STATE OF RHODE ISLAND PUBLIC UTILITIES COMMISSION
IN RE: REVIEW OF PROPOSED TOWN OF NEW SHOREHAM PROJECT
PURSUANT TO RHODE ISLAND GENERAL LAWS § 39-26.1-7

PREFILED REBUTTAL TESTIMONY

OF

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MANAGING MEMBER
MYSTIC RIVER ENERGY GROUP, LLC

FOR

DEEPWATER WIND BLOCK ISLAND, LLC

FEBRUARY 16, 2010

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is David P. Nickerson and my business address is P.O. Box 9213, Noank, CT.

Q. Did you previously submit pre-filed testimony in this proceeding?

A. Yes. I submitted pre-filed direct testimony on December 9, 2009 on behalf of Deepwater Wind Block Island, LLC ("Deepwater Wind").

Q. What is the purpose of your rebuttal testimony?

A. I have been requested by Deepwater Wind to provide rebuttal testimony in response to several issues raised in this proceeding.

Q. Can you provide an outline of your rebuttal testimony?

A. This rebuttal first addresses issues raised by Richard Hahn, who provided testimony on behalf of the Division of Public Utilities and Carriers. These issues included the commercial reasonableness of the Power Purchase Agreement ("PPA"), and the comparability of the cost of the Block Island Wind Farm Project to certain other projects and technologies. I then review some PPA contract price and term issues raised by Mr. Hahn. Finally, I comment on miscellaneous issues that have been raised throughout in the course of this Docket.

II. RICHARD HAHN TESTIMONY

Q. Mr. Hahn calculated a real levelized price of the Block Island Wind Farm Project, including an estimated cost of the cable from Block Island to the mainland, and contrasted the project with 17 other projects. Do you agree with Mr. Hahn's conclusions on the real levelized price?

A. No.

Q. Can you explain the basis for your disagreement with Mr. Hahn?

A. Yes, I will. However, before I discuss my specific disagreements, I would like to address some general issues. As I mentioned in my original testimony, in my view it is reasonable and appropriate to compare Deepwater Wind's cost to that of other projects that can serve the same purpose. In this context, that is to provide newly developed renewable energy to Rhode Island along with associated electric reliability and environmental enhancements to the Town of New Shoreham, and within the 30 MW maximum project size as required by statute. As I discussed, there are no readily available alternatives other than offshore wind projects to achieve this objective, which corroborated by the lack of competing proposals in response to National Grid's RFP. In this context, I continue to believe that the Deepwater Wind's PPA is commercially reasonable.

Furthermore, when comparing this project to other renewable energy sources that are available to Rhode Island, I believe it is important to compare projects on an 'apples-to-apples', or comparable basis. Technologies and their characteristics are important. For example, it is very unlikely that an experienced power market analyst would compare, on a cost per MWH basis, a newly developed simple cycle gas peaking facility to a newly developed nuclear facility, even if they are in the same region, because they are not built to serve the same purpose. Likewise, considering a resource not currently available in the region fails to meet this test. And scale is important. Because of the 30 MW limit in the applicable legislation, projects larger than this have less direct relevance. Any comparables used in assessing the 'commercially reasonable' standard, then, must be available to both the region and to Block Island, must serve the same purposes and yield the same benefits.

Q. Mr. Hahn compared and contrasted the Block Island Wind Farm Project with 17 projects. Do you find these comparisons reasonable?

A. No. Mr. Hahn calculated the real levelized price of the Block Island Wind Farm Project, including an estimated cost of the cable from Block Island to the mainland, and contrasted the project to 17 other projects with differing technologies, locations and size, without including the cost of a cable to Block Island. Further, some of the 17 projects are specific actual projects and some are generic technology types. The basis of my opinion that a comparison of these projects is unreasonable is set forth in detail below.

Q. Can you comment on Mr. Hahn's inclusion of the cable cost in calculating the levelized price of the Block Island Wind Farm Project?

A. Yes. First, the applicable Rhode Island statues do not state that the cost of the cable should be included in any determination of commercially reasonable in §39-26.1-2(1), or as the term is used in the description of the Town of New Shoreham project in §39-26.1-7. However, the cable is an important element of Deepwater Wind's overall project to achieve the requirement in §39-26.1-7 to "enhance the electric reliability and environmental quality of the Town of New Shoreham", as the ability to achieve the same objectives with on-island generation resources is very limited. For analysis purposes and to achieve a fair, apples-to-apples comparison regarding other generation options, that leaves two alternatives. Either:

1) Remove the cost of the cable from the real levelized prices shown for the Block Island Wind Farm Project, reducing the value Mr. Hahn shows from $310.62/MWh to $262.83/MWh (assuming for these purposes now, Mr. Hahn's estimate of $47.79/MWh for the cable). This could be appropriate, for example, if there were a

comparable new renewable energy project of sufficient scale and sited on Block Island, or

2) Add the cost of the cable to the real levelized price of any other project or technology located on the mainland used for comparative purposes.

To do otherwise, ignores the basic structure and requirements of §39-26.1-7 under which this PPA was negotiated with respect to the benefits to the Town of New Shoreham.

Second, each of the 17 benchmark projects or technology types that Mr. Hahn compares with the Block Island Wind Farm Project has characteristics that make direct comparisons for purposes of establishing the commercial reasonableness a challenge to varying degrees. For a meaningful comparison, a project must be:

- Commercially viable (i.e., the project and technology should be in current commercial use);
- Eligible to meet the RI Renewable Energy Standards (RES);
- On a comparable basis (i.e., not comparing real projects with generic ideals);
- Of similar scale; and,
- Local (i.e., available, at a minimum, to meet the RI RES (deliverable to ISO New England) and also deliverable to Block Island to meet the requirement in §39-26.1-7 to “enhance the electric reliability and environmental quality of the Town of New Shoreham”).

