THE STATE OF NEW HAMPSHIRE

SITE EVALUATION COMMITTEE

DOCKET NO. 2015-02

<u>APPLICATION OF ANTRIM WIND ENERGY, LLC</u> <u>FOR A CERTIFICATE OF SITE AND FACILITY</u>

PREFILED SUPPLEMENTAL TESTIMONY OF LISA LINOWES

ON BEHALF OF THE WIND ACTION GROUP

1) Please state your name and address and qualifications.

My name is Lisa Linowes, and my address is 286 Parker Hill Road, Lyman, NH 03585. My qualifications remain the same as those presented in my pre-filed direct testimony submitted May 23, 2016.

2) Please summarize your current position as it relates to this matter.

I serve as Executive Director of the Industrial Wind Action Group (Windaction.org) a New Hampshire corporation form in 2006.

3) What is the purpose of this supplemental testimony?

My supplemental testimony relates to the Antrim Wind Energy LLC's ("Applicant") claimed benefits and costs. In particular, I provide greater detail for why I believe the economics of the project are not realistic. I also note that since filing testimony in this Docket, I have had the opportunity to review the confidential pro forma for Antrim Wind (the "Project"). Supplemental testimony that directly references the confidential pro forma figures has been omitted from the public version of my supplemental testimony but is included in a separate document filed with the Administrator for the Site Evaluation Committee ("SEC" or "Committee").

4) In responding to question 12 of your prefile testimony, you state that the future price for Class I renewable energy is likely to be lower than the \$81 bundled price cited in the Applicant's public pro forma. What analysis did you perform to support your claim?

Exhibit WA-01s (attached) presents a model of my analysis of Class I renewable energy pricing based on Henry Hub futures¹ for natural gas through to 2025. The analysis is similar to what others would follow in arriving at a fair price for wind energy when negotiating a long-term energy contract in the New England region. I relied on the following assumptions in preparing the model:

- a) Monthly Henry Hub gas futures (column B) are based on a gas pipeline located in Erath, Louisiana which serves as the official delivery location for futures contracts on the NYMEX. Natural gas sources closer to New England are likely to have lower delivery charges but for this analysis I present a low (\$0.25) and high (\$1.25) value for delivery charges (columns C and D);
- b) The conversion from \$/mBTU to \$/MWh assumes 8.0 mBTU/MWh heat rate based on the ISO-New England's Annual Emissions Report (columns E and F).
- c) The analysis uses 0.4 RGGI allowances per MWh based on CO₂/MWh rates cited in the ISO-NE Annual Emissions Report (columns G and H). The analysis sets the RGGI price at the cost containment reserve (CCR) price in each year starting at \$10 in 2017 and increasing by 2.5% each year after that. Recent auctions have resulted in allowances clearing at prices well below the CCR price.²
- d) Prices for Class I Renewable Energy Credits are assumed to be \$40 during the years 2017, 2018 and 2019. Beginning in January 2020, the analysis assumes a Class I REC price of \$25 (columns I and J).
- e) A \$20/MWh 'winter adder' is applied during the four months of winter (December-March) in the years 2017-2019 to address potential price spikes relating to recent fuel availability problems. I anticipate gas shortages to be resolved by 2020 but in the interim, oil is assumed to be the back-up fuel burned approximately 25% of the time. The \$20/MWh assumes oil priced at \$45/barrel, delivering 6 mBTU per barrel at an efficiency of 11 mBTU/MWh: adder = (\$45/6)*.25*11.

Based on these conservative assumptions, a more realistic long-term bundled price for the energy and RECs that also includes a price for RGGI allowances, would range between \$61.90 and \$69.90 per MWh. When compared to the \$81 price cited in the Applicant's public pro forma, ratepayers could be paying as much as

¹ The analysis shown in Exhibit WA-01s has been updated to reflect Henry Hub pricing as of August 13, 2016. I also introduced other factors such as the 'winter adder' which explains why some of the figures differ from statements made in my May 23, 2016 testimony.

² Auction 32 conducted on June 1, 2016 resulted in a clearing price of \$4.53 while the cost containment reserve price for 2016 is \$8/allowance. <u>https://www.rggi.org/market/co2_auctions/results/auction-32</u>

\$19/MWh above that of other eligible Class I generation in New England. With a winter adder included, the Project's \$81/MWh price would still be nearly \$17/MWh above competitively priced Class I resources.

5) Your analysis applies a \$40 REC price during the years 2017-2019 and then lowers that price to \$25 per REC. Please explain the basis for these numbers.

As cited in my prior testimony, there are several important trends occurring in the New England REC market that are placing downward pressure on the price of Class I RECs.

In 2014 and 2015, the five New England states with active RPS policies successfully met their Class I (or New in Rhode Island) mandates using renewable energy credits as opposed to alternative compliance payments. Although the 2016 compliance year is ongoing, I expect a similar outcome this year. Such compliance is reflected in lower REC prices through 2015-2016. Exhibit WA-02s (attached) includes REC trading sheets from 2016 showing Class I prices as low as \$23/MWh and now trading at/around \$35/MWh. The surplus of Class I RECs can be attributed to several factors including the growth of in-region resources, in particular behind-the-meter solar in Massachusetts and a growing supply of imports into New England especially from New York State. Figures 1 and 2 contain screen shots from the NEPOOL GIS that show how the number of wind and solar RECs have grown materially from Q1-2015 to Q1-2016.

