

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:

APPLICATION OF NTE CONNECTICUT, LLC
FOR A CERTIFICATE OF ENVIRONMENTAL
COMPATIBILITY AND PUBLIC NEED FOR
THE CONSTRUCTION, MAINTENANCE AND
OPERATION OF AN ELECTRIC POWER
GENERATING FACILITY OFF LAKE ROAD,
KILLINGLY, CONNECTICUT

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: DOCKET NO. 470
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: DECEMBER 8, 2016

REBUTTAL TESTIMONY OF ETHAN PATERNO [Redacted]

1 **INTRODUCTION**

2 **Q. PLEASE STATE YOUR NAME, BUSINESS TITLE AND BUSINESS ADDRESS.**

3 A. My name is Ethan Paterno. I am a Managing Consultant at PA Consulting Group, Inc. (“PA”). My
4 business address is 1700 Lincoln St., Denver, Colorado.

5 **Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS.**

6 A. I have over 10 years of energy industry experience. I am a North American power market forecasting
7 and energy analytics expert at PA. I routinely advise clients on investments in the energy sector and the
8 value drivers of electricity markets like New England, and have led numerous price forecasting
9 assignments in New England and across North America. I hold a B.A. in Economics from the University
10 of New Hampshire, and an M.S. in Mineral Economics from the Colorado School of Mines. My resume
11 was provided to the Council in NTE Connecticut, LLC (“NTE”)’s pre-hearing submission on October
12 27, 2016.

1 **Q. PLEASE DESCRIBE PA CONSULTING GROUP AND ITS EXPERIENCE WITH**
2 **ELECTRICITY MARKETS?**

3 A. PA is an independent global consulting, technology and innovation firm employing approximately
4 2,500 people from offices across the Americas, Europe, the Nordics, the Gulf and Asia Pacific. PA's
5 experience in the energy industry is extensive, spanning two decades, and includes providing clients
6 with electricity market analysis and modeling. PA helps clients understand and quantify the impact of
7 commodity, market structure and regulatory changes to make investment decisions in the energy sector.
8 Since 2011, PA has supported over 250,000 MW of power plant transactions nation-wide, with over
9 25,000 MW located in New England.

10 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING?**

11 A. My testimony is on behalf of the applicant, NTE, in support of their application for a Certificate of
12 Environmental Compatibility and Public Need from the Connecticut Siting Council to construct the
13 Killingly Energy Center ("KEC") project in Killingly, Connecticut.

14 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

15 A. To respond to the assertions of Robert Fagan in his Pre-Filed Direct Testimony, filed on November
16 15, 2016 on behalf of Not Another Power Plant ("NAPP") and the Sierra Club.

17 **Q. PLEASE SUMMARIZE YOUR TESTIMONY?**

18 A. My rebuttal testimony demonstrates the following:

- 19 • The direct testimony of Mr. Fagan misunderstands the design, intent and purpose of the Forward
20 Capacity Auction and makes statements that contradict ISO-NE market rules - which calls into
21 question the validity of Mr. Fagan's overall analysis and conclusions. This is discussed in the
22 first section below.
- 23 • The direct testimony of Mr. Fagan does not consider the reliability and ratepayer impacts of the
24 6,000 MW of at-risk retirements identified by ISO-NE, and fails to recognize that procuring

1 capacity in excess of the NICR provides higher levels of reliability and lower capacity costs to
2 Connecticut ratepayers. This is discussed in the second section below.

- 3 • The direct testimony of Mr. Fagan criticizing the Applicant’s electricity market modeling is
4 unfounded. None of the technologies advocated by Mr. Fagan as a substitute for KEC (e.g. off-
5 shore wind, battery storage, and new Canadian hydro imports) were selected in the New England
6 Clean Energy RFP nor the Connecticut DEEP’s RFP for Class I renewables under 20 MW and
7 energy efficiency and energy storage. It is unlikely these types of projects will enter the market
8 without a PPA from an RFP. This is discussed in the third section below.

- 9 – Moreover, projects that enter the market without a PPA, like KEC, transfer no financial
10 risk to ratepayers. The success or failure of the project and the associated financial
11 burden are borne solely by the project developer, while the ratepayers realize the higher
12 reliability and lower electricity cost benefits from the project. In contrast, projects that
13 enter the market with a PPA, like most renewable generation, transfer nearly all the
14 financial risk to ratepayers - since the cost of the PPA is typically passed onto ratepayers
15 in their retail electric rates.