These criteria reflect the specific legislative context within which the Block Island Wind Farm Project was developed and proposed to National Grid.

Q. How reasonable is it to compare a real project proposal with an idealized generic benchmark for projects?

A. In Exhibits RSH-5 and 6 of his testimony Mr. Hahn presents 9 renewable energy resource technologies whose costs are termed "generic". At this point we do not know the source of Mr. Hahn's generic cost figures, but in reviewing his data, the results suggest that the generic source costs likely omit various cost categories.

As a case in point, Mr. Hahn's costs for the Linden CA Wind project are over 25% more than his generic land-based wind cost estimates for the same size project. Comparing a real project in a region like New England to a generic, or national average project must be done with care; taking information out of context is likely to cause distortions if the details are not considered. Such figures are often more valuable for comparisons to other technologies, when the costs are estimated on a similar basis, than for comparing directly against real projects. For example, projects in New England tend to have higher than average costs for a variety of reasons, ranging from higher costs of labor and doing business, a more challenging permitting environment, seasonal construction windows, and in some cases, more challenging land ownership or topographical characteristics.[1] A real project will have to bear the cost of interconnection and often building transmission radials and/or substations, which are often excluded from 'generic' cost data. It will often either omit, or have some generalized national average, of a variety of cost components such as the soft costs (including land acquisition, legal, permitting and financial closing costs), royalties, taxes, construction interest, maintenance and decommissioning reserves, to name a few. This shows that such generic figures may not serve as reasonable benchmarks for realistic alternatives.

[1] For instance, a nationally 'typical' wind farm in a good wind regime may be on easily accessible farmland where access is easy, little or no blasting is required, and there may be no need to build paved roads. It may have one or a few landowners with whom to negotiate, rather than many required in New England where land parcels are far smaller than much of the country. In New England, a commercial-grade wind site may be on a mountain top where additional costs such as civil works and building new roads up the side of a mountain may be required.

Q. Can you please review each of the 17 projects or technology types presented by Mr. Hahn for purposes of judging commercial reasonableness of the Deepwater Wind PPA, and discuss their relevance as viable benchmarks?

A. Yes. I will briefly review what we know at this point about each of these 17 projects or technology types. Deepwater Wind has requested further information on Mr. Hahn's analysis in a data request. As such, I may update my testimony after I have reviewed this information. Please note, as discussed above, for each of these the cost of a cable to Block Island should be added to the cost of any comparable project.

- WMECO Solar 6 MW, NGRID MA Solar 4.88 MW, solar (generic) 5 MW, MA Solar 0.5 MW – As would be expected, these projects are more costly than Deepwater Wind due to the relatively high cost of current photovoltaic technology. The 0.5 MW "MA Solar" project is of much smaller scale compared to the other solar projects and could have much lower land and development costs. Also relative to the Block Island Wind Farm Project, all these projects are of much smaller scale, but that is to be expected at this stage in the technology's development. In any event, these projects appear to constitute real, reasonable, eligible and available benchmarks.

- Fuel Cells (generic, 10 MW) – I am not aware of a 10 MW fuel cell project that has been constructed to date, although there is one PPA in Connecticut in this range. However, fuel cells are not eligible under the RI RES unless using "renewable resources" as the fuel source. Most commercial MW-scale fuel cells currently are designed and configured to operate on pipeline quality natural gas. To run on a renewable fuel (biomass, or landfill methane), it is my understanding that significant additional fuel cleanup equipment would be required. It is not clear how at this scale the project could be fueled and meet the RI RES standard, and at what cost. In the absence of any evidence that an eligible fuel cell generator of this scale is

commercially available at this cost, fuel cells fail on several criteria to be measures of the commercial reasonableness of the Deepwater Wind PPA.

- Wind Offshore (generic, 100 MW) – As noted above, a comparison of an actual project to a hypothetical, generic project, particularly where there are no commercial projects in the country to serve as a basis for the cost estimate, for the hypothetical project, is inappropriate because the generic project is likely to understate costs. We also know that studies have shown water depth and distance to shore to be important factors in the cost of offshore wind and there is no basis to normalize this value. Finally there is an issue of scale, with this project being about 3.5 times larger than the Block Island Wind Farm Project. As discussed in my testimony as well as the testimony of others, offshore wind has substantial scale economies, and the unit cost of power from a 100 MW project could be significantly lower than that from a 30 MW project. Importantly, a larger project such as this would not qualify for the size limitation included in the statute, and accordingly is not a valid comparable.

- Tidal (generic, 2 MW) – This technology has tremendous potential, but to my knowledge no tidal energy projects have been implemented on a commercial basis, so the basis for the cost is speculative and the capacity factor is unknown. It fails to qualify as a viable and available alternative.

- Small hydro (generic, 5 MW) – In New England it is generally recognized that nearly all of the commercially viable small hydro sites have already been developed. Hardly any new hydro has been developed in the region for years, and the costs of hydro facilities are extraordinarily site-specific. As a result, I do not believe a single point

estimate for small hydro is realistic or comparable, and it is questionable how available small hydro resources are a substitute.

