LEI responses to interrogatories

Responses to interrogatories prepared for the Ontario Energy Board staff by London Economics International LLC ("LEI")

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Table of contents

Table of figures

1 Interrogatories to LEI from Kingston Cogen Limited Partnership

1.1 KCLP-1

Interrogatory

Reference: LEI Report, section 3.2.2, pp. 9-10

Preamble: FERC Order No. 745 at paragraph 49 describes "the billing unit effect of dispatching demand response resources" as:

> "*…when reductions in LMP from implementing demand response results in a reduction in the total amount consumers pay for resources that is greater than the money spent acquiring those demand response resources at LMP, such a payment is a cost effective purchase from the customers' standpoint.*"

Footnote 119 of FERC Order No. 745 provides an example to illustrate:

> "*As a simple example, assume a market of 100 MW, with a current LMP of $50/MWh without demand response, and an LMP of $40/MWh if 5 MW of demand response were dispatched. Total payments to generators and load would be $4,000 with demand response compared to the previous $5,000. Even though, the reduced LMP is now being paid by less load, only 95 MW compared to 100 MW, the price paid by each remaining customer would decrease from $50/MWh to $42.11/MWh ($4,000/95). Therefore, the payment of LMP to demand resources is cost-effective.*"

The LEI Report states that Figure 4 demonstrates the billing unit effect of DR under three separate conditions. Scenario 2 demonstrates the billing unit effect of DR and the circumstances when there is a zero net benefit from dispatching the DR Resources, i.e. the price point of the target of the net benefits test.

Questions:

(a) In Scenario 2, when there is no DR deployment, can you please confirm:
   i. When the LMP is determined, where total load to be supplied (Regular Load and DR load) is equal to 10,100 MWh, which is the total amount supplied?
   ii. When the offer price of Supplier V is $1,062/MWh, whether it is the marginal price-setting supplier, and hence the LMP is $1,062/MWh?
   iii. As per the simple example provided by the Commission, if the average price paid by each customer is $1,062/MWh, and total payments by load to generators would be equal to the LMP multiplied by total load supplied (i.e., $1,062/MWh x 10,100 MWh = $10,726,200).

(b) In Scenario 2, when there is DR deployment, can you please confirm:
   i. When the bid price of the DR resource is $1,000 MWh, the DR resource is the marginal price setting resource and hence the LMP is $1,000?
   ii. Whether the remaining load benefits pays generators the amount of $10,000,000, which is derived as the LMP times total load (i.e., $1,000/MWh x 10,000 MWh = $10,000,000)?

iii. Whether the amount the remaining load must pay to DR resources is $100,000, which is derived as $1,000 MWh x 100 MWh?
iv. As per the simple example provided by the Commission, total payments by the remaining load to generators and DR resources would by the sum of what they pay generators plus the amount that they pay the DR resource, which is equal to $10,000,000 + $100,000 = $10,100,000, and that the average price paid by the remaining load customer is $1,010/MWh?

(c) In Scenario 2, when there is DR deployment, can you please confirm:
i. Whether the bid price of the DR resource is $1,000 MWh, the DR resource is the marginal price setting resource and hence the LMP is $1,000?
ii. Whether the remaining load benefits from the lower LMP and pays generators the amount of $10,000,000?
iii. Whether the amount the remaining load must pay to DR resources is $100,000?
iv. As per the simple example provided by the Commission, total payments by the remaining load to generators and DR resources would by the sum of what they pay generators plus the amount that they pay the DR resource, which is equal to $10,100,100 and that the average price paid by the remaining load customer is $1,010/MWh?

(d) Do you agree that contrary to what Scenario 2 claims to demonstrate, this is not a zero net benefit scenario as contemplated by FERC Order 745 but instead a net benefit scenario?

(e) Do you agree that your calculation of the net benefits test and billing unit effect is different from the Commissioners definition?

Response

Figure 4 of LEI's report was meant to show hypothetical billing unit effects under an illustrative scenario where suppliers receive different prices applicable to their nodes, while load pays the load-weighted zonal average price. In LEI's Figure 4, Suppliers A-R, S, T, and U, are meant to exist at individual nodal points, while Supplier V and DR resource are at the same node. Under this illustrative scenario, suppliers are receiving their applicable nodal prices based on their supply, and load is paying the load-weighted average price.

Figure 4 should be interpreted with the above context in mind. As covered in the first question to LEI from KCLP (KCLP-1), when all suppliers receive the same price as 'Supplier V' or 'DR resource', dispatching the DR resource over Supplier V in LEI's Scenario 2 would be cost-effective.

1.2 KCLP-2

Interrogatory

Reference: LEI Report, section 3.2.2, pp. 10-11

Preamble: The LEI Report states that Figure 5 presents for illustrative purposes PJM's monthly NBT prices from April 2012 to October 2019, along with the monthly average prices for PJM – RTO Zone. It states that the chart is illustrative as the test is actually applied to each applicable zone on an hourly basis.

Questions:

(a) Can you confirm that the net benefits test price threshold in PJM is calculated monthly using a system-wide monthly supply curve that is smoothed using non-linear estimation techniques?
(b) Can you confirm that this singular system-wide threshold is compared to the various locational marginal prices (LMPs) on an hourly basis to determine DR resources are eligible for compensation?
(c) In your opinion, are there any shortcomings of applying this system-wide threshold to hourly LMPs for determining a net benefit to consumers from compensating DR resources?
(d) Would you recommend the same approach be applied to Ontario? If yes, why and if no, why not?

Response

(a) As laid out in PJM's *Manual 11: Energy & Ancillary Services Market Operations, Revision: 107,* Section 10.3.1 *(*effective September 26, 2019), the aggregate supply curve for PJM is smoothed using a non-linear least squares estimation technique.

(b) The system-wide threshold is compared to applicable LMPs; this can be on an hourly basis (e.g. in the case of the day-ahead market) or on a five-minute basis (e.g. in the case of the real-time market).

(c) Yes. Comparing the LMPs to a system-wide threshold poses a degree of administrative burden on market institutions, while potentially oversimplifying net benefit calculations given the possible diversity in how load to customers is priced and the nature of their financial hedges, among other factors.

(d) No. We do not believe that Order 745 is relevant to the specifics of the Ontario market. Any test developed for Ontario should at a minimum take into account Ontario-specific conditions, including the Global Adjustment and how it is recovered, as well as more generally how supply is priced to various types of load in Ontario and over what time period, and the expected evolution of the Ontario market.

1.3 KCLP-3

Interrogatory

Reference: LEI Report, Section 3, Pages 7-14

The Affidavit of Brian Rivard dated Nov 8, 2019 (the "Rivard Affidavit"), Paragraphs 53-57

Preamble: At section 3 (pages 7-14) of the LEI Report, LEI provides an overview of FERC Order 745 and the net benefits test.

At paragraphs 53-57 of the Rivard Affidavit, Mr. Rivard provides a summary of the FERC Order 745 and the net benefits test.

Questions:

(a) Please identify any points on which LEI is in agreement with, or disagrees with, Mr. Rivard's overview of FERC Order 745 and the net benefits test. If LEI generally agrees with Mr. Rivard, please confirm this.
(b) If LEI disagrees with any aspect of Mr. Rivard's overview, please explain the basis of this disagreement.

Response:

LEI broadly agrees with Dr. Rivard's brief description of FERC Order 745 provided in Paragraph 53, and agrees that the contents in Paragraph 54 and 55 are consistent with LEI's understanding. LEI does not disagree with the information contained in Paragraph 56, but believes it would be more appropriate to refer to "remaining load" rather than "non-DR consumers." For the contents in Paragraph 57 related to FERC Order 745, LEI would characterize the net benefits test as seeking to avoid situations where dispatching DR may result in higher costs per unit for remaining load, rather than to "maximize the benefits to non-DR participants."

1.4 KCLP-4

Interrogatory

Reference: LEI Report, Section 3, Pages 7-14

Rivard Affidavit, Paragraphs 56-58

Preamble: At section 3 (pages 7-14) of the LEI Report, LEI provides an overview of FERC Order 745 and the net benefits test.

At paragraphs 56-58 of the Rivard Affidavit, Mr. Rivard draws a distinction between the net benefits test and economic efficiency.

Questions:

(a) Please identify any points on which LEI is in agreement with, or disagrees with, Mr. Rivard's assessment of the net benefits test and economic efficiency. If LEI generally agrees with Mr. Rivard, please confirm this.
(b) If LEI disagrees with any aspect of Mr. Rivard's assessment, please explain the basis of this disagreement.
(c) Based its research conducted, has LEI formed an opinion regarding the economic impacts of providing energy payments to DR resources? If yes, please state the opinion.
(d) Is LEI of the opinion that providing energy payments to DR resources could lead to economically inefficient outcomes both during the TCA, and in the event that a DR resource is dispatched? Please explain.

Response

(a) LEI's disagreement with the assessment of the net benefits test lies primarily with regards to its relevance to the Ontario situation. With regards to economic efficiency, LEI's concern is with regards to the fidelity of the price signal and the need for a more nuanced approach to the concept of horizontal equity.

However, LEI agrees that any consideration of whether and how market rules are developed to incorporate an activation payment must take into account the incentives Class A customers receive under the ICI to adjust their consumption.

(b) LEI believes that the discussion of horizontal equity is over-simplified. Fossil generators are not expected to guess how many times they will operate and at what fuel price, and to incorporate those assumptions into their capacity bids because they will not be paid an energy price when run. While the theoretical premise is that generators will reduce their capacity bids by the margin above fuel costs that they expect to achieve, generators do expect to receive at least their short run marginal costs when dispatched, and configure their bids accordingly.

A framework in which DR receives only capacity payments but no activation payments will drive DR participants to set high activation price thresholds. This may dull the effectiveness of the price signal at relatively high price periods (such as periods when the market price is high, but remains below the DR activation threshold). Short run costs of activation include process wastage (for

example disposing of unfinished and unfinishable products) and staff inefficiencies; allowing compensation for these costs rather than expecting companies to factor them in to their activation threshold (i.e. the price trigger at which load would be curtailed) is more consistent with horizontal equity in that it is equivalent to generators being paid for fuel and other short run variable operating costs through their energy bids.

(c) Given the short time period in which to develop its analysis and respond, LEI's opinions are preliminary and subject to change. With that caveat in mind, LEI's views are as follows:

Based on the markets and programs LEI reviewed in its report, actual activation of DR resources has been relatively limited, and DR resource revenues from this activation have also been limited (as compared DR capacity revenues, see Section 4.4 of LEI's report). This implies that, from a practical perspective, the benefit or harm arising from whether DR resources are provided energy payments may not be material in the near term.

LEI's understanding is that the IESO's proposed design is the subject of this proceeding and alternative approaches are not within the scope of the case. Nevertheless, LEI believes that, conceptually, there is merit in separating the reservation payment embodied in a capacity payment from an activation payment which occurs when the resource is actually deployed. In such a market design, bidders into the capacity auction need not consider the frequency of deployment or build in a risk premium when submitting their capacity bid. Were market rules devised which allowed a two part bid from DR resources in which they set forth both their required activation payment and the activation price threshold, DR resources would receive a payment, and their DR activation bids would reflect both the benefit of avoiding a cost and the cash payment required to address specific costs of activation. LEI believes that such an approach would result in greater variation of DR activation bids leading to a more robust price signal. LEI also notes that behavior responses to avoidance of cost versus those to receipt of a benefