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CENTRAL MAINE POWER COMPANY REQUEST FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE CONSTRUCTION OF THE NEW ENGLAND CLEAN ENERGY CONNECT (NECEC) TRANSMISSION PROJECT

REBUTTAL TESTIMONY OF DAYMARK ENERGY ADVISORS: DANIEL PEACO, DOUGLAS SMITH AND JEFFREY BOWER

On Behalf of Central Maine Power Company

July 13, 2018

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I. INTRODUCTION

Central Maine Power (CMP or the Company) offers the following rebuttal testimony of Daniel Peaco, Douglas Smith, and Jeffrey Bower of Daymark Energy Advisors (Daymark).[1]

CMP retained Daymark to prepare an analysis of the economic benefits to Maine and Maine electricity consumers that would be realized from the implementation of the New England Clean Energy Connect (NECEC) and the delivery of clean energy from Hydro-Québec to the Massachusetts electric distribution companies (Massachusetts EDCs). Our analysis (the Daymark Report) quantified benefits including impacts on wholesale energy and capacity market prices in Maine, and the hedging benefits on those prices in the event of high natural gas price events. That analysis demonstrated that the NECEC would cause significant energy and capacity market benefits to Maine electricity consumers.

In addition, CMP asked Daymark to assess the impact that the NECEC would have on regional carbon dioxide (CO_2) emissions and energy congestion. Our analysis demonstrated that there will be significant CO_2 emissions reduction benefits to Maine and the region. Our congestion analysis demonstrated that the NECEC operation will not lead to any material congestion in the Maine power system. Our analyses also showed that the NECEC would reduce demand for natural gas in the electric sector.

[1] Mr. Peaco is a Principal Consultant, Mr. Smith a Managing Consultant, and Mr. Bower is a Senior Consultant at Daymark. *See* **Exhibit NECEC-1** to CMP's September 27, 2018 Petition for a Certificate of Public Convenience and Necessity (CPCN) for the New England Clean Energy Connect (NECEC) Transmission Project for Mr. Peaco's and Mr. Smith's curriculum vitae. Mr. Bower's curriculum vitae is provided as **Exhibit NECEC-31**.

Lastly, we addressed other benefits qualitatively, including ancillary services savings and the benefits to all natural gas consumers resulting from the reduction in natural gas consumption in the electric sector.

The Report submitted by London Economics International (LEI)[2] and testimony offered by the Generator Intervenors[3] (GI) and NextEra Energy Resources, LLC (NextEra) offer alternatives analyses and critiques of the methods and assumptions employed by Daymark.

This report contains Daymark's assessment of the LEI Report, the GI and NextEra testimony and our rebuttal to issues raised in those testimonies, including evidence offered in response to data requests and in technical conferences.

II. SUMMARY OF CONCLUSIONS

We find that the evidence offered by LEI, GI and NextEra supports the conclusions initially offered in the Daymark Report. As described in this rebuttal testimony, we conclude that the asserted problems with our analysis or asserted adverse impacts on Maine generators either are not well founded or do not change the conclusion that the NECEC is beneficial to Maine. The evidence supports the conclusion that the NECEC offers significant savings to Maine electricity consumers in the energy and capacity markets, as well as providing potential ancillary services benefits and a hedge against higher natural gas prices in Maine. These electricity consumer savings come at no cost to Maine electricity

[2] London Economics International, LLC, Independent Analysis of Electricity Market and Macroeconomic Benefits of the New England Clean Energy Connect Project (May 21, 2018) ("LEI Report").

[3] The Generator Intervenors are Calpine Corporation (Calpine), Vistra Energy Corporation (f/k/a Dynegy, Inc.) (Vistra Energy), and Bucksport Generation LLC (Bucksport Generation).

consumers.[4] The evidence demonstrates that the NECEC also helps advance Maine policy with respect to reducing CO_2 emissions in Maine and in reducing demand for natural gas in the electric sector. Lastly, the evidence shows that the NECEC will have no significant adverse impacts on existing Maine generators.

As discussed in this rebuttal testimony, we find that the evidence supports the following conclusions regarding key issues raised regarding the NECEC:

- The NECEC is required in order to provide the transfer capability necessary to deliver the 9.45 terawatt-hours (TWh) of clean energy contracted for by the Massachusetts EDCs under purchase power agreements (PPAs). Assertions that existing ties between Québec and New England have available transfer capability for this energy are in error and not consistent with historical operations of those ties.

- The NECEC will not have any material adverse impact on congestion in Maine or across key interfaces to the south. Assertions to the contrary were based on analyses that were flawed.

We observe that there is agreement that the NECEC offers economic benefits to Maine electricity consumers:

- Maine electricity consumers will pay less for wholesale energy if the NECEC is operating than in a future without the NECEC. All parties offering analysis on this issue agree that this is a benefit to consumers. The parties only differ on the magnitude of those benefits based on alternative methods and assumptions.

- Maine electricity consumers may pay less for capacity if the NECEC capacity clears in the forward capacity market (FCM) primary auction. In no event will the NECEC increase the cost of capacity to Maine electricity consumers. The parties differ only on the likelihood of the NECEC clearing in the primary auction.

- The NECEC represents a hedge on wholesale electric energy prices in Maine in the event that higher natural gas prices delivered to generators in the

[4] *See* Rebuttal Testimony of Thorn Dickinson, Eric Stinneford and Bernardo Escudero at Section III(H).

region and in Maine result from congestion in the natural gas supply network. The parties differ on the assumed reference forecast for natural gas prices, but do not dispute that this assumption is subject to uncertainty. We observe that the NECEC will have no material adverse impact on existing Maine generators:

- The NECEC will not force any existing Maine generators to retire early. Parties that asserted that this could occur provided no supporting analysis and relied on misunderstandings of the rules regarding the forward capacity market primary auction, the Minimum Offer Pricing Rules (MOPR), and the voluntary substitution auction.

- The NECEC does not create any material congestion in the energy market and existing Maine generators will not be precluded from participating in the energy markets when it is economic for them to do so with the NECEC in the system. Parties asserting congestion issues relied on analysis that we show to be flawed.

We observe that the NECEC will make positive contribution to Maine's greenhouse gas reduction and natural gas pricing polices:

- The NECEC will produce significant CO_2 emission reductions in Maine and New England. No party disputes that there are savings in the region. The party asserting that other markets would have increased emissions was based on an incorrect assertion that the NECEC energy would be energy diverted from existing exports to New York.

- The NECEC will reduce the consumption of natural gas in the electric sector in Maine and New England, mitigating the exposure to higher natural gas prices to Maine natural gas consumers resulting from high demand.

This rebuttal testimony discusses each of these points in the sections below.

III. ANALYTICAL FRAMEWORK

Our analytical framework has been called into question in this proceeding. Three modeling decisions we made were raised during the technical conferences:

- Modeling 20 years;
- Modeling two cases, a Base Case without the NECEC and a Change Case that adds the NECEC; and
- Energy and capacity market modeling that provide feedbacks between the models.

We made the first choice, to model 20 years of impacts, to represent the full 20-year life of the proposed (and now executed) NECEC PPAs to sell clean energy to the Massachusetts EDCs.

The GI analysis focused on a single year, 2023, the first year of the proposed NECEC PPAs and, as presented by the GI witnesses, did not attempt to derive the benefits that would accrue over the duration of the NECEC PPAs. Further, this single year approach does not adequately reflect the impacts that the NECEC can have over time, as the changes in load, retirements, generation additions, and other factors are important to such an analysis and 2023 is not representative of the system in all 20 years.

The LEI analysis considered the first 15 years of the NECEC PPAs. While the 15-year analysis does capture significant dynamics of the New England markets over time that the GI's single year analysis does not, it still did not model the full impact of the NECEC over the entire 20-year NECEC PPAs.

The second decision we made was to select a modeling approach designed to capture the impacts of the NECEC on the New England markets and, in particular, in Maine. Daymark constructed a 20-year base case that assumed no NECEC in that period and an

NECEC case that included the NECEC transmission and the PPAs between HQUS[5] and the Massachusetts EDCs. This is the technique used by all witnesses offering analyses of NECEC economic benefits in this case.[6]

Ms. Green from CLF challenged LEI on the use of this approach, asking why the base case did not assume a similar project in the region.[7] As Ms. Frayer discussed with Ms. Green in that technical conference, analyzing the impact of a single project is frequently done by constructing a base case without the project and a change case with the project. This approach, frequently referred to as "with and without", allows modelers to capture the market impacts of the project in question. We agree with the explanation offered by LEI and object to the notion that an analysis comparing a future with the NECEC the project to a future with an alternative, but fundamentally similar, project has any value in assessing the merits of proceeding with such a project.