- Euro offshore-DPN (185 MW) – This is presumably the 185 MW average nameplate size of 14 recent and current European and one Chinese offshore wind projects mentioned in my pre-filed testimony. These projects had an installed cost of $5.01 million/MW, when water depth was normalized to be the same as the Block Island Wind Farm Project. The comparable Block Island Wind Farm Project installed cost is $6.96 million/MW for a 28.8 MW project. As previously described in my direct testimony, the differences between these values is believed to be driven primarily by:
  - Scale, since these other projects are 6.4 times the size of Deepwater Wind on average, and
  - The state of infrastructure necessary for construction and operations and maintenance, which is well developed in Europe but does not currently exist in New England or in the U.S.

  We have requested details on how Mr. Hahn developed a real levelized price for each of the projects in this group.

- Biomass (generic, 80 MW) – There are no 80 MW biomass plants in operation and selling power into the wholesale market in New England or, to my knowledge, planned. Hypothetically, a newly developed biomass project using eligible fuels could meet the RI RES standards, but biomass as a viable renewable energy source in New England is facing many current, serious challenges. Two Connecticut projects with long term PPAs as a result of Project 150[2] have asked to have their PPAs

[2] Project 150 is a legislatively driven initiative in Connecticut to increase the Class I renewable energy generation in the State by 150 MW. To date, three rounds of competitive solicitations have been conducted and have resulted in approximately 150 MW of PPAs between projects and the State's two regulated electric distribution companies.

reopened by the Connecticut Department of Public Utility Control because they have been unable to secure financing. The only Connecticut biomass project from this process that appears to be moving forward uses fuels (construction and demolition debris) not eligible for the RI RES. Massachusetts has effectively seen a curtailment of all new biomass development due to the process initiated by the Massachusetts DOER to examine the sustainability and carbon-neutrality of biomass, and a ballot initiative that, if passed, would preclude biomass eligibility for the Massachusetts RPS. In fact, the size of biomass plants is generally constrained by the available biomass resource within economic transportation distance from the plant. Biomass projects have significant scale economies, and again, it is inappropriate to use an 80 MW project in this context. So, while biomass may be a reasonable benchmark, Mr. Hahn's cost estimate should be adjusted upwards to reflect (a) the likely underestimated cost associated with his generic estimates, and (b) a realistic project scale for the region and in light of the 30 MW limit applicable to the Block Island Wind Farm Project.

- Bluewater Wind (200 MW) – Bluewater has a PPA with Delmarva Power & Light Company (Delmarva). An important element of the PPA is the 350% REC multiplier under which Bluewater delivers to Delmarva 28.6%[3] of the RECs generated under the 200 MW contract, but ratepayers have to pay for all 200 MW of RECs. This understates the ratepayer impact of the Bluewater PPA because ratepayers are paying for RECs they do not receive. Bluewater can then sell the other 71.4% of the project's RECs into the market as an independent and supplemental revenue stream, thus enhancing its project economics and presumably allowing it to offer a lower price. We do not know at this point whether or how Mr. Hahn has modeled this feature. Because of this significant structural difference, the Bluewater PPA is

[3] Reciprocal of the 350% credit: (1 / 3.5) x 100 = 28.6%

simply not comparable without taking this into account. From a public policy impact, 350% of the RECs delivered can be used by Delmarva to meet its RPS objectives, so the actual renewable energy generated in the State is lower than it would be otherwise.

There are also scale issues, as Bluewater has the option to build a project between 200 and 600 MW or 6.9 to 20.9 times the size of Deepwater Wind. Given the economies of scale that exist for offshore wind projects, Bluewater's cost would likely also be much higher if the project's size were limited to no more than 30 MW to meet the Rhode Island statue. Further, we would have to assume that such power is somehow deliverable to Rhode Island. From a technology perspective, Bluewater Wind is sited in shallower waters, using a monopile foundation that is less suitable for use in the deeper waters around Block Island, and unsuitable for the even deeper waters in Rhode Island Sound

Finally, I note that the pricing of the Bluewater Wind project is, at this juncture, still speculative – as Bluewater has a clear right to walk away. According to a consultant's report[4] prepared for several Delaware State agencies on the Bluewater PPA, the PPA:

> "provides Bluewater Wind with the flexibility to build an offshore wind project of between 200 MW and 600 MW of installed capacity (Section 2.4(b)); If, however, Bluewater is unable to find satisfactory buyers for the unsold energy, capacity, and RECs, or determines that it is otherwise not prudent to develop the Project, it may terminate the Final PPA on or by June 23, 2010 without liability and obtain the return of its $6 million of Development Period Security (Section 2.4(a))."

[4] New Energy Opportunities, Inc., La Capra Associates, Inc., Merrimack Energy Group, Inc., McCauley Lyman LLC, REPORT ON FINAL POWER PURCHASE AGREEMENT BETWEEN DELMARVA POWER AND BLUEWATER WIND DELAWARE LLC, PREPARED FOR: Delaware Public Service Commission, Delaware Office of Management and Budget, Delaware Energy Office, Delaware Controller General, July 3, 2008. http://www.ceoe.udel.edu/Windpower/DE-Qs/NEO%20Report%207-3-08%20FINAL.pdf

In short, the PPA pricing agreed upon may actually be dependent on a much larger project with strong scale economies, yet there is no evidence that either the project has begun construction, or that PPAs supporting a project nearing 600 MW have been completed. So, Bluewater Wind has a contractual right to terminate by late June if they cannot proceed based on the Delmarva PPA economics alone. For all of these reasons, it is not clear whether the Bluewater Wind PPA can be considered a sufficiently real benchmark.

- Linden CA Wind (50 MW) – Mr. Hahn's testimony indicated that this project is located in California. I was unable to locate this project in that state, but I note that there is a project of the same size and same name that started construction in late 2009 in Klickitat County, Washington and has a power contract with Southern California Public Power Authority. Assuming this is the correct plant, this is an onshore project that is presumably operating, and there are three reasons why this plant is not a viable benchmark for establishing commercial reasonableness. First, the project benefits from scale economies, being about 1.7 times the size of the Block Island Wind Farm Project. Second, there is no information presented to suggest whether the wind regimes and capacity factors are comparable to an onshore project in New England. Finally, the project is not eligible for the RI RES due to its location.

- Geothermal (generic, 50 MW) – This technology is not available in the region[5], there is no geothermal development underway in any location eligible for the RI RES, and as such is inappropriate as a basis for comparison in this context.

- Milford CA wind (200 MW) - Mr. Hahn's testimony indicated that this project is located in California. I was unable to locate this project there, but I have been able

[5] See http://www1.eere.energy.gov/geothermal/geomap.html

to locate a project of 203.5 MW with the same name that is operating in Milford, Utah and also has a PPA with Southern California Public Power Authority. Assuming this was the project referred to by Mr. Hahn, this plant is an unrealistic benchmark for the same reasons as the Linden wind project, perhaps more so because the project is 7 times the size of the Block Island Wind Farm Project, and larger than any onshore wind project yet developed in New England. This project would also not be eligible for the RI RES due to its location.

- Wind onshore (generic, 50 MW) – As discussed earlier, this generic estimate may be poorly suited as a basis for comparison. The cost that Mr. Hahn presents for Linden CA , an actual wind project of the same size, is more than 25% higher than this generic onshore project. Such a significant cost difference between projects of similar size and technological basis further demonstrates the limited utility of the approach adopted by Mr. Hahn. There is an issue of scale here as well, with this project being about 1.7 times larger than the Block Island Wind Farm Project. Nevertheless, newly developed onshore wind is potentially available in New England and, if delivered to Block Island, could constitute a possible basis of comparison.

- Landfill gas (generic, 30 MW) – Landfill methane resources in the region have already been largely exploited. The Johnston Landfill project in Rhode Island is the largest landfill project in the region, currently being expanded to replace and add to existing units. Most other existing projects in New England are in the 1 to 6 MW range. As verified by the landfill methane outreach program database, there are no remaining unexploited landfill methane resources of 30 MW scale in the region. It is questionable whether there are even 30 MW of total landfill methane generation projects yet to be exploited at reasonable cost in the entire region. Because landfill methane generation costs also have substantial scale economies, the cost for actual

available smaller landfill methane generation projects may need to be increased as compared to Mr. Hahn's 30 MW assumption.

- VT Landfill (1.6 MW) - Here it is hard to say that this project is repeatable and scalable due to extensive development of the New England landfill resource.

Q. Mr. Hahn has developed a real levelized cost of the Deepwater Wind PPA of $262.83/MWh, without the cable or any National Grid payments. Do you calculate the same value based on the terms of the PPA and using the same discount and escalation rates and the same capacity factor?

A. No. My calculated real levelized price is $256.38/MWh, which I believe accurately reflects the structure and terms of the PPA. The difference can be explained by reviewing Exhibit E of the PPA which specifically reduces the monthly National Grid payments to Deepwater Wind by the value of the project's capacity, assuming that the project was participating in the ISO-NE Forward Capacity Market (FCM). I note that the risk of the project successfully participating in the FCM and the revenues it receives are solely at the project's risk – the price that National Grid pays is reduced regardless. So the difference of $6.46/MWh between Mr. Hahn's and my real levelized values is effectively the estimated value of capacity.

Exhibit E also reduces the monthly price by the Wind Outperformance Adjustment Credit, but for base-case modeling purposes, I have assumed that credit to be $0. However, if for example, the annual capacity factor assumption is changed from 40% to 41.5% which would result from a better actual wind resource than originally assumed, the Wind Outperformance Adjustment Credit would reduce the real levelized price from $256.38/MWh to $251.97/MWh.

Later, Mr. Hahn's overall analysis appears to properly value capacity conceptually by assuming National Grid receives the capacity and then gets a market value for it. In contrast, I did not include capacity in my evaluation of the market value of the products delivered because National Grid never actually receives it – it acts to reduce the amounts paid to the project. In looking at the above-market impacts the result should be approximately the same. I do note that in his market value analysis Mr. Hahn uses a different confidential capacity price forecast and also a 28.1% (8.1 MW) capacity credit which I consider low compared to a development of the project's FCM capacity value based on its detailed projected 8,760 hourly output and applicable ISO-NE market rules resulting in 45.3% (13.0 MW) for FCM purposes. We are awaiting Mr. Hahn's explanation to his approach to the capacity credit in response to a data request.

Q. Mr. Hahn suggests in his testimony starting at page 27, line 16, that Deepwater Wind's one-time right in Section 3.1(b) to delay the Commercial Operation Date by up to 5 years creates a 25 year PPA and exposes National Grid to additional risks related to the price paid for energy, capacity and RECs over an added 5 years period prior to the delayed Commercial Operation Date. Also, on page 28, line 7, Mr. Hahn seems to suggest that any capacity provided prior to commercial operation should be paid for by National Grid at Forward Capacity Market prices. Do you agree?

