a proposal by the United States Coast Guard to create several new anchorage areas along the shores of the Hudson River. This fly-through animation was used in a media campaign to stop the permitting of the anchorage areas.

Interstate 81 (I-81) Viaduct Project, Visual Impact Assessment, City of Syracuse, Onondaga County, NY- Prepared a Visual Impact Assessment that was conducted in accordance with Federal Highway Administration (FHWA) Visual Impact Assessment protocol as part of NEPA review as part of a consultant team with Parsons, AKRF, Inc., and TWMLA for the replacement of approximately 5 miles of elevated Interstate highways in the City of Syracuse, New York (NYSDOT PIN 3501.60, D031085).

NYS Route 3 Community Development Study, Jefferson County, NY- Provided graphic and technical assistance in this highway corridor development guideline package prepared for the Tug Hill Commission. Assisted in creating a professional, full-length video and a 150 slide DVD presentation with 3-D animations and videography.

University Avenue, Syracuse, NY- This project included recommendations and guidelines for street improvements along University Avenue, a main corridor onto the Syracuse University campus. Responsible for creating photo-renderings from conceptual plans that illustrated the proposed improvements to pedestrian and vehicular spaces.

Hamlet of Brewerton Revitalization Project, Onondaga County, NY- Prior to EDR, This project included a multimillion-dollar highway and park design improvement project. Provided expertise in state design guidelines and federal grant guidelines. Presented at major televised public outreach events.

Walden Pond Shoreline Erosion Assessment & Monitoring- *Prior to EDR*, Designed a system by which MASS DCR can photographically document erosion rates and severity. Produced an interactive map package which allows the user to compare multiple years of erosion data and photographs. Provided field survey and documentation to demonstrate to rate of erosion.

Town of Dennis Comprehensive Dredge & Beach Nourishment Plan, Town of Dennis, MA- *Prior to EDR*, Completed dredge design and grading for the Bass River and associated mooring basins. Created permitting drawings for dredge and beach nourishment using LIDAR and bathymetry survey data. Assisted the Town of Dennis in a cost benefit analysis to prioritize dredging activity.

Winchester Country Club Course Expansion, Winchester, MA- *Prior to EDR*, Provided the design, grading and permitting for a 15-acre golf course expansion. Provided expertise in invasive species management and wetland buffer enhancement. Performed cut fill calculations and watershed analysis.

Additional Employment History

- Project Scientist Visualization and GIS Specialist, ESS Group, Inc., East Providence, RI, 2011-2016
- Senior Visual Analyst, Project Manager, Saratoga Associates Landscape Architects, Architects, Engineers, and Planners, P.C., Syracuse, NY, 2008-2011
- Project Manager and Visualization Specialist, Environmental Design & Research, Syracuse, NY, 2001-2008

Publications and Presentations

- NYSERDA Learning from the Experts, a webinar series. The Science of Visibility June 23, 2021
- Perkins, Gordon W., "The Application of Lidar Data for Determining the Area of Potential Effect Associated with Offshore Wind Projects on the Outer Continental Shelf" (2019). Visual Resource Stewardship Conference. 13. <u>https://digitalcommons.esf.edu/vrconference/13</u>
- Southern New England Offshore Wind Energy Science Forum. University of Rhode Island . Graduate School of Oceanography 2017. Speaker on Community Impacts.