Finally, in any situation where new capacity is being considered, it is important to capture the energy and capacity market impacts in a manner that reflects the feedback mechanisms between those two markets. While this decision has not been directly challenged, both Mr. Russo and Ms. Bodell have discussed impacts across the energy and capacity markets without explicitly modeling both markets to test their theories. Expected energy prices impact capacity market bids by generators, and the results of capacity

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[5] HQUS replaced HRE as the counterparty for the PPAs. HQUS is a U.S. corporation organized and existing under the laws of the State of Delaware.

[6] Daymark, LEI, and GI each used this "with and without" approach. As discussed in Section V.D., the NextEra analysis presented by Mr. Whitley did not properly model the change case. Nonetheless, his analysis was an attempt to produce a "with and without" set of model runs.

[7] *See* 6/14/18 Tech. Conf. Tr. at 50:20-53:15 (Frayer).

auctions impact the amount and types of generation available for future energy production, making such modeling important for ensuring quality analysis.[8] Only LEI and Daymark produced analyses that utilized this technique.

For these reasons, we believe the 20-year analysis, comparing cases with and without the NECEC project and considering the interactions between the energy and capacity market is the proper structure of the analysis for this proceeding. This approach is the one used in the Daymark Report and is the only analysis presented in this proceeding that includes all elements of this approach.

IV. ENERGY MARKET BENEFITS

The Daymark Report provided a detailed analysis of the wholesale energy market benefits of the NECEC for electricity consumers in Maine and throughout the region based on a set of assumptions typical of those used in the region for reference case analysis. We concluded that the import of clean, low-cost energy will lower wholesale energy and retail energy prices in Maine and throughout the region, providing $496 million net present value (NPV) of benefits to Maine electricity consumers over 20 years in our reference case scenario.[9] The LEI Report and GI and NextEra rebuttal testimonies explored alternative assumptions to those included in our analysis, indicating that the level of energy benefits we derived could be lower and that there is a range of uncertainty around any forecast of

[8] Ms. Frayer noted this as well in her technical conference, saying, "It's great to have models, and that's why we use them, to make sure we can vet the theories that we put out there." *See* 6/14/18 Tech. Conf. Tr. at 93:13-15.

[9] CMP's September 27, 2018 Petition for a Certificate of Public Convenience and Necessity (CPCN) for the New England Clean Energy Connect (NECEC) Transmission Project (Petition), **Exhibit NECEC-5** (NECEC Transmission Project: Benefits to Maine Ratepayers) at 17 of 98.

this nature. However, none of the witnesses dispute the fact that there will be energy benefits to Maine electricity consumers. We believe the record is clear that the benefits are positive and significant.

A. LEI Analysis of Energy Market Benefits

LEI reviewed and critiqued Daymark's energy market benefits analysis and conducted its own analysis quantifying the potential energy market benefits of the NECEC using LEI's proprietary production cost model. LEI's analysis of the potential wholesale energy market benefits of the NECEC which is structurally similar to Daymark's analysis. LEI used PoolMod, its proprietary production cost model, to model a status quo Base Case and a Project Case including the incremental generation and transmission upgrades associated with the NECEC. As in the Daymark analysis, the primary output of this analysis is a calculation of wholesale energy market savings.

While the analyses are structurally similar, there are some key differences which led to variation in results from the LEI and Daymark analyses, including:

- Topology: LEI's PoolMod analysis only modeled ISO-NE zones, with interchange from other regions (New York, New Brunswick, and Québec) modeled as **[Begin Confidential PO 8]** [redacted] **[End Confidential PO 8]**.[10] By contrast, Daymark's analysis models loads and generation for more areas within the Eastern Interconnect, including NYISO, New Brunswick, Québec, PJM, MISO, etc.

- Natural gas prices: LEI's assumptions regarding natural gas prices differed from the U.S. Energy Information Administration (EIA) Annual Energy Outlook (AEO) forecasts used by Daymark. LEI's gas price analysis relies on near-term forward prices and AEO growth rates to develop a Henry Hub

[10] Confidential 6/14/18 Tech. Conf. Tr. at 183:8-184:18.

index price. On top of this forecast LEI adds a transportation adder to develop an Algonquin Citygate price.[11] The adder used by LEI for this analysis assumed incremental pipeline capacity is added in New England which has not yet been fully permitted and approved.[12] In addition to these differences in forecast method, there were some differences in how LEI and Daymark applied natural gas price forecasts to individual resources depending on location and unit type.

- Generation portfolio: LEI and Daymark used different forecasts of generator retirements and resource additions (both thermal and renewable). These differences were due, in part, to the outputs of capacity models used by each party (discussed below). Another aspect of the difference was that **[Begin Confidential PO 8]** [redacted] **[End Confidential PO 8]**.

The LEI Report includes additional discussion of the drivers of the difference in results between the Daymark and LEI analyses.[13]

Similar to the results of the Daymark analysis, the LEI analysis concluded that there are likely to be significant benefits to electricity consumers: $122 million NPV in benefits to Maine electricity consumers over 15 years[14] and $1.2 billion NPV in benefits to the New England region as a whole.

[11] LEI Report at 20, 42-43.

[12] 6/14/18 Tech. Conf. Tr. at 21:8-19.

[13] *Id*. at 38-46.

[14] LEI's quantification of the NECEC benefits assumed a 15-year operations period for the NECEC, from 2023 to 2037. However, the Massachusetts EDCs have contracted for 1090 MW of transmission capacity on the NECEC for the first twenty years of the Project and the Hydro-Québec has committed to deliver up to 1,090 MW of energy to the Massachusetts EDCs in every hour of each day for the first twenty years of the NECEC. Rebuttal Testimony of Thorn Dickinson, Eric Stinneford and Bernardo Escudero at Section II(A).

B. GI Analysis of Energy Market Benefits

GI also conducted independent analysis of the potential energy market benefits of the NECEC. The GI witnesses, with the support of Calpine personnel, used the UPLAN model to conduct its analysis.

As with the LEI modeling analysis, the GI analysis uses a methodology similar to the approach used by Daymark, modeling a future with and without the NECEC and assessing potential economic and environmental impacts by comparing the changes between those two cases. Also, as with the LEI analysis, there are some differences in approach and assumptions which led to variation in results from the GI and Daymark analyses:

- Study period: GI only evaluated the impact in 2023, the first year of operation of the NECEC.[15]

- Topology: GI's UPLAN modeled loads and generation in New England, New York, PJM, MISO, and Ontario. Interchange from Québec and New Brunswick were reflected as fixed hourly shapes.[16] The interchange from Québec to Ontario was not modeled.[17]

- Natural gas prices: GI's natural gas price assumptions are the result of a Calpine internal forecast and differed from the EIA AEO forecasts used by Daymark. In addition, as with the LEI analysis, there were some differences in how GI and Daymark applied natural gas price forecasts to individual resources depending on location and unit type.[18]

[15] Bodell Direct Testimony at 5.

[16] 6/20/18 Tech. Conf. Tr. at 56:2-18.

[17] 6/20/18 Tech. Conf. Tr. at 65:11-66:7.

[18] See, e.g., zonal gas price inputs defined in GI Response to Data Request EXM-004-006, Attachment *EXM-004-006_UPLAN Results.xlsx*.

- CO_2 prices: GI's CO_2 forecast was $5/metric ton for the RGGI states, with a $15/metric ton price for Massachusetts generators.[19] Daymark used a forecast beginning at approximately $15/metric ton and growing over time.

- Generation portfolio: GI and Daymark assumed different forecasts of generator retirements and renewable resource additions.[20]

GI evaluated three scenarios and three cases for each scenario.[21] One scenario used Calpine's standard assumptions regarding fuel prices, carbon prices, and resource portfolio. The second scenario built from the first one, altering several inputs in an attempt to replicate some of the Daymark assumptions in the year 2023. The assumptions that GI modified were natural gas prices, CO_2 pricing, and the renewable buildout. The third GI scenario used the CO_2 price and resource buildout assumptions from the second scenario, but used the lower natural gas prices assumed by Calpine in the first scenario. The modeling cases for each scenario included a Base Case, an NECEC case in which the NECEC energy represents incremental exports from Québec, and an NECEC case in which the energy exported to Maine displaces energy exported to New York.

From the production cost modeling, GI calculated the change in Maine LMPs resulting from the addition of the NECEC. This was done twice for each scenario: once by comparing the results of the "incremental" NECEC case to the Base Case and once by comparing the results of the "constant" NECEC case to the Base Case. "Incremental" meant that the 9.45 TWh of NECEC generation was added to the model without any reductions to

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[19] GI Response to Data Request EXM-004-006, Attachment *EXM-004-006_UPLAN Results.xlsx*.

[20] GI Response to Data Request EXM-004-006, Attachment *EXM-004-006_UPLAN Results.xlsx*.

[21] ENERGYZT Technical Report, Section 3 (UPLAN Market Analysis), submitted in response to CMP-004-001, Attachment 4. *See also* 6/20/2018 Tech. Conf. Tr. at 8:2-10:18.