Solar RECs increased by nearly 100% from 150,888 in Q1-2015 to 298,562 in Q1-2016. Imports of wind RECs also increased by 26% as projects in New York State came off contract and their RECs flowed into New England. New England's higher REC prices, while below their highs, offer a powerful price signal to generators to move into the region. Some of the wind imports also flowed into New England from Canada.

by Other Attributes

_____I

			Year - Quarter	: 2015 - Q1	T					
by Fu	el Attribute	ĺ	by	RPS Eligibility	Ĭ		by Other Attributes			
Number of Renewable Certificates by Fuel 📥 🖶										
Year ++	Quarter ++	Fuel ++	Fuel Description ++	# Certificates ++	# Certificates IMP ++	# Certificates MSS ++	# Certificates NON ++			
2015	1	Biomass	Biomass	630,022	0	384,456	245,566			
2015	1	Digester gas	Digester gas	10,473	1,594	3,402	5,477			
2015	1	Fuel cell	Fuel cell	50,456	0	29,130	21,326			
2015	1	Geothermal	Geothermal	44	0	0	44			
2015	1	Hydroelectric/Hydropower	Hydroelectric/Hydropower	1,944,931	191,558	1,710,378	42,995			
2015	1	Hydrokinetic	Hydrokinetic	6,875	0	129	6,746			
2015	1	Landfill gas	Landfill gas	315,511	160,909	127,023	27,579			
2015	1	Municipal solid waste	Municipal solid waste	281,908	0	281,908	0			
2015	1	Solar	Photovoltaic	150,888	0	5,636	145,252			
2015	1	Solar	Thermal	1	0	0	1			
2015	1	Trash-to-energy	Trash-to-energy	520,833	0	477,754	43,079			
2015	1	Wind	Wind	1,022,073	363,225	628,813	30,035			
2015	1	Wood	Wood	604,258	132,401	445,296	26,561			
Total				5,538,273	849,687	4,093,925	594,661			

Figure 1: 2015-Q1 REC imports

by Fuel Attribute

		MEPOOL G I S
Year - Quarter: 2016 - 01	•	

by	RPS Eligibility

	Number of Renewable Certificates by Fuel 📥 🎒											
Year ++	Quarter ++	Fuel ↑↓	Fuel Description ++	# Certificates +	# Certificates IMP ++	# Certificates MSS ++	# Certificates NON ++					
2016	1	Biomass	Biomass	645,184	0	454,577	190,607					
2016	1	Digester gas	Digester gas	19,500	1,503	3,912	14,085					
2016	1	Fuel cell	Fuel cell	58,159	0	32,711	25,448					
2016	1	Geothermal	Geothermal	71	0	0	71					
2016	1	Hydroelectric/Hydropower	Hydroelectric/Hydropower	2,660,189	289,440	2,315,238	55,511					
2016	1	Hydrokinetic	Hydrokinetic	253	0	184	69					
2016	1	Landfill gas	Landfill gas	324,219	163,830	134,111	26,278					
2016	1	Municipal solid waste	Municipal solid waste	289,047	0	289,047	0					
2016	1	Solar	Photovoltaic	298,562	0	9,606	288,956					
2016	1	Solar	Thermal	5	0	0	5					
2016	1	Trash-to-energy	Trash-to-energy	563,570	0	516,668	46,902					
2016	1	Wind	Wind	1,192,550	457,696	701,373	33,481					
2016	1	Wood	Wood	610,307	132,164	441,431	36,712					
Total				6,661,616	1,044,633	4,898,858	718,125					
	1 - 13 : 13 ∢ first ⊈ prev goto next ▶ last ▶											

Figure 2: 2016-Q1 REC imports

6) Have you accounted for recent and potential RPS policy changes?

Yes. There is on-going tension within the region to see cleaner generation brought online while keeping costs under control. Rhode Island recently increased its RPS mandate to 40% by 2035 however, the effect of the change is still not clear. In July 2016, Massachusetts passed an omnibus energy bill which added a requirement for utilities to solicit contracts for up to 1,200 MW of clean generation that could include a mix of hydro, onshore wind and solar. The bill also requires utilities to competitively solicit proposals for offshore wind up to 1,600 MW by June 30, 2017 and to enter into 15-20 year contracts "provided that reasonable proposals have been received" and state regulators approve. There is no certainty that any proposals will be found acceptable in the near-term given the high price of offshore wind. Massachusetts lawmakers decided against a 1% increase in the RPS annual percentage.

Finally, New York State is moving forward with a clean energy standard³ that includes a subsidy for upstate nuclear power and that will also permit out-of-state generation to be eligible provided it is located adjacent to the NYISO control area. Although specifics such as the alternative compliance payment have not yet been defined, I continue to believe that the price differences between RECs in New England, New York and the PJM control area will direct the flow of Class I RECs into New England and drive down prices to \$25 in future years. As cited in my prior testimony, as much as 3 million wind RECs could flow from New York into New England in the next five years.

Exhibit WA-03s includes a spreadsheet showing the current New York wind resources placed under contract with NYSERDA beginning in 2005 and that are beginning to come off contract this year. The size of the solicitation and the contract price for the RECs is also included in the Exhibit. It is evident that New York State has historically paid considerably less for wind RECs. This helps further enforce that these same RECs are likely to flow into New England.

7) Why are these figures meaningful?

The financial success of Antrim Wind relies on how accurately the Applicant has assessed the Project's production level (capacity factor) and its after-tax cash flow. The Applicant is currently asserting one of the highest P50 capacity factors for the area (37%) and forecasting a bundled REC and energy price (\$81/MWh)

³ <u>http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={1A8C4DCA-E2CC-449C-AA0D-7F9C3125F8A5}</u>

that, according to my data, cannot be justified long-term under current market conditions. If the Project produces at a more realistic 31% capacity factor and energy/REC prices are more in line with my analysis, there may not be sufficient cash flow to cover debt and still operate the project in accordance with the certificate. This concern, coupled with the inexperience of the Applicant in building and operating wind energy facilities in New England raises real concerns over whether the Committee can make a positive finding that the Applicant has the financial, technical and managerial ability to proceed with the Project.

8) Does this conclude the public portion of your supplemental testimony?

Yes. Additional pages containing confidential testimony with Exhibits follow but are redacted from this public document. A full, un-redacted hardcopy of this testimony has been sent to the SEC administrator, Pamela Monroe, via U.S. Mail.

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Date	Henry Hub Futures (\$/MBTU)	Low Cost transport (\$0.25)	High Cost transport (\$1.25)	Conversion to MWh (heat rate 8 MBTU/MWh)	Conversion to MWh (heat rate 8 MBTU/MWh)	Add RGGI (\$10+)	Add RGGI (\$10+)	Add REC (\$40 to \$25)	Add REC (\$40 to \$25)	Winter adder	Price with Winter Adder	Price with Winter Adder	% R0 Incre
Oct-17	2.994	3.244	4.244	25.952	33.952	29.952	37.952	69.952	77.952	0.00	69.952	77.952	
Nov-17	3.052	3.302	4.302	26.416	34.416	30.416	38.416	70.416	78.416	0.00	70.416	78.416	
Dec-17	3.195	3.445	4.445	27.56	35.56	31.56	39.56	71.56	79.56	20.00	91.560	99.560	
Jan-18 Feb-18	3.294 3.261	3.544 3.511	4.544 4.511	28.352 28.088	36.352 36.088	32.452 32.188	40.452 40.188	72.452 72.188	80.452 80.188	20.00 20.00	92.452 92.188	100.452 100.188	0
Mar-18	3.177	3.427	4.511	28.088	35.416	31.516	39.516	71.516	79.516	20.00	92.188	99.516	0
Apr-18	2.808	3.058	4.058	24.464	32.464	28.564	36.564	68.564	76.564	0.00	68.564	76.564	C
May-18	2.773	3.023	4.023	24.184	32.184	28.284	36.284	68.284	76.284	0.00	68.284	76.284	(
Jun-18	2.8	3.05	4.05	24.4	32.4	28.5	36.5	68.5	76.5 76.724	0.00	68.500	76.500 76.724	(
Jul-18 Aug-18	2.828 2.837	3.078 3.087	4.078 4.087	24.624 24.696	32.624 32.696	28.724 28.796	36.724 36.796	68.724 68.796	76.724	0.00	68.724 68.796	76.724	() ()
Sep-18	2.819	3.069	4.069	24.552	32.552	28.652	36.652	68.652	76.652	0.00	68.652	76.652	(
Oct-18	2.845	3.095	4.095	24.76	32.76	28.86	36.86	68.86	76.86	0.00	68.860	76.860	(
Nov-18	2.91	3.16	4.16	25.28	33.28	29.38	37.38	69.38	77.38	0.00	69.380	77.380	(
Dec-18 Jan-19	3.05 3.17	3.3 3.42	4.3 4.42	26.4 27.36	34.4 35.36	30.5 31.56	38.5 39.56	70.5	78.5 79.56	20.00 20.00	90.500 91.560	98.500 99.560	(
Feb-19	3.138	3.388	4.42	27.30	35.104	31.304	39.304	71.304	79.304	20.00	91.300	99.300	
Mar-19	3.078	3.328	4.328	26.624	34.624	30.824	38.824	70.824	78.824	20.00	90.824	98.824	
Apr-19	2.814	3.064	4.064	24.512	32.512	28.712	36.712	68.712	76.712	0.00	68.712	76.712	
May-19	2.804	3.054	4.054	24.432	32.432	28.632	36.632	68.632	76.632	0.00	68.632	76.632	
Jun-19 Jul-19	2.835 2.871	3.085 3.121	4.085 4.121	24.68 24.968	32.68 32.968	28.88 29.168	36.88 37.168	68.88 69.168	76.88 77.168	0.00	68.880 69.168	76.880 77.168	
Aug-19	2.871	3.121	4.121	24.908	32.908	29.108	37.108	69.272	77.272	0.00	69.272	77.272	
Sep-19	2.868	3.118	4.118	24.944	32.944	29.144	37.144	69.144	77.144	0.00	69.144	77.144	
Oct-19	2.89	3.14	4.14	25.12	33.12	29.32	37.32	69.32	77.32	0.00	69.320	77.320	
Nov-19	2.96	3.21	4.21	25.68	33.68	29.88	37.88	69.88	77.88	0.00	69.880	77.880	
Dec-19 Jan-20	3.102 3.228	3.352 3.478	4.352 4.478	26.816 27.824	34.816 35.824	31.016 32.124	39.016 40.124	71.016 57.124	79.016 65.124	20.00 20.00	91.016 77.124	99.016 85.124	(
Feb-20	3.196	3.446	4.446	27.568	35.568	31.868	39.868	56.868	64.868	20.00	76.868	84.868	(
Mar-20	3.135	3.385	4.385	27.08	35.08	31.38	39.38	56.38	64.38	20.00	76.380	84.380	(
Apr-20	2.875	3.125	4.125	25	33	29.3	37.3	54.3	62.3	0.00	54.300	62.300	(
May-20 Jun-20	2.868 2.9	3.118 3.15	4.118 4.15	24.944 25.2	32.944 33.2	29.244 29.5	37.244 37.5	54.244 54.5	62.244 62.5	0.00	54.244 54.500	62.244 62.500	(
Jul-20	2.9	3.187	4.13	25.496	33.496	29.796	37.796	54.796	62.796	0.00	54.796	62.796	
Aug-20	2.965	3.215	4.215	25.72	33.72	30.02	38.02	55.02	63.02	0.00	55.020	63.020	(
Sep-20	2.966	3.216	4.216	25.728	33.728	30.028	38.028	55.028	63.028	0.00	55.028	63.028	(
Oct-20	2.996	3.246	4.246	25.968	33.968	30.268	38.268	55.268	63.268	0.00	55.268	63.268	(
Nov-20 Dec-20	3.069 3.217	3.319 3.467	4.319 4.467	26.552 27.736	34.552 35.736	30.852 32.036	38.852 40.036	55.852 57.036	63.852 65.036	0.00	55.852 57.036	63.852 65.036	(
Jan-21	3.352	3.602	4.602	28.816	36.816		41.216	58.216	66.216	0.00		66.216	
Feb-21	3.32	3.57	4.57	28.56	36.56	32.96	40.96	57.96	65.96	0.00	57.960	65.960	
Mar-21	3.258	3.508	4.508	28.064	36.064	32.464	40.464	57.464	65.464	0.00		65.464	
Apr-21	2.991	3.241	4.241	25.928	33.928	30.328	38.328	55.328	63.328	0.00	55.328	63.328	
May-21 Jun-21	2.986 3.018	3.236 3.268	4.236 4.268	25.888 26.144	33.888 34.144	30.288 30.544	38.288 38.544	55.288 55.544	63.288 63.544	0.00	55.288 55.544	63.288 63.544	
Jul-21	3.055	3.305	4.305	26.44	34.44	30.84	38.84	55.84	63.84	0.00		63.840	
Aug-21	3.089	3.339	4.339	26.712	34.712	31.112	39.112	56.112	64.112	0.00		64.112	
Sep-21	3.092	3.342	4.342	26.736	34.736	31.136	39.136	56.136	64.136	0.00		64.136	
Oct-21 Nov-21	3.128 3.208	3.378 3.458	4.378 4.458	27.024 27.664	35.024 35.664	31.424 32.064	39.424 40.064	56.424 57.064	64.424 65.064	0.00	56.424 57.064	64.424 65.064	
Dec-21	3.362	3.612	4.438	27.884	36.896	33.296	40.084	58.296	66.296	0.00	58.296	66.296	
Jan-22	3.511	3.761	4.761	30.088	38.088	34.588	42.588	59.588	67.588	0.00		67.588	(
Feb-22	3.486	3.736	4.736	29.888	37.888	34.388	42.388	59.388	67.388	0.00		67.388	(
Mar-22	3.424	3.674	4.674	29.392	37.392	33.892	41.892	58.892	66.892	0.00		66.892	(
Apr-22 May-22	3.159 3.154	3.409 3.404	4.409 4.404	27.272 27.232	35.272 35.232	31.772 31.732	39.772 39.732	56.772 56.732	64.772 64.732	0.00	56.772 56.732	64.772 64.732	
Jun-22	3.186	3.436	4.436	27.488	35.488	31.988	39.988	56.988	64.988	0.00	56.988	64.988	
Jul-22	3.224	3.474	4.474	27.792	35.792	32.292	40.292	57.292	65.292	0.00		65.292	
Aug-22	3.26	3.51	4.51	28.08	36.08	32.58	40.58	57.58	65.58	0.00		65.580	
Sep-22	3.265	3.515	4.515	28.12	36.12	32.62	40.62	57.62	65.62	0.00		65.620	
Oct-22 Nov-22	3.305 3.385	3.555 3.635	4.555 4.635	28.44 29.08	36.44 37.08	32.94 33.58	40.94 41.58	57.94 58.58	65.94 66.58	0.00	57.940 58.580	65.940 66.580	
Dec-22	3.385	3.035	4.635	30.344	37.08	33.58	41.58	59.844	67.844	0.00	58.580	67.844	
Jan-23	3.693	3.943	4.943	31.544	39.544	36.144	44.144	61.144	69.144	0.00		69.144	

