production tax credits: "The tax credits have a significant impact on the economics of the project. National Grid was advised by Cape Wind and was persuaded that the project could not have moved forward with project financing without them."[122]

What these witnesses are really saying is that the present value of the expected stream of revenues from sales of Cape Wind's output into the New England electric market, plus the present value of future revenues from the sale of RECs, plus the present value of the investment tax credit or production tax credit the project will receive (or, in lieu of those credits, a higher contract price), is less than the cost to construct Cape Wind, plus the present value of future operating costs. Dr. Tierney considers such an outcome to be *prima facie* evidence of "market barriers." This is entirely wrong. It simply means that Cape Wind is too expensive.

Q PLEASE EXPLAIN.

A The testimony of Mr. Milhous actually implies that Cape Wind faces no market barriers. Mr. Milhous testifies that, "With the recent federal approval of the project announced by US Secretary of the Interior Salazar, Cape Wind, for all material purposes, is permitted and ready for

[122] Milhous Direct at 19:9–11.

construction."[123] I conclude from this statement that Mr. Milhous is testifying that Cape Wind faces no barriers to entry from the permitting process. Since this is the only legitimate market barrier Cape Wind can face, there are no other market barriers.

Thus, once the price of RECs, emissions reductions, and the various tax credits are accounted for, if Cape Wind still requires an above-market price PPA, then it is simply too costly given how federal and Commonwealth policy makers have themselves determined the value of the non-market attributes.[124] We thus have a situation no different from the expensive Rolls-Royce, which not everyone can afford.

What National Grid witnesses are arguing is that, because Cape Wind's cost is greater than the sum of expected future market prices plus of all of the additional revenues Cape Wind will obtain through tax credits and REC payments, it cannot obtain financing. That is not evidence of a market barrier. Rather, it is basic economics, and is the same reason that a

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[123] *Id.* at 7:16–18.

[124] Massachusetts policy makers can always mandate higher levels of RECs, effectively increasing the demand for RECs. In that case, the value of RECs produced by Cape Wind will increase in value. Once again, one could compare the stream of revenues from the sale of power, plus the stream of revenues from the sale of RECs, and the value of the investment or production tax credits with the project's present value cost.

bank will not provide you with a car loan for more than the purchase price of the car.

Q DID NATIONAL GRID DETERMINE WHETHER THE COST OF THE CAPE WIND PPA WAS GREATER THAN THE MARKET VALUE OF THE PROJECT'S ENERGY, CAPACITY, AND RECS?

A Yes. Mr. Milhous testifies that

> The comparison shows that, under the modeled assumptions, the Bundled Price for energy and RECs under PPA-1 will be above the market cost of an equivalent amount of capacity, energy and RECs for the same time period as the term of PPA-1.

The comparison is provided in Exhibit MNM-2. What it shows is that in the year 2013, the cost premium of the PPA is about 75% higher than the bundled value of energy, capacity, and RECs. That percentage increases over time and, at the end of the contract period in the year 2027, the cost premium is over 100% greater (i.e., more than double) the market value of energy, capacity, and RECs. <u>This is clear and indisputable evidence that the PPA is not cost-effective</u>.

*******Begin Confidential Material *******

[redacted]

[redacted]

[redacted]

[redacted][125]

[redacted]

[125] Milhous Direct at 25:5 – 26:3.

[redacted]

*******End Confidential Material *******

Q CAN A CEILING PRICE FOR COST-EFFECTIVENESS BE ESTABLISHED?

A Yes. In Docket No. D.P.U. 10-71, NStar witness Daly defines this ceiling price as the sum of the market price of energy plus the ACP for RECs that has been established by DOER.[126] For example, suppose the average market price for energy in 2010 is $50/MWh. The 2010 ACP has been set to $60.93/MWh for Class I renewables, which represents the maximum price Massachusetts ratepayers can be expected to pay for Class I RECs. In that case, a renewable price in excess of $110.93/MWh ($50/MWh + $60.93/MWh) is not cost-effective.

Q THIS IS AN EXAMPLE FOR JUST ONE YEAR. CAN YOU PERFORM A SIMILAR ANALYSIS OVER THE ENTIRE 15-YEAR CONTRACT PERIOD OF THE CAPE WIND PPA?

A Yes. The way to do this is to compare the levelized cost of the PPA with the levelized cost of energy plus the ACP. In addition, since the Cape Wind PPA may be eligible to receive capacity payments in the ISO-NE Forward Capacity Market, forecast capacity values can be included in the comparison of levelized costs.

Q HOW CAN YOU PROJECT THE ACP OVER TIME?

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[126] *NSTAR Electric Company*, Docket No. D.P.U. 10-71, Direct Testimony of James G. Daly, July 2, 2010, at 25:5–9.

A The regulations for the Renewable and Alternative Energy Portfolio Standards specify that DOER will adjust the ACP each year based on the change in the previous year's consumer price index ("CPI").[127] Thus, to perform the analysis, we can combine the combined energy+capacity+REC market price forecasts prepared by Levitan or ESAI for National Grid, which include an estimate of inflation, and project future ACPs for the duration of the contract. Then, we subtract the forecast REC prices from the combined price and add back the inflation-adjusted ACP. Thus, the maximum cost-effectiveness price threshold in year t, $P_{MAX,t}^{C/E}$ equals

$$P_{MAX,t}^{C/E} = P_t - REC_t + ACP_t,$$

where P_t is the combined energy+capacity+REC market price forecast for year t, REC_t is the forecast REC price in year t, and ACP_t is the alternative compliance price in year t. Finally, we levelize the 15-year stream of prices for both the PPA and this maximum cost-effectiveness threshold and compare them. If the levelized price of the PPA is greater than the levelized price of the threshold, the PPA is, by definition, not cost-effective.

[127] 225 CMR § 14.08(3)(a)2.

Q IF THE LEVELIZED PRICE IS BELOW THIS THRESHOLD, IS IT THEN COST-EFFECTIVE?

A Not necessarily. The maximum threshold criterion I have just described and which is the basis for NStar witness Mr. Daly's testimony regarding the cost-effectiveness of the New England Wind Energy Project PPA he discusses, is a necessary, but not sufficient determination of cost-effectiveness. The fact that the levelized price of a PPA is below this threshold does not guarantee cost-effectiveness because the cost-effectiveness finding still requires comparison with other renewable resource alternatives. In other words, it is cost-effective to enter into a long-term PPA priced above the maximum threshold criterion. It also generally would not be cost-effective to enter into a long-term PPA that, while priced below the maximum threshold criterion, is priced far higher than alternative, renewable resources.

Q DID YOU PERFORM AN ANALYSIS TO EVALUATE WHETHER THE CAPE WIND PPA MEETS THIS PRICE THRESHOLD?

A Yes. Although the details are discussed in the confidential section below, the results of my analysis show that the minimum levelized cost of the Cape Wind PPA, which assumes the project is fully operational on January 1, 2013, and obtains its tax credits, is over 50% greater than the

levelized threshold price. This value excludes the 4% adder on top of the PPA price that National Grid charges ratepayers. Because the Cape Wind PPA exceeds the levelized cost-effectiveness threshold cost, and by such a significant amount, the contract is not cost-effective.

*******Begin Confidential Material *******

[redacted]

*******End Confidential Material *******

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*******End Confidential Material *******

Q PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE SUPPLY OF RENEWABLE GENERATION AS IT RELATES TO THE COST-EFFECTIVENESS OF THE CAPE WIND PPA.

A National Grid and Cape Wind have attempted to perform an "end-run" around a true cost-effectiveness analysis by creating a series of strawman arguments regarding the demand and supply of renewable generation.

First, Dr. Tierney compares the demand for renewable resources in the year 2025 to the available supplies of renewable generation today, based solely on known projects under development. Finding that future demand is greater than existing supply, she manufactures an artificial "shortage."

Second, Dr. Tierney attempts to justify Cape Wind because of its nearness to the southern New England load center and thus not requiring extensive new transmission capacity. In making this argument, Dr. Tierney ignores the fact that new transmission capacity must be built regardless to fully integrate all of the wind resources planned for New England, without which the adverse impacts on system reliability will be severe. Thus, from a cost-effectiveness standpoint, future transmission system investments are irrelevant. Cape Wind's location near the southern New England load center is irrelevant for system reliability purposes. To maintain system reliability, the variable output from the project must be "firmed up" with other generating resources in the form of additional regulation reserves.

Third, Dr. Tierney has created a wholly artificial and inaccurate "market barriers" construct, arguing that building Cape Wind is needed

to reduce these market barriers. In other words, she has invented a series of "market barriers" faced by Cape Wind and other renewable generating resources so as to argue that approving the Cape Wind PPA is necessary to overcome these market barriers. In fact, Mr. Milhous's testimony proves Cape Wind faces no market barriers.

Fourth, the fact that the PPA price will exceed the forecast bundled price for energy, capacity, and RECs—even assuming, *arguendo*, that the forecasts developed for National Grid by ESAI and Levitan are accurate—is clear evidence that the PPA is not cost-effective, not because it faces barriers, because high cost itself is not a market barrier, but because the project is simply too costly.

IV. SPECIFIC REBUTTAL OF NATIONAL GRID AND CAPE WIND WITNESSES

A. National Grid Has Not Evaluated the Cost-Effectiveness of the Cape Wind Project

Q HOW HAVE NATIONAL GRID AND CAPE WIND WITNESSES DEFINED COST-EFFECTIVENESS?

A National Grid and Cape Wind witnesses offer up at least four alternative "definitions" of cost-effectiveness to conclude that the proposed PPA is cost-effective. These include:

1. Cape Wind is needed to meet RPS goals, and therefore the PPA is cost-effective by definition (Tierney, Milhous);

2. "With respect to long-term energy price commitments like the PPA, the comparison must be made to similarly long-term alternative price commitments that do not include price adjustments relative to potential fuel cost volatility"[128] (Duffy);

3. "the [GC Act] calls upon the Department to view the concept of "cost-effectiveness" expansively in order to incorporate these external benefits that are undervalued in prices today but that are nonetheless critically important for the Commonwealth's citizens and its electricity consumers"[129] (Tierney); and

4. "the Green Communities Act envisions a cost-effectiveness concept that is designed to overcome certain non-monetary barriers to entry for early-mover projects"[130] (Tierney).

None of these four definitions even approximates an economic definition of cost-effectiveness, nor a definition that is appropriate for ratemaking purposes. Whether Cape Wind will help the state meet its RPS goals, overcome "non-monetary barriers to entry" that prevent renewable resources from competing in the market, or incorporate external benefits, a cost-effectiveness finding requires an evaluation and comparison of alternatives. National Grid has not made any such comparisons. Instead,

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[128] Duffy Direct at 23:8–11.

[129] Tierney Direct at 8:14–18.

[130] *Id.* at 23:3–5.

these four alternative definitions have been advanced specifically to avoid performing such comparative analysis.

Q WHAT DOES DR. TIERNEY MEAN BY AN "EXPANSIVE" VIEW OF COST-EFFECTIVENESS ANALYSIS?

A Dr. Tierney's definition of "expansive" cost-effectiveness analysis is vague and Alice-in-Wonderland-like,[131] so as to avoid the need for any empirical analysis. She states that benefits that should be incorporated into such an "expansive" definition include "helping to enhance reliability and moderate system peaks, providing electricity and renewable energy attributes, and other long-term benefits."[132] These benefits, in turn, apparently include "meeting energy security, environmental and economic goals in a carbon-constrained global economy."[133] She also discusses the state's goal of "greater reliance on electricity produced from renewable fuels that do not involve drilling or production of fossil fuels."[134] In essence, Dr. Tierney argues that cost-effectiveness analysis

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[131] L. Carroll, *Through the Looking Glass*, Chapter 6. "When I use a word," Humpty Dumpty said in rather a scornful tone, "it means just what I choose it to mean -- neither more nor less."

[132] *Id.* at 7:13–15.

[133] *Id.* at 6:5–6.

[134] *Id.* at 9:5–6.

must incorporate all of these "benefits," but that such benefits are so "expansive" as to preclude measurement.

Q CAN NON-MARKET COSTS AND BENEFITS BE INCLUDED IN A COST-EFFECTIVENESS ANALYSIS?

A Yes. Cost-effectiveness analysis and, more broadly, cost-benefit analysis, are not limited solely to market-based attributes, such as price. It is both reasonable and appropriate to incorporate the value of non-market attributes in such analyses. The problem is that Dr. Tierney argues these non-market attributes are either not measurable or not fully reflected in the price of RECs. By arguing these benefits cannot be measured or are otherwise incomplete measures of cost-effectiveness, Dr. Tierney can thus bootstrap her way to concluding that the Cape Wind PPA is cost-effective. That is unreasonable: it establishes a "because I say so" definition of cost-effectiveness that cannot possibly have any probative value.

Q CAN NON-MARKET ATTRIBUTES BE VALUED?

A Yes. There are several approaches that have been developed to address cases where performing a cost-effectiveness or cost-benefit analysis involves non-market attributes. Environmental economists do this routinely, using a variety of methods. For example, the oil spill in the

Gulf of Mexico is likely to reduce recreation activities in the region. The value of such recreation activities can be measured using empirical methods known as *travel cost* methods.[135] Similarly, the cost associated with a reduction in the quality of a view shed, perhaps owing to the presence of wind turbines, can be estimated using what are called *hedonic models* or *contingent valuation* studies. The former uses differences in market prices to estimate the marginal contributions of specific environmental characteristics, such as view shed quality.[136] The latter is a form of survey methodology that, through carefully designed questions and econometric analysis, determines respondents' willingness to pay for improved environmental amenities or willingness to accept reduced environmental amenities.[137] Contingent valuation studies were used to assess punitive damages in the case of the *Exxon Valdez* oil spill.

Q WHAT ABOUT OTHER NON-MARKET ATTRIBUTES, SUCH AS REDUCTIONS IN POLLUTION LEVELS OR REDUCED RELIANCE ON FOSSIL FUELS? CAN THESE BE FULLY VALUED?

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[135] *See* LDZ 1997 at 296–304.

[136] *Id.* at 276–82.

[137] *Id.* at 282–96.