Hydro-Québec exports to other regions. "Constant" meant that the 9.45 TWh of NECEC generation led to a one-for-one elimination of MWh otherwise being exported to New York. The results found that the average hourly LMP reduction in Maine across these scenarios ranged from $2.30/MWh to $3.21/MWh.[22]

GI did not translate this LMP reduction to a total benefit to Maine electricity consumers. However, we estimated the GI annual impact to Maine electricity consumers using the ISO-NE forecast of 2023 Maine load, to yield a range of $26.5 million – $36.1 million[23] in benefits to Maine load in 2023. These benefits are almost identical to the 2023 benefits calculated by Daymark of $30-35 million.[24]

From this analysis, GI's witness Ms. Bodell concludes that "[c]hanging key conditions such as natural gas prices, carbon prices and renewable buildout illustrates how benefits can be significantly altered by market conditions and policy decisions."[25]

C. NextEra Comments on Energy Market Benefits

NextEra witness Christopher Russo critiqued Daymark's calculation of the benefits associated with the Project using a delivered gas price in New England, rather than price for Algonquin Citygate.[26] Mr. Russo testified that if gas prices are lower than those used in

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[22] GI Response to Data Request EXM-004-006, Attachment *EXM-004-006_UPLAN Results.xlsx*.

[23] Calculated based on data in EXM-004-006 and the ISO-NE 2018 load forecast data for the Maine zone (Gross-PV-EE).

[24] Daymark reported 20 year levelized benefits of $40-44 million per year. As can be seen in IECG_004_001_Att 3 CONFIDENTIAL, the 2023 values were less and the benefits rose throughout the study period as gas prices increase.

[25] Bodell Direct Testimony at 23:3-5.

[26] Russo Direct Testimony at 9, 11-12.

the analysis, benefits are likely lower as well. Additionally, and without performing any modeling to rely upon, he referred to the Daymark model calculations of energy market benefits as "speculative."[27]

D. Conclusions Regarding Energy Benefits of the NECEC

LEI and GI have each offered analyses assessing the potential energy market benefits of the NECEC and both parties concluded that there are significant benefits under a variety of futures. LEI evaluated the benefits over a 15-year study period and evaluated the "significant additional value" of the NECEC during weather-driven system stress events.[28] GI evaluated the benefits of the NECEC using a variety of different assumptions for natural gas prices, CO_2 prices, renewable resource buildout, and levels of Québec exports to other markets. The GI's "constant HQ exports" NECEC cases do not provide material evidence for this docket as they were based on a flawed assumption regarding Hydro-Québec's inability to produce incremental hydro power for the NECEC. As discussed in the rebuttal testimony of Mr. Dickenson, Mr. Stinneford, and Mr. Escudero, the hydropower production will be incremental to historical base line exports, which invalidates the "constant HQ exports" assumption underlying much of the GI analysis.[29] Yet even in that flawed case, and in each of the other scenarios, GI's UPLAN analysis found significant energy benefits in 2023, the one year evaluated by GI.

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[27] *Id*. at 9:12:20

[28] LEI Report at 27-30.

[29] Rebuttal Testimony of Thorn Dickinson, Eric Stinneford and Bernardo Escudero at Section III(D).

The claims made by Mr. Russo that the energy market benefits of the NECEC are speculative are nothing more than recognition that natural gas prices, and therefore energy market prices, might vary over a wide range in the future. The primary support for his argument appears to be linked to criticism that the EIA AEO natural gas price forecast used by Daymark is too high.[30]

While it is true that, in general, lower natural gas prices would reduce the benefits of the NECEC energy, this does not mean that the benefits themselves are speculative. In total, three parties have conducted production cost modeling to quantify the benefits of the NECEC. Each analysis used a different natural gas price, with LEI and GI specifically noting that they used lower natural gas price forecasts than the EIA forecast used in Daymark's analysis. In addition, LEI's lower New England natural gas price assumptions assume the completion of incremental pipeline capacity that has not yet been permitted and approved, and therefore may underestimate regional natural gas prices in the future.

Despite the differences in assumptions, all analyses have found significant energy market benefits for Maine electricity consumers. Specifically, the LEI Report showed NECEC energy market benefits of $13 million per year,[31] the GI analysis showed NECEC energy market benefits of $26 – 36 million in 2023[32] and the Daymark analysis showed NECEC energy market benefits of $40 – 44 million per year.[33] The precise level of benefits

[30] LEI Report at 14; Russo Direct Testimony at 9, 11-12; Bodell Direct Testimony at 23:17-23:7.

[31] LEI Report at 11, Figure 1.

[32] Calculated based on data in EXM-004-006 and the ISO-NE 2018 load forecast data for Maine zone (Gross-PV-EE).

[33] *See* **Exhibit NECEC-5** at 3 of 98.

that will accrue to Maine electricity consumers over the next 20 years or more is not knowable today. The results of each forecast conducted by parties in this case is dependent on the input assumptions. However, this does not mean that the existence of benefits is speculative, and no party has suggested that the NECEC will increase energy prices for Maine electricity consumers. Rather, each analysis has found millions of dollars in benefits for Maine electricity consumers after the NECEC is constructed.

V. TRANSMISSION CONGESTION ANALYSIS

The Daymark Report provided an assessment of the impact of the NECEC generation and transmission upgrades on congestion at key network interfaces in Maine and in the region, demonstrating that the NECEC enables full delivery of the PPA energy from Hydro-Québec with minimal congestion throughout the system.[34] The purpose of this analysis is to demonstrate that the project will not have material adverse consequences on existing Maine generators due to significant size or duration of periods of non-zero congestion in the LMPs. This analysis also demonstrates that the wholesale market price benefits to electricity consumers are the result of lower values for the energy component of LMPs, not the congestion component.[35]

LEI, GI, and NextEra all provide alternative assessments of congestion on key Maine interfaces, most notably the Surowiec South and Maine-New Hampshire interfaces. The results of these analyses support Daymark's conclusion.

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[34] **Exhibit NECEC-5** at 33 of 98.

[35] If congestion were to occur, it would provide further benefits to electricity consumers, while lowering the prices that Maine generators would realize.

A. Review of Daymark Analysis

Using both zonal and nodal analyses, we evaluated the impact of the NECEC on congestion on the primary interfaces between the point of interconnection of the project and the points of delivery in Massachusetts: Surowiec South, Maine-New Hampshire, NNE-Scobie+394, and New England North-South.

Our analysis found that the interfaces were uncongested in at least 99 percent of all hours studied, and that the energy from the NECEC could freely flow to load centers in southern New England.[36]

B. LEI Analysis and Conclusions

As described above, LEI also conducted production cost modeling using its PoolMod model. LEI used the output of that model to address the congestion impacts of the NECEC.[37]

The LEI results agree with the Daymark results that there is no congestion at the Surowiec South interface after the NECEC generation and transmission upgrades are added to the system. The LEI analysis shows slightly higher levels of congestion at the Maine-New Hampshire interface than the Daymark analysis, though the average of 4.3 percent of congested hours still represents minimal congestion.

There are multiple possible explanations for the higher congestion levels resulting from the LEI analysis. First, as previously discussed, **[Begin Confidential PO 8]**[redacted]

[36] **Exhibit NECEC-5** at 31-33 of 98.

[37] LEI Report at 24-25.

[redacted] **[End Confidential PO 8]** The addition of the inframarginal NECEC energy will reduce wholesale market prices in Maine, which could lead to some reduction in economic imports of energy from New Brunswick. This would reduce the amount of energy trying to flow across the Maine-New Hampshire interface to the load centers in southern New England.

In addition, LEI's modeling assumptions included **[Begin Confidential PO 8]** [redacted] **[End Confidential PO 8]** that Daymark did not model.[39] The output of this new capacity without associated transmission upgrades increases energy flows north to south across the Maine system and increases the potential for congestion at the Maine-New Hampshire interface.

C. GI Analysis and Conclusions

As part of the UPLAN analysis previously described, GI evaluated the impact of the NECEC on congestion on major interfaces. This analysis is summarized in the direct testimony of Tanya Bodell.[40]

The analysis assesses the hourly flows on the Surowiec South and Maine-New Hampshire interfaces to identify the hours in which the interface flow is at or near its limit. This assessment was conducted for both the Base Case and the Project Case, adding the

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[38] Confidential 6/14/18 Tech. Conf. Tr. at 183:8-184:18.

[39] LEI's Response to Data Request CMP-011-005, Attachment *CMP-011-005_Attachment_1_CONFIDENTIAL.xlsx*, "New Entry_Retirements" tab.

[40] Bodell Direct Testimony at 18:1-19:3.

NECEC generation and increasing the transfer limit at Surowiec South due to the transmission network upgrades associated with the project.

According to Ms. Bodell's testimony, the results of the analysis show that there is no congestion at the Maine-New Hampshire interface in the Base Case (without the NECEC) under any of the scenarios.[41] In the NECEC Cases, Ms. Bodell concludes that the flows over the interface are at or within 5-10 percent of the interface limit in a small percentage of hours[42] of the year using the Calpine's assumptions.[43]

There are two primary issues with the GI analysis that make these results an unreliable representation of the potential congestion impact of the NECEC.