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Feb-23		3.918	4.918	31.344	39.344	35.944	43.944	60.944	68.944	0.00	60.944	68.944	0.15
Mar-23		3.857	4.857	30.856	38.856	35.456	43.456	60.456	68.456	0.00	60.456	68.456	 0.15
Apr-23		3.592	4.592	28.736	36.736	33.336	41.336	58.336	66.336	0.00	58.336	66.336	0.15
May-23		3.587	4.587	28.696	36.696	33.296	41.296	58.296	66.296	0.00	58.296	66.296	0.15
Jun-23		<u>3.369</u> <u>3.619</u> <u>4.619</u> <u>28.952</u> <u>36.952</u> <u>33.552</u> <u>4</u>						58.552	66.552	0.00	58.552	66.552	0.15
Jul-23									66.856	0.00	58.856	66.856	0.15
Aug-23	3 3.443 3.693 4.693 29.544 37.544 34.144 42.144 5								67.144	0.00	59.144	67.144	0.15
Sep-23	3.452	3.702	4.702	29.616	37.616	34.216	42.216	59.216	67.216	0.00	59.216	67.216	0.15
Oct-23	3.497	3.747	4.747	29.976	37.976	34.576	42.576	59.576	67.576	0.00	59.576	67.576	 0.15
Nov-23	3.577	3.827	4.827	30.616	38.616	35.216	43.216	60.216	68.216	0.00	60.216	68.216	0.15
Dec-23	3.731	3.981	4.981	31.848	39.848	36.448	44.448	61.448	69.448	0.00	61.448	69.448	0.15
Jan-24	3.878	4.128	5.128	33.024	41.024	37.724	45.724	62.724	70.724	0.00	62.724	70.724	0.175
Feb-24	3.853	4.103	5.103	32.824	40.824	37.524	45.524	62.524	70.524	0.00	62.524	70.524	0.175
Mar-24	3.788	4.038	5.038	32.304	40.304	37.004	45.004	62.004	70.004	0.00	62.004	70.004	0.175
Apr-24	3.523	3.773	4.773	30.184	38.184	34.884	42.884	59.884	67.884	0.00	59.884	67.884	0.175
May-24	3.513	3.763	4.763	30.104	38.104	34.804	42.804	59.804	67.804	0.00	59.804	67.804	0.175
Jun-24	3.545	3.795	4.795	30.36	38.36	35.06	43.06	60.06	68.06	0.00	60.060	68.060	0.175
Jul-24	3.59	3.84	4.84	30.72	38.72	35.42	43.42	60.42	68.42	0.00	60.420	68.420	0.175
Aug-24	3.626	3.876	4.876	31.008	39.008	35.708	43.708	60.708	68.708	0.00	60.708	68.708	0.175
Sep-24	3.637	3.887	4.887	31.096	39.096	35.796	43.796	60.796	68.796	0.00	60.796	68.796	0.175
Oct-24	3.687	3.937	4.937	31.496	39.496	36.196	44.196	61.196	69.196	0.00	61.196	69.196	0.175
Nov-24	3.769	4.019	5.019	32.152	40.152	36.852	44.852	61.852	69.852	0.00	61.852	69.852	0.175
Dec-24	3.921	4.171	5.171	33.368	41.368	38.068	46.068	63.068	71.068	0.00	63.068	71.068	0.175
Jan-25	4.063	4.313	5.313	34.504	42.504	39.304	47.304	64.304	72.304	0.00	64.304	72.304	0.2
Feb-25	4.038	4.288	5.288	34.304	42.304	39.104	47.104	64.104	72.104	0.00	64.104	72.104	0.2
Mar-25	3.973	4.223	5.223	33.784	41.784	38.584	46.584	63.584	71.584	0.00	63.584	71.584	0.2
Apr-25	3.698	3.948	4.948	31.584	39.584	36.384	44.384	61.384	69.384	0.00	61.384	69.384	0.2
May-25	3.684	3.934	4.934	31.472	39.472	36.272	44.272	61.272	69.272	0.00	61.272	69.272	0.2
Jun-25	3.717	3.967	4.967	31.736	39.736	36.536	44.536	61.536	69.536	0.00	61.536	69.536	0.2
AVERAGES	5			28.133	36.133	32.546	40.546	61.901	69.901		64.481	72.481	
Notes:													
Henry Hub so	ource as of Au	igust 13, 201	6 - http://wv	vw.cmegroup.c	om/trading/en	ergy/natura	-gas/natural-	gas.html					
Assumptions						5,,		-					
		sources close	r to New Eng	gland are likely	to have lower o	delivery char	ges.						
-	-						-	eport					
	2 0.4 RGGI allowances per MWh based on CO2/MWh rates cited in ISO-NE Annual Emissions Report 3 price per RGGI allowance of \$10 in 2017 and increasing 2.5% annually after that												
				. Prices at the N	-		the low end.						
				/MWh (ISO-NE									
-				drops to \$25									
				roximately 25%	of the time: 6	MBTU per b	arrel. \$45/ba	rrel at 11,00	0 efficiencv (a	adder = (\$4	5/6)*.25*11)	
	Llinowes, win			, _0/0			, ,				,		
	,												

EXHIBIT WA-02s

CAP

March 31, 2016

							arkots/Environm	ontalMarkots aspe
Carbon			РЈМ			NEPOOL		
RGGI	Bid	Offer	NJ Class I	Bid	Offer	MA Class I	Bid	<u>Offer</u>
Apr'16 v'16	5.23	5.29	RY 2014	12.50	13.25	2015	23.00	30.00
Dec'16 v'16	5.28	5.33	RY 2015	12.75	13.75	2016	25.00	35.00
			RY 2016	13.00	14.00	2017	30.00	40.00
CCA	Bid	Offer	RY 2017	13.75	14.50	2018	30.00	40.00
ICE - Apr'16 v'16	12.45	12.55	RY 2018	14.75	15.50	2019	30.00	40.00
ICE - Dec'16 v'16	12.60	12.70	RY 2019	15.25	16.00	2020	35.00	40.00
ICE - Dec'17 v'17	12.93	13.20	RY 2020	15.00	16.00	MA Class II Waste	Bid	Offer
			NJ Class II	Bid	Offer	2015	6.00	6.75
Solar			RY 2016	6.00	7.00	2016	6.25	7.25
NJ Solar	Bid	Offer	RY 2017	8.50	9.50	MA Class II Non-Waste	Bid	Offer
RY 2014	270.00	280.00	RY 2018	9.00	10.00	2015	26.50	27.50
RY 2015	275.00	285.00	RY 2019	9.50	10.50	2016	26.50	28.50
RY 2016	280.00	288.00	PA Tier I	Bid	Offer	MA APS	Bid	Offer
RY 2017	280.00	290.00	RY 2014	12.50	13.00	2015	21.00	21.50
RY 2018	235.00	245.00	RY 2015	12.75	13.50	2016	20.75	21.75
RY 2019	180.00	190.00	RY 2016	12.75	13.75	CT Class I	Bid	Offer
RY 2020	153.00	163.00	RY 2017	13.50	14.50	2015	22.75	29.75
PA Solar	Bid	Offer	RY 2018	14.50	15.25	2016	24.75	34.75
RY 2015	12	16	PA Tier II	Bid	Offer	2017	29.75	39.75
RY 2016	15	10	RY 2015	0.03	0.10	2018	29.75	39.75
RY 2017	15	20	RY 2015	0.05	0.10	2019	29.75	39.75
RY 2018	16	20	DE Tier I	Bid	Offer	CT Class II	Bid	Offer
MD Solar	Bid	Offer	RY 2014	13.75	14.50	2015	0.75	1.50
2015	75	100	RY 2014 RY 2015	13.75	14.50	2015	1.25	1.50
2015	70	85	RY 2015	14.00	14.75	2016 2017	1.25	2.25
2010	75	85	DE Existing	Bid	Offer	CT Class III	Bid	Offer
2017	45	75	RY 2015	0.50	-	2015	27.00	28.50
2018	43	65	DC Tier I			2015	27.00	28.25
	_			Bid	Offer			
DC Solar	Bid	Offer	2015	0.75	1.75	2017	26.25	27.75
2015	480	495	2016	1.25	3.00	2018	25.50	27.00
2016	480	495	DC Tier II	Bid	Offer	RINew	Bid	Offer
2017	320	345	2015	0.40	1.00	2015	22.75	29.75
DE Solar	Bid	Offer	2016	0.60	1.50	2016	24.75	34.75
CY 2015	28	32	MD Tier I	Bid	Offer	2017	29.75	39.75
NC Solar Out-of-State	Bid	Offer	2014	10.00	12.00	2018	29.75	39.75
2015	1.50	3.00	2015	12.00	13.00	RI Existing	Bid	Offer
MA SREC I	Bid	Offer	2016	12.75	13.25	2015	0.50	0.95
2015	460	470	2017	12.75	14.40	ME New	Bid	Offer
2016	450	457.5	2018	12.75	15.50	2015	20.00	27.00
2017	300	305	MD Tier II	Bid	Offer	2016	23.00	33.00
2018	275	290	2014	0.25	0.50	2017	27.00	37.00
2019	265	285	2015	0.40	1.00			
MA SREC I Reminted	Bid	Offer	2016	0.60	1.50	ME Existing	Bid	Offer
2013	460	470	OH Certified	Bid	Offer	2015	0.30	0.50
2014	460	470	2014	1.00	2.25	2016	0.50	0.75
MA SREC II	Bid	Offer	2015	1.25	2.50	NH Class I	Bid	Offer
2015	265	275	IL ARES Wind	Bid	Offer	2015	22.75	29.75
2016	260	270	BH 2014	0.27	0.35	2016	24.75	34.75
2017	255	265	FH 2015	0.27	0.40	2017	29.75	39.75
2018	255	265	BH 2015	0.30	0.40	NH Class II	Bid	Offer
2019	210	240	FH 2016	0.35	0.45	2015	54.00	oner
OH Certified Solar				0.40	0.45	NH Class III		-
2015	<u>Bid</u> 16	Offer 23	BH 2016 IL ARES Non-Wind	Bid	Offer	2015	Bid 43.50	Offer
					oner	NH Class IV		-
2016	17	25		for pricing		2015	<u>Bid</u> 25.25	Offer
Texas	Di-l	0//	VOLUNTARY and GREEN-e	Di-I	0//		25.25	26.00
TX RECs Green-e	Bid	Offer	MRO Green-e Wind	Bid	Offer	Emissions	21	e ″
BH 2014	0.30	0.36	BH 2014	0.27	0.35	CSAPR NOx Annl	Bid	Offer
FH 2015	0.30	0.37	FH 2015	0.27	0.37	2015	65	110
BH 2015	0.33	0.38	BH 2015	0.30	0.40	2016	45	100
FH 2016	0.35	0.40	FH 2016	0.35	0.41	CSAPR NOx Seasonal	Bid	Offer
CAL 2015	0.33	0.38	CAL 2015	0.30	0.43	2016	125	175
CAL 2016	0.35	0.41	PNW Wind	Bid	Offer			
CAL 2017	0.40	0.45	CAL 2015	0.85	1.00	CSAPR SO2 Grp 1	Bid	Offer
TX Compliance RECs	Bid	Offer	CAL 2016	1.00	1.50	2015	0.50	5
2013	0.30	0.35	National Green-e Any	Bid	Offer	CSAPR SO2 Grp 2	Bid	Offer
2014	0.30	0.36	G-e RY 2014	0.30	0.38	2015	1	7
2015	0.30	0.39	G-e RY 2015	0.30	0.38	Climate Action Reserve		
Michigan			National Green-e Wind	Bid	Offer	Forestry	Bid	Offer
MI-RECs	Bid	<u>Offer</u>	BH 2014	0.30	0.35		Call for pricing	
2014	0.50	1.50	FH 2015	0.30	0.36	Ag Methane	Bid	Offer
2015	0.75	2.00	BH 2015	0.34	0.37		Call for pricing	
WECC	5.75	2.00	FH 2016	0.35	0.40	LFG	Bid	Offer
WECC REC	Did.	Offer	BH 2016	0.36	0.40	10	Call for pricing	oner
	Bid							0#
2014 2015	0.30	0.95	CAL 2015	0.34	0.38	CEC TREC	Bid Call for pricing	Offer
2015	0.40	1.00	CAL 2016	0.36	0.41		Call for pricing	
For market analysis, news	s, and price data, vi	sit the all NEW	Aud. 0	6				
Environmen	tal Market Website		Andrew Carr	Susan Cecilia		Green-e	e Certified Bro	oker
	rgy.com/us/emissi		Daniel Walsh	Stuart Kirkp	atrick	Green		

ATTENTION: THE DATA AND INFORMATION PROVIDED IN THE ATTACHMENT OR IN THIS COMMUNICATION AND SUCH SIMILAR DATA AND INFORMATION PROVIDED IN A FUTURE ATTACHMENT OR COMMUNICATION (THE "DATA") IS SUBJECT TO YOUR AGREEMENT TO AND ACCEPTANCE OF THE TERMS AND CONDITIONS ("TERMS") SET FORTH BELOW. OPENING THE ATTACHMENT OR YOUR USE OF THE DATA IN ANY WAY NOW OR IN THE FUTURE SHALL BE DEEMED ACCEPTANCE BY YOU OF THE TERMS WITH RESPECT TO ALL SUCH DATA. IF YOU ARE UNWILLING TO ACCEPT THE TERMS, YOU ARE PROHIBITED FROM USING THE DATA IN ANY WAY.