16
17 **THE TESTIMONY MISUNDERSTANDS THE DESIGN, INTENT AND PURPOSE OF THE**

18 **FORWARD CAPACITY AUCTION**

19
20 **Q. PLEASE SUMMARIZE YOUR IMPRESSION OF MR. FAGAN’S TESTIMONY AS IT**
21 **RELATES TO THE ISO-NE FORWARD CAPACITY AUCTION**

22 A. Mr. Fagan misunderstands aspects of the design, intent and purpose of the Forward Capacity
23 Auction, calling into question his overall analysis. Mr. Fagan (i) misrepresents how social surplus is
24 used in the Forward Capacity Auction which is in direct contradiction with ISO-NE’s definition, (ii)

1 creates a definition of need directly contradicting ISO-NE’s definition, (iii) does not recognize that the
2 Net Installed Capacity Requirement (“NICR”) is the minimum amount of capacity required for
3 reliability, and (iv) ignores the higher levels of reliability and lower levels of capacity costs that result
4 from procured capacity greater than the NICR.

5 **Q. WHAT ASPECTS OF TESTIMONY REGARDING SOCIAL SURPLUS DO YOU**
6 **DISAGREE WITH?**

7 A. Mr. Fagan asserts on page 60 of his pre-filed testimony that the FCA does not maximize social
8 surplus. ISO-NE’s Market Rule 1, Section III.13.2.7.4 states that the design of the FCA is “*to determine*
9 *cleared capacity offers and Capacity Clearing Prices that seek to maximize social surplus for the*
10 *associated Capacity Commitment Period.*” (Market Rule 1 Standard Market Design effective date
11 November 1, 2016, [https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1](https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1_sec_13_14.pdf)
12 [_sec_13_14.pdf](https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1_sec_13_14.pdf), at Section III.13.2.7.4, *emphasis added*.) In testimony accompanying the FCA 9 results
13 filed with FERC, Dr. Robert Ethier, Vice President of Market Operations at ISO-NE, states plainly:
14 “*The objective of the FCM clearing engine is to maximize social surplus.*” (Testimony of Robert G.
15 Ethier on Behalf of ISO New England, Inc. before the Federal Energy Regulatory Commission dated
16 February 27, 2015, p. 7, lines 14-15, [https://www.iso-ne.com/static-assets/documents/2015/02/er15-___-](https://www.iso-ne.com/static-assets/documents/2015/02/er15-000_2-27-15_fca_9_results_filing.pdf)
17 [000_2-27-15_fca_9_results_filing.pdf](https://www.iso-ne.com/static-assets/documents/2015/02/er15-000_2-27-15_fca_9_results_filing.pdf), at p. 54, *emphasis added*.)

18 **Q. PLEASE DESCRIBE HOW MR. FAGAN’S DEFINITION OF NEED CONTRADICTS ISO-**
19 **NE’S DEFINITION?**

20 A. Mr. Fagan asserts on page 15 of his testimony that the FCM “...*does not determine need.*” However,
21 in its press release for the most recent FCA (FCA 10) ISO-NE stated: “*The FCM is designed to procure*
22 *the resources that will be needed to meet projected demand.*” (Finalized Capacity Auction Results
23 Lower 10th FCA Procured Sufficient Resources, at a Lower Price, for 2019-2020 dated February 29,
24 2016, https://www.iso-ne.com/static-assets/documents/2016/02/20160229_fca10_finalresults.pdf at page

1 1, *emphasis added*.) Moreover, ISO-NE states on page 6 of its Introduction to New England’s Forward
2 Capacity Market ISO 101 “*The Forward Capacity Market is a long-term wholesale market that assures*
3 *resource adequacy, locally and system-wide.*”

4 **Q. PLEASE DESCRIBE HOW MR. FAGAN’S INTERPRETATION OF THE NICR**
5 **CONTRADICTS ISO-NE’S?**

6 A. On page 15 of his testimony, Mr. Fagan claims “*Need is represented by the installed capacity*
7 *requirements.*”¹ This view is based on an antiquated understanding of the Forward Capacity Auction
8 with the old vertical demand curve that was utilized in FCAs 1-8. This vertical demand curve did not
9 recognize the value from higher levels of reliability resulting from higher amounts of capacity.

10 The vertical demand curve was eliminated beginning with FCA 9. In FCA 9 a sloped demand
11 curve was introduced, and that sloped demand curve shape was used again in FCA 10.

12 **Q. WHAT IS THE SLOPED DEMAND CURVE?**

13 A. The Forward Capacity Auction’s downward sloping demand curve is explicitly designed to meet, on
14 average in the long-term, a 1-in-10-year Loss of Load Expectation (“LOLE”), the minimum reliability
15 standard for the New England electricity market. In lay terms, this means that using the downward
16 sloping demand curve to procure capacity should result in a loss of electric service of no more than 1
17 day every 10 years. In the FERC hearing for the sloped demand curve, ISO-NE stated that the sloped
18 demand curve is fully compatible with resource adequacy planning standards and is targeted specifically
19 to satisfying the 1-in-10 LOLE criterion over the long term.² FERC agreed, stating in paragraph 30 of its
20 Order in Docket ER14-1639 approving the ISO-NE system-wide sloped demand curve, “*the proposed*

¹ The installed capacity requirement is also known ICR. ISO-NE subtracts the Hydro Quebec Interconnection Capability Credit (“HQICC”) from the ICR to derive the net installed capacity requirement (“NICR”). The NICR is the minimum amount of capacity procured in the FCAs.

² ISO-NE states: “As a factual matter, the proposed demand curve design is specifically targeted at satisfying the 0.1 days/year LOLE criterion over the long term.” ISO-NE, “MOTION FOR LEAVE TO ANSWER AND ANSWER OF ISO NEW ENGLAND INC.” filed in Docket ER14-1639 on May 1, 2014.

1 *sloped demand curve can reasonably be expected to elicit sufficient capacity to meet its stated reliability*
2 *objective of a 1-in-10 average over time.*” (FERC Order Accepting Tariff Revisions, Issued May 30,
3 2014 in Docket No. ER14-1639, at p. 10, *emphasis added.*)

4 Capacity resources that clear the Forward Capacity Auction receive a Capacity Supply
5 Obligation (“CSO”), a physical obligation to provide energy into the Day-Ahead Energy Market, and are
6 therefore needed to meet that stated reliability objective.

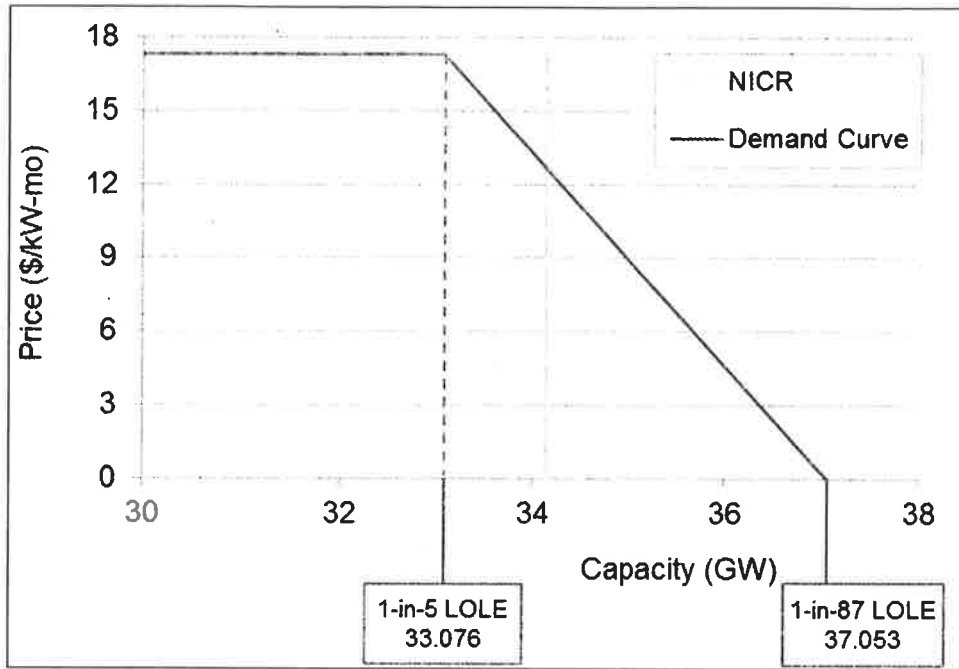
7 **Q. HOW DOES THE SLOPED DEMAND CURVE DIFFER FROM THE VERTICAL DEMAND**
8 **CURVE USED IN FCAs 1-8?**

9 A. A sloped demand curve (illustrated in Figure 1) is based on the fundamental microeconomic
10 principle of the law of demand, which holds that as the price of a good (in this case capacity) declines,
11 the quantity of that good will rise. A vertical demand curve (illustrated in Figure 2) fails to recognize
12 this fundamental principle (since it procures a static amount of the good), and the underlying tenet that
13 procuring more of a good at a lower per unit price has value. If this wasn’t the case, the Costcos and
14 Sam Clubs of the world likely wouldn’t exist.

15 ISO-NE transitioned away from the antiquated vertical demand curve to the sloped demand
16 curve in recognition that procuring capacity greater than the NICR has value, and improves the
17 reliability of the electricity system while simultaneously decreasing capacity clearing prices. This is
18 demonstrated in FCAs 9 and 10, which cleared capacity greater than the NICR by 506 MW and 1,416
19 MW, respectively.

1

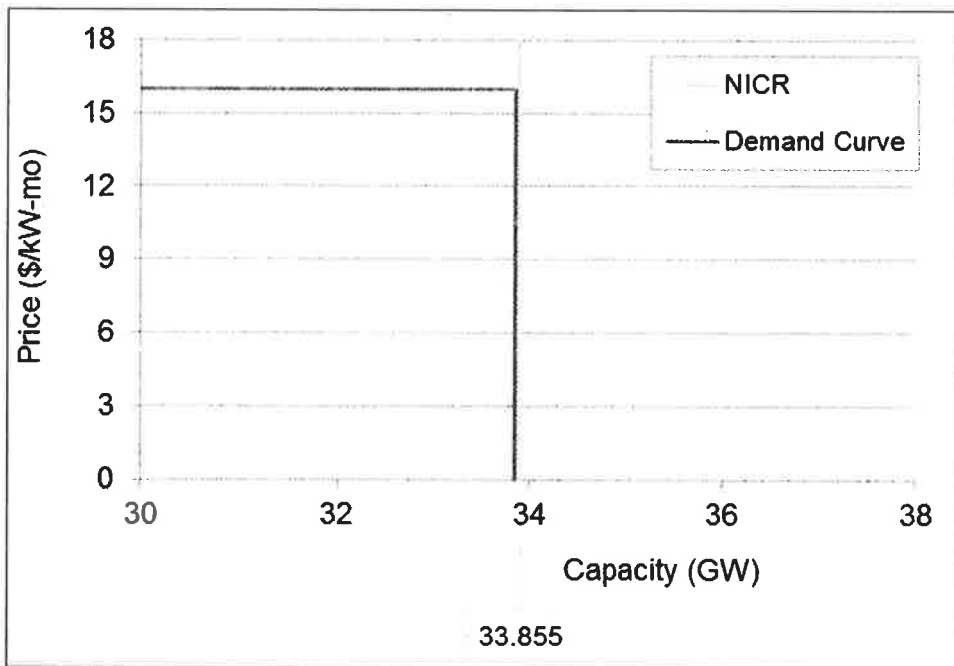
Figure 1: FCA 10 Sloped Demand Curve



2

3

Figure 2: FCA 8 Vertical Demand Curve



4

5 Q. EXPLAIN HOW CLEARING CAPACITY GREATER THAN THE NICR PROVIDE

6 BENEFITS TO CONNECTICUT RATEPAYERS?

1 A. Capacity that clears in amounts greater than the NICR benefits Connecticut ratepayers by providing
2 (i) higher levels of reliability while (ii) simultaneously lowering wholesale electricity costs (via lower
3 capacity costs).

4 Higher levels of reliability are achieved because increasing amounts of capacity result in a
5 decreasing probability of electric service interruptions such as brown and/or blackouts. More
6 technically, higher amounts of cleared capacity correspond to lower LOLE.³

7 Additionally, capacity greater than the NICR puts downward pressure on capacity costs. For
8 example, if FCAs 9 and 10 had cleared capacity exactly equal to the NICR capacity costs would have
9 increased by approximately \$800 million in total for Connecticut ratepayers and approximately \$3
10 billion for New England ratepayers as a whole. These capacity costs would be passed on to Connecticut
11 and New England ratepayers, respectively, and provide a windfall to power generators.

12 In effect, the fact that FCAs 9 and 10 cleared capacity greater than NICR saved Connecticut
13 ratepayers nearly \$800 million, while simultaneously increasing the reliability of the electric service to
14 those ratepayers (by decreasing the electricity system's LOLE due to the additional capacity).

15 **Q. IF KEC CLEARS FCA 11 WILL IT HAVE A SIMILAR EFFECT AS THE CAPACITY**
16 **THAT CLEARED GREATER THAN NICR IN FCAS 9 AND 10?**

17 A. Yes, if KEC clears FCA 11, as the Application reflects, KEC would result in lower capacity costs for
18 Connecticut ratepayers and increased reliability for the electricity system and ratepayers. PA's analysis
19 forecasts KEC to result in lower wholesale electricity costs for Connecticut ratepayers of approximately
20 \$215 million annually from 2020 through 2024.

21

³ ISO-NE's stated reliability objective is a 1-10 LOLE, however the 'end' of the sloped demand curve used in FCA 10 (and illustrated in Figure 2) corresponds to a 1-87 LOLE.

1 **THE TESTIMONY DOES NOT CONSIDER THE RELIABILITY AND RATEPAYER**
2 **IMPACTS OF THE 6,000 MW OF AT-RISK RETIREMENTS IDENTIFIED BY ISO-NE**

3
4 **Q. WITH WHAT ASPECTS OF MR. FAGAN’S TESTIMONY RELATED TO RELIABILITY**
5 **IMPACTS ASSOCIATED WITH THE 6,000 MW OF CAPACITY THAT ISO-NE HAS**
6 **IDENTIFIED AS AT-RISK FOR RETIREMENT WITHIN NEW ENGLAND DO YOU**
7 **DISAGREE?**

8 A. Mr. Fagan states on page 6 of his pre-filed testimony that “*New gas-fired combined cycle capacity*
9 *will not be needed to meet reliability requirements if, or as, the remaining older, ‘at risk’ New England*
10 *fossil plants retire since both ongoing energy efficiency and increases in renewable supply and energy*
11 *storage provide capacity for reliability.”* In its 2016 Regional Electricity Outlook (p. 11), ISO-NE
12 identified 6,000 MW of capacity that is at-risk for retirement. The loss of 6,000 MW of capacity is
13 approximately 20% of ISO-NE’s total capacity. I consider the potential loss of 20% of ISO-NE’s
14 capacity as a material risk to the reliability of the electricity system, and it poses a material financial and
15 reliability risk to Connecticut and ISO-NE ratepayers.

16 Mr. Fagan provided no quantitative analysis backing up his claims that sufficient energy
17 efficiency, renewable generation and energy storage capacity is available to offset the loss of 6,000 MW
18 of at-risk capacity. Nor did Mr. Fagan provide any qualitative clarification on who is actually planning
19 to develop this capacity. Such vague references to potential capacity is not sufficient evidence to suggest
20 that such capacity could be built to meet the reliability risk posed by the loss of 6,000 MW of capacity
21 within New England.

22 **Q. WHAT HAS ISO-NE STATED REGARDING THE ABILITY FOR RENEWABLE**
23 **GENERATION AND ENERGY EFFICIENCY TO OFFSET AT-RISK RETIREMENTS?**

1 A. ISO-NE President & CEO van Welie stated (page 6) in a November 17, 2016 presentation that “*New*
2 *England will need sufficient resources to replace retiring resources... Renewable resources provide*
3 *variable energy production and are typically not reliable capacity resources... To assure reliability, the*
4 *region needs fast-responding, flexible capacity resources that are not constrained in their operation.*”

5 (Gordon van Welie presentation to the New England-Canada Business Council, p. 6,
6 http://www.necbc.org/content/pages/Gordon-van-Welie_ISO-NE_NECBC_11_17_2016_final.pptx.pdf,
7 *emphasis added.*) It should be noted that Mr. van Welie made this presentation after Mr. Fagan
8 submitted his testimony, which indicates that ISO-NE currently does not believe that renewable
9 generation and energy efficiency will be sufficient to replace the 6,000 MW of capacity at-risk for
10 retirement.

11 **Q. DO YOU CONSIDER KEC TO BE A FAST-RESPONDING, FLEXIBLE CAPACITY**
12 **RESOURCE THAT IS NOT CONSTRAINED IN ITS OPERATION?**

13 A. Yes. KEC is a fast-responding, flexible and fully dispatchable dual-fuel capacity resource (i.e. not
14 constrained) that can operate on either natural gas or ultra-low sulfur diesel (“ULSD”). And KEC will
15 have a 6,500 Btu/kWh full load heat rate and 29 MW per minute turbine ramp rate.

16 **Q. WHAT ARE THE IMPLICATIONS FOR CONNECTICUT RATEPAYERS, BEYOND**
17 **RELIABILITY, IF THE 6,000 MW OF AT-RISK CAPACITY WERE TO RETIRE?**

18 A. There are material negative electricity cost impacts. The results of FCA 8 provide a good example of
19 the impacts of power plant retirements.

20 In FCA 8, Vermont Yankee and Brayton Point submitted retirement plans, which totaled
21 approximately 2,000 MW. As a result, ISO-NE did not procure enough capacity in FCA 8 to meet the
22 NICR. In turn, this resulted in a capacity clearing price of \$15/kW-mo for FCA 8. This is more than
23 double the capacity clearing price in FCA 10 of \$7.03/kW-mo.

1 If the situation in FCA 8 had occurred in FCA 10, and FCA 10 had not procured enough capacity
2 to meet the NICR, FCA 10 capacity clearing prices would have cleared at approximately \$17/kW-mo.
3 This would have resulted in over \$1 billion of additional capacity costs for Connecticut ratepayers. Such
4 a situation could occur in future FCAs, driven by the 6,000 MW of at-risk retirements, if facilities like
5 KEC do not enter the market.

6 **Q. WHAT, IF ANY, ANALYSIS DOES MR. FAGAN PROVIDE REGARDING IMPACTS ON**
7 **RATEPAYERS, INCLUDING IMPACTS ASSOCIATED WITH THE POTENTIAL**
8 **RETIREMENT OF 1,622 MW OF CAPACITY IN FCA 11?**

9 A. Mr. Fagan does not account for ratepayer impacts at any point in his testimony. Mr. Fagan's Table 3
10 on page 20 of his testimony shows that there could be 1,622 MW of price-sensitive retirements in FCA
11 11, resulting in as little as 317 MW of capacity greater than the NICR. However, he did not address what
12 impact the retirements would have on capacity costs.

13 **Q. WHAT WOULD THE RATEPAYER IMPACTS BE IF THE 1,622 MW OF CAPACITY**
14 **RETIRED IN FCA 11?**

15 A. Based on Mr. Fagan's analysis in Table 3, I calculated the capacity clearing prices - based on Mr.
16 Fagan's assumption that there would be a range of 317-540 MW of capacity greater than the NICR. My
17 analysis indicated that the likely capacity clearing price would be between approximately \$7.70/kW-mo
18 and \$9.15/kW-mo.

19 **Q. HOW DOES THIS COMPARE WITH PA'S ANALYSIS FOR FCA 11 IN THE**
20 **APPLICATION?**

21 A. PA's analysis forecasted a capacity clearing price of \$6.19/kW-mo with KEC in FCA 11 – which is
22 approximately 20-30% lower than the likely capacity clearing price from Mr. Fagan's analysis.

23 **Q. WHAT COULD THE HIGHER CAPACITY CLEARING PRICE MEAN FOR**
24 **CONNECTICUT RATEPAYERS?**

1 A. The higher capacity clearing prices based on Mr. Fagan’s analysis would result in an additional \$150
2 million to \$300 million of capacity costs for Connecticut ratepayers from FCA 11 alone.
3 Additionally, in Mr. Fagan’s analysis less capacity would clear the FCA. Since less capacity would clear
4 the auction it would increase the LOLE for ISO-NE and thereby decrease overall reliability for
5 ratepayers.

6 In other words, Mr. Fagan’s analysis in Table 3 of his pre-filed testimony indicates that
7 Connecticut ratepayers should (i) pay **more money** for (ii) a **less reliable electricity system**.

8
9 **THE TESTIMONY CRITICIZING THE APPLICANT’S ELECTRICITY MARKET**

10 **MODELING IS UNFOUNDED**

11
12 **Q. PLEASE DESCRIBE PA’S ELECTRICITY MARKET MODELING EXPERIENCE?**

13 A. PA’s electricity market modeling uses the same AURORAxmp electricity market simulation model
14 that is widely used by electric utilities, power market regulators, independent system operators and other
15 market consultants. For example, the North American Electric Reliability Corporation (“NERC”) - the
16 non-profit organization that oversees electric reliability in New England - recently used AURORAxmp
17 to assess impacts related to the U.S. EPA’s Clean Power Plan. Similarly, ISO-NE itself is currently
18 using AURORAxmp to forecast the operations of the New England electricity market in its review of
19 the Forward Capacity Auction. Furthermore, PA’s modeling process was most recently vetted by the
20 Rhode Island Office of Energy Resources (“OER”) in the proposed Clear River Energy Center
21 proceedings. The OER found in its Advisory Opinion (dated September 12, 2016, page 34) that PA’s
22 *“key assumptions regarding the regional market structure, fuel and emission allowance prices, supply*
23 *and demand forecasts, and transmission all appear to be reasonable and the model supports a*
24 *reasonable forecast of the Project’s [Clear River’s] impact on CO₂ emissions in the region.”*

1 This modeling process has also been vetted in litigation and court proceedings, including some
2 of the largest corporate restructurings in the power industry. These include the restructurings of Calpine
3 (\$20 billion), Mirant (\$10 billion), and NRG Energy (\$6 billion).

4 Additionally, PA's process has been accepted by financial lenders in connection with the
5 purchase, sale and financing of power plants. Since 2011, PA has used this process to support over
6 250,000 MW of power plant transactions nation-wide, with over 25,000 MW located in New England.

7 **Q. DOES PA'S MODELING OF THE NEW ENGLAND ELECTRICITY SYSTEM INCLUDE**
8 **NEW RENEWABLE GENERATION SUCH AS MAINE WIND AND UTILITY SOLAR?**

9 A. *[Redacted]*

10 **Q. WERE PA'S MODELING INPUT ASSUMPTIONS RELATED TO MAINE WIND AND**
11 **UTILITY SOLAR GENERATION PROVIDED TO NAPP AND THE SIERRA CLUB?**

12 A. Yes. In response to NAPP's interrogatories dated October 20, 2016, PA provided a spreadsheet of its
13 modeling input assumptions.⁴ *[Redacted.]*

14 **Q. DOES PA'S MODELING INCLUDE MORE EXPENSIVE FORMS OF GENERATION**
15 **SUCH AS OFF-SHORE WIND, BATTERY STORAGE AND NEW CANADIAN HYDRO**
16 **IMPORTS?**

17 A. *[Redacted]*

18 **Q. DO LEGISLATIVE ACTS SUCH AS MASSACHUSETTS BILL H.4568 HELP**
19 **ENCOURAGE OFF-SHORE WIND TO ENTER THE MARKET?**

20 A. Yes, but they do not guarantee off-shore wind will enter the market. For example, Massachusetts Bill
21 H.4568, An Act to Promote Energy Diversity, calls for the state's distribution companies to enter into
22 long-term contracts with off-shore wind provided those contracts are '*...cost-effective long-term*
23 *contracts...*'. (Massachusetts Bill H.4568, An Act to Promote Energy Diversity Approved August 8,

⁴ See NAPP Question 1, Attachment 1.

1 2016, <https://malegislature.gov/Laws/SessionLaws/Acts/2016/Chapter188>, at Section 83(C). (a) and (b),
2 *emphasis added*) In other words, if off-shore wind projects are determined not to be cost-effective, the
3 state's distribution companies do not have to enter into long-term contracts. Therefore there is no
4 certainty off-shore wind generation will enter the market during the study period in question (through
5 2024) as page 29 of Mr. Fagan's testimony asserts.

6 **Q. ARE THERE A LOT OF OFF-SHORE WIND PROJECTS OPERATING IN THE U.S.?**

7 A. No. Currently there is only one off-shore wind project operating in the United States; Block Island in
8 Rhode Island. Block Island has a nameplate capacity rating of only 30 MW, so it is relatively small, and
9 has been heavily criticized as being uneconomic and not cost competitive with other forms of
10 generation. For example, National Grid (the parent company of Block Island's power purchase
11 agreement counterparty Narragansett Electric Company) calculated the above market cost of the Block
12 Island power purchase agreement ("PPA") was more than \$400 million over the 20-year contract, and
13 the contract will cost Rhode Island ratepayers more than \$800 million in total.⁵

14 In contrast, KEC will not cost Connecticut ratepayers anything (since KEC is not signing a PPA
15 with any of Connecticut's electric utilities) and is expected to result in lower wholesale electricity costs
16 for Connecticut ratepayers by an average of \$215 million annually.

17 **Q. WHAT IS THE TIMELINE FOR OFF-SHORE WIND UNDER MASSACHUSETTS BILL**
18 **H.4568?**

19 A. As Mr. Fagan correctly states on Page 29 Lines 11-12 of his testimony, Massachusetts is targeting
20 off-shore wind by the late 2020s.

21 **Q. HOW DOES BLOCK ISLAND COMPARE TO THE OFF-SHORE WIND UNDER**
22 **MASSACHUSETTS BILL H.4568?**

⁵ [http://www.ripuc.org/eventsactions/docket/4371-NGrid-PHDR-DPU4\(3-2-15\).pdf](http://www.ripuc.org/eventsactions/docket/4371-NGrid-PHDR-DPU4(3-2-15).pdf)

1 A. Block Island is significantly smaller than the projects contemplated under the H.4568. Specifically,
2 H.4568 calls for projects 400 MW or larger – more than 10 times the size of Block Island.

3 **Q. BASED ON THIS INFORMATION, WHAT DO YOU CONCLUDE WITH REGARD TO**
4 **VIABILITY OF OFF-SHORE WIND TO SUBSITITUTE FOR KEC’S CAPACITY?**

5 A. Since Block Island is the only off-shore wind project operating in the U.S. and H.4568 requires
6 projects significantly larger than Block Island I conclude Mr. Fagan’s assertion that off-shore wind is a
7 viable substitute for KEC’s capacity to be very questionable.

8 Moreover, I also conclude that it is unlikely that off-shore wind, even if it ultimately enters the
9 market, would be able to help replace the 6,000 MW of at-risk retirements in ISO-NE if they retire – as
10 Mr. Fagan asserts on Page 7 Lines 13-18 of his testimony. This is because ISO-NE has identified the
11 6,000 MW of at-risk retirements as being a near-term risk, i.e. early 2020s, and not a long-term risk –
12 which the late 2020s would imply.⁶

13 **Q. WHAT RECENT MARKET EVENTS SUPPORT PA’S DECISION TO EXCLUDE OFF-**
14 **SHORE WIND, BATTERY STORAGE AND NEW CANADIAN HYDRO IMPORTS FROM ITS**
15 **ANALYSIS?**

16 A. *[Redacted]*

17 **Q. WAS NORTHERN PASS AMONGST THE REJECTED BIDDERS IN THESE RFPs?**

18 A. Yes. Northern Pass, a proposed 1,000 MW new transmission line from Canada terminating in New
19 Hampshire, was a rejected bidder in the New England Clean Energy RFP.

20 **Q. BASED ON THIS INFORMATION WHAT DO YOU CONCLUDE?**

21 A. I conclude the 2019 in-service date for Northern Pass, which Mr. Fagan asserts on page 28 of his
22 testimony, is unreasonable and overly optimistic. Moreover, I conclude since Northern Pass was not
23 selected in either RFP it is unlikely Northern Pass will “*obviate the need for KEC*” – which Mr. Fagan

⁶ Page 11 of ISO-NE’s 2016 Regional Electricity Outlook.

1 asserts on Page 7 Line 18 of his testimony – since Northern Pass is unlikely to enter the market without
2 a PPA and it is unlikely Northern Pass will receive a PPA without being selected in an RFP.

3 **Q. COULD OFF-SHORE WIND, BATTERY STORAGE OR NEW CANADIAN HYDRO**
4 **ENTER THE MARKET WITHOUT A PPA?**

5 A. In theory yes, but it would be extremely unlikely. Nearly all forms of renewable generation in New
6 England enter the market under a PPA (typically secured through a RFP), which is the opposite of
7 flexible and efficient dual-fuel fired generation like KEC that enter the market on an uncontracted (i.e.
8 merchant) basis. Therefore, since (i) these types of projects are not being selected in RFPs and therefore
9 do not have a PPA, and (ii) these types of projects seldom enter the market without a PPA - I conclude it
10 is unlikely they will enter the market.

11 **Q. WHAT IS THE DIFFERENCE TO CONNECTICUT RATEPAYERS BETWEEN**
12 **PROJECTS THAT ENTER THE MARKET WITH A PPA AND PROJECTS THAT ENTER**
13 **THE MARKET WITHOUT A PPA?**

14 A. Projects that enter the market without a PPA, like KEC, transfer no financial risk to ratepayers. The
15 success or failure of the project and the associated financial burden are borne solely by the project
16 developer, while the ratepayers realize the higher reliability and lower electricity cost benefits from the
17 project.

18 In contrast, projects that enter the market with a PPA, like most renewable generation, transfer
19 nearly all the financial risk to ratepayers. (The financial risk is borne by ratepayers because the cost of
20 the PPA is typically passed onto ratepayers in their retail electric rates.) Moreover, ratepayers may not
21 realize lower electricity costs, as evidenced by National Grid's analysis of the Block Island contract.

22 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

23 A. Yes.

CERTIFICATION OF SERVICE


I hereby certify that on this 8th day of December, 2016, a copy of the foregoing was sent via electronic mail, to the following:

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