The first issue relates to the Maine-New Hampshire interface limit used in various pieces of GI analysis. The UPLAN analysis modeled the Maine-New Hampshire interface at 1,960 MW in the north-to-south direction.[44] However, when Ms. Bodell conducted the analysis described above, in which she determined the number of hours at or near the interface limit, she used an interface limit of 1,900 MW.[45]

To determine the impact that this discrepancy has on the results reported in Ms. Bodell's testimony, we recalculated the results presented in her testimony, correcting the inconsistency by using the 1,960 MW Maine-New Hampshire interface limit, consistent

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[41] *Id*. at 18:10-20.

[42] Even in her flawed analysis, Ms. Bodell only found Maine-New Hampshire congestion in less than 5 percent of the hours. As discussed below, there are no hours of congestion when her analysis is corrected to reflect the modeled interface definition.

[43] Bodell Direct Testimony at 18:10-20.

[44] GI Response to Data Request EXM-004-006, Attachment *EXM-004-006_UPLAN_Input Assumptions (2017-232).xlsx*, "Interfaces" tab, Row 4. *See also* 6/20/2018 Tech. Conf. Tr. at 2:21-3:16 (Bodell Confidential).

[45] Bodell Direct Testimony at 19, Figures 5 and 6.

with the limit actually used in the UPLAN model. These corrected results are presented in the table below.

Table 1. GI congestion analysis results, corrected for 1,960 MW Maine-New Hampshire Interface limit

	CURRENT CONDITIONS		DAYMARK REPRODUCTION		DAYMARK REPRODUCTION WITH LOWER GAS PRICES	
	Base – No NECEC	With NECEC (Incremental)	Base – No NECEC	With NECEC (Incremental)	Base – No NECEC	With NECEC (Incremental)
At Limit	0	0	0	0	0	0
Within 5% of Limit	0	537	0	354	0	235
Within 10% of Limit	0	918	0	579	0	436

The first row, "At Limit", is the number of hours per UPLAN case where there was actual congestion on the Maine-New Hampshire interface. These corrected results show that the GI model produced no hours in which the flow over the Maine-New Hampshire reached the modeled limit of 1,960 MW, as opposed to Ms. Bodell's claims of several hundred hours of actual congestion.[46]

The other two rows relate to the unsubstantiated premise that if flows are within 5 or 10 percent of the interface limit, it will cause negative system consequences. Ms. Bodell presents the results of the interface flow data counting the number of hours within those thresholds, but does not provide any support for the significance of those levels. Additionally, Ms. Bodell testified that those levels do not relate to any particular ISO-NE

[46] ENERGYZT Technical Report, Figure 16, submitted in response to CMP-004-001, Attachment 4.

rules or operational procedures.[47] Despite the lack of support for the relevance of these numbers, the corrected table above shows that even if they do represent some economic impact to Maine prices, such impact is only in a limited number of hours. Finally, any impact would only serve to lower prices in Maine, producing additional Maine electricity consumer benefits.

In addition to the modeling performed and her post processing calculation of potential impacts, Ms. Bodell argues that there are historical price differences between Maine and New Hampshire (and the region more generally). She asserts that the lower prices, combined with higher gas prices in Maine, harms the competitiveness of Maine generators. She suggests that the NECEC will create congestion that will exacerbate these price differentials.[48]

In her testimony, Ms. Bodell presents an analysis of the zonal LMPs in Maine and New Hampshire showing a histogram of zonal LMP differentials in the 2013 to 2017 period. This histogram compares the Maine and New Hampshire zonal LMPs, counting the number of hours over a five-year period in which the LMPs differed between the zones. Ms. Bodell notes that "[l]ower prices in Maine tend to be due to congestion and losses."[49]

Ms. Bodell's historical analysis and testimony misrepresents the historical data. The issues include:

[47] 6/20/2018 Tech. Conf. Tr. at 93:15-94:10.

[48] Bodell Direct Testimony at 15:4-18:20.

[49] Bodell Direct Testimony at 16:4.

1) The analysis does not distinguish between the congestion and loss components of the LMPs;

2) The analysis ignores material changes in transmission topology during the 2013 to 2017 period.

With respect to the first issue, the LMP price differences between Maine and New Hampshire can *only* be the result of congestion or losses.[50] The GI workpapers include the difference in LMP broken out into the congestion and loss components.[51] The data Ms. Bodell presented in her testimony combined the congestion and loss components.[52] ***Figure 1*** below is copied from Ms. Bodell's workpapers and includes the disaggregated data showing the number of hours where the congestion and losses components of zonal LMPs (the congestion component or MCC and the marginal loss component or MLC) differed between Maine and New Hampshire. The MCC differences are shown in grey on the stacked bar chart and the MLC differences of the same magnitude are stacked in orange. These data show that congestion caused differences in the zonal LMPS in only 12 percent of the 43,824 hours in the five-year data set, with 38,476 of the hours (88 percent of the time) showing no differences in MCC between Maine and New Hampshire. However, the loss factor causes differences in the zonal LMPs in 98 percent of the time over that five-year

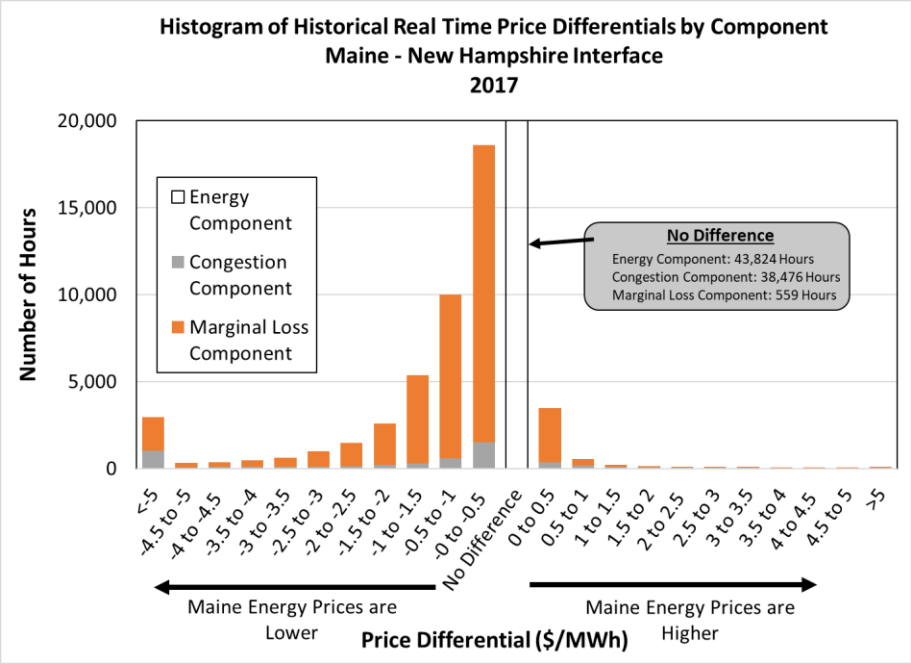
[50] LMPs consist of three components, the Energy Component, Congestion Component, and Loss Component. The Energy Component is equal for all nodes across the system.

[51] GI Response to Data Request CMP-004-001, Attachment *CMP-004-001_ENERGYZT_ISO-NE Zonal LMP Analysis.xlsx*

[52] Bodell Direct Testimony at 16, Figure 3.

period, with only 559 hours (less than 2 percent of the time) showing no differences in MLC between the two zones.

Figure 1. Historical price differential between Maine and New Hampshire by LMP component



This figure shows clearly that the vast majority of occurrences of zonal price difference between Maine and New Hampshire is due to the loss component, rather than congestion, an important observation that was not apparent in the figure Ms. Bodell included in her testimony. In fact, over that historical period, there was very limited congestion difference between Maine and New Hampshire zonal LMPs.

With respect to the second issue, the historical period that Ms. Bodell examined includes data from periods that pre-dates the completion of Maine Power Reliability Program (MPRP) in 2015. The 2013 to 2015 period of the data is based on a materially different transmission topology and a period when significant transmission construction,

including several necessary transmission outages, was conducted. Ms. Bodell indicated she chose the 2013 – 2017 period because it was the most recent five years and asserted that it is representative of current conditions.[53] However, Ms. Bodell did not consider these significant changes in the system in her analysis.

Had Ms. Bodell accounted for these issues, it would have become apparent that the loss component (MLC) is the material cause of differences in LMPs in Maine, not congestion (MCC). Accordingly, Ms. Bodell's conclusions regarding the impact of the NECEC on congestion are not reliable and should be discarded.

D. NextEra Analysis and Conclusions

NextEra similarly conducted production cost modeling, and used the results to draw conclusions about the impact of the NECEC on congestion in Maine. While this analysis was not described in the testimony of either Stephen Whitley or Mr. Russo, the results were referenced in response to data requests.[54] Based on our review of the analysis, the analytical structure was flawed, and thus the conclusions related to congestion have no merit.