August 5, 2016

LITEISY, LL Ph: 281.340.8300 Fax: 281.340.8308 http://www.icapenergy.com/us/m

Carbon PACODE PACODE PACODE PACODE Control PACODE Dect 5 v1.6 8.0 0.0 0.0 0.0 0.00 </th <th></th> <th>-</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>energy.com/us/m</th>		-							energy.com/us/m
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Description 4.5.8 4.7.9 17.25 13.06 28.7.7 14.5.0 44.00 CCM 4.6.9 10.7.7 10.25 10.06 28.7.7 10.5.0 44.00 44.00 CCM C.C. MIC 12.05 10.25 <									
Control Problem Problem <t< td=""><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	-								
Cold Edit Offer US Priority (C) Priority (C) <thpriority (C) <thprior< th=""> <thprior< th=""></thprior<></thprior<></thpriority 	Dec'16 v'16	4.55	4.70						
No. 4. 19 1 (1)			- 4						
LCL - Dec/L (vi/L) 12.30 12.31 INP 2031 1.4.35 15.35 INP 2031 1.4.35 1.5.35 VIEW INP 2031 1.2.30 1.2.35 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>									
Kit No							2020	40.00	44.00
No. Solution No. Solution<							MA Class II Maste	D:4	0#07
Schur Wolfer Pri 2015 List Pri 2015 Collis Pri 2015 Pri 2015 Pri 2015 F. Collis Pri 2017 Pri 2017 Pri 2015 Pri 2017 Pri 2017 Pri 2017 Pri 2018 Pri 2017 Pri 2018 Pri 2017 Pri 2018 Pri 2018 Pri 2018	ICE - Dec 17 V 17	12.95	13.25						
Nissler uie Offer (N 2015) Pack (N 2015)	Solar						2016	0.25	7.25
NY 3254 26.00 1500 10.00 <t< td=""><td></td><td>Bid</td><td>Offer</td><td></td><td></td><td></td><td>MA Class II Non-Waste</td><td>Bid</td><td>Offer</td></t<>		Bid	Offer				MA Class II Non-Waste	Bid	Offer
NY 2015 22:2.0 5:200 No. No. <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
N 2365 24.20 255.00 N 2015 12.00 N 2015 2016 2017 21.175 N 2312 14.00 150.00 N 2015 12.00 13.00 13.00 N 2312 14.00 150.00 N 2017 12.175 14.00 <							2010	20100	20.00
NY 2017 26.500 12.50 NY 2014 10.75 12.00 20.75 21.75 NY 2015 12.60 12.60 12.60 12.60 12.60 12.60 12.60 12.60 12.60 12.60 12.75							MA APS	Bid	Offer
Nr 2013 Nr 2013 345.00 (Nr 2015 12.00 (Nr 2015 12.00									
Nr 2019 145.00 186.00 Pr 2015 13.29									
No. 2020 130.00 150.00 NY 2017 13.00 13.75 2017 2017 2017 2017 2017 2017 2017 2018 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>CT Class I</td> <td>Bid</td> <td>Offer</td>							CT Class I	Bid	Offer
Nr 2015 12 13 Average in the image									
Nº 2015 12.75 14 Nº 2015 0.33 0.10 2013 41.00 43.50 NU 5017 14 16 01 methods 180 01 for 100 10	PA Solar	Bid	Offer	RY 2018	14.00	14.75	2017	36.50	40.00
NY 2017 13 15 NY 2016 0.65 0.10 92020 40.00 40.00 ME Solar Bid Offer NY 2015 11.3 11.00 11.00 10.00 2018 0.00 1.46 Q017 20 40 Offer NY 2015 11.32	RY 2015			PA Tier II	Bid	Offer	2018	38.50	42.00
Inv 2015 14 16 Of Her No def Construct Construct Construct Offer Construct Construct Offer Construct Construct Offer Construct Construct Offer Construct Construct <thconstruc< td=""><td>RY 2016</td><td>12.75</td><td>14</td><td>RY 2015</td><td>0.03</td><td>0.10</td><td>2019</td><td>41.00</td><td>43.50</td></thconstruc<>	RY 2016	12.75	14	RY 2015	0.03	0.10	2019	41.00	43.50
Min Solar Bd Offer NY 2014 11.00 12.00 2016 0.90 1.60 2015 20 35 NY 2015 12.25 12.75 12.75 12.75 12.75 2017 1.00 22.85 2015 200 40 OFfer 12.05 2.50 3.50 2017 2.6.5 2.7.5 2.7.5 2.7.5 2.7.5 2.0.5 2.0.6 4.00 4.6.6 2.7.5 2.5.0 2.0.7 2.6.5 2.5.5 2.5.5 2.5.5 2.0.6 4.00 4.00 0.7.5 2.5.5 2.5.5 2.5.5 2.0.6 0.7.7 2.5.5 2.5.5 2.0.6 0.7.7 2.5.5 2.5.5 2.0.6 0.7.7 2.2.5 2.5.5 2.0.6 0.7.7 2.2.5 2.0.6 0.7.7 2.2.5 2.0.6 0.7.7 2.2.5 0.0.0 2.0.7 2.0.6 0.7.7 2.2.5 0.0.0 2.0.7 2.0.6 0.7.7 2.2.5 0.0.0 2.0.5 0.0.0 2.0.5 0.0	RY 2017	13	15		0.05	0.10		40.00	44.00
2015 20 35 PY 2015 12.2									
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2017 20 40 05 C Cass IIII, and IIII, and IIII, and IIII, and IIII, and IIIII, and IIIII, and IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII							2017	1.00	2.25
2018 20 40 Image: constraint of the second seco								nt.l	0#
2019 20 40 Offer Bid Offer 2017 26.25 27.50 2015 480 495 2015 2.50 3.50 2018 2.52.50 2.018 2.52.50 2.018 2.52.50 2.018 2.52.50 2.018 2.52.50 2.019 2.47.5 2.5.00 2.019 2.47.5 2.5.00 40.00 0.016er 2.019 2.015 3.02 4.00 0.016er 2.018 35.00 40.00 0.016er 2.018 2.016 3.00.00 37.50 2.016 3.00.00 37.50 2.016 3.00.00 37.50 2.016 3.00.00 37.50 2.016 3.00.00 37.50 2.016 3.00.00 37.50 2.016 3.00.00 37.50 2.016 3.00.00 37.50 2.016 3.00.00 37.50 2									
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cr 2015 28 32 2015 0.40 0.75 2018 38.50 42.00 2015 1.50 3.00 MA STECI 0.60 1.00 Pressource									
NS-Solar Out-of-State Bid Offer 2016 0.60 1.00 MA SBEC1 Bid Offer 2014 Bid Offer Bid Offer 2015 1.50 3.00 MO Ter I Bid Offer Bid Offer 2017 350 360 2016 1.150 11.75 Bid Offer 2018 3200 300 2017 12.52 13.50 14.50 2016 30.00 37.50 2018 23.51 1.60 0ffer 0ffer 2016 0.50 0.60 NE 2016 0.50 0.75 2016 0.50 0.75 2016 0.50 0.75 2016 0.50 0.50 0.75 2016 0.50 0.75 2016 0.50 0.75 2016 0.50 0.75 2016 0.50 0.75 2017 36.50 0.75 2017 36.50 0.75 2016 36.00 0.75 2017 36.50 0.75 20									
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2018 300 310 2017 12.25 13.25 2016 30.00 37.50 2019 285 295 2019 12.017 12.25 13.25 2017 30.00 37.50 MA SAEC I Reminied Bid Offer 2014 0.25 0.50 ME Existing Bid Offer ASAEC I Reminied Bid Offer 2015 0.50 0.60 0.50 0.50 0.50 0.60 0.50 0.50 0.60 0.50 0.50 0.60 0.50 0.60 0.50 0.50 0.60 0.50 0.60 0.50 0.60 0.50 0.60 0.50 0.60 0.50 0.60 0.50 0.50 0.60 0.50 0.60 0.50 0.60 0.50 0.60 0.50 0.60 0.50 0.60 0.50 0.50 0.60 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50	2016	440	445	2015	11.25	11.75			
2019 285 295 2018 13.50 14.50 2017 30.00 37.50 MA SRC (Remember 2014 0.25 0.50 1.50 2.7.5 2015 1.50 2.7.5 2015 2015 1.50 2.7.5 2015 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50 2.0.5 1.50	2017	350	360	2016	11.50	12.00	ME New	Bid	Offer
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ATTENTION: THE DATA AND INFORMATION PROVIDED IN THE ATTACHMENT OR IN THIS COMMUNICATION AND SUCH SIMILAR DATA AND INFORMATION PROVIDED IN A FUTURE ATTACHMENT OR COMMUNICATION (THE "DATA") IS SUBJECT TO YOUR AGREEMENT TO AND ACCEPTANCE OF THE TERMS AND CONDITIONS ("TERMS") SET FORTH BELOW. OPENING THE ATTACHMENT OR YOUR USE OF THE DATA IN ANY WAY NOW OR IN THE FUTURE SHALL BE DEEMED ACCEPTANCE BY YOU OF THE TERMS WITH RESPECT TO ALL SUCH DATA. IF YOU ARE UNWILLING TO ACCEPT THE TERMS, YOU ARE PROHIBITED FROM USING THE DATA IN ANY WAY.

EXHIBIT WA-03s

New York State Wind Contracts (2005-2014)

Facility	County	Year Solicitation	Bid Capacity (MW)	Maximum Contract (MWh)	\$/MWh	
Maple Ridge I	Lewis	Jan-05	231	605,820	\$22.90	
Dutch Hill WF	Steuben	Feb-07	4.3	8,513	\$15.52	
Cohocton WF	Steuben	Feb-07	8.3	23,372	\$15.52	
Clinton WP	Clinton	Feb-07	95.5	180,747	\$15.52	
Ellenburg WP	Clinton	Feb-07	77	167,381	\$15.52	
Bliss WP	Wyoming	Feb-07	95.5	191,720	\$15.52	
Altona WP	Clinton	Feb-07	96.9	188,282	\$15.52	
Chateaugay WP	Franklin	Feb-07	101.2	215,058	\$15.52	
Wethersfield WP	Wyoming	Oct-07	119.7	314,572	\$14.75	
Dutch Hill WF	Steuben	Oct-07	11.3	28,200	\$14.75	
Cohocton WF	Steuben	Oct-07	26.3	65,700	\$14.75	
Hardscrabble	Herkimer	Dec-09	43.7	121,508	\$19.76	
Hardscrabble	Herkimer	Mar-10	26.6	74,141	\$21.17	
Steel Winds II	Erie	Mar-10	14.3	37,430	\$21.17	
High Sheldon WF	Wyoming	Mar-10	106.9	228,200	\$21.17	
Marble River WF	Clinton	Apr-11	204.5	581,510	\$22.01	
Howard WF	Steuben	Apr-11	46.1	115,184	\$22.01	
Orangeville WF	Wyoming	Apr-11	88.2	279,103	\$22.01	
Locust Ridge WF	Schuykill PA	Dec-11	24.7	54,093	\$28.70	
Howard WF Expansion	Steuben	Dec-11	3.9	9,849	\$28.70	
Howard WF	Steuben	Jan-13	2.6	6,359	\$34.95	
Zotos Intl Wind	Ontario	Jan-13	3.1	3,847	\$34.95	
Marsh Hill WF	Steuben	Jan-13	15.4	52,526	\$34.95	
Black Oak WF	Tompkins	Jan-13	12	40,894	\$34.95	
Cody Road WF	Madison	Jan-13	9.5	27,463	\$34.95	
Arkwright Summit	Chautauqua	Oct-14	73.8	229,873	\$22.96	(20 Years)
Jericho Rise	Franklin	Oct-14	73.8	206,272	\$22.96	(20 Years)
			1,616	4,057,617		

Source:

NYSERDA 2016 RPS Annual Report: http://www.nyserda.ny.gov/-/media/Files/Publications/Energy-Analysis/RPS/2016-RPS-Annual-Report.pdf