A. No. The term of the PPA is 20 years. With respect to any energy delivered prior to Commercial Operation, in my experience most PPAs would consider this energy as essentially "test energy" and this structure of receiving and paying the actual hourly market value of the energy is typical to protect ratepayers from market price risk and fairly compensate the project for the value provided. In this case the energy delivered in any hour is priced at the Real Time Locational Marginal Price (LMP) which should be the value that National Grid receives for that energy in its ISO-NE settlement account.

The limited quantities of products likely to be delivered as "test energy" prior to Commercial Operation are purchased at or below their market value and there is no material risk to National Grid ratepayers. As I understand it, the purpose of this 5 year extension period is to accommodate potential project delays, for example, in securing the necessary permits, rather than to afford Deepwater Wind an extended period of time to sell "test energy". It is unlikely that the project's lenders would tolerate such an arrangement, and Mr. Hahn did not indicate whether the value of such "test energy" would be adequate to meet debt service requirements in the financial model he used. In addition, Deepwater Wind would also have a clear incentive to minimize these deliveries and achieve Commercial Operation promptly in order to operate under the higher pricing terms of the PPA's Exhibit E. As such, Mr. Hahn's concern does not correspond to commercial reality, and the additional discount suggested by Mr. Hahn adds no further meaningful incentive to achieve Commercial Operation and is effectively punitive.

Mr. Hahn's recommendation to price any capacity provided during the period prior to Commercial Operation at Forward Capacity Market (FCM) prices would be beneficial to the project, but does not reflect the agreement between the parties. First, it is unlikely that any capacity would be provided, as achieving Commercial Operation is currently required under ISO-NE market rules in order for a unit to take on a Capacity Supply Obligation in the FCM and receive associated compensation. Even if the project partially achieved Commercial Operation or capacity was somehow otherwise provided if the market rules change, National Grid gets the value of that capacity at no additional cost currently under the PPA. National Grid is only obligated to pay the Real Time LMP for all energy and capacity delivered per PPA Section 4.1(b). Finally, the pricing structure for RECs delivered pre-Commercial Operation provides compensation at a reasonable short

term proxy for market prices and therefore should present minimal risk or benefit to National Grid or its ratepayers.

Q. Do you agree with Mr. Hahn's testimony on page 28, line 10 suggesting that any assignment of the PPA to an affiliate, or in conjunction with a Financing should be subject to National Grid's consent?

A. No. It is typical for a renewable energy PPA that anticipates a financing and where the project intends to utilize tax credits to have an unencumbered right of assignment. This is, and has been, a common feature in PPAs and one that utilities such as National Grid are likely to be familiar working with. Such clauses were common even in renewable energy PPAs that I negotiated in the mid-1990s while working for National Grid's affiliate, New England Power Company. Such a clause helps facilitate financing and removes a possible concern on the part of a financing counterparty that a dispute could arise regarding the reasonableness of a utility objection that could delay closing. While I'm not a tax attorney, I understand that an unencumbered right to assign the PPA to project affiliates is currently necessary to effectively structure for and best utilize the tax credits potentially available to renewable energy projects.

Q. On page 28, line 16, of his testimony Mr. Hahn recommends a Favored Nations Pricing clause to cover any additional wind turbines that Deepwater Wind might install. What is your reaction to this?

A. In his testimony, Mr. Hahn alluded to the concept of passing along cost savings from a hypothetical "ninth" turbine for the Block Island Wind Farm. My understanding is that the Block Island Wind Farm cannot exceed eight turbines or 30 MWs of nameplate generation capacity, under any circumstances, whether the power were to be sold to National Grid or any other party, and that the legislation clearly sets these limits. As such, the concept of passing along such savings is not relevant and there is no need or

opportunity for a Favored Nations clause. The point of Bill Moore's testimony in referring to such a hypothetical "ninth" turbine was to illustrate the potential economies of scale that could be achieved in building the Utility Scale Wind Farm in Rhode Island Sound.

III. MISCELLANEOUS ISSUES

Q. Are there any other issues you would like to address?

A. Yes, there were some other issues raised in this Docket that I think should be addressed. Many of these issues were raised by William Short, who was presented as an expert on behalf of the former interveners, Michael and Maggie Delia. I realize that the Delias have withdrawn as parties, and it is my understanding that Mr. Short's testimony will not be in evidence in this Docket. However, the parties in this Docket, including the Commission, have presumably read Mr. Short's testimony, and many of the assertions made were unsupported or inconsistent with available evidence and/or observations. Thus, I would like the opportunity to address some of these issues to clear up any potential lingering confusion created by these unsupported statements and assertions.

Q. Do you believe that National Grid's REC price forecast is too high, and will have little value within 4 years and negligible value within 7 years?

A. No. While the National Grid REC forecast is confidential, and I could infer that it is lower than the projections in my testimony, I certainly don't agree that the National Grid REC price forecast is too high.

First, any arguments on REC market dynamics must recognize one of the central features of the region's Class I REC marketplace - a steadily and materially increasing demand for Class I RECs in each year. As can be seen in the Synapse Energy Economics,

Inc. "Avoided Energy Supply Cost in New England: 2009 Report"[6] (the "AESC 2009"), Class I RPS demand will roughly double between now and 2013. In fact, REC prices are presently going up over time in New England. Our own examination of recent REC prices (compiled from recent broker quotes of comparable quality and similar sources) show that REC price quotes are available further out in time and that all have an increasing price trend.

Settle Date	MA Class I REC Futures - Settle Price [1]	CT Class I REC Futures - Settle Price [2]
10-Apr	$26.00	$22.50
10-Jul	$29.40	$26.30
10-Oct	$29.67	$26.54
11-Jan	$29.94	$26.78
11-Apr	$30.20	$27.01
11-Jul	$30.68	$27.40
11-Oct	$30.96	$27.65
12-Jan	$31.25	$27.90
12-Apr	$31.53	$28.15
12-Jul	$31.75	$28.35
12-Oct	$32.05	$28.60
13-Jan	$32.34	$28.86
13-Apr	$32.63	$29.11
13-Jul	$32.82	$29.29
13-Oct	$33.12	$29.56
14-Jan	$33.43	$29.83
14-Apr	$33.72	$30.09
14-Jul	$33.89	$30.25
14-Oct	$34.20	$30.53
15-Jan	$34.51	$30.80
15-Apr	$34.82	$31.08
15-Jul	$34.95	$31.20
15-Oct	$35.27	$31.48

	REC Broker Source #1 (avg. of bid-ask spread, 2/5/10)			
	MA Class I	RI Class I	ME Class I	CT Class I
2009	$ 25.75	28.00	18.50	$ 22.25
2010	$ 29.75	34.00	20.75	$ 26.25
2011	$ 34.00	36.75	26.00	$ 28.50
2012	$ 35.75		28.00	

1 Taken from Chicago Climate Exchange, http://www.ccfe.com/mktdata_ccfe/futuresSummary.jsf?symbol=rec-ma
2 Taken from Chicago Climate Exchange, http://www.ccfe.com/mktdata_ccfe/futuresSummary.jsf?symbol=rec-ct

In examining this issue, one must be careful in comparing REC prices and REC market dynamics from states other than Rhode Island. For instance, the Maine and Connecticut

[6] Synapse Energy Economics, Inc., "Avoided Energy Supply Cost in New England: 2009 Report", Revised October 23, 2009

Class I REC markets are different from, and typically lower than, the Massachusetts, New Hampshire, and Rhode Island REC markets due to less stringent eligibility rules[7]. This can be seen from the REC market data that I provide in the table above. An example is a Maine PUC eligibility ruling allowing a large existing biomass plant to qualify as "New". This eligibility structure will likely reduce prices in the Maine Class I market only, and Maine's demand is a small fraction of the regional REC demand. More importantly, big projects that are eligible as "New" in Maine (such as the SAPPI plant or Lincoln Paper & Tissue) are not eligible elsewhere and cannot flood the RI Class I REC market, so all this has very little impact on Rhode Island.

Similarly, one must be careful in evaluating past spot market prices for Connecticut Class I REC purchases, as they may be more representative of a specific anomaly in the Connecticut REC market that no longer exists. Until December 2009, Connecticut was the only New England state with an RPS that did not allow banking of surplus RECs into the future. The absence of banking created the possibility that a market surplus could arise from time to time, leading to the possibility that REC prices would periodically fall due to the expiration of these surplus RECs. In contrast, banking allows RECs to be purchased and saved up as insurance against higher future prices, as can be done in Massachusetts, Rhode Island, New Hampshire and Maine. This approach smoothes out the variability of supply, which is important given the intermittent nature of primary renewable energy resources such as wind and solar power. So, prior to adoption of REC banking, Connecticut Class I REC prices were falling, as would be expected in surplus. As the Connecticut DPUC has just adopted banking, Connecticut REC prices are already starting to rise back towards Massachusetts or Rhode Island Class I REC prices, and as shown in the table above, are showing an increasing trend over time. Note that because of eligibility differences – Connecticut is the only state that does not require most Class I

[7] See the ISO New England Regional System Plan 2009 dated October 15, 2009, page 80 for tables summarizing different eligibility.

plants to qualify as "New" – Connecticut REC prices are also lower than those in Massachusetts or Rhode Island.

Q. Is there a current trend of allowing states to treat existing generation as "New" generation for the purposes of RPS eligibility? If so, and existing supply is converted to "New" renewable resources, will the RPS requirements for "New" renewable energy for all of the New England states be satisfied until the end of this decade?

A. No. It is true that since 2002, many existing renewable resources have qualified for one or more of the various "New" New England RPS programs as "New" resources. However, while the potential for some states to allow existing renewables to qualify as "New" does have a destabilizing effect on the market and can suppress prices, any claims regarding the potential for this dynamic to impact REC prices relevant to Rhode Island are dramatically overstated. It is not realistic that this conversion from existing to new can happen to all existing resources or impact the REC markets in each state. While such rulings may lower the prices in the Maine Class I REC market, these resources are <u>not</u> eligible for Class I in Massachusetts, Rhode Island, or New Hampshire, and in many cases, in Connecticut.

Most of the biomass potentially eligible to qualify in Connecticut (which has stringent emission limits for biomass) has been accomplished. Many NO_x retrofits occurred several years ago when Connecticut REC prices were near $50/MWh, but few have occurred lately. For Massachusetts, only 6 to 8 plants have been grandfathered as 'vintage' units, and whose incremental generation above a historic baseline can qualify as new. However, Massachusetts has changed its Class I RPS rules, such that it is not realistically possible for any more 'existing' plants to qualify as "New."' So, while Maine Class I RPS may be subject to falling prices, Maine's RPS is a small fraction of the regional demand and other markets with different eligibility would not be materially impacted.

Q. Do changes in hydroelectric eligibility threaten to flood the REC market and keep REC prices low?

A. No. Hydroelectric generation is largely saturated in New England due to the extensive development and use of this resource, historically speaking. There is very limited opportunity to develop and permit new hydro capability – so few sites are available. There is nothing I am aware of to suggest that existing hydro would qualify for the non-Maine RPS market for other than truly incremental generation.