A Yes. In some cases, policy makers create markets for non-market attributes, allowing these attributes to be directly valued. For example, with the 1990 Clean Air Act Amendments, Congress created a system of tradable emissions allowances for sulfur dioxide and oxides of nitrogen. As such, changes in emissions of these two pollutants can be directly valued. Thus, if the PPA with Cape Wind would reduce sulfur dioxide emissions by, say, 10,000 tons per year and the allowance price is $31/ton,[138] then the value of that annual emissions reduction would be $310,000/year. Similarly, if Cape Wind reduced carbon emissions by, say, 200,000 tons/ year and the price of carbon allowances was $5/ton, the value of the savings would be $1 million/year. Those savings would then be included in the cost-effectiveness valuation of the Cape Wind PPAs in comparison to the savings produced by alternative renewable resources.

More broadly, the cost-effectiveness of Cape Wind relative to other generating resources can be compared using REC prices. Contrary to the testimony of Dr. Tierney, REC prices do account for all non-price benefits. The reason is that policy makers themselves have created the REC market.

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[138] This is the forecast price of SO2 allowances for 2013 as estimated by ESAI. *See* Exhibit MNM-6 at 8.

To suggest, therefore, that RECs do not incorporate all non-monetary values means that policy makers have, for some reason, set the REC requirements below the "correct" level. However, since policy makers themselves collectively set the level, by definition they must be setting them "correctly."

Q BUT SUPPOSE DR. TIERNEY IS CORRECT, THAT RECS DO NOT FULLY VALUE ALL OF THE NON-MARKET ATTRIBUTES. IS IT STILL POSSIBLE TO RANK ALTERNATIVE RESOURCES AND GAUGE THEIR COST-EFFECTIVENESS?

A Yes. Even assuming *arguendo*, that some attributes of renewable resources cannot be valued or that RECs do not reflect all renewable attributes, cost-effectiveness comparisons still can be made using multi-attribute (or multi-objective) analysis.[139] To do this, all of the attributes—monetary and non-monetary—of each alternative resource are measured and weights are assigned to each attribute.[140] The cost-effective resource (or combination of resources) is the one for which the weighted sum of the attributes is maximized or minimized.

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[139] For an introduction to multi-objective analysis, see R. Keeney and H. Raiffa, *Decisions with Multiple Objectives*, (New York: Cambridge University Press 1993).

[140] The measures themselves do not have to be monetary, but can be based on consistent scales established by decision makers. For example, credit rating agencies have created scales for bond ratings that can be used to assess the relative risk of different bond issuances.

Q **DID NATIONAL GRID PERFORM ANY FORM OF MULTI-ATTRIBUTE ANALYSIS TO EVALUATE CAPE WIND AGAINST ALTERNATIVES?**

A No. The contrast between National Grid's failure to perform any form of comparative analysis and the detailed analysis that was performed by Delmarva to evaluate renewable and fossil-fuel resources is striking. In addition to cost measures, Delmarva and the Delaware Public Service Commission developed a set of eight non-price factors with specific point values for each, as shown in the table below.[141]

Non-price Factor	Maximum Points
Environmental Impact	14
Fuel Diversity	3
Technology Innovation	3
Operation Date and its Certainty	3
Reliability of Technology	2
Site Development	5
Bidder Experience, Safety and Staffing	5
Project Financeability	5
Total Non-Price Points	**40**

Similarly, the Delmarva RFP used four price factor variables in the evaluation, as shown in the following table.[142]

[141] Delmarva RFP Evaluation Report at 16.

[142] *Id.* at 17–38.

Price Factor	Maximum Points
Price Impact	33
Price Stability	20
Risk Exposure	6
Contract Terms	1
Total Price Points	**60**

Q **ARE YOU AWARE OF ANY CIRCUMSTANCES THAT PREVENTED NATIONAL GRID FROM PERFORMING A SIMILAR MULTI-ATTRIBUTE ANALYSIS AS THAT IN THE DELMARVA RFP EVALUATION REPORT?**

A No. In fact, National Grid has its own RFP evaluation process that assigns price factors an 80% weight and non-price factors a 20% weight. Although the relative weights assigned to the price and non-price factors differ from the Delmarva RFP, the concept is the same.

Q **ARE YOU AWARE OF ANY LANGUAGE IN SECTION 83 OF THE GC ACT THAT PREVENTS A MASSACHUSETTS UTILITY FROM PERFORMING A COST-EFFECTIVENESS ANALYSIS SUCH AS THAT SHOWN IN THE DELMARVA RFP EVALUATION REPORT?**

A No. Section 83 states, in part, "The department of public utilities shall take into consideration both the potential costs and benefits of such contracts, and shall approve a contract only upon a finding that it is a cost effective mechanism for procuring renewable energy on a long-term basis." I see no language in Section 83 that precludes this form of cost-effectiveness analysis. Indeed, given the stated requirement that contracts

must be found cost-effective, it would make no sense to include language that prevented a utility like National Grid from performing a detailed, multi-attribute analysis.

Q BOTH DR. TIERNEY AND CAPE WIND WITNESS DUFFY DISCUSS THE BENEFITS OF FUEL DIVERSITY THAT CAPE WIND WILL PROVIDE. CAN THESE BENEFITS BE VALUED?

A Yes. Both Dr. Tierney[143] and Mr. Duffy[144] discuss the benefits of increased fuel diversity that Cape Wind will provide, arguing that this is another benefit that should be incorporated into their "broad" definition of cost-effectiveness. However, rather than evaluating the benefits of fuel diversity, both witnesses resort to "proof by example." Specifically, they both discuss events that took place during the winter of 2003/04, when peak natural gas demand and the resulting high natural gas prices caused numerous natural-gas fired generating plants to shut down because electric prices did not reflect those high gas prices, and because many dual-fuel generators were prevented from burning fuel oil instead.

During the events of that winter, the market price of electricity was too low to support paying for the natural gas needed to generate

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[143] Tierney Direct at 99:17–20.

[144] Duffy Direct at 18:14–16.

electricity, but there was no linkage between acquiring natural gas supplies to ensure sufficient generating resources to meet demand, and contractual commitments for those gas supplies. There was no coordination between day-ahead gas supply commitments and day-ahead electric generating commitments. Quite simply, the gas supply schedulers were not talking to their electric counterparts. Moreover, environmental restrictions limited the ability to operate many generating plants with dual-fuel capability, which ISO-NE identified as its top concern in ensuring reliable operations.[145]

Since 2004, ISO-NE has made operational changes to prevent this type of situation from occurring again. First, there now is careful coordination between day-ahead gas and electric supply scheduling. Second, the forward capacity market was implemented in a way that incented generating resources to ensure they were available to provide power to the market during peak events. Thus, gas-fired generators have a much greater economic interest in ensuring they are running and supplying power into the market. Third, additional gas supply infrastructure has been developed to increase gas supplies, and more will

[145] ISO-NE, "Power Generation and Fuel Diversity in New England," August 2005 at 3.

be developed to take advantage of huge new shale gas reserves in New York. Fourth, dual-fuel generators now have greater flexibility to operate.

Q IS INCREASED FUEL DIVERSITY A REASONABLE GOAL?

A Yes. However, the benefits of additional fuel diversity should be greater than the costs. Moreover, fuel diversity can take different forms, with different costs. Dual-fuel operation ability, which allows generating units to quickly switch the fuels they burn, is the most cost-effective approach for fuel diversity when the primary goal is electric supply adequacy.

Similarly, if the primary objective is reducing exposure to fuel price volatility, then fuel price hedging is more efficient and less costly than relying on wind generation, whose intermittency must itself be addressed by integrating other generating resources—ironically, gas-fired ones—that can be brought on-line quickly so as to compensate for sudden decreases in wind generation levels.

Q DID NATIONAL GRID EVALUATE THE COST-EFFECTIVENESS OF THE FUEL DIVERSITY PROVIDED BY CAPE WIND?

A No. National Grid witnesses do not provide any evidence that they evaluated the benefits of the additional fuel diversity that Cape Wind will

allegedly provide. Moreover, without sufficient integration of the Cape Wind output into the ISO-NE grid, Cape Wind may actually increase reliance on fossil fuels. Thus, rather than increasing fuel diversity, Cape Wind could, instead, reduce fuel diversity.

The reason goes back to the need to ensure there is sufficient regulation reserves and back-up generation to account for the inherent volatility of wind power. Additional wind generation requires additional fossil-fuel generating resources, primarily gas-fired generating units, to "firm up" wind generation. As such, rather than generate a steady output of electricity, these gas-fired units are cycled on and off, which reduces their operating efficiency and shortens their overall lifetime, much as operating a car in stop-and-go traffic uses more fuel and places more stress on the motor than highway driving.

B. The Cost-effectiveness Analysis of Cape Wind Witness Stoddard is Severely Flawed

Q PLEASE SUMMARIZE THE CONCLUSIONS REGARDING THE COST-EFFECTIVENESS OF THE CAPE WIND PPA MADE BY CAPE WIND WITNESS STODDARD.

A Cape Wind witness Stoddard asserts that the contract prices set forth under the proposed PPA are reasonable. Specifically, he states

> In my opinion, the pricing and other terms specified in the PPAs are reasonable in light of the expected range of potential market prices for the energy, capacity, and renewable energy products that National Grid will receive under the Agreements, other benefits that National Grid customers will receive, the requirements of the GCA, and the other alternatives available to National Grid for meeting the requirements of the Massachusetts legislation and related renewable energy policies.[146]

Mr. Stoddard focuses on the "benefits" of the PPA provided by its price certainty, the need to meet the demand for renewable energy established by the state's RPS requirements, and its "price suppression" benefits.

Q IS MR. STODDARD'S ANALYSIS CREDIBLE?

A No. Mr. Stoddard's analysis is not credible for the following reasons. First, his conclusion that the PPA is needed to meet the demand for renewable energy established by the RPS and the GC Act is simply a rehash of the flawed arguments made by Dr. Tierney. Cape Wind is not cost-effective simply because the demand for renewable energy is projected to be greater than the available supply in certain years, especially when estimates of the available supply have been artificially

[146] Stoddard Direct at 3:17–22.

reduced and National Grid has ignored numerous other renewable generation alternatives.

Second, his conclusion that, "plausible scenarios," such as higher carbon dioxide allowance prices, more retirements forced by environmental policy, outages of nuclear power plants, or several years with extreme weather and high demand could easily lead to market prices well in excess of the PPA price"[147] is highly misleading: the issue is not whether market prices could exceed the PPA price at a given moment in time, but how expected market prices will compare to the PPA price over its 15-year lifetime. Moreover, Mr. Stoddard's "plausible" high gas price scenario[148] misleadingly refers to the ISO RTS gas price forecast of twice the EIA forecast when, in fact, that price scenario was prepared by ISO-NE as a sensitivity case only, with no assignment of any probability value.[149]

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147 Exhibit CW-RBS-1 at 16: 9-12.

148 Exhibit CW-RBS-3 at 8, Figure 5 purports to be the EIA natural gas price forecast through the year 2037. In fact, the EIA forecast in its *Annual Energy Outlook 2009* ends in the year 2030. In fact, in Figure 5, the EIA forecast is misleadingly extends the price trend outwards through the year 2037. Moreover, the CRA report states that the EIA forecast was released in April 2009. In fact, it was released in December 2008.

149 ISO RTS at 9. "The ISO study included a sensitivity for higher fuel prices. For this sensitivity, the ISO increased natural gas prices by a factor of two, distillate fuel oil prices by a factor of 1.75, and residual fuel oil prices by a factor of 1.5."

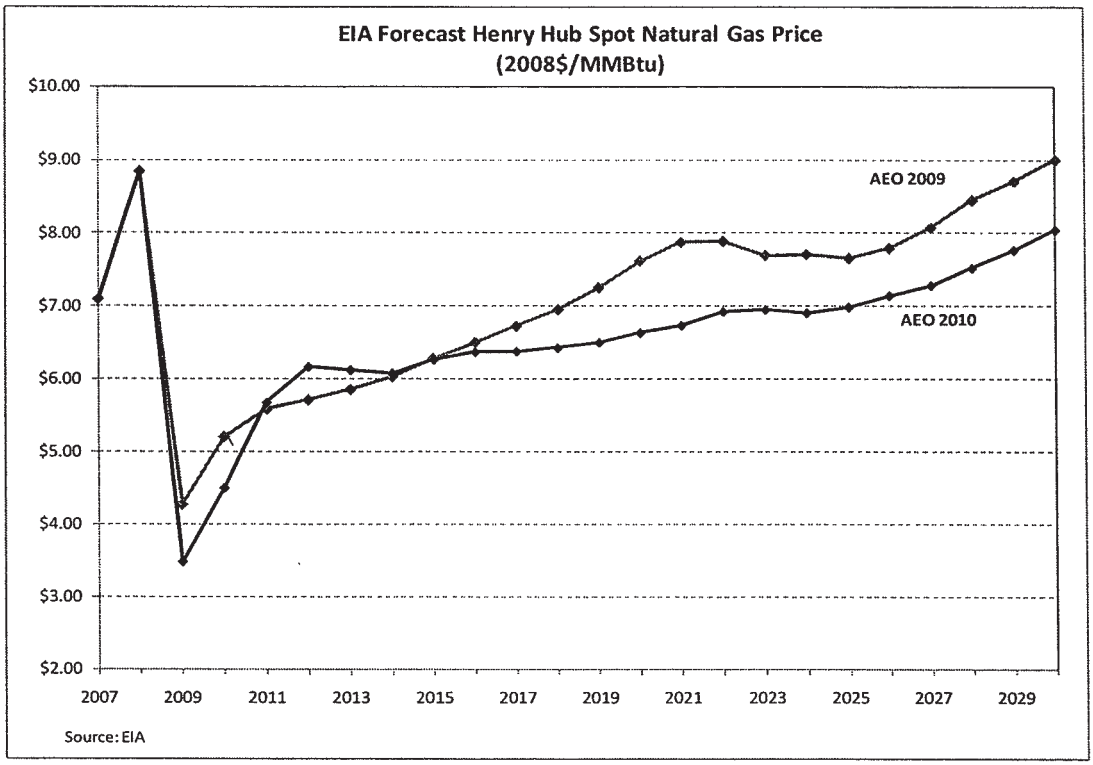
In other words, Mr. Stoddard has arbitrarily assigned a high probability to an individual sensitivity analysis, when ISO-NE did no such thing.