The NextEra analysis utilized ABB's Gridview model, operated on an hourly nodal basis evaluating 2021 only. The analysis included a Base Case and a Change Case, with 1,200 MW of incremental generation injected at the Larrabee Road node in every hour for the Change Case.

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[53] 6/20/2018 Tech. Conf. Tr. at 14:4-15:5.

[54] NextEra's Responses to Data Requests CMP-001-010 and CMP-001-001.

The analysis conducted by NextEra concluded that the NECEC would result in significant congestion at the Surowiec South interface. These results do not provide a reasonable or accurate assessment of potential congestion due to an error in the methodology.

Specifically, despite Mr. Whitley's assertions to the contrary,[55] the modeling workpapers and output files provided in response to ODR-005-001 demonstrate that in modeling the NECEC, **[Begin Confidential PO 7]** [redacted] **[End Confidential PO 7]**

Due to the critical nature of this problem with the NextEra methodology, the results of the NextEra congestion analysis do not merit further evaluation or consideration.

[55] 6/14/2018 Tech. Conf. Tr. at 139:24-140:4.

[56] NextEra's Response to Data Request ODR-005-001, Attachment HIGHLY CONFIDENTIAL - Surowiec South (With HVDC) HourlyData_Interface.csv. **[Begin Confidential PO 7]** [redacted] **[End Confidential PO 7]**

E. Conclusions Regarding Transmission Congestion

The Daymark Report provided two separate analyses of congestion. A full 20-year analysis, using a zonal topology, modeled the hourly flows on the Maine interfaces with and without the NECEC project. The results of the analysis concluded that the NECEC does not create material congestion at Maine interfaces, with results showing uncongested deliveries of energy over the Surowiec South and Maine-New Hampshire interfaces in more than 99 percent of all hours.[57]

In addition to the long-term zonal results, Daymark also performed a one-year nodal analysis for the year 2025. The nodal analysis not only reviewed the Maine interfaces but also looked at several key downstream interfaces that ISO-NE monitors closely:

- Surowiec South Interface;
- Maine-New Hampshire Interface;
- NNE-Scobie+394 Interface; and
- New England North-South Interface.[58]

The results of the more detailed nodal model confirmed the long-term zonal results, with a conclusion that "[i]n all cases, following the construction of the NECEC Project, the key interfaces were unconstrained a minimum of 99% of the hours in the year."[59]

Daymark's congestion analysis is supported by LEI's model, which showed no congestion at the Surowiec South interface and limited congestion at the Maine-New

[57] **Exhibit NECEC-5** at 31 of 98.

[58] *Id*.

[59] *Id*.

Hampshire interface, **[Begin Confidential PO 8]** [redacted] .**[End Confidential PO 8]** And finally, the UPLAN model that Ms. Bodell relied upon shows no congestion at Surowiec South, and when the proper interface limit is used for the Maine-New Hampshire interface, there was no congestion in her results either.

From a pricing perspective, the only actual impact on LMPs in Maine is due to the loss component of LMPs. Upon examination, Ms. Bodell's historical pricing data show the relative impact of the loss and congestion components in the real-time market historically, and the vast majority of the zonal LMP differences between Maine and New Hampshire are due to the loss component, not congestion. The loss component is a function of the distance between supply and demand, and is unrelated to congestion. Further, Ms. Bodell's analysis includes data from years prior to the completion of MPRP.

The record is clear that if the NECEC is properly modeled, there is little to no congestion and substantially all energy flowing through Maine can be delivered south without any negative congestion pricing impacts on existing Maine generators.

VI. ELECTRIC CONSUMERS' CAPACITY BENEFITS

A. Review of Daymark Analysis

The Daymark Report provided an assessment of the potential impact of the NECEC generation and transmission upgrades on the ISO-NE forward capacity market (FCM). In that report, we found that if the NECEC clears the FCM, Maine electricity consumers will realize significant savings through the lowering of the FCM clearing price. Specifically, the Daymark Report states that, "[d]uring the first 8 years of the project, assuming it clears in each year, the NECEC Project Bids produce an average of $50 million per year in benefits to

Maine electricity consumers, and a total NPV of $312 million (2023$) over the 20-year study period."[60]

B. LEI Analysis and Conclusions

LEI conducted capacity market modeling using their proprietary capacity market model, the FCA Simulator.[61] Based on their model, LEI estimated electricity consumer capacity benefits of $223 million (2023$) NPV over the 15-year period studied by LEI.[62] Furthermore, Ms. Frayer, chief witness for LEI, stated during LEI's technical conference that, "we were leaning towards it more likely clearing the primary auction."[63]

C. GI Analysis and Conclusions

The generator intervenors provided two pieces of testimony that discussed potential impacts of the NECEC on the FCM. Ms. Bodell summarized her position in her direct testimony, where she states that electricity consumer capacity benefits are "[l]ikely to be $0 – market rules make it unlikely that energy (sic) supply from NECEC will qualify and clear" and "[i]f it does clear, likely to be lower than impact calculated by (Daymark's) proprietary model due to excess supply and zones/interties which have cleared at lower prices."[64] Mr. Fowler summarizes his position by stating that "it is unlikely there will be any capacity market 'benefits' to Maine or anywhere else."[65]

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[60] **Exhibit NECEC-5** at 20 of 98.

[61] LEI Report at 67 of 85.

[62] *Id*. at 10 of 85.

[63] 6/14/2018 Tech. Conf. Tr. at 49:25-50:1.

[64] Bodell Direct Testimony at 11.

[65] Fowler Direct Testimony at 4:68-69.

{W6781898.7}

Both Ms. Bodell and Mr. Fowler base their conclusion that Maine electricity consumers will not receive capacity benefits upon the assertion that the NECEC will not, in their opinion, clear the primary auction for any FCA over the duration of the NECEC PPAs. No model results or other analysis were provided in support of either claim.

D. NextEra Analysis and Conclusions

The position of NextEra regarding potential electricity consumer capacity benefits is contained in the testimony of Mr. Russo. He summarizes his position with respect to the potential for electricity consumer capacity benefits by stating that:

> *Given the high cost of the HVDC transmission line, if HRE offers its capacity at a cost lower than the cost of capital for the HVDC to financially benefit from the ISO-NE capacity market, the BSM[66] would likely be triggered. Should HRE's capacity be mitigated and eliminated from the auction, then there will be no benefit to Maine electricity consumers, despite claims by CMP and its consultant Daymark of such benefits as a result of HRE's generation selling into the capacity market.*[67]

Similar to the GI positions, no capacity modeling was performed in support of this position.

E. Conclusions Regarding Capacity Market Benefits

Only two capacity models have been presented as evidence in this docket. The Daymark proprietary capacity model projects the impact on capacity prices between 2023 and 2042 (the time during which the NECEC PPAs would be in force) based on a

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66 Buyer side mitigation rule.

67 Russo Direct Testimony at 11:10-15.

presumption that the NECEC will clear in the primary auction of the FCA. The LEI capacity analysis is also premised on the NECEC clearing the primary auction. While LEI did not specifically analyze a cost-based bid that might be approved by the ISO-NE IMM, Ms. Frayer indicated during the LEI technical conference that their analysis also produced forecasted capacity prices that, in her professional judgement meant that, "it's plausible to see a MOPR that would be sufficiently below that capacity price for a project like this."[68]

The Daymark and LEI capacity models are two independent proprietary models, each with their own inputs and methodology for forecasting capacity prices. The fact that both models project capacity prices high enough to make the NECEC clearing "plausible" and the fact that no other capacity model has been introduced by any other witness suggests that electricity consumer capacity benefits have a reasonable probability of occurring with the NECEC in service.

While Daymark believes it is reasonable to assume a level of electricity consumer capacity benefits commensurate with the LEI or Daymark model results, we do recognize that these benefits are uncertain. It is possible that in any or even all years of the NECEC the hydro capacity will not clear the FCM primary auction, leading to no electricity consumer capacity benefits in that year. However, in that scenario, electricity consumers will not be harmed; there will simply be no capacity market benefits. This means that there is a clear potential for significant electricity consumer benefits with some possibility capacity prices will be unaffected due to the NECEC not clearing. If the NECEC does not

[68] 6/14/2018 Tech. Conf. Tr. at 50:4-5.

clear the FCA though, capacity prices do not increase. Thus, there is no risk that electricity consumers will pay more in that situation. The record in this docket shows a range of uncertainty of electricity consumer capacity benefits extends from $0 if the NECEC does not clear to a material positive benefit in the range of $223 to $312 million NPV if it does clear.