One might argue that hydroelectric projects larger than 5 MW have been able to qualify for several of the New England state RPS programs, and that many are working on projects to expand their production or retrofit their facilities to qualify as "New" renewable resources. However, there simply is not a vast amount of hydroelectric generation flooding the "New" RPS marketplace. In fact, hydro generators in excess of 5 MW, are simply not relevant to the "New" REC marketplace unless the generation is new or truly incremental. Existing hydro over or under 5 MW is not eligible as New in any state in New England, with two exceptions:

(a) A minor exception under Connecticut Class I will allow generators below 5 MW that convert from storage facilities to run-of-river operation to qualify for Class I (this has resulted in a very modest rate of conversion which is not likely to be expanded, because projects would lose on-peak energy value that storage provided which may offset any REC revenue gain), and

(b) Refurbishment/life extension under the Maine Class I RPS. As noted above, the impact to the REC market would be largely limited because of the lack of eligibility in Rhode Island and the vast majority of the regional REC market.

Q. Do you expect that imported renewable energy generation from outside New England will flood the New England REC market?

A. Imports into New England certainly have an impact on the New England REC marketplace. However, the impact is not significant.

With respect to New York generation, any argument that when 10-year New York RPS contracts expire, 3,000 MW of New York generation will flow to New England seeking higher prices is flawed in the following respects. First, New York has a policy goal of 30% of total supply from renewable energy generation – its needs are increasing; the Main Tier RPS referred to is one part of the suite of policies to achieve that goal. If all of the currently contracted supply, and supply contracted over the next few years, were to leave New York, then New York will no longer be meeting its RPS. In order to maintain its goals, New York would create rules, restrictions or post-contract demand aimed at keeping much of that renewable energy generation in-state. It is inconceivable that New York would consider its goals met if all the new generation fled the market – a classic case of double counting.

Second, there are substantial practical constraints on importing RECs from New York. The maximum available transfer capacity from New York into New England, excluding the Cross Sound Cable (which is on the wrong side of the New York City transmission bottleneck to be a source of imports from upstate New York wind) is about 1,500 MW in the summer. However, much of this transfer capability on the transmission ties is already being utilized for a variety of grandfathered transactions, renewable energy transactions, and economy transactions, leading to varying degrees of congestion.

With respect to Quebec, any similar assertions that large volumes associated with 10-year wind contracts entered into by Hydro Quebec would flow to New England after their expiration are unfounded. Again, these projects resulted from provincial goals that

could not be considered met if all the supply flowed to New England without clear double counting.

Q. Do you have any other observations about REC prices?

A. Yes. When REC prices fall below a certain level, some eligible plants that cannot profitably operate without sufficient REC revenue may withdraw from the market. In fact, several biomass plants have curtailed operations even at recent REC prices. And, when REC prices are low due to surplus, development slows until demand growth consumes the surplus. One cannot expect REC prices to stay below the cost of entry of new resources for an extended time period while renewable generation continues to get built.

Q. Do you believe that potential nuclear power plants in New England will affect energy prices and that as a result, National Grid's energy price projections are too high?

A. No. In fact, any argument with respect to nuclear expansion in New England can only be considered as speculative. The timeframe to develop a new nuclear power plant is perhaps 10-15 years; and expansion prohibitions are in place in Connecticut, Maine and Vermont. There is no existing site available to expand in Rhode Island and there are currently no planned plants for New England. Add to these factors the expected difficulty in siting any new nuclear facility in the region, the huge cost uncertainty (which I would estimate to be far more uncertain than the costs of offshore wind), and the lack of any approved plan for permanent waste disposal.

The issue of public opposition is also significant. Given the historical resistance to nuclear plants proposed in the region, concerns with large thermal outflows and their possible impact on fisheries, and the publicity that surrounding recent issues at New England's existing nuclear plants, it seems far from likely that public opposition to expansion of the nuclear fleet in New England will go away.

Q. In your estimation, will the Block Island Wind Farm Project only minimally enhance environmental quality since the production from a "wind resource of this size cannot be reliably forecasted" or somehow does not reduce the operation of fossil-fueled units?

A. No. In fact, power pools with significant amounts of wind power have instituted forecasting methods that have had very good, although not perfect, results. A wide range of studies of actual systems in the U.S. and elsewhere have shown that at small penetrations up to about 20%, the variability of wind generation does not alter the behavior of large electric system dispatch materially, as the variability is similar in characteristics and magnitude to load variability which the system is designed to accommodate. To paraphrase, these studies show that as wind penetrations grow, the cost imposed on the system – reflected as incrementally less efficient use of operating reserves – grows. The increased cycling of reserves would, indeed, be associated with a modest incremental increase in emissions from load-following plants. And these studies generally suggest a non-linear relationship between wind penetration and the impact on reserves required to accommodate that penetration. In addition, these studies show that the bigger the control area, the less the impact associates with integrating wind.

While it is not disputable that a system that relies on wind to meet 100% of its energy needs would require a lot of dispatchable generation to keep the lights on, at small penetrations wind imposes negligible change to a system's operating needs. It is relevant to consider a study of the New England system, with its particular cumulative and diversified variations of load and performance of hundreds of generators and demand resources. ISO-NE has been actively studying the impact of substantial wind penetration, and continues with a far more refined New England Wind Integration Study (NEWIS), currently underway. These studies are by far a more relevant metric of the

actual emission impact of adding substantial volumes of wind to the New England system.