Q **PLEASE DISCUSS THE NATURAL GAS PRICE FORECAST ON WHICH MR. STODDARD'S ANALYSIS RELIED.**

A Mr. Stoddard relied on an outdated natural gas price forecast that was prepared by EIA in December 2008 for publication in its 2009 Annual Energy Outlook ("2009 AEO"). The 2009 AEO was officially released in May 2009. In December 2009, EIA prepared a natural gas price forecast for its 2010 Annual Energy Outlook ("2010 AEO"), which was released in May 2010.[150] The new forecast of natural gas prices is lower, reflecting the increasing availability of new natural gas reserves, especially shale gas. Figure 6 compares the two natural gas price forecasts.

[150] U.S. EIA, Annual Energy Outlook 2010. Available at: http://www.eia.doe.gov/oiaf/aeo/pdf/trend_4.pdf.

Figure 6: Comparison of EIA Henry Hub Natural Gas Price Forecasts



As figure 6 shows, the AEO 2010 forecast of Henry Hub natural gas prices is significantly lower than the AEO 2009 forecast. Between 2024 and 2030, the AEO 2010 forecast shows prices that are about 10% lower than the AEO 2009 forecast.

Q WHY DOES THE DROP IN FORECAST NATURAL GAS PRICES MATTER FOR ASSESSING THE COST-EFFECTIVENESS OF THE CAPE WIND PPA?

A Given that natural gas tends to be the marginal generating fuel in ISO-NE and that EIA's most recent forecast of natural gas prices is lower than its previous forecast, the increase in the average annual market price

posited by Mr. Stoddard is highly unlikely. The trend in natural gas futures prices has been extensively downward. For example, figure 7 shows the average weekly closing futures price for natural gas delivered in January 2017. The closing price as of the week of July 23, 2010 was $7.083/MMBtu. One year ago, the price was about $8.40/MMBtu.

Figure 7: Henry Hub Natural Gas Futures Price: January 2017 Delivery

Q DID MR. STODDARD PROJECT FUTURE WHOLESALE MARKET ELECTRIC PRICES IN ISO-NE?

A Yes. Mr. Stoddard prepared a comparison of PPA pricing to market pricing under a high gas price scenario developed by ISO-NE, the

results of which are shown in his Exhibit CW-RBS-5. This comparison shows an average annual market price of electricity of $133.47/MWh in 2013, which escalates at an annual average rate of about 3.8%. By comparison, the average wholesale energy price in 2009 was $42.02/ MWh.

Q PLEASE DISCUSS AVERAGE WHOLESALE ENERGY PRICES FOR THE FIRST HALF OF 2010.

A According to data published by ISO-NE, for the first 6 months of 2010, the average real-time ISO-NE hub price was $48.64/MWh.[151] Thus, for Mr. Stoddard's analysis to be plausible, the average annual real-time market price will have to almost triple in three years, but then increase at a rate only slightly higher than inflation thereafter.

Q WHAT ARE THE MOST CURRENT FUTURES MARKET PRICES FOR ISO-NE IN 2013?

A As of July 26, 2010, the on-peak futures price of electricity at the ISO-NE hub in calendar year 2013, as published by NYMEX, was $60.78/MWh, less than half Mr. Stoddard's forecast price. The off-peak

[151] Source: ISO-NE, Monthly LMP Indices, July 6, 2010. Available at: http://www.iso-ne.com/markets/mkt_anlys_rpts/lmp_indices/2010/WW_RTIDXMON_ISO_2010010100_20100706093900.csv.

futures price was $47.57/MWh,[152] indicating an average overall market price of $53.86/MWh.[153] As shown in Exhibit CW-RBS-5, Mr. Stoddard's assumed electric price in 2013 is $133.47/MWh, almost $80/MWh, or about 150%, greater than the current futures price. Given that the futures market represents the collective expectations of buyers and sellers, economists generally agree that such prices are the most accurate estimate of future prices.

Q MR. STODDARD ALSO STATES THAT CARBON CAP-AND-TRADE LEGISLATION WILL LIKELY LEAD TO SIGNIFICANTLY HIGHER ELECTRIC PRICES BEGINNING IN 2013. DO YOU AGREE?

A No. Mr. Stoddard testifies that,

> CRA's forecast assumes that a federal policy limiting the release of carbon dioxide will be in place by 2013, as proposed under the Kerry-Lieberman bill recently introduced in the Senate. The introduction of a federal cap-and-trade carbon policy will raise the costs of power generation significantly and those costs are likely to escalate at a rate significantly above inflation.[154]

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[152] Source: FutureSource.com. http://futuresource.quote.com/markets/market.jsp?id=energy&s=XKI.

[153] Based on a 5x16 peak. Thus, the average price is {(80)($60.78) + (88)($47.57)}/168 = $53.86/MWh.

[154] Stoddard Direct at 10:18–22 (fn. omitted).

Mr. Stoddard does not provide any definition of what constitutes a "significant" increase in the costs of power generation. However, an initial carbon price in the $15–$25 per ton range, as specified under Kerry-Lieberman for the year 2013, will not increase the average annual price of electricity by 150% over the current futures price, as Mr. Stoddard forecasts.[155] Again, the futures market already incorporates traders' expectations about the likelihood of the Kerry-Lieberman legislation or other legislation that would cap greenhouse gas emissions and impose some form of cap-and-trade or carbon tax system. In fact, on July 27, 2010, Senate Majority Leader Reid (D-Nev) introduced new energy legislation, called the *Clean Energy Jobs and Oil Company Accountability Act*. The bill does not contain a carbon cap-and-trade provision. Thus, the likelihood of a carbon cap-and-trade program being in place by 2013, as Mr. Stoddard's analysis assumes, has decreased.

Q DID MR. STODDARD ALSO ESTIMATE REC PRICES FOR HIS ANALYSIS?

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[155] A summary of the bill can be found at: http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=eb1619a8-2b2f-4750-8aec-779726be03dc.

A Yes. Mr. Stoddard's analysis shows REC prices of $55/MWh in 2013.[156] It is straightforward to examine the reasonableness of this value by examining the prices at which REC futures trade, since those are the best estimate of the future value of RECs. As shown previously in figure 2, as of July 12, 2010, the average closing price of RECs for calendar year 2013 had fallen almost 40% this year alone to $21.34/MWh. Thus, for Mr. Stoddard's $55/MWh REC to be plausible, there would have to be an unanticipated decrease in available renewable generation supplies or an unanticipated increase in renewable generation demand. In other words, Mr. Stoddard would have to possess unique knowledge not known anywhere else in the market.

Q WHY DO YOU SAY "UNANTICIPATED" INCREASES OR DECREASES?

A Futures market prices incorporate all publicly available information. If they did not, then so-called "arbitrage" opportunities would exist. In other words, someone could buy and sell futures in such a way as to make unlimited amounts of money. This is not a reasonable outcome. Therefore, economists refer to futures market prices as

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[156] Exhibit CW-RBS-5.

incorporating all publicly known information. So, the 2013 MA REC prices are based on all information known by traders as of July 12, 2010. The observed 40% decrease in the REC price indicates that the market is anticipating significant additions to qualifying renewable supplies, making Mr. Stoddard's $55/MWh REC assumption unreasonable.

Q DOES NATIONAL GRID WITNESS MILHOUS CONSIDER THE CCFE REC PRICES TO BE REASONABLE?

A Yes. Mr. Milhous testifies that "the REC value will equal the Massachusetts Class 1 Compliance RECs futures settlement price as published by the Chicago Climate Futures Exchange for the applicable billing period (the "CCFE Index Price"), which the parties considered to be a reasonable approximation of a market price for the RECs."[157]

Q DOES MR. STODDARD ALSO FORECAST RENEWABLE GENERATION SUPPLIES?

A Yes. Mr. Stoddard provides what he terms a "plausible" assessment of the total amount of new wind generation, other than Cape Wind. As shown in his Exhibit CW-RBS-7, he projects total installed wind capacity of 1,265 MW over the 10-year period 2011–2020. Beginning in 2013, Mr. Stoddard assumes only 100 MW of new wind generation—

[157] Milhous Direct at 17:8–12.

whether on-shore or off-shore—will be added each year. Mr. Stoddard's "plausible" assessment of new renewable generation supplies is simply implausible.

Q HOW DOES MR. STODDARD'S FORECAST OF NEW RENEWABLE GENERATION COMPARE WITH THE ESAI FORECAST?

A The ESAI forecast, which as I discussed previously is based on too low a probability of renewable generating resource completion, projects an average annual increase of 350 MW of new wind generating capacity.[158] Thus, Mr. Stoddard's analysis assumes less than one-third as much renewable generation supply additions as the ESAI analysis that, as I discussed previously, is itself based on faulty assumptions that result in too low a forecast of additional renewable generation supplies.

As a result of his grossly pessimistic and implausible assumptions, Mr. Stoddard projects that, by the year 2020, total REC-qualifying renewable generation will be just 9,729 GWh. By comparison, ESAI projects almost 15,000 GWh of REC-qualifying renewable generation by the year 2020.

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[158] Exhibit MNM-5 at 17.

Q DOES MR. STODDARD'S ANALYSIS ADDRESS THE IMPACTS OF FUEL PRICES AND CO2 PRICES ON LOAD GROWTH?

A No. For example, despite assuming higher CO2 allowance prices and gas prices that are double those in EIA's Annual Energy Review, Mr. Stoddard assumes future load growth, which is based on ISO-NE's CELT forecast (and, hence, using EIA's natural gas price forecast), will remain unchanged.[159] In other words, Mr. Stoddard's analysis presumes that neither higher CO2 prices nor a doubling of gas prices will affect load growth whatsoever. This is "apples and oranges" modeling, selecting inconsistent assumptions and blending them together to create an analytical *frappé* that, while offering an appealing viewpoint, is misleading and of no analytical value. The result is a comparative analysis of PPA prices to market prices that is completely inconsistent and has no probative value.

C. Price Suppression is not an Economic Benefit

Q BOTH CAPE WIND WITNESS STODDARD AND NATIONAL GRID WITNESS MILHOUS PRESENT STUDIES OF THE "PRICE SUPPRESSION" BENEFITS PROVIDED BY CAPE WIND. ARE THESE "BENEFITS" IMPORTANT TO CONSIDER IN DETERMINING THE COST-EFFECTIVENESS OF THE CAPE WIND PPAS?

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[159] Stoddard Direct at 13:17–14:4.

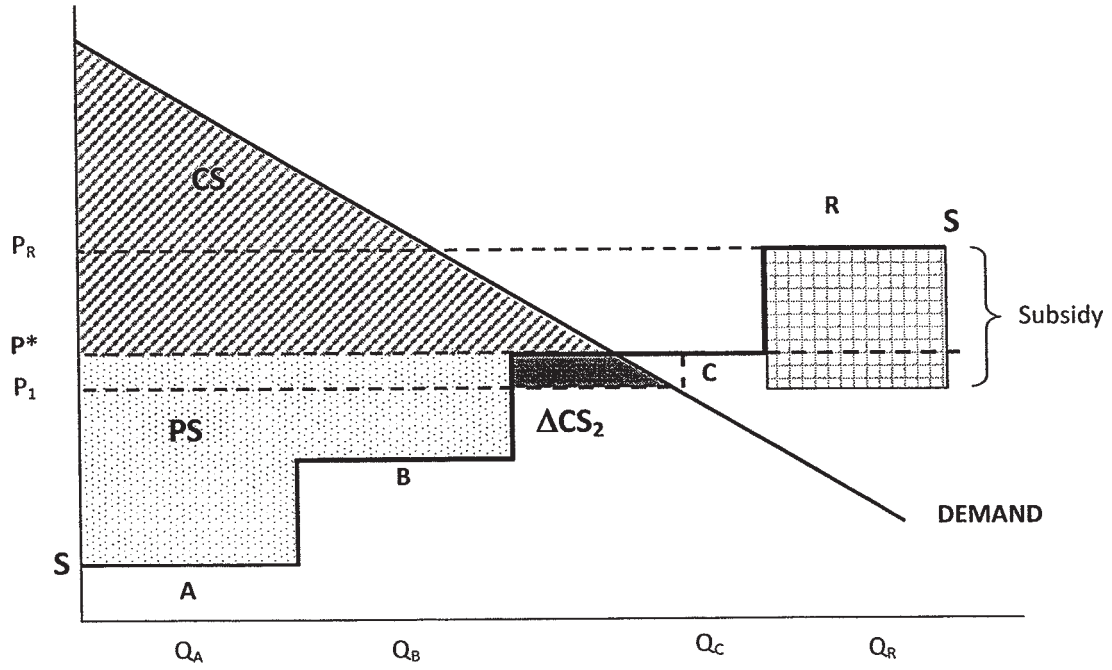
A No. First, price "suppression" is not an economic benefit. Instead, the price suppression studies presented by Mr. Stoddard (Exhibit CW-RBS-5) and the ESAI study provided by Mr. Milhous (Exhibit MNM-7) are flawed studies demonstrating that, if one increases generating supply and bids in new generation at a zero price, then market-clearing prices fall. Specifically, Mr. Stoddard and Mr. Milhous have offered studies that, rather than estimating benefits, estimate what economists call "transfer payments."

In general, whenever the supply of a good increases the overall economic value of the market increases. That is a beneficial outcome. In this case, however, the price suppression "benefit" has a tremendous, above-market cost: the mandatory tax that National Grid consumers will pay to obtain the price suppression "benefit."

Q PLEASE CONTINUE.

A To understand the economics of transfer payments, consider figure 8.

Figure 8: Transfer Payments and Change in Market Value



In figure 4, assume there are four generators: A, B, C, and a renewable generator, R, that can supply, Q_A, Q_B, Q_C, and Q_R megawatt-hours (MWh) of generation, respectively. The electric supply curve is the stair-shaped thick line, **SS**. The initial market price is determined by the intersection of the demand and supply curves. The market price is **P***, and the quantity sold is **Q***. To supply that quantity of electricity, generators A and B sell all of their output, and generator C sells a fraction of its output. Because of its high selling price, none of the renewable generator's output is sold.

The economic value of this market equals the sum of *consumer's surplus* (CS) and *producer's surplus* (PS) Consumer's surplus is the difference between what consumers would be willing to pay for each MWh of electricity and what they actually pay, the market price P_0. Similarly, producer's surplus is the difference between what producers are paid for their generation and the prices at which they would be willing to produce that generation. In the figure, therefore, consumer's surplus equals the diagonally shaded triangle labeled **CS,** and producer's surplus equals the lightly shaded L-shaped area labeled **PS**. The overall economic value of this market equals **CS** + **PS**.

Suppose policy-makers subsidize the renewable energy generator in order to "suppress" market prices and create green jobs. To do this, they provide the renewable generator with a subsidy equal to $\$(P_R - P_1)$/MWh, where P_R is the cost of the renewable generator's output.[160] As a result of the subsidy, the renewable generator displaces generator C's output (shown as the arrow in the figure from R to its new location),

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160 Although the variable operating cost of many renewable generators is close to zero, to simplify the example, I assume that, to stay in business, the renewable generator must ultimately recover a price of P_R per MWh. The effect of the subsidy on overall market value does not change with this simplification.

because the latter's output is now more costly. We assume the subsidy is set such that the renewable generator sells all of its output Q_R. The result is that the market price of electricity falls to P_1. The renewable subsidy has successfully "suppressed" the market price.

All generators, except for the renewable energy generator, are unambiguously worse off. Some of the economic profits these generators previously earned have been lost. Producer C is especially worse off, because the subsidy has driven him out of the market entirely.

Q DO CONSUMERS BENEFIT FROM THE SUBSIDY?

A No. To support renewable portfolio standards, consumers must pay the renewable subsidy. This can be in the form of a specific charge on their electric bills or it may be embedded in above-market cost purchase power contracts.[161] Thus, whereas consumers may benefit from lower market prices, they will also pay the subsidy, shown as the gray cross-hatched area on the right. Because the subsidy equals ($P_2 - P_1$) times Q_R, it

[161] One such contract, between National Grid and Deepwater Wind LLC, was rejected by the Rhode Island Public Utilities Commission. The Commission concluded that the project was not "commercially reasonable" as defined under Rhode Island law and would not provide "direct economic benefits to Rhode Island such as job creation." See, Rhode Island Public Utilities Commission, *In Re: Review of Proposed Town of New Shoreham Project Pursuant to R.I. Gen. Laws § 39-26.1-7*, Docket No. 4111, Report and Order, April 2, 2010, 65.

must be greater than ΔCS_2. Because ΔCS_1 is just a transfer from producers to consumers, however, the total value of the market with the renewable subsidy decreases. In other words, the subsidy necessarily reduces the economic value of the electricity market and drives out some producers in favor of a subsidized one. This is a recipe for economic disaster because it reduces the incentive for the subsidized producer to improve its overall operating efficiency.

Q WHY SHOULD THE DPU CARE IF EXISTING GENERATORS ARE HARMED, AS LONG AS MASSACHUSETTS RATEPAYERS BENEFIT FROM LOWER ELECTRIC PRICES?

A The DPU should care about the competitiveness and efficiency of the ISO-NE wholesale energy market. Whereas it is clearly possible to impose policies that artificially lower the price of electricity in the short-run, the long-run costs to ratepayers of such policies will be far higher. The reason is that such policies increase uncertainty and raise the cost of investment, both of which will reduce entry into the market by generation suppliers. The ultimate result will be higher wholesale market prices that leave Massachusetts ratepayers worse off.

Q IS THIS PRICE SUPPRESSION EFFECT ONLY ACHIEVED BY ADDING WIND POWER?

A No. Price "suppression" can be achieved through the addition of all new generating resources that are competitive in the market, because as the supply of a good increases relative to demand, prices decrease. For example, adding biomass generating capacity and bidding in the output of such generation into the ISO-NE wholesale market at a zero price would have a far larger "price suppression" impact on wholesale market prices than an intermittent resource like Cape Wind because the impacts of increased supplies would occur in far more hours.

Q IN THE CASE OF WIND POWER, WOULD THE ADDITIONAL TRANSMISSION COSTS ARISING BECAUSE OF THE NEED TO FULLY INTEGRATE WIND RESOURCES AFFECT HOW MUCH PRICES WERE SUPPRESSED?

A Yes. And this is another flaw in Mr. Stoddard's analysis. He fails to include the required transmission upgrades that will be needed to integrate wind resources into the ISO-NE grid. The additional transmission costs can be thought of as a further "tax" on ratepayers, which drives up the cost of power.

Q COULD OTHER RENEWABLE RESOURCES PROVIDE THE SAME "PRICE SUPPRESSION" IMPACTS AS CAPE WIND?

A Yes. In fact, a combination of smaller, geographically dispersed onshore wind farms and solar photovoltaic plants almost certainly would

have a substantially higher capacity factor than Cape Wind. Like Cape Wind, both the onshore wind and solar plants would price their bids at $0. Thus, even if were to accept, *arguendo*, that Cape Wind will provide price suppression "benefits," there is no basis for relying on such benefits as a basis for determining that Cape Wind is cost-effective as compared to alternative resources, since those alternatives resources could produce the same benefits.

D. The "Beneficial" Economic Impacts of Cape Wind are Grossly Overestimated

Q DO YOU AGREE WITH CAPE WIND WITNESS DUFFY THAT THE PROJECT WILL PROVIDE A "HUGE" ECONOMIC IMPACT ON THE MASSACHUSETTS ECONOMY?

A I agree with Mr. Duffy that the Cape Wind project will have a "huge" economic impact on the Massachusetts economy. Unfortunately, the "huge" impact will be precisely the opposite of what Mr. Duffy concludes, that the Cape Wind project

> will unquestionably represent a huge stimulus to the local and state economy as a result of the significant number of jobs that will be created, during both the Project's construction and operational phases. It is clear that these much-needed, high-paying jobs will lead to increased

economic activity, spending and related tax revenues for the benefit of the local, state and regional economy.[162]

To reach his conclusion, Mr. Duffy relies on a 2003 study prepared by Global Insight.[163] What the Global Insight study fails to address is the adverse economic impacts of higher electric rates, which act like a huge tax on the Massachusetts economy.

If Mr. Duffy is to be believed, levying a multi-billion dollar tax on Massachusetts ratepayers will benefit the state's economy. This is economic nonsense. Moreover, it is indeed curious that Massachusetts, a state which according to data published by EIA has the fourth highest average residential electric rates and the highest average commercial electric rates in the contiguous United States,[164] should now seek to raise rates even higher during a severe economic recession. What Mr. Duffy is requesting is a massive subsidy to his company and paid for by Massachusetts ratepayers to create temporary construction jobs and 50 permanent maintenance jobs.[165] That is neither a plausible nor equitable

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[162] Duffy Direct at 25:20–26:2.

[163] Exhibit CW-DJD-9.

[164] Source: EIA, *Electric Power Monthly*, June 16, 2010, Table 5.6A. Available at: http://www.eia.doe.gov/cneaf/electricity/epm/epmxlfile5_6_a.xls.

[165] Source: Exhibit CW-DJD-5 at 14.

strategy for growing the Massachusetts economy, especially when the state unemployment rate at the end of June 2010 was 9.0%.

Q HAVE OTHER STATE UTILITY REGULATORS ADDRESSED THE JOB-KILLING IMPACTS OF HIGHER ELECTRIC RATES?

A Yes. For example, one of the reasons cited by the Rhode Island Public Utilities Commission for its rejection in April of this year of the PPA between National Grid and Deepwater Wind for an offshore-wind project was the job-killing effects of higher electric prices:

> It is basic economics to know that the more money a business spends on energy, whether it is renewable or fossil based, the less Rhode Island businesses can spend or invest, and the more likely existing jobs will be lost to pay for these higher costs.[166]

The Rhode Island PUC clearly understood that higher electric rates have adverse economic impacts that ripple through an entire economy. In the current economic climate, "free-lunch" economic pronouncements, such as made by Mr. Duffy, are not only wrong, they are immoral. Asking Massachusetts ratepayers, who have suffered greatly in the economic downturn, to shoulder billions of dollars in extra costs for the sole benefit of Cape Wind and its investors is untenable.

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[166] *In Re: Review of New Shoreham Project Pursuant to R.I. Gen Laws § 39-26.1-7*, Docket No. 4111, Report and Order, April 2, 2010, at 82 (emph. added).

Q HAVE YOU PERFORMED ANY RESEARCH ON THE EMPLOYMENT IMPACTS OF HIGHER ELECTRIC RATES?

A Yes. My research indicates that each $1 million increase in electric costs above market prices causes the loss of about 7 jobs.[167] Therefore, one can compare the estimated 154 direct, indirect, and induced jobs that will be created during the operations phase of Cape Wind[168] against the lost jobs that will occur as a result of forcing National Grid ratepayers to pay above-market costs for their electricity.

Q PLEASE CONTINUE.

A As an example of the likely job losses resulting from forcing National Grid ratepayers to purchase above-market cost electricity, consider the impacts in 2013, the assumed first year of the contract. The average of the above-market costs of the PPA shown in Exhibit MNM-2, which represents only one-half of the output, in 2013 is $84.1 million. At 7 lost jobs per million of above-market costs, that translates into a loss of almost 590 jobs in the first year of the contract, increasing to over 800 jobs

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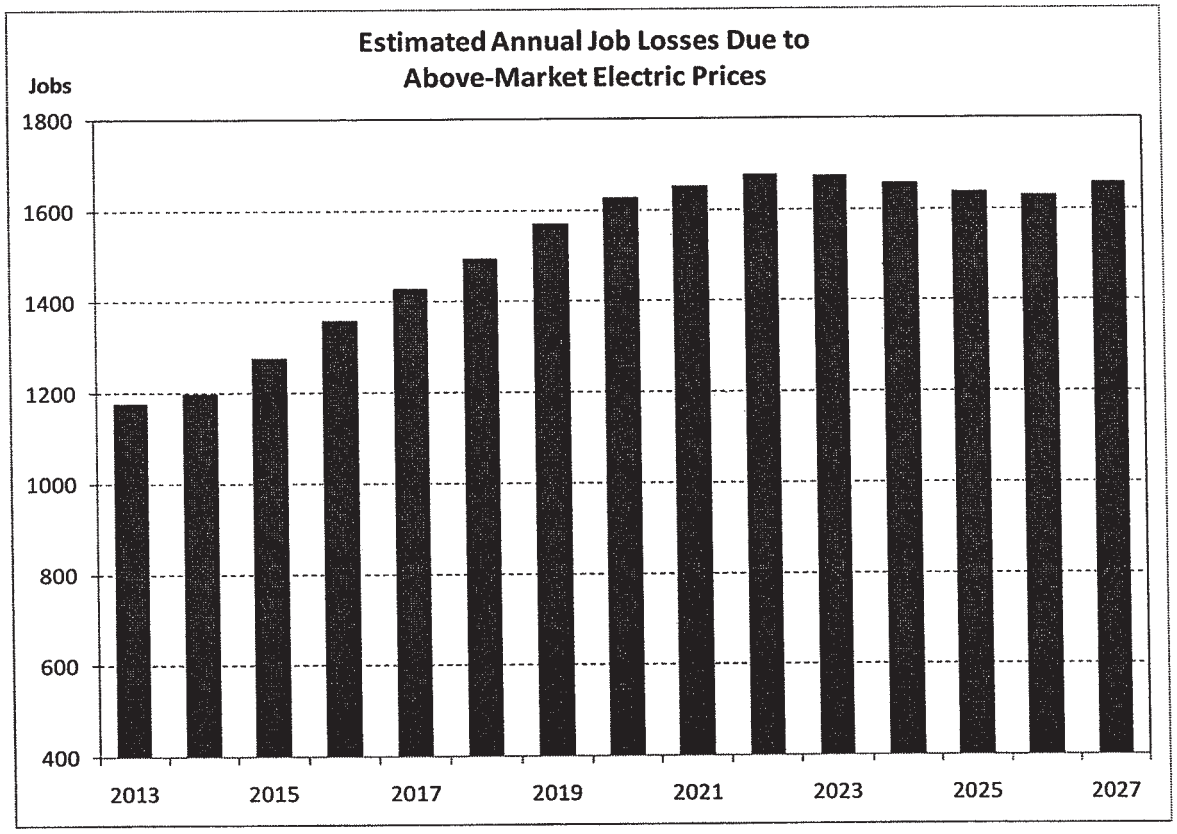
[167] J. Lesser, "Renewable Energy and the Fallacy of 'Green' Jobs," *The Electricity Journal*, August 2010, *in press*. This value is based on an analysis of impacts of higher prices in the Pennsylvania and Maryland economies. My analysis used the same IMPLAN model that was used by Global Insight, which prepared the study that is attached to Mr. Duffy's testimony as Exhibit CW-DJD-5.

[168] Exhibit CW-DJD-9 at 14.

by the year 2020. If both PPAs are priced equivalently, the annual job losses would be almost 1,180 jobs in the 2013 increasing to over 1,600 jobs by the year 2020, as shown in figure 9 below.

Figure 9: Estimated Annual Job Losses Caused by Higher Electric Rates



Creating 150 jobs, based on the direct, indirect, and induced impacts of operations and maintenance personnel, at the expense of 1,200—1,600 lost jobs in the Massachusetts economy because of higher electric rates, as well

as the loss of jobs because of a decline in tourism,[169] is not an effective—or rational—economic development strategy.

Q **WHY DO GREEN ENERGY SUBSIDIES COST JOBS?**

A Fundamentally, subsidies reward economic inefficiency. By preventing investment in more economically efficient activities, subsidies distort markets and reduce overall economic well-being. The Cape Wind subsidy will be paid for by other existing wholesale electric suppliers (through the vaunted "price-suppression" impact) and by Massachusetts ratepayers. In both cases, the reduction in net income available will further dampen investment.

Thus, selecting lower-cost renewable resources, such as those offered in response to the RFP, would reduce the adverse economic impacts of above-market costs. The onshore wind and biomass resources that were offered in response to National Grid's RFP would therefore have less damaging economic impacts than Cape Wind.

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[169] Beacon Hill Study, *op cit.*

V. CONCLUSION: THE CAPE WIND PPA IS NOT COST-EFFECTIVE AND SHOULD BE REJECTED

Q HAS NATIONAL GRID DEMONSTRATED THAT THE CAPE WIND PPA IS COST-EFFECTIVE UNDER ANY ACCEPTABLE ECONOMIC OR RATE-MAKING STANDARD?

A No. The testimony submitted by witnesses for National Grid and Cape Wind fails to demonstrate that the proposed PPA is cost-effective under any reasonable economic or ratemaking definition of the term. Cost-effectiveness analysis cannot be performed in a vacuum: the entire concept is comparative, that is, it requires comparing different alternatives.

To evaluate the cost-effectiveness of the Cape Wind PPA, National Grid would have had to perform meaningful comparisons between the PPA and other resource alternatives. At the very least, National Grid should have compared the Cape Wind PPA to the conforming bids the Company received in response to its own RFP and using the methodology it stated it would use to evaluate those responses. But there is no evidence whatsoever that National Grid performed any such analysis.

Q DOES THE CAPE WIND PPA MEET THE COST-EFFECTIVENESS TEST THRESHOLD?

A No. The Cape Wind PPA price is at least 50% higher than the cost-effectiveness price threshold, based on the forecast of energy and capacity prices, plus the forecast of the ACP. As a result, the implied REC costs for the Cape Wind PPA are double the forecast ACP values. Since the ACP was established by the Massachusetts legislature to be the maximum cost ratepayers should have to pay for renewable generation, it is unfathomable that forcing ratepayers to pay double the ACP is reasonable and cost-effective.

Q **DO YOU AGREE WITH NATIONAL GRID WITNESS TIERNEY THAT SECTION 83 OF THE GC ACT REQUIRES AN "EXPANSIVE" VIEW OF COST-EFFECTIVENESS THAT OBVIATES THE NEED FOR ANALYTICAL COMPARISONS?**

A No. The GC Act requires utilities that sign long-term PPAs under the auspices of the Act's requirements to evaluate the cost-effectiveness of those PPAs. If by expansive, one means incorporating non-price attributes, then the appropriate way to do so is by comparing the combined forecast of market and REC prices with the PPA's cost. The Cape Wind PPA cost is double National Grid's own such forecasts, which based on futures market data are too high. Since the entire purpose of RECs is to incorporate all of the non-price, environmental attributes of

renewable resources, such a finding is *prima facie* evidence that the PPA is not cost-effective.

Even if one accepted, *arguendo*, that some non-price attributes cannot be valued monetarily, it is still possible, and indeed necessary, to perform a multi-attribute analysis that incorporates and weighs those attributes, such as was performed by DelMarva for its RFP. What one cannot do, as National Grid has done, is to conclude that these attributes prevent any form of quantitative analysis. Such a conclusion indicates either a fundamental lack of understanding of the basic tenets of cost-effectiveness and cost-benefit analysis or a deliberate attempt at obfuscation.

Q DO YOU AGREE THAT, BY "SUPPRESSING" MARKET PRICES, THE CAPE WIND PROJECT WILL PROVIDE ADDITIONAL ECONOMIC BENEFITS?

A No. Price "suppression" is not an economic benefit, but is a transfer payment from existing generators to Cape Wind. Moreover, it is axiomatic that paying a substantially above-market price to lower those same market prices is no bargain.

Q DO YOU AGREE WITH NATIONAL GRID WITNESS TIERNEY THAT, WITHOUT THE CAPE WIND PPA, THE STATE'S RPS GOALS CANNOT BE MET?

A No. This is another strawman argument. Dr. Tierney compares RPS requirements 15 years from now, in the year 2025, with the available supply of renewable resources today, based solely on renewable resources already listed in the ISO-NE generation queue. This is an obvious "apples-to-oranges" comparison. In making this comparison, Dr. Tierney implicitly assumes that no new renewable generation will be developed in response to higher electric prices and increasing RPS requirements. Such an assumption defies basic economic logic.

The responses to National Grid's RFP for renewable resources clearly shows the Company received bids for hundreds of MW of lower-priced renewable resources within the state of Massachusetts. The Company's RFP failed to allow participation by out-of-state renewable resources, which would have obviously increased the number of responses, based on the filings made by TransCanada in this proceeding and in that company's challenge to the GC Act as violating interstate commerce. Moreover, National Grid's rejection of all bids in response to

its RFP in favor of Cape Wind belies the Company's argument of insufficient renewable resources to meet future RPS standards.

National Grid and Cape Wind witnesses have attempted to establish a meaningless, circular definition of cost-effectiveness based on extrapolations of future renewable resources supply and RPS requirements. It is not reasonable to conclude the Cape Wind PPA is cost-effective simply because these (erroneous and biased) extrapolations show that the demand for renewable generation will exceed the supply. This is tantamount to concluding that the economic value of the output from Cape Wind is infinite.

Q **IS APPROVING THE CAPE WIND PPA NECESSARY TO OVERCOME MARKET BARRIERS?**

A No. Dr. Tierney's discussion of "market barriers" is incorrect and irrelevant. First, high cost relative to market price is not a market barrier. As Mr. Milhous testifies, Cape Wind is effectively permitted. As such, according to National Grid, the Cape Wind project faces no market barriers. The fact that the PPA cost is double the projected value of energy, capacity, and RECs indicates the project is too expensive, not that it faces market barriers.

Q WILL THE CAPE WIND PROJECT BENEFIT THE MASSSACHUSETTS ECONOMY?

A No. The long-term job-killing impacts of Cape Wind, which stem from the higher electric prices it will force National Grid ratepayers to pay, will far outstrip the 50 jobs that will be created as a result of operating the facility. The Cape Wind PPA effectively levies a minimum $1.6 billion tax on Massachusetts ratepayers and businesses over the 15-year lifetime of the contract. If Massachusetts purchases the entire project output, that tax increases to at least $3.2 billion.

Massachusetts has some of the highest electric rates in the 48 contiguous states and, in fact, according to EIA the highest average commercial rates. In a time of high unemployment and severe recession, it is not only unwise, it is unconscionable to impose such a tax on ratepayers and businesses.

In rejecting a proposed PPA between National Grid and Deepwater Wind LLC, the Rhode Island PUC recognized the job-killing impacts of higher electric rates. The Massachusetts DPU should do the same.

Q DOES THIS CONCLUDE YOUR TESTIMONY?

A Yes.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES

Petition of Massachusetts Electric	)	
Company and Nantucket Electric	)	
Company each d/b/a National Grid	)	
For Approval of Proposed Long-Term	)	D.P.U. 10-54
Contracts for Renewable Energy With	)	
Cape Wind Associates, LLC	)	
Pursuant to G.L. c. 169, §83	)	

VERIFICATION

I, Jonathan A. Lesser, declare under penalty of perjury that the foregoing Testimony on behalf of the Alliance to Protect Nantucket Sound is true and correct.

Jonathan A. Lesser

OFFICIAL SEAL
JODY HOSIER
NOTARY PUBLIC-STATE OF NEW MEXICO
My commission expires 08/12/2013

Subscribed and sworn to me this 28th day of July, 2010, in the County of Bernalillo, New Mexico, United States of America.

Notary Public

OFFICIAL SEAL
JODY HOSIER
NOTARY PUBLIC-STATE OF NEW MEXICO
My commission expires 08/12/2013

My commission expires on: 08/12/2013.

Exhibit JAL-1
CV of Jonathan A. Lesser, PhD

Jonathan A. Lesser, Ph.D.
President

SUMMARY OF EXPERIENCE

Dr. Jonathan Lesser is the President of Continental Economics, Inc., and has over 25 years of experience working for regulated utilities, government, and as an economic consultant. He has analyzed critical economic and regulatory issues affecting the energy industry, including cost-benefit and cost-effectiveness analysis of transmission, generation, and distribution investment, gas and electric utility structure and operations, generating asset valuation under uncertainty, mergers and acquisitions, cost allocation and rate design, resource investment decision strategies, cost of capital, depreciation, risk management, incentive regulation, economic impact studies of energy infrastructure development, including FERC hydroelectric relicensing applications, and general regulatory policy.

Dr. Lesser has prepared expert testimony and reports in cases before utility commissions in numerous states; before the Federal Energy Regulatory Commission (FERC); before international regulators in Belize, Guatemala, Mexico, and Puerto Rico; in commercial litigation cases; and before legislative committees in Connecticut, Maryland, New Jersey, Ohio, Texas, Vermont, and Washington State. He has also served as an independent arbiter in disputes involving regulatory treatment of utilities and valuation of energy generation assets.

Dr. Lesser has designed economic models to value nuclear, fossil fuel, and renewable generating assets, as well as long-term power contracts in the presence of market, regulatory, and environmental uncertainty. He is the author of numerous academic and trade press articles, and coauthored *Fundamentals of Energy Regulation*, published in 2007 by Public Utilities Reports, Inc., Dr. Lesser is also a contributing columnist and Editorial Board member for *Natural Gas & Electricity*.

AREAS OF EXPERTISE

- Utility rate regulation – cost of capital, depreciation, cost of service, cost allocation, rate design, and alternative regulatory structures
- Load forecasting
- Energy asset valuation and due diligence
- Commercial damages estimation
- Cost-benefit analysis
- Regulatory policy and market design
- Economic impact analysis and input-output studies
- Environmental compliance and litigation
- Market power analysis

SELECTED EXPERT TESTIMONY AND REPORTS

Public Service Company of New Mexico

- Proceeding before the New Mexico Public Regulation Commission (Case No. 10-00086-UT)

  Subject: Load forecast for future test year, residential price elasticity study.

M-S-R Public Power Agency

- FERC proceeding (*Southern California Edison Co.*, Docket No. ER09-187-000 and ER10-160-000)

  Subject: Allowed rate of return for construction work in progress (CWIP) expenditures for certain transmission facilities.

- FERC proceeding (*Southern California Edison Co.*, Docket No. ER10-160-000)

  Subject: Allowed rate of return for construction work in progress (CWIP) expenditures for certain transmission facilities.

Financial Marketers

- FERC proceeding (*Black Oak Energy, LLC v PJM Interconnection, L.L.C.*, Docket No. EL08-014-002)

  Subject: Allocation of surplus transmission line losses under the PJM tariff.

Southwest Gas Corporation and Salt River Project

- FERC proceeding regarding rate application of El Paso Natural Gas Company (Docket No. RP08-426-000)

  Subject: Analysis of proposed capital structure and recommended capital structure adjustments

New York Regional Interconnect, Inc.

- Proceeding before the New York Public Service Commission (Case No. 06-T-0650)

  Subject: Analysis of economic and public policy benefits of a proposed high-voltage transmission line.

Portland Natural Gas Transmission System

- FERC rate proceeding regarding the rate application by Northern Border Pipeline Company (*Re: Portland Natural Gas Transmission System*, Docket No. RP08-306-000)

  Subject: Natural gas supplies, economic lifetime, and depreciation rates.

Occidental Chemical Corporation

- FERC Proceeding (*Westar Energy, Inc.* ER07-1344-000)

  Subject: Compliance of wholesale power sales agreement with FERC standards

EPIC Merchant Energy, LLC, et al.

- FERC Proceeding (*Ameren Services Company v. Midwest Independent System Operator, Inc.*, Docket Nos. EL07-86-000, EL07-88-000, EL07-92-000 (Consolidated)

Subject: Allocation of revenue sufficiency guarantee costs.

Cottonwood Energy, LP

- Proceeding before the Public Utility Commission of Texas (*Application of Kelson Transmission Company, LLC for a Certificate of Convenience and Necessity for the Amended Proposed Canal to Deweyville 345 kV Transmission Line with Chambers, Hardin, Jasper, Jefferson, Liberty, Newton, and Orange Counties*, Docket No. 34611, SOAH Docket No. 473-08-3341)

  Subject: Benefits of transmission capacity investments.

Redbud Energy, LP

- Proceeding before the Oklahoma Corporation Commission (*Request of Public Service Company of Oklahoma for the Oklahoma Corporation Commission to Retain an Independent Evaluator*, Cause No. PUD 200700418)

  Subject: Reasonableness of PSO's 2008 RFP design.

The NRG Companies

- FERC Proceeding (*ISO New England Inc. and New England Power Pool*, Docket No. ER08-1209-000)

  Subject: Compensation of Rejected De-list Bids Under ISO-NE's Forward Capacity Market Design

Dynegy Power Marketing, LLC

- FERC proceeding, *KeySpan-Ravenswood, LLC v. New York Independent System Operator, Inc.*, Docket No. EL05-17-000

  Subject: Estimation of damages accruing to Dynegy arising from a failure by the NYISO to accurately calculate locational installed capacity requirements in NYISO during the summer of 2002.

Constellation Energy Group

- FERC proceeding (*Maryland Public Utility Commission, et al., v. PJM Interconnection, LLC*, Docket No. EL08-67-000)

  Subject: "Just and reasonableness" of PJM's Reliability Pricing Mechanism.

Government of Belize, Public Utility Commission

- Proceeding before the Belize Public Utility Commission, *In the Matter of the Public Utilities Commission Initial Decision in the 2008 Annual Review Proceeding for Belize Electricity Limited.*

  Subject: Arbitration and Independent Expert's report, in dispute between the Belize PUC and Belize Electricity Limited in an annual electric rate tariff review, as required under Belize law.

Federal Energy Regulatory Commission

- Technical hearings on wholesale electric capacity market design.

  Subject: Analysis of proposal to revise RTO capacity market design developed by the American Forest and Paper Association.

Dogwood Energy, LLC

- Proceeding before the Missouri Public Service Commission, *In the Matter of the Application of Aquila, Inc., d/b/a Aquila Networks - MPS and Aquila Case No. EO-2008-0046, Networks - L&P for Authority to Transfer Operational Control of Certain Transmission Assets to the Midwest Independent Transmission System Operator, Inc.*, Case No. EO-2008-0046.

  Subject: Cost-benefit analysis to determine whether Aquila should join either the Midwest Independent System Operator (MISO) or the Southwest Power Pool (SPP).

Independent Power Producers of New York

- FERC proceeding (*Re: New York Independent System Operator, Inc.*, Docket No. ER08-283-000)

Subject: Revisions to the installed capacity (ICAP) market demand curves in the New York control area, which are designed to provide economic incentives for new generation development.

Empresa Eléctrica de Guatemala

- Rate proceeding before the Comisión Nacional de Energía Eléctrica

  Subject: Rate of return for an electric distribution company

Electric Power Supply Association

- FERC proceeding (*Re: Midwest Independent Transmission System Operator, Inc.*, Docket No. ER07-1182-000)

  Subject: Critique of cost-benefit analysis by MISO Independent Market Monitor concluding that permanent establishment of Broad Constrained Area mitigation was appropriate.

Constellation Energy Commodities Group, LLC

- FERC proceeding regarding rate application for ancillary services by Ameren Energy (*Re: Ameren Energy Marketing Company and Ameren Energy, Inc.*, Docket Nos. ER07-169-000 and ER07-170-000)
- Subject: Analysis and testimony on appropriate "opportunity cost" rates for ancillary services, including regulation service and spinning reserve service. Case settled prior to testimony being filed.

Suiza Dairy Corporation and Vaquería Tres Monjitas, Inc.

- Rate proceeding before the Office of Milk Industry Regulatory Administration of Puerto Rico.
- Subject: Analysis and testimony on the appropriate rate of return for regulated milk processors in the Commonwealth of Puerto Rico.

DPL Inc.

- Proceeding before the Ohio Board of Tax Appeals (*DPL, Inc. and its subsidiaries v. William W. Wilkins, Tax Commissioner of Ohio*, Case No. 2004-A-1437)

Subject: Economic impacts of generation investment and qualification of electric utility investments as "manufacturing" investments for purposes of state investment tax credits.

IGI Resources, LLC and BP Canada Energy Marketing Corp.

- FERC proceeding regarding the rate application by Gas Transmission Northwest Corporation (*Re: Gas Transmission Northwest*, Docket No. RP06-407-000)

  Subject: Natural gas supplies, economic lifetime, and depreciation rates.

Baltimore Gas and Electric Co.

- Maryland Public Service Commission (Case No. 9099)

  Subject: Standard Offer Service pricing. Testimony focused on factors driving electric price increases since 1999, and estimates of rates under continued regulation

- Maryland Public Service Commission (Case No. 9073)

  Subject: Stranded costs of generation. Testimony focused on analysis of benefits of competitive wholesale power industry.

- Maryland Public Service Commission (Case No. 9063)

  Subject: Optimal structure of Maryland's electric industry. Testimony focused on the benefits of competitive wholesale electric markets. Presented independent estimates of benefits of restructuring since 1999.

Pemex-Gas y Petroquímica Básica

- Expert report in a rate proceeding. Presented analysis before the Comisión Reguladora de Energía on the appropriate rate of return for the natural gas pipeline industry.

BP Canada Marketing Corp.

- FERC proceeding regarding the rate application by Northern Border Pipeline Company (*Re: Northern Border Pipeline*, Docket No. RP06-072-000)

  Subject: Natural gas supplies, economic lifetime, and depreciation rates.

Transmission Agency of Northern California

- FERC rate proceeding (*Re: Pacific Gas & Electric Company*, Docket No. ER09-1521-000)

  Subject: Analysis of appropriate return on equity, capital structure, and overall cost of capital. Case settled prior to filing expert testimony.

- FERC rate proceeding (*Re: Pacific Gas & Electric Company*, Docket No. ER08-1318-000)

  Subject: Analysis of appropriate return on equity, capital structure, and overall cost of capital. Case settled prior to filing expert testimony.

- FERC rate proceeding (*Re: Pacific Gas & Electric Company*, Docket No. ER07-1213-000)

  Subject: Analysis of appropriate return on equity, capital structure, and overall cost of capital. Case settled prior to filing expert testimony.

- FERC rate proceeding (*Re: Pacific Gas & Electric Company*, Docket No. ER06-1325-000)

  Subject: Analysis of appropriate return on equity, capital structure, and overall cost of capital. Case settled prior to filing expert testimony.

- FERC rate proceeding (*Re: Pacific Gas & Electric Company*, Docket No. ER05-1284-000)

  Subject: Analysis of appropriate return on equity, capital structure, and overall cost of capital. Case settled prior to filing expert testimony.

- FERC rate proceeding (*Re: Pacific Gas & Electric Company*, Docket Nos. ER03-409-000, ER03-666-000)

  Subject: Analysis and development of recommendation for the appropriate return on equity, capital structure, and overall cost of capital.

State of New Jersey Board of Public Utilities

- Merger application of Public Service Enterprise Group and Exelon Corporation (*I/M/O The Joint Petition Of Public Service Electric And Gas Company And Exelon*

Corporation For Approval Of A Change In Control Of Public Service Electric And Gas Company And Related Authorizations, BPU Docket No. EM05020106, OAL Docket No. PUC-1874-050)

Subject: Proposed merger between Exelon Corporation and PSEG Corporation. Testimony described the structure and results of a cost-benefit analysis to determine whether the proposed merger met the state's positive benefits test, and included analysis of market power, value of changes in nuclear plant operations, and merger synergies.

Sierra Pacific Power Corp.

- FERC proceeding regarding the rate application by Paiute Pipeline Company (*Re Paiute Pipeline Company* Docket No. RP05-163-000)

  Subject: Depreciation analysis, negative salvage, and natural gas supplies. Case settled prior to filing expert testimony.

Matanuska Electric

- Regulatory Commission of Alaska rate proceeding (*In the Matter of the Revision to Current Depreciation Rates Filed by Chugach Electric Association, Inc.*, Docket No. U-04-102)

  Subject: Analysis of the reasonableness of Chugach electric's depreciation study.

Duke Energy North America, LLC

- FERC proceeding (*Re: Devon Power, LLC*, et al., Docket No. ER03-563-030)

  Subject: Appropriate market design for locational installed generating capacity in the New England market to ensure system reliability.

Keyspan-Ravenswood, LLC

- FERC proceeding, *KeySpan-Ravenswood, LLC v. New York Independent System Operator, Inc.*, Docket No. EL05-17-000

  Subject: Estimation of damages arising from a failure by the NYISO to accurately calculate locational installed capacity requirements in New York City during the summer of 2002.

Electric Power Supply Association

- FERC proceeding (*Re: PJM Interconnection, LLC*, Docket No. EL03-236-002)

  Subject: Analysis and critique of proposed pivotal supplier tests for market power in PJM identified load pockets.

Vermont Department of Public Service

- Vermont Public Service Board Rate Proceedings
  - Concurrent proceedings: *Re: Green Mountain Power Corp.*, Dockets No. 7175 and 7176. Subject: Cost of capital and allowed return on equity under cost of service regulation, as well as under a proposed alternative regulation proposal.
  - *Re: Shoreham Telephone Company*, Docket No. 6914. Subject: Analysis and development of recommendations for the appropriate return on equity, capital structure, and overall cost of capital.
  - *Re: Vermont Electric Power Company*, Docket No. 6860. Subject: Development of a least-cost transmission system investment strategy to analyze the prudence of a major high-voltage transmission system upgrade proposed by the Vermont Electric Power Company.
  - *Re: Central Vermont Public Service Company*, Docket No. 6867. Subject: Analysis and development of recommendations for the appropriate return on equity, capital structure, and overall cost of capital.
  - *Re: Green Mountain Power Corporation*, Docket No. 6866. Subject: Analysis and development of recommendations for the appropriate return on equity, capital structure, and overall cost of capital.

Pipeline shippers

- FERC proceeding regarding the rate application of Northern Natural Gas Company (*Re: Northern Natural Gas Company*, Docket No. RP03-398-000)

  Subject: Gas supply analysis to determine pipeline depreciation rates as part of an overall rate proceeding.

Arkansas Oklahoma Gas Corp.

- Oklahoma Corporation Commission rate proceeding (*Re: Arkansas Oklahoma Gas Corporation*, Docket No. 03-088)

  Subject: Analysis and development of recommendations for the appropriate return on equity, capital structure, and overall cost of capital.

- Arkansas Public Service Commission rate proceedings
  - *In the Matter of the Application of Arkansas Oklahoma Gas Corporation for a General Change in Rates and Tariffs*, Docket No. 05-006-U. Subject: Analysis and development of recommendations for the appropriate return on equity, capital structure, and overall cost of capital.
  - *In the Matter of the Application of Arkansas Oklahoma Gas Corporation for a General Change in Rates and Tariffs*, Docket No. 02-24-U. Subject: Analysis and development of recommendations for the appropriate return on equity, capital structure, and overall cost of capital.

Entergy Nuclear Vermont Yankee, LLC

- Vermont Public Service Board proceeding (*Re: Petition of Entergy Nuclear Vermont Yankee for a Certificate of Public Good*, Docket No. 6812)

  Subject: Analysis of the economic benefits of nuclear plant generating capacity expansion as required for an application for a Certificate of Public Good.

Central Illinois Lighting Company

- Illinois Commerce Commission rate proceeding (*Re: Central Illinois Lighting Company*, Docket No. 02-0837)

  Subject: Analysis and development of recommendations for the appropriate return on equity, capital structure, and overall cost of capital.

Citizens Utilities Corp.

- Vermont Public Service Board rate proceeding (*Tariff Filing of Citizens Communications Company requesting a rate increase in the amount of 40.02% to take effect December 15, 2001*, Docket No. 6596)

Subject: Analysis of the prudence and economic used-and-usefulness of Citizens' long-term purchase of generation from Hydro Quebec, including the estimated environmental costs and benefits of the purchase.

Dynegy LNG Production, LP

- FERC proceeding (*Re: Dynegy LNG Production Terminal, LP*, Docket No. CP01-423-000). September 2001

  Subject: Analysis of market power impacts of proposed LNG facility development.

Missouri Gas Energy Corp.

- FERC rate proceeding (*Re: Kansas Pipeline Corporation*, Docket No. RP99-485-000)

  Subject: Gas supply analysis to determine pipeline depreciation rates as part of an overall rate proceeding.

Green Mountain Power Corp.

- Vermont Public Service Board rate proceedings
  - *In the Matter of Green Mountain Power Corporation requesting a 12.93% Rate Increase to take effect January 22, 1999*, Docket No. 6107. Subject: Analysis of the appropriate discount rate, treatment of environmental costs, and the treatment of risk and uncertainty as part of a major power-purchase agreement with Hydro-Quebec.
  - *Investigation into the Department of Public Service's Proposed Energy Efficiency Utility*, Docket No. 5980. Subject: Analysis of distributed utility planning methodologies and environmental costs.
  - *Tariff Filing of Green Mountain Power Corporation requesting a 16.7% Rate Increase to take effect 7/31/97*, Docket No. 5983. Subject: Analysis of distributed utility planning methodologies and avoided electricity costs.
  - *Tariff Filing of Green Mountain Power Corporation requesting a 16.7% Rate Increase to take effect 7/31/97*, Docket No. 5983. Subject: Valuation of a long-term power purchase contract with Hydro-Quebec in the context of a determination of prudence and economic used-and-usefulness.

United Illuminating Company

- Connecticut Dept. of Public Utility Control proceeding (*Application of the United Illuminating Company for Recovery of Stranded Costs*, Docket No. 99-03-04)

  Subject: Development and application of dynamic programming models to estimate nuclear plant stranded costs.

OTHER COMMERCIAL LITIGATION EXPERIENCE

- *IMO Industries v. Transamerica.* Estimated the appropriate discount rate to use for estimating damages over time associated with a failure of the insurance companies to reimburse asbestos-related damage claims and the resulting losses to the firm's value.
- *John C. Lincoln Hospital v. Maricopa County.* Performed statistical analysis to determine the value of a class of unpaid hospital insurance claims.
- *Catamount/Brownell, LLC. v. Randy Rowland.* Prepared an expert report on the damages associated with breach of commercial lease.
- *Lyubner v. Sizzling Platters, Inc..* Performed an econometric analysis of damage claims based on sales impacts associated with advertising.
- *Pietro v. Pietro.* Estimated pension benefits arising from a divorce case.
- *Nat'l. Association of Electric Manufacturers v. Sorrell.* Testified on the costs of labeling fluorescent lamps and the impacts of labeling laws on the demand for electricity.

ARBITRATION CASES

***TransCanada Hydro Northeast, Inc. v. Town of Littleton, New Hampshire*, (CPR File No. G-09-24).**

Subject: dispute regarding valuation for property tax purposes of a hydroelectric facility located on the Connecticut River.

Served as neutral on a three-person arbitration panel.

***Belize Electricity Limited v. Belize Public Utilities Commission* (Claim No. 512 of 2008).**

Subject: Proceeding before the Supreme Court of Belize alleging that the Final Decision by the Belize Public Utilities Commission setting electric rates and tariffs for the 2008-2009 period were unreasonable and non-compensatory.

Prepared independent report on behalf of the Belize Supreme Court for arbitration of the dispute.

SELECTED BUSINESS CONSULTING EXPERIENCE

- For a environmental advocacy group, critically evaluated the financial implications of operating restrictions for an off-shore wind generating facility stemming from requirements under the U.S. Endangered Species Act.
- For a major investor-owned utility in the US, prepared a new system of short-term peak and energy forecasting models.
- For a major wholesale electric generation company, prepared comprehensive economic impact studies for use in FERC hydroelectric relicensing proceedings.
- For a major investor-owned utility in the Southwest US, prepared a detailed econometric model and wrote a comprehensive report on residential price elasticity that was required by regulators.
- For a major investor-owned utility in the Southwest US, developed a methodology to value nuclear plant leases that incorporated future uncertainty regarding greenhouse gas regulations.
- Faculty member, PURC/World Bank International Training Program on Utility Regulation and Strategy, University of Florida, Public Utility Research Center, Gainesville, FL, 2008 – 2009. Courses taught:
    - Sector Issues: Basic Techniques–Energy
    - Sector Issues in Rate Design: Energy
    - Sector Issues in Rate Design: Energy–Case Studies
    - Transmission Pricing Issues
- For a major solar energy firm, evaluated costs and benefits of alternative solar technologies; assisted with siting and transmission access issues.
- For industrial customers in the State of Vermont, prepared a position paper on the impacts of demand side management funding on electric rates and competitiveness.

- For a major New York brokerage firm, performed a fairness opinion valuation of a gas-fired electric generating facility.
- For electric utilities undergoing restructuring, developed comprehensive economic models to value buyer offers associated with nuclear power plant divestitures.
- For a large municipal electric utility in Florida, analyzed real option values of alternative proposed purchased generation contracts whose strike prices were tied to future natural gas and oil prices, and developed contract recommendations.
- For a municipal electric utility in Florida, developed an analytical model to determine risk-return tradeoffs of alternative generation portfolios, identify an efficient frontier of generation asset portfolios, and recommended asset purchase and sale strategies.
- For Central Vermont Public Service Corp. and Green Mountain Power Corp., developed analyses of distribution capacity investments accounting for uncertainty over future peak load growth.
- For a major electric utility in Latin America, developed risk management strategies for hedging natural gas supplies with minimal up-front investment; prepared training materials for utility staff; and wrote the utility's risk management Policies and Procedures Manual.
- For a major nuclear plant owner and operator in the U.S., prepared reports of the economic benefits of nuclear plant operation and development.
- For the Electric Power Supply Association, prepared numerous policy papers addressing wholesale electric market design and competition.
- For the California Energy Commission, developed a new policy approach to renewables feed-in tariffs and developed portfolio analysis models to develop an "efficient frontier" of generation portfolios for the state.
- For a major nuclear plant owner and operator, assessed the likelihood of relicensing a specific nuclear plant in New England, given state regulatory concerns over on-site spent fuel storage.
- For a large investor-owned utility in the Southeast, analyzed alternative environmental compliance strategies that directly incorporated uncertainty over

future emissions costs, environmental regulations, and alternative pollution control technology effectiveness.

- For a Special Legislative Committee of the Province of New Brunswick, served as an expert advisor on the development of a deregulated electric power market.
- For the Bonneville Power Administration, developed models to assess the economic impacts of local generation resource development in Washington State and Oregon.
- For an electric utility in the Pacific Northwest, assisted in negotiations surrounding relicensing of a large hydroelectric generating facility.
- Served as an expert advisor for the Northwest Power Planning Council regarding future power supplies, load growth, and economic growth.

EDUCATION

- Ph.D., Economics, University of Washington
- M.A., Economics, University of Washington
- B.S., Mathematics and Economics (with honors), University of New Mexico

EMPLOYMENT HISTORY

- 2009–Present: Continental Economics, President.
- 2004–2009: Bates White, LLC, Partner, Energy Practice.
- 2003–2004: Vermont Dept. of Public Service, Director of Planning.
- 1998–2003: Navigant Consulting, Senior Managing Economist.
- 1993–1998: Green Mountain Power Corporation, Manager, Economic Analysis.
- 1986–1993: Washington State Energy Office, Energy Policy Specialist.
- 1984–1986: Pacific Northwest Utilities Conference Committee, Energy Economist.
- 1983–1984: Idaho Power Corporation, 1982-1983. Load Forecasting Analyst.

PROFESSIONAL ACTIVITIES

- Reviewer, *Journal of Regulatory Economics*
- Reviewer, *The Energy Journal*
- Reviewer, *Energy*

PROFESSIONAL ASSOCIATIONS

- Society for Benefit-Cost Analysis
- Energy Bar Association
- International Association for Energy Economics
- American Bar Association (Associate Member)

PUBLICATIONS

Peer-reviewed journal articles

- Lesser, J., and E. Nicholson, "Abandon all Hope? FERC's Evolving Standards for Identifying Comparable Firms and Estimating the Rate of Return," *Energy Law Journal* 30 (April 2009): 105-132.
- Lesser, J. and X. Su. "Design of an Economically Efficient Feed-in Tariff Structure for Renewable Energy Development." *Energy Policy* 36 (March 2008) 981–990.
- Lesser, J. "The Economic Used-and-Useful Test: Its Origins and Implications for a Restructured Electric Industry." *Energy Law Journal* 23 (November 2002): 349–82.
- Lesser, J., and C. Feinstein. "Electric Utility Restructuring, Regulation of Distribution Utilities, and the Fallacy of 'Avoided Cost' Rules." *Journal of Regulatory Economics* 15 (January 1999): 93–110.
- Lesser, J., and C. Feinstein. "Defining Distributed Utility Planning." *The Energy Journal*, Special Issue, Distributed Resources: Toward a New Paradigm (1998): 41–62.
- Lesser, J., and R. Zerbe. "What Can Economic Analysis Contribute to the Sustainability Debate?" *Contemporary Policy Issues* 13 (July 1995): 88–100.

- Lesser, J., and R. Zerbe. "The Discount Rate for Environmental Projects." *Journal of Policy Analysis and Management* 13 (Winter 1994): 140–56.
- Lesser, J., and D. Dodds. "Can Utility Commissions Improve on Environmental Regulations?" *Land Economics* 70 (February 1994): 63–76.
- Lesser, J. "Estimating the Economic Impacts of Geothermal Resource Development." *Geothermics* 24 (Winter 1994): 52–69.
- Lesser, J. "Application of Stochastic Dominance Tests to Utility Resource Planning Under Uncertainty." *Energy* 15 (December 1990): 949–61.
- Lesser, J. "Resale of the Columbia River Treaty Downstream Power Benefits: One Road From Here to There." *Natural Resources Journal* 30 (July 1990): 609–28.
- Lesser, J., and J. Weber. "The 65 M.P.H. Speed Limit and the Demand for Gasoline: A Case Study for the State of Washington." *Energy Systems and Policy* 13 (July 1989): 191–203.
- Lesser, J. "The Economics of Preference Power." *Research in Law and Economics* 12 (1989): 131–51.

Books and contributed chapters

- Lesser, J., and L.R. Giacchino, *Principles of Utility Corporate Finance*, Vienna, VA: Public Utilities Reports, forthcoming, 2010.
- Lesser, J., and L.R. Giacchino. *Fundamentals of Energy Regulation*, Vienna, VA: Public Utilities Reports, 2007.
- Lesser, J., and R. Zerbe. "A Practitioner's Guide to Benefit-Cost Analysis." In *Handbook of Public Finance*, edited by F. Thompson, 221–68. New York: Rowan and Allenheld, 1998.
- Lesser, J., D. Dodds, and R. Zerbe. *Environmental Economics and Policy*, Reading: MA: Addison Wesley Longman, 1997.

Trade press publications

- Lesser, J., "Renewable Energy and the Fallacy of 'Green' Jobs," *The Electricity Journal*, August 2010, forthcoming.
- Lesser, J., "Let the Tough Choices Begin: Affordable or Green?," *Natural Gas & Electricity* (June 2010): 27-29.

- Lesser, J., "Will Shale Gas Production be Damaged by Too Many Fraccing Complaints?," *Natural Gas & Electricity* (April 2010): 31-32.
- Lesser, J., "As the Climate Turns: The Saga Continues," *Natural Gas & Electricity* (February 2010): 29-32.
- Lesser, J. and N. Puga, "Public Policy and Private Interests: Why Transmission Planning and Cost-Allocation Methods Continue to Stifle Renewable Energy Policy Goals," *The Electricity Journal* (December 2009): 7-19.
- Lesser, J, "Short Circuit: Will Electric Cars Provide Energy and Environmental Salvation?" *Natural Gas & Electricity* (November 2009): 27-28.
- Lesser, J., "Green is the New Red: The High Cost of Green Jobs," *Natural Gas & Electricity* (August 2009): 31-32.
- Lesser, J., "Regulating Greenhouse Gas Emissions: EPA Gets Down," *Natural Gas & Electricity* (June 2009): 31-32.
- Lesser, J., "Being Reasonable While Regulating Greenhouse Gas Emissions under the Clean Air Act," *Natural Gas & Electricity* (April 2009): 30-32.
- Lesser, J., "Renewables, Becoming Cheaper, Are Suddenly Passé," *Natural Gas & Electricity* (February 2009): 30-32.
- Lesser, J., "Measuring the Costs and the Benefits of Energy Development," *Natural Gas & Electricity* (December 2008): 30-32.
- Lesser, J., "Comparing the Benefits and the Costs of Energy Development," *Natural Gas & Electricity* (October 2008): 31-32.
- Lesser, J., "New Source Review Is Still Anything but Routine," *Natural Gas & Electricity* (August 2008): 31-32.
- Lesser, J., and N. Puga, "PV versus Solar Thermal," *Public Utilities Fortnightly* 146 (July 2008), pp. 16-20, 27.
- Lesser, J., "Cap-and-Trade for Gasoline?," *Wall Street Journal*, June 14, 2008, A14.
- Lesser, J., "Kansas Secretary Unilaterally Bans Coal Plants," *Natural Gas & Electricity* (June 2008): 30-32.
- Lesser, J., "Seeing Through a Glass, Darkly, Banks Approach Coal-Fired Power Financing," *Natural Gas & Electricity* (April 2008): 29-31.

- Lesser, J., "The Energy Independence and Security Act of 2007: No Subsidy Left Behind," *Natural Gas & Electricity* (February 2008): 29-31.
- Lesser, J., "Control of Greenhouse Gases: Difficult with Either Cap-and-Trade or Tax-and-Spend." *Natural Gas & Electricity* (December 2007): 28-31.
- Lesser, J., "Déjà vu All Over Again: The Grass was not Greener Under Utility Regulation." *The Electricity Journal* 20 (December 2007): 35–39.
- Lesser, J., "Blowin' in the Wind: Renewable Energy Mandates, Electric Rates, and Environmental Quality." *Natural Gas & Electricity* (October 2007): 26-28.
- Lesser, J., "No Leg to Stand On." *Natural Gas & Electricity* (August 2007): 28–31.
- Lesser, J., "Goldilocks Chills Out." *Natural Gas & Electricity* (July 2007): 26–28.
- Lesser, J., "Goldilocks and the Three Climates." *Natural Gas & Electricity* (April 2007): 22–24.
- Lesser, J., "Command-and-Control Still Lurks in Every Legislature." *Natural Gas & Electricity* (February 2007): 8–12.
- Lesser, J., and G. Israilevich, "The Capacity Market Enigma." *Public Utilities Fortnightly* 143 (December 2005): 38-42.
- Lesser, J., "Overblown Promises: The Hidden Costs of Symbolic Environmentalism." *Livin' Vermont* 1 (January/February 2005): 7, 27.
- Lesser, J., "Regulation by Litigation." *Public Utilities Fortnightly* 142 (October 2004): 24–29.
- Lesser, J., "ROE: The Gorilla is Still at the Door." *Public Utilities Fortnightly* 144 (July 2004): 19–23.
- Lesser, J., and S. Chapel, "Keys to Transmission and Distribution Reliability." *Public Utilities Fortnightly* 142 (April 2004): 58–62.
- Lesser, J. ,"DCF Utility Valuation: Still the Gold Standard?" *Public Utilities Fortnightly* 141 (February 15, 2003): 14–21.
- Lesser, J., "Welcome to the New Era of Resource Planning: Why Restructuring May Lead to More Complex Regulation, Not Less." *The Electricity Journal* 15 (July 2002): 20–28.
- Lesser, J., and C. Feinstein, "Identifying Applications for Distributed Generation: Hype vs. Hope." *Public Utilities Fortnightly* 140 (June 1, 2002): 20–28.

- Lesser, J., et al., "Utility Resource Planning: The Need for a New Approach." *Public Utilities Fortnightly* 140 (January 15, 2002): 24–27.
- Lesser, J., "Distribution Utilities: Forgotten Orphans of Electric Restructuring?" *Public Utilities Fortnightly* 137 (March 1, 1999): 50–55.
- Lesser, J., "Regulating Distribution Utilities in a Restructured World." *The Electricity Journal* 12 (January/February 1999): 40–48.
- Lesser, J., "Is it How Much or Who Pays? A Response to Rothkopf." *The Electricity Journal* 10 (December 1997): 17–22.
- Lesser, J., and M. Ainspan, "Using Markets to Value Stranded Costs." *The Electricity Journal* (October 1996): 66–74.
- Lesser, J., "Economic Analysis of Distributed Resources: An Introduction." *Proceedings*, First Annual Conference on Distributed Resources, Electric Power Research Institute, Kansas City, MO, July 1995.
- Lesser, J., "Distributed Resources as a Competitive Opportunity: The Small Utility Perspective." *Proceedings*, First Annual Conference on Distributed Resources, Electric Power Research Institute, Kansas City, MO, July 1995.
- Lesser, J., and M. Ainspan, "Retail Wheeling: Deja vu All Over Again?" *The Electricity Journal* 7 (April 1994): 33–49.
- Lesser, J., "An Economically Rational Approach to Least-Cost Planning: Comment." *The Electricity Journal* 4 (October 1991).
- Lesser, J., "Long-Term Utility Planning Under Uncertainty: A New Approach." Paper presented for the Electric Power Research Institute: *Innovations in Pricing and Planning*, May 1990.
- Lesser, J., "Centralized vs. Decentralized Resource Acquisition: Implications for Bidding Strategies." *Public Utilities Fortnightly* (June 1990).
- Lesser, J., "Most Value—The Right Measure for the Wrong Market?" *The Electricity Journal* 2 (December 1989): 47–51.

Selected speaking engagements

- "The Failures of Transmission Planning and Policy," Harvard Electric Policy Group, February 25, 2010.

- "Financing the Smart Grid," Energy Bar Association Seminar, Washington, DC, December 4, 2009.
- "Renewable Power: At the Crossroads of Economics and Policy," Presentation to the Utilities State Government Organization, Newport, Rhode Island, July 13, 2009.
- "The Stimulus Act and Laws they Didn't Teach You in Law School," presentation to the 27th National Regulatory Conference, Williamsburg, VA, May 19, 2009.
- "Rate Recovery for Capital Intensive Generation: Rate Base and Construction Work in Progress," Law Seminars International, Las Vegas, NV, February 5, 2009.
- "Financial Risks Faced by Regulated Utilities: Implications for the Cost of Capital and Ratemaking Policies," Law Seminars International, Las Vegas, NV, February 7, 2008.
- "Alternative Regulatory Structures and Tariff Mechanisms: Practical approaches to providing low-cost, environmentally responsible energy and how to avoid some dangerous pitfalls." Western Energy Institute, October 1, 2007.
- "Economics and Energy Regulation." Law Seminars International, Washington, DC, March 15-16, 2007.
- "Energy in the Northeast: Resource Adequacy & Reliability." Law Seminars International, Boston, MA, October 16–17, 2006.
- "Energy in the Southwest: New Directions in Energy Markets and Regulations." Law Seminars International, Santa Fe, NM, July 14, 2006.
- "Energy and the Environment." Vermont Journal of Environmental Law, South Royalton, VT, March 10, 2006.
- "Electricity and Natural Gas Regulation: An Introduction." Law Seminars International, Washington, DC, March 17–18, 2005.

Exhibit JAL-2

Response to APNS Information Request APNS 1-6

Massachusetts Electric Company
Nantucket Electric Company
d/b/a National Grid
Docket No. D.P.U. 10-54
Responses to the Alliance to Protect Nantucket Sound's
First Set of Information Requests
Exhibit APNS 1-6
Date of Response: July 23, 2010
Hearing Officer: L. Bickel

Information Request APNS 1-6

Request:

With respect to page 8, lines 14-21 of Mr. Mihous' testimony, please

(a) State whether National Grid evaluated any other off-shore wind projects in determining that the cost of the Cape Wind PPA is within the "acceptable range." If so, identify all such projects.

(b) State whether National Grid believes the unit cost of Cape Wind is reasonable as compared to all other renewable projects in the region. If so, provide the basis for such determination, including any supporting documents, data, workpapers, and analysis.

(c) State whether National Grid believes the unit cost of Cape Wind is reasonable as compared to all other wind projects in the region, both onshore and offshore. If so, provide the basis for such determination, including any supporting documents, data, workpapers, and analysis.

Response:

(a) National Grid had reviewed the pricing for the Deepwater Wind Block Island project that was the subject of the proceeding in Rhode Island Public Utilities Commission Docket 4111 as well as the other offshore wind projects discussed by Cliff W. Hamal in that docket (produced in response to Information Request APNS 1-1). National Grid also reviewed a bid submitted by an offshore wind project in response to the Massachusetts statewide Request for Proposals, and information on that bid was provided in response to Information Request AG 1-13. Based on this pricing data and its other knowledge about the Cape Wind project, National Grid concluded that the pricing in the PPAs was within an "acceptable range" for offshore wind projects.

(b) See Milhous testimony at pages 28-31 and Response to Information Requests AG 2-3 and AG 2-4.

Based on information available to the Company, which has been produced in discovery, National Grid concluded that the cost of Cape Wind is reasonable for an offshore wind project. National Grid has acknowledged that there are land-based wind and other renewable energy projects that are not offshore wind and

Prepared by or under the supervision of: Madison N. Milhous, Jr.

that may have a lower unit cost than Cape Wind. National Grid has acknowledged also that there are other renewable energy projects that are not offshore wind that have a higher unit cost than Cape Wind. As explained in the testimony of Dr. Tierney and Richard Rapp, National Grid believes that offshore wind, as well as other renewable technologies for the region, will be needed to meet established goals for renewable energy and carbon reduction. All of the options to a greater or lesser degree have some inherent challenges. While certain land-based wind projects bidding in the statewide RFP were at prices lower than the price under the PPAs, those projects were more limited in scale and scope than Cape Wind and generally are expected to have lower capacity factors and produce less energy during peak usage than projected from offshore wind. (See response to APNS 1-11 for discussion of capacity factors of offshore wind relative to land-based wind). Biomass projects may also be available in the region and do not suffer from the same capacity factor and production cycle concerns, but they present a great deal of uncertainty as to whether they will qualify for the Massachusetts renewable energy portfolio standard. While very large land-based wind projects may be available from northern New England and Canada in the future, they depend on extensive "build out" of a transmission "backbone" to deliver that energy to the load centers to the south. Solar projects also are promising for meeting renewable energy needs and will undoubtedly be part of the mix of capacity in the region, but cost and project size limit their overall deployment. Confidential information about particular projects in the region is included in response to Information Request AG 1-13.

In the end, National Grid concluded that offshore was a necessary technology to be supported and developed, that Cape Wind was the single best offshore wind option available now and in the foreseeable future, and that contracting with Cape Wind was most consistent with the intent of the Commonwealth to foster renewable energy projects in the region as reflected in the Green Communities Act and the efforts of the Commonwealth, all as discussed more fully in the testimony of Dr. Tierney and Richard Rapp.

(c) See Response to Information Request APNS 1-6(b).

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Exhibit JAL-3
Response to Information Request AG 2-3

Information Request AG 2-3

Request:

Refer to Mr. Milhous' testimony page 28, lines 16-19. Other than the pricing proposals provided in response to the Attorney General's information request AG 1-13, please provide all information on the price of other renewables projects which the Company reviewed or considered in connection with determining the Bundled Price proposed in the PPAs. Include in this response all evaluations, studies, reports, correspondence, e-mails, notes, presentation materials, and work papers related to the pricing of other renewables projects.

Response:

While not specifically reviewed or considered in connection with determining the price, the Company was aware of pricing generally based on the following broad sources of information:

- Publicly available information concerning other off-shore wind projects across the globe. This information was referenced in my testimony and the testimony of Mr. Cliff Hamal in Rhode Island Public Utilities Commission (the "RIPUC") Docket No. 4111, the proceeding regarding the power purchase agreement between Deepwater Wind, LLC ("Deepwater Wind") and Narragansett Electric. The information provided in that docket can be accessed through the following link: http://www.ripuc.org/eventsactions/docket/4111page.html. The testimony of Mr. Cliff Hamal has been provided as Attachment AG 2-3-1.
- Comparisons of Deepwater Wind and Cape Wind pricing prepared internally for the Company. See Attachment AG 2-3-2, which is confidential.
- Proposals received in response to the request for proposals issued in accordance with the order in D.P.U. 09-77. This information was provided as a confidential response to AG 1-13.

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Exhibit JAL-4
Response to Information Request AG 1-13

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Exhibit JAL-5

In Re: Review of New Shoreham Project Pursuant to R.I. Gen Laws § 39-26.1-7, Docket No. 4111,

Direct Testimony of Clif Hamal, December 9, 2009

Exhibits 3 and 4

DIRECT TESTIMONY

OF

CLIFF W. HAMAL

December 9, 2009

Summary of PPA Prices for Offshore Wind Power Projects

	Project	2009 Price	2013 Price	2023 Price	Source/Note
1	United Kingdom	$229/MWh			1
2	France	$196/MWh			2
3	Spain	$167/MWh			3
4	Denmark	$101/MWh			4
5	Sweden	$93/MWh			5
6	Germany Feed-In Tariff Price	$196/MWh and $226/MWh for projects in operation by the end of 2015	$196/MWh and $226/MWh for projects in operation by the end of 2015	$202/MWh and $233/MWh for projects in operation by the end of 2015	6
7	Delmarva Bluewater	$126/MWh	$139/MWh	$177/MWh	7
8	Feed-In Tariff Prices for Renewable Energy Projects in Ontario, Canada Base Date: September 30, 2009	$176/MWh	$186/MWh	$190/MWh	8

Sources/Notes:

1) Financing of Offshore Wind Farms - Challenges and Solutions, HSH Nordbank, March 2009, p. 5. HSH Nordbank estimate of UK Offshore Wind Price as equal to power price from long term PPA + green certificate. Offshore Wind Energy, 2009 Issue, p. 35. UK price of 15.23 cents/kWh (Euros) = 8.82 cents/kWh certificate + an estimated 6.41 cents/kWh for market price.
Euro exchange rates and forwards (used for projects 1 - 6) from Bloomberg, accessed 12/4/2009. We use the average of the bid and ask price. For the 2013 price, we use the the 4 year forward, dated 12/9/13; for the 2023 price, we use the 15 year forward dated 12/9/2024 (the closest date available).

2) Offshore Wind Energy, 2009 Issue, p. 35. France's price appears fixed for 10 years and then has a variable tariff.

3) Offshore Wind Farms in Europe, KPMG, 2007, p. 20, 27. Spain provides a fixed price of 8.43 cents/kWh (Euros) plus the market price (estimated at 3.6 cents/kWh (Euros) in 2007) for 20 years for offshore wind projects. Payment is capped at 16.4 cents/kWh (Euros).

4) Offshore Wind Energy, 2009 Issue, p. 35. Denmark's price is fixed for about 14 years (50,000 full load hours) and then the market price applies. This price may be in addition to the market price -- the reports are ambiguous. "The tariff is guaranteed in addition to the market and the basic price and is calculated on the basis of the offer made by the bidders in the tender procedure" (Offshore Wind Farms in Europe, KPMG, 2007, p. 20).

5) Offshore Wind Farms in Europe, KPMG, 2007, p. 20, 27. Sweden provides an estimated 6.19 cents/kWh for offshore wind projects in 2007 comprised of a certificate component of 2.18 cents/kWh (Euros) plus the market price (estimated at 2.49 cents/kWh (Euros) in 2007 and a environmental bonus of 1.52 (bonus through 2009).

6) Global Wind Energy Council, Germany Section. The initial 15 cents/kWh (Euros) will be paid for a period of 12 years, and 3.5 cents/kWh (Euros) thereafter. For offshore wind farms starting operation after 2015, the initial tariff is reduced by 5% per year, so projects starting operation in 2016 will receive 13 cents/kWh – 5%, etc.

7) PPA between DelMarVa Power and Light Company and Bluewater Wind Delaware LLC, June 23, 2008. Price starts at $120 in 2007 and escalates at 2.5% per year thereafter.

8) Feed-In Tariff Prices for Renewable Energy Projects in Ontario; Base Date: September 30, 2009, Commercial Operation Date: 9/30/2012; http://fit.powerauthority.on.ca/Storage/98/10718_FIT_Pricing_Schedule_-_Final_September_30_2009_PV_10MW.pdf; http://fit.powerauthority.on.ca/Storage/98/10741_FIT_Contract.pdf; CPI information from the Bank of Canada. See http://www1.bank-banque-canada.ca/en/cpi.html
We assume a 2% annual increase in inflation/CPI, per the Bank of Canada's target rate. See http://www1.bank-banque-canada.ca/en/inflation/index.html
Prices converted to US dollars at exchange rate forwards from Bloomberg. For the 2009 rate, we use the exchange rate on 10/27/2009. For the 2013 rate, we use the 4 year forward, dated 10/28/13; for the 2023 rate, we use the 15 year forward, dated 10/28/2024 (the closest date available), and use the average of the bid and ask price.

Summary of PPA Prices for Renewable Power Projects

	Renewable Project	Price	Source/Note
1	2008 Capacity-Weighted Average Wind Power Price (From PPAs) for projects built between 2006-2008	$48/MWh	1
2	2008 Wind Power PPA prices for projects built between 2006-2008	$20 to $126/MWh	2
3	2009 Feed-In Tariff Price for Renewable Power Projects (<20MW) California PUC/SCE	$100 - $111/MWh	3
4	Feed-In Tariff Prices for Renewable Energy Projects in Ontario Base Date: September 30, 2009	Biomass $122 - $130/MWh Biogas $98 - $183/MWh Hydro $11 - $123/MWh Landfill Gas $97 - $104/MWh Solar PV $416 - $754/MWh Onshore Wind $127/MWh Offshore Wind $179/MWh	4
5	Ontario Power Authority All In Customer Payments for Renewables for 2003 to 2008 (There more than 439 Renewable Energy contracts with a contracted capacity of more than 1,411 MW)	Wind $72 - $128/MWh Hydro $61 - $95/MWh By Product & Biofuels $70 - $92/MWh CHP $107 - $225/MWh Solar PV $395/MWh	5
6	Renewable Wind Energy PPA between DelMarVa Power and Light Company and Synergics Eastern Wind Energy, LLC, and DelMarVa Power and Light and Synergics Roth Rock Wind, LLC May 30, 2008	$83/MWh	6
7	Renewable Wind Energy PPA between DelMarVa Power and Light Company and AES Armenia Mountain Wind, LLC, June 6, 2008	$92/MWh	7
8	Hydro PPA between Lower Valley Energy and Pacificorp, May 29, 2009	$77/MWh (2009 price) $80/MWh (2012 price)	8
9	Wind PPA between Schwendiman and Pacificorp, January 27, 2006	$56/MWh (2009 price) $62/MWh (2013 price)	9

Massachusetts Electric Company

Nantucket Electric Company

d/b/a National Grid

Docket No. 10-54

Exhibit JAL-5

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Sources/Notes:

1) 2008 Wind Technologies Market Report, DOE Energy Efficiency & Renewable Energy, July 2009, page 30-31; the prices are from the Berkeley Lab database and reflect 60 projects and 5,465 MW. They reflect the bundled price of electricity and RECs as sold by the project owner under a PPA (page 25). Wind power PPAs of 62 MW located in Hawaii were excluded from the DOE analysis because the price was linked to oil and was considered to be outliers (2008 revenue ranged from $130/MWh to $230/MWh) (page 25). Price is approximated from Figure 18.

2) Ibid. The next highest price point below $126 was $80/MWh.

3) These prices are used in the CA PUC Feed-In Tariff Program for all utilities and Southern California Edison references these prices in its standard contract template. Price varies for contract term 10 years to 25 years. The rates are calculated by using set market price referents (MPR) and adjusted by time of use (TOU) factors as authorized by the Commission. The MPR is the predicted annual average cost of production for a combined-cycle natural gas fired baseload proxy plant. Energy produced during utility peak hours should command a higher price reflecting the higher cost of generation during those hours. Conversely, energy produced during off-peak hours is less valuable to the utility and the tariff should vary accordingly. Using time of delivery (TOD) adjustment factors will result in annual payments under this program that better match with the MPR. http://www.cpuc.ca.gov/PUC/energy/Renewables/Feed-in+Tariff+Price.htm http://www.sce.com/NR/rdonlyres/49A78CEC-38FC-4D7D-8452-A8D71B262816/0/090121_Renewables_Standard_Contracts_20mw.doc
accessed via: http://www.sce.com/EnergyProcurement/renewables/renewables-standard-contracts.htm

4) Feed-In Tariff Prices for Renewable Energy Projects in Ontario; Base Date: September 30, 2009
http://fit.powerauthority.on.ca/Storage/98/10718_FIT_Pricing_Schedule_-_Final_September_30_2009_PV_10MW.pdf.
Projects that use renewable biomass, bio-gas, landfill gas or waterpower as their renewable fuel will receive a time differentiated price under the FIT Contract. For all Hourly Delivered Electricity, such Suppliers will receive the price as otherwise determined in accordance with this Section 7, multiplied by the Peak Performance Factor for the corresponding hour. The application of the Peak Performance Factor will result in higher payments during On-Peak Hours and lower payments during Off-Peak Hours to encourage such Projects to schedule their production during On-Peak Hours to the extent practicable. http://fit.powerauthority.on.ca/Storage/98/10725_FIT_Rules.pdf

5) Historical Customer Payments for OPA Management Contracts, from "Generation Procurement Cost Disclosure" on OPA's website.
http://www.powerauthority.on.ca/SOP/Page.asp?PageID=122&ContentID=6670&SiteNodeID=120&BL_ExpandID=93
http://www.powerauthority.on.ca/Storage/106/15329_2009_Q2_A_Progress_Supply_on_Electricity_Supply.pdf

6) Renewable Wind Energy PPA between DelMarVa Power and Light Company and Synergics Eastern Wind Energy, LLC, May 30, 2008. Included 2.5% escalation to reflect 2009 price.

7) Renewable Wind Energy PPA between DelMarVa Power and Light Company and AES Armenia Mountain Wind, LLC, June 6, 2008.

8) PPA between Lower Valley Energy and Pacificorp for run of River hydro, May 29, 2009. Price reported is for 2012.

9) Wind PPA between Schwendiman and Pacificorp (2009 and 2013 prices) January 27, 2006.

Exhibit JAL-6

Response to Information Request AG 1-4_1

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Exhibit JAL-7

Analysis of Threshold Cost-Effectiveness Price

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