In his technical conference session, Mr. Fowler raised one additional possibility not covered in his direct testimony.[69] In a discussion between Mr. des Rosiers and Mr. Fowler, Mr. Fowler made the point that, "in some narrow circumstances" the NECEC could cause price separation in the Maine zone without clearing the primary auction. Mr. Fowler was describing a potential situation where the NECEC qualifies for the FCM and causes the ISO-NE to model Maine as a separate zone for capacity market purposes. If that occurs, then the FCM primary auction for Maine will use a local demand curve rather than the ISO-NE demand curve for "rest-of-pool" (ROP) resources. Mr. Fowler pointed out that depending on where the Maine capacity market cleared, the price derived from the local demand curve could differ from the ROP derived price, causing price separation even if the NECEC does not clear.

While this situation could occur in some circumstances as Mr. Fowler alleges, there is no situation where this could harm Maine electricity consumers. Section III.13.2.7.2. of the ISO-NE Tariff specifies that "[t]he Capacity Clearing Price in an export constrained Capacity Zone shall not be higher than the Capacity Clearing Price in the Rest-of-Pool Capacity Zone." This means that in the situation Mr. Fowler identified, the Maine capacity

[69] 6/19/2018 Tech. Conf. Tr. at 97:1-21.

price can be equal to or less than the Rest-of-Pool price that Maine electricity consumers would have paid but for that circumstance. This outcome, as unlikely as it might be, would reduce the capacity payments made by Maine electricity consumers – a benefit to consumer – while it would also lead to lower revenues for Maine generators.

VII. NECEC IMPACTS ON MAINE GENERATOR RETIREMENTS

A. Review of Daymark Analysis

In explicitly modeling the 20-year NECEC PPAs through our proprietary energy and capacity models, we considered the potential impacts to Maine generators. The Daymark energy and capacity models are designed to analyze the individual market impacts and the feedbacks between energy and capacity markets to determine from quantitative analysis what the likely impacts would be for a given set of input assumptions. The results of these models showed no retirements of Maine generators caused by the inclusion of the NECEC throughout the study period.[70]

B. LEI Analysis and Conclusions

In similar fashion to the Daymark modeling, LEI produced an analysis based on both its proprietary energy and capacity models, which also work together to produce results consistent with the inputs and results of both models. The LEI study found that "[t]he generation units that are expected to retire early as a result of the NECEC participating in the FCM are located in Connecticut."[71]

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[70] Daymark Report and associated workpapers.

[71] LEI Report at 35 of 85.

C. GI Analysis and Conclusions

Despite the assertions of both Ms. Bodell and Mr. Fowler that the NECEC was unlikely to clear the primary auction, Ms. Bodell also claims that "NECEC's participation in ISO-NE energy markets would hasten Maine generating plant retirements."[72] Additionally, with respect to the capacity market, Ms. Bodell claims that "any pricing benefits would be offset by retirements required by CASPR."[73] In her technical report, presented as part of the response to the discovery response CMP-004-001, Ms. Bodell further identifies the factors she believes will cause distress to the Maine generators as "lower energy prices, congestion and displacement."[74]

In addition to identifying factors she believes will lead to Maine generator retirements, Ms. Bodell specifies plants she believes are most at risk: "The most likely candidate would be a fossil fuel peaker unit that barely operates – the William F. Wyman Power Plant ('Wyman') – which is around 850 MW…"[75] She also identifies another seven plants, three of which are owned by the GI,[76] which she believes are at risk of retirement.

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[72] Bodell Direct Testimony at 40:18-19.

[73] Bodell Direct Testimony at 41:1-2.

[74] Technical Report, Analytical Basis for Critique of Impacts from New England Clean Energy Connect (NECEC) at 6 of 61 (May 2018).

[75] Bodell Direct Testimony at 27:14-17. In this testimony, Ms. Bodell is referring to all four Wyman units together.

[76] 6/20/2018 Tech. Conf. Tr. at 45:12-19.

Table 2. GI Table on Maine Fossil Fuel Generating Units that Could Retire under CASPR[77]

All Steam Powered Units						
Plant ID	Plant Name	Nameplate (MW)	2016 Net Generation (MWh)	2016 Property Taxes	Capacity Factor	Reported Prime Mover
10491	Mead Rumford Cogen	12.5	-	$ 367,084	0%	ST
50243	Bucksport Generation LLC	111.6	524	$ 110,567	0%	ST
50243	Bucksport Generation LLC	186.8	8,720	**	1%	GT
55031	Androscoggin Energy Center	163.5	170,341	$ 1,580,573	12%	GT
55068	Maine Independence Station	194.6	222,129	$ 188,739	13%	CA
55100	Rumford Power, Inc	179.4	263,928	$ 3,285,287	17%	CT
55100	Rumford Power, Inc	95.1	149,305	**	18%	CA
	TOTAL	**943.5**	**814,947**	**$ 5,532,249**		

In addition to Ms. Bodell's arguments, Mr. Fowler argues that the NECEC's participation in the FCM will lead to Maine generation retiring. "To obtain a capacity obligation as CMP's petition assumes, NECEC will have to secure that CSO through the new 'CASPR' mechanism; to do that will almost certainly require an equal number of MWs of existing generation inside Maine to retire."[78]

Similar to GI claims regarding the likelihood of the NECEC clearing the primary auction, no modeling analysis was performed in support of the claims that the energy market or capacity market results would materially impact the chance that Maine generating plants will retire.

D. NextEra Analysis and Conclusions

Neither NextEra witness makes any claim regarding the potential impact of the NECEC on existing Maine generation.

[77] Bodell Direct Testimony at 28, Table 10

[78] Fowler Direct Testimony at 4:87-5:90.

E. Conclusions Regarding Impacts on Maine Generator Retirements

Two energy and capacity models have been produced in this docket that model impacts over time, the Daymark and LEI models. Both of these models show no Maine generator retirements due to the NECEC clearing in the primary auction. Notwithstanding this point, we also investigated other information in the record or available publicly to determine if there was credible evidence that Ms. Bodell's "at risk" generating units would retire due solely to the NECEC or if those units were either not "at risk" or were at significant risk of retirement without the NECEC.

To understand the potential signals being sent by generators submitting delist bids into an FCA, it is first important to understand the general types of delist bids available to them. A delist bid of any sort is a price signal that provides the revenue level at which the generator would rather leave the capacity market (and potentially all energy markets depending on delist type). Delist bids generally fall into three categories. They are either bids at the time of qualification for the auction designed to commit the generator for all future capacity periods, bids at qualification designed to commit the generator for only the capacity period of the bid, or bids at auction designed to commit the generator for only the capacity period of the bid.

The first type, where the generator is looking for their bid to be binding for all capacity periods going forward, can either be a *permanent delist bid*, which is for the capacity market only, or a *retirement delist* bid, which is for all ISO-NE markets. The second type, which is for one year but is made during qualification, has a few types, but for a

generator will ordinarily be a *static delist bid*. The final type, where the bid is made at auction, is a *dynamic delist bid* and is for only that commitment period.

The first piece of data to consider with respect to the Maine generators is their capacity situation with respect to the recently completed FCA 12. The results of that auction were provided as part of the response to CMP-004-001. Four units in Maine had dynamic delist bids accepted in FCA 12. These units are the Wyman 1&2 units (owned by NextEra), the Rumford Power plant and the Maine Independent Station (owned by Vistra Energy). As discussed above, a dynamic delist bid is a bid to remove capacity from the current auction and does not preclude participation in future auctions (*i.e.* the unit is not obligated to permanently retire). However, it is an indicator of units that may have a willingness to retire. ISO-NE, in discussing the results of FCA 12, noted that "[t]he submittal and clearing of a static or dynamic delist bid may be an indication of a future retirement."[79] Whether or not these delists bids are actually a precursor to an upcoming retirement decision, they are certainly clear indication that some power plants in Maine are sending price signals regarding potential retirements without the NECEC. Several of those units are on Ms. Bodell's "at risk" list. So, while it appears reasonable to consider them at risk for retirement, there is no basis for the GI assertion that the cause of the risk is the NECEC or that the NECEC materially exacerbates that risk.

[79] Twelfth Forward Capacity Auction for the 2021/2022 Capacity Commitment Period; Results Summary & Trends, March 13, 2018, Slide 16. https://www.iso-ne.com/static-assets/documents/2018/04/a3_fca_12_results_summary.pptx

That being said, we have attempted to investigate, through the discovery process, market and financial information from the GIs in an effort to determine whether the generation units owned by the GI and NextEra are "at risk" or are expected to be "at risk" of retirement in the base case scenario where the NECEC is not constructed.[80] Despite CMP's best efforts, such information has not been produced by the GIs and is the subject of the ongoing Motion to Compel data responses.

Even accepting for the sake of argument the GI's claim that the NECEC will lower energy prices, thereby causing or accelerating the retirement of existing generating units in ISO-NE, this impact is materially identical to the impact of any other procurement of 9.45 TWh of clean energy. The impact is also unlikely to be material for most Maine generators, as Ms. Bodell's evidence shows the majority of them have very low capacity factors, therefore not being dependent on net energy market revenues for most of their operating margins.[81] As was discussed above in Section IV, the modeling and historical evidence presented in this docket all points to the fact that any energy pricing disadvantages for Maine generators derive from the loss component of LMPs, not by congestion. Furthermore, the Daymark, LEI, and GI models all show little to no new congestion created by the NECEC. Accordingly, if Massachusetts was to procure 9.45 TWh of clean energy from any source besides the NECEC, whatever incremental financial stress such a

[80] Such requested information included historical and forecast data relating to the participation of the GI's ISO-NE generation units in the energy and capacity markets, as well as historical and forecast data with respect to the revenues, costs and net profits of each of these units. See Data Request Sets CMP-006, CMP-008, and CMP-009.

[81] 6/20/2018 Tech. Conf. Tr. at 18:19-25.

procurement would produce through reduced energy and capacity prices in the market would be similar to the NECEC impacts.

Another claim, discussed by Mr. Fowler and Ms. Bodell, is that the potential for the NECEC to participate in the CASPR substitution auction will cause Maine generating plants to retire. While Maine generating units may or may not choose to participate in the substitution auction and may or may not shed their obligation, it is important to note that their participation in the substitution auction is entirely voluntary, meaning there is no way for the NECEC to force any retirements or cause these generators to be retired against the owners' will.[82] Participation is required of any unit that enters a retirement delist bid, a bid to permanently exit all ISO-NE markets, into the primary auction, but entering such a delist bid is in itself a voluntary choice that the generator makes. The requirement to participate only occurs if the generator first elects that permanent retirement option.

Furthermore, there are two methods for indicating interest in participating in the substitution auction. A generator can either enter a retirement delist bid (which automatically requires them to participate in the substitution auction) or they can indicate interest through other delist bids.[83] Of the two methods, only a unit entering the substitution auction through a retirement delist bid is required to retire from all ISO-NE markets. According to the ISO-NE Tariff, resources that shed their CSO through the substitution auction must retire from at least the capacity market, and from all New

[82] Mr. Fowler acknowledged as much in his response to Data Request CMP-005-012.

[83] 6/19/2018 Tech. Conf. Tr. at 102:7-16.

England markets if they submitted a retirement delist bid.[84] While some Maine generation may choose to shed their CSO through the substitution auction, they will only be required to fully retire if they chose to enter the substitution auction through a retirement delist bid in the primary auction, in which case they were seeking to permanently retire in any event.

Additionally, Ms. Bodell raised the potential issue that if a different state sponsored resource, outside of Maine, were to come online instead of the NECEC, the impacts to Maine generators would be different because other generators outside of Maine could sell their CSO instead of just the Maine generators.[85] That conclusion is not supported by the evidence from FCA 12, where the only northern New England generating units to clear with a delist bid were Maine generation. This suggests that even if the Maine zone does not separate, the units most likely to clear in a substitution auction with the NECEC or any other state sponsored resource would still be the Maine generating units, because they are the units sending a signal that they might exit the capacity market.

Finally, while the GI companies have failed to provide any data regarding their specific plant economics, NextEra did provide data regarding the four Wyman units and two Cape GT units. These data are highly confidential, but provide additional insight into those power plants. Given that the Wyman units were specifically identified by Ms. Bodell

[84] ISO-NE, Market Rule 1, Section III.13.2.8.3.1 states, "A resource, or portion thereof, associated with a cleared demand bid shall be retired from all New England Markets (except that a resource, or portion thereof, associated with a cleared demand bid that is associated with a Proxy De-List Bid and a Permanent De-List Bid which has not been elected to retire pursuant to Section III.13.1.2.4.1(a) shall be retired only from the capacity market) at the start of the Capacity Commitment Period associated with the Forward Capacity Auction." . Mr. Fowler also confirmed this understanding at the technical conference. 6/19/2018 Tech. Conf. Tr. at 103:25-104:5.

[85] 6/20/2018 Tech. Conf. Tr. at 148:21-149:7.

as "[t]he most likely candidate"[86] for retirement, we reviewed the provided data to identify to what extent the plants were at risk, and to what extent those risks would continue to exist absent the NECEC. For context, it is publicly known that Wyman 3 and 4, Bucksport and Westbrook did not delist in FCA 12[87] despite the $4.63/kW-mo clearing price, from which we can know that these units were offered into FCA 12 either without a delist bid or with a delist bid below $4.63/kW-mo.

The NextEra data provides **[Begin Confidential PO 9]** [redacted] [redacted] [redacted] **.[End Confidential PO 9]**

Table 3 below shows the results for each plant for each component.

Table 3. NextEra unit delist bids, by bid component[88]

[Begin Confidential PO 9]

	Wyman Units				Cape GT Units	
Cost component	#1	#2	#3	#4	#4	#5
Net Going-Forward Costs	[redacted]					
Capacity Performance Payments	[redacted]					
Risk Premium	[redacted]					
Total	[redacted]					

[redacted]

[redacted]

[redacted]

[86] Bodell Direct Testimony at 27:14-15.

[87] GI's Response to Data Request CMP-004-001, Attachment *CMP-004-001 ISO-NE_FCA_obligations (2017-232).xlsx*.

[88] NextEra's Response to Data Request CMP-007-009.

[redacted] **End Confidential PO 9]**

Based on all of the evidence related to potential impacts of the NECEC on Maine generators, it is highly unlikely that the NECEC will induce any Maine generators to retire, as both Daymark and LEI models have demonstrated. In addition, if any Maine generators do retire, it will be a voluntary choice of the generator and not an action that is imposed on the generator by the NECEC or ISO-NE. And finally, there is no credible evidence that the NECEC will produce materially different impacts on Maine generator economics as compared to any other state sponsored resource of the same size and characteristics.

VIII. CO_2 EMISSIONS IMPACT OF THE NECEC

A. Review of Daymark Analysis

The Daymark analysis found that adding the NECEC to the supply mix in New England yielded reductions in regional CO_2 emissions. Using the results of the previously discussed energy market modeling, we determined that the NECEC Project will induce annual CO_2 emission reductions of approximately 3.1 million metric tons across New

England and the net emissions from the portion of regional generation serving Maine load will be reduced by approximately 264,000 metric tons per year.[89]

B. LEI Analysis and Conclusions

In similar fashion to the Daymark modeling, LEI produced an analysis of NECEC induced reductions in CO_2 emissions in New England. Their energy model results determined that the "NECEC could reduce CO_2 emissions in New England by approximately 3.6 million metric tons per year."[90]

C. GI Analysis and Conclusions

The energy market model used by Mr. Speyer in his analysis of the impact of the NECEC on CO_2 emissions shows reductions in New England emissions. In fact, according to the Technical Report Mr. Speyer sponsored, "[i]n all cases, the results for New England match the analysis performed by Daymark, coming in at around a 3 million MT reduction in carbon emissions."[91]

Despite the savings in New England emissions, Mr. Speyer states that "[u]nder all scenarios, NECEC increases total carbon emissions." He reaches this conclusion by assuming the NECEC generation will not be incremental to current Hydro-Québec exports, instead reducing New York imports of Hydro-Québec hydropower in amounts equal to the imports of NECEC power. He then states that, "[a]ny reduction in carbon emissions

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[89] **Exhibit NECEC-5** at 4 of 98.

[90] LEI Report at 12 of 85.

[91] Speyer Direct Testimony, **Exhibit JMS-4**, Technical Report: New England Clean Energy Connect (NECEC) Regional Carbon Emissions Impacts, at 3.

resulting from the NECEC transmission line in Maine and New England would be offset by higher emissions in other markets."[92]

D. NextEra Analysis and Conclusions

Neither NextEra witness makes any claim regarding the potential impact of the NECEC on CO_2 emissions.

E. Conclusions Regarding CO_2 Emissions Savings

All three models showed reductions New England CO_2 emissions. In fact, the three estimates are very similar, ranging from a low value of approximately 3 million metric tons per year to a high of approximately 3.6 million metric tons per year.

With respect to Mr. Speyer's claim that the NECEC generation will not be incremental, and therefore the New England benefits will be offset with increases elsewhere, the Rebuttal Testimony of Thorn Dickinson, Eric Stinneford and Bernardo Escudero presents evidence that the generation will, in fact, be incremental to existing Hydro-Québec exports, contrary to Mr. Speyer's assumption.[93] Mr. Speyer did run a case where the NECEC energy was treated as incremental, so his workpapers provide information that allowed us to prepare a version of Figure 2 from Mr. Speyer's "Technical Report: New England Clean Energy Connect (NECEC) Regional Carbon Emissions Impacts" that is consistent with the fact that the imports will be incremental. ***Table 4*** below presents these results from Mr. Speyer's own analysis, showing CO2 reductions of almost

[92] Speyer Direct Testimony at 4:2-4.

[93] Rebuttal Testimony of Thorn Dickinson, Eric Stinneford and Bernardo Escudero, Section III(D).

4.2 million metric tons across the modeled region when the NECEC energy is properly considered incremental:

Table 4. GI analysis of regional CO_2 emissions, NECEC as incremental energy

	Carbon Emissions (MT)		Net Carbon Emissions Impact
State/Region	Without NECEC	With NECEC	MT
ISONE	26,808,907	23,287,431	(3,521,476)
NYISO	25,820,742	25,520,246	(300,496)
PJM	396,772,050	396,422,315	(349,735)
MISO	351,004,059	351,049,282	45,223
Ontario	3,600,282	3,553,804	(46,478)
NE+NY+PJM+MISO+IESO	804,006,040	799,833,078	(4,172,962)

As discussed in the Rebuttal Testimony of Thorn Dickinson, Eric Stinneford and Bernardo Escudero, the one possible exception to the NECEC generation being fully incremental is that a small amount of reduction in exports from Hydro-Québec to Ontario could occur if Hydro-Québec's planning and preparation for deliveries under the NECEC PPAs prove to be insufficient in any contract year.[94] While this is not the anticipated result for Hydro-Québec, it is a possible outcome. Given the results in ***Table 4*** above, this is not a significant concern with respect to regional emissions. Mr. Speyer's incremental analysis shown in that table concludes that the NECEC saves the region almost 4.2 million metric tons of CO_2. The savings in Ontario are only about 46,000 metric tons. This is because the supply portfolio in Ontario is already significantly clean, contributing less than one half of one percent of the region's emission in both the with and the without NECEC cases.

[94] *Id.*

Even if Hydro-Québec must divert small amounts of power from Ontario to New England, New England and the broader region would still see significant savings with the NECEC in place.

IX. OTHER ITEMS

A. Availability on Existing Lines in from Hydro-Québec

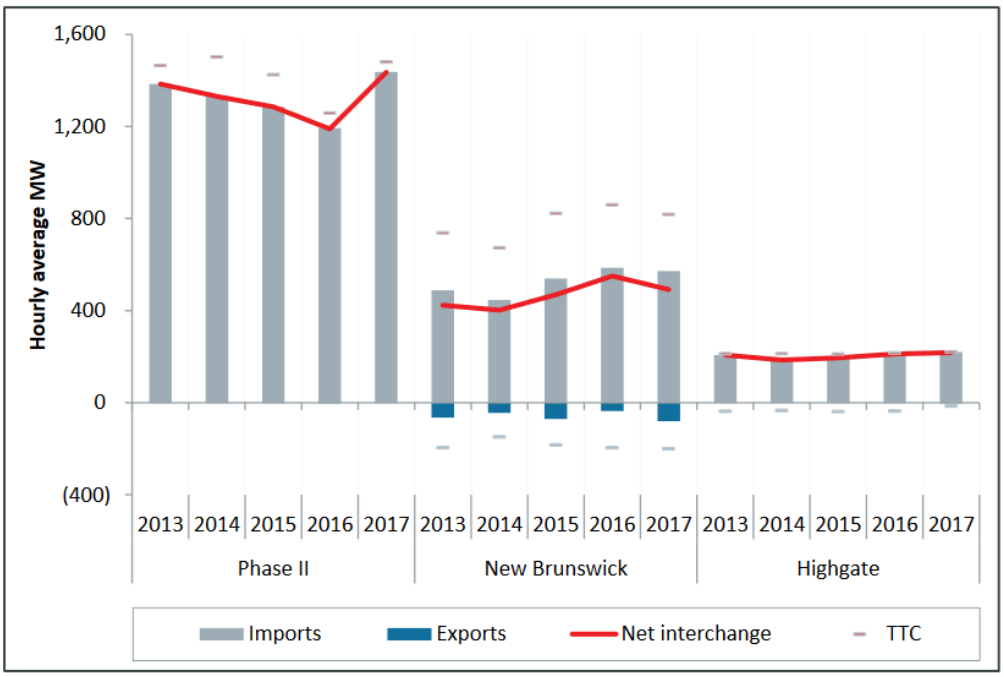
In his technical conference, Mr. Speyer made references to uncertainties regarding headroom on existing tie lines between Hydro-Québec and New England.[95] However, the historical data clearly demonstrates that the existing ties between Hydro-Québec and New England are near full capacity and do not have much room for additional imports, much less an additional 1,200 MW that would be required without NECEC. With respect to Hydro-Québec's ability to export additional hydro into the New England market, the existing tie lines provide very little room for incremental power. The following figure, produced by ISO-NE, represents the extent to which the transfer capabilities are already being utilized, comparing the annual average real-time net interchange to the annual total transfer capability (TTC) on each interconnection:

[95] *See* 6/28/18 Tech. Conf. Tr. at 28:10-14.

MR. DES ROSIERS: Could HQ inject into New England an additional 9.45 terawatts over the existing interties without an additional line from Québec to New England?

MR. SPEYER: We haven't done that analysis so I can't definitively say whether they could or not.

Figure 2: Real-Time Net Interchange at Canadian Interfaces (ISO-NE[96]



The figure clearly shows that the two direct interties between Hydro-Québec and New England, Phase II and Highgate, are both substantially fully loaded over the past 5 years. This demonstrates that a new interface is needed in order for Hydro-Québec to sell 1,090 MW (9.45 TWhs) of hydropower as baseload into New England.

B. The NECEC Acts as a Hedge Against Potentially Rising Natural Gas Prices

Both LEI and the GI witnesses argued for a forecast of benefits based on lower natural gas prices. As discussed in Section IV above, even assuming the lower gas prices, the NECEC still creates significant energy market savings for Maine electricity consumers.

[96] ISO-NE 2017 Annual Markets Report, at 120; https://www.iso-ne.com/static-assets/documents/2018/05/2017-annual-markets-report.pdf

However, the history of New England natural gas prices and pipeline projects indicate that the region cannot count on continued low natural gas prices. Whether it is a shift in market fundamentals that leads to higher prices or a short-term shock, higher natural gas prices have occurred in New England in the past and are likely to occur again, especially given the difficulty the region has experienced related to potential new natural gas pipeline. Maine has a history of trying to be a leader in establishing a regional objective for building new natural gas pipelines, and to date that effort has not been successful. Natural gas pipelines have been difficult to build in New England, and the region is at the end of the line from a transportation perspective. The combination of those two factors means that higher natural gas prices are likely to occur during periods when natural gas supply gets tight, such as many winter hours.[97]

The NECEC, as has been shown in all production cost models run, reduces the capacity factors of natural gas generation in New England, thereby reducing electric generator demand for natural gas. It is also providing inframarginal power in all hours. For these reasons, the NECEC provides a hedge against rising natural gas prices.

The analysis performed by Daymark shows that in the event of an increase in natural gas prices relative to the current market, the NECEC provides strong benefits to

[97] These issues were identified in the Concurrence of Commissioner Cheryl A. LaFleur on the ISO New England Waiver Request Regarding Mystic Units 8 and 9, where Commissioner LaFleur stated: "Since 2000, the region's resource mix transitioned very quickly to natural gas-fired generation, but has not seen commensurate investment in natural gas infrastructure to support the regional need for gas. Moreover, large-scale development of renewables and transmission intended to offset the reliability impacts of the gas constraints has been delayed." (FERC Docket ER18-1509-000, Statement published July 2, 2018).

electricity consumers as a hedge against rising electricity prices that would otherwise occur due to rising natural gas prices.

C. Why There is No Market Cliff

Mr. Whitley and Mr. Russo both discuss the concern about a "market cliff." Mr. Whitley defines this cliff in his testimony by stating that, "at the end of the 15-20 year commercial arrangement, there is a scenario in which CMP and Maine find itself with a HVDC transmission line that has no market use, resulting in an abandoned asset that is occupying a prime transmission corridor in the state of Maine."[98]

This view of the relative impact of the NECEC on markets out in years 21-40 is flawed for several reasons. First, as has been discussed in the Rebuttal Testimony of Chris Malone, Scott Hodgdon and Justin Tribbet,[99] an HVAC line sized to the needs of the Massachusetts EDCs will not have any room on it for additional renewables to interconnect, making the distinction Mr. Whitley makes moot. Furthermore, Hydro-Québec is reserving the full capacity of the HVDC line for years 21-40, which is a substantial economic investment. This investment by Hydro-Québec shows a commitment to use of the line beyond the initial 20-year NECEC PPAs, making any potential "cliff" highly unlikely. Finally, the continued use of Phase II, well beyond its original PPA, provides historical evidence that the claims of Mr. Whitley and Mr. Russo are highly speculative and extremely unlikely to occur. New England has historically been an attractive market for Hydro-Québec due to its proximity and market prices. There is no reason to expect a significant change in the

[98] Whitley Direct Testimony at 6:22-25.

[99] Rebuttal Testimony of Chris Malone, Scott Hodgdon and Justin Tribbet, Section III.

relative commercial viability of the various markets to which Hydro-Québec exports energy, and therefore no reason to anticipate that Hydro-Québec will eliminate or even significantly reduce its energy sales across the NECEC at the end of the 20-year NECEC PPAs.