As noted in my testimony, ISO-NE recently performed an analysis of different wind power scenarios[8], which evaluated the emissions of sulfur dioxide (SO_2), nitrogen oxide (NO_X), and carbon dioxide (CO_2) associated with a number of future scenarios including substantial wind penetration. Comparing two cases, for example, the case adding 4000 MW of wind versus 4000 MW of natural gas plants, shows material reductions in both NO_X and CO_2. For CO_2, the difference between the two cases is approximately 5.9 million tons of CO_2. That's about 1,475 tons per year (tpy) CO_2 per MW of wind. Multiplied by the Deepwater Wind's 28.8 MW, this would result in a reduction of 42,480 tpy of CO_2. This compares to the estimate in my testimony of 48,641 tpy based on ISO New England's 2008 marginal emissions analysis. ISO-NE's study shows that emissions of NO_X would also decrease substantially.

When wind operates, it predominantly backs down fossil-fired resources and their associated emissions and not possibly lower emission generation reportedly used to provide regulation such as pumped storage or hydro units. ISO-NE's own studies on this subject are informative. Many different units provide regulation or automatic generation control (AGC) and the responsibility tends to be spread around the system. Per ISO-NE's 2008 Annual Market report (page 109), over 90% of the MWhs of AGC in 2008 was provided by gas fired units. Contrary to other claims made, hydro's contribution was negligible and pumped storage was about 5%.

[8] Draft New England 2030 Power System Study Report to the New England Governors 2009 Economic Study: Scenario Analysis of Renewable Resource Development (ISO New England Inc. September 8, 2009) http://www.nescoe.com/uploads/iso_eco_study_report_draft_sept_8.pdf . See Table 8.

More directly, there could be important local emissions reductions on Block Island itself. If we make a reasonable assumption that Block Island Power Company would take advantage of a cable to the mainland to purchase power from the New England wholesale market, this should result in their fleet of diesel fueled generators being effectively shut down and used only on an emergency basis. The result would be a reduction of emissions to the environment and reduced exposure to oil price levels and volatility for Block Island Power Company's customers.

Q. In your opinion will the Block Island Wind Farm Project crowd out more economical renewable energy projects in Rhode Island that could possibly meet the Long-Term Contracting Standard for Renewable Energy in §39.26-1?

A. No. In my opinion, informed by available resource studies and based on the current state of renewable energy technologies, there is limited remaining potential not already developed or under construction for on-shore renewable resources at costs lower than offshore wind. The viable incremental potential, other than more costly solar and offshore wind, does not appear to reach the 90 *average* MW specified in Rhode Island law. Consider the following data points:

- The Rhode Island Winds study[9] commissioned by the state indicated very limited on-shore wind potential, identifying only one viable area for a 10 MW wholesale onshore project, and limited potential for community-scale wind (8 towns and 4 potential industrial or institutional customers (which I approximate corresponds to 18 to 25 MW assuming 1 or 2 turbines of 1.5 MW capacity each per each site).

[9] Applied Technology & Management, et al., *Final Report, RIWInds Phase I: Wind Energy Siting Study*, April 2007. See http://www.energy.ri.gov/documents/independence1/RIWINDSReport.pdf

- DOE's January 2006 Hydropower Assessment (conducted by Idaho National Laboratory)[10] identifies 7 average MW of incremental feasible potential hydropower in Rhode Island.

- Rhode Island's incremental landfill methane resource potential is largely exploited by the new project expansion underway at the Johnson landfill. EPA's Landfill Methane Outreach Program[11] identifies un-quantified incremental potential at other small landfills in Westerly, Tiverton and Bristol.

- No commercial-scale biomass plants have been proposed that I am aware of.

In summary, there is little basis to assume that 90 average MW of new renewable energy other than offshore wind and solar projects could be built in Rhode Island.

Perhaps more importantly, the statute specifically envisions that the New Shoreham project resulting from National Grid's RFP would be encouraged and would constitute part of the 90 average MW minimum statutory target for long-term contracts.

IV. CONCLUSION

Q. Now that you have had the opportunity to review the testimony and data requests in this proceeding, do you still consider that Deepwater Wind's PPA for the Block Island Wind Farm to be commercially reasonable?

A. Yes I do.

Q. Does this conclude your rebuttal testimony?

A. Yes, with the exception that I may file supplemental rebuttal testimony to address the specific support for some of Mr. Hahn's opinions and conclusions. As set forth in Mr. Moore's testimony, Deepwater Wind requested supporting information in its first set of

[10] See http://hydropower.inel.gov/resourceassessment/pdfs/main_report_appendix_a_final.pdf. See Table 7.
[11] http://www.epa.gov/lmop/projects-candidates/index.html#map-area

data requests to the Division of Public Utilities and Carriers. This request was served on February 5, 2010, and a response was due on February 15, 2010. In reviewing the Division's response, it claimed that much of Mr. Hahn's supporting documents and information are confidential. It is my understanding that the attorneys for Deepwater Wind and the Division are currently working to resolve this issue.

Since my rebuttal testimony was due on February 16, 2010, I will not be able to review Mr. Hahn's supporting information until the confidentiality issue is resolved and the information produced. I may file supplemental rebuttal testimony as soon as possible following my review of the materials and information supplied by Mr. Hahn.

CERTIFICATION

I hereby certify that on February 16, 2010, I sent a copy of the within to all parties set forth on the attached Service List by electronic mail and copies to Luly Massaro, Commission Clerk, by electronic mail and regular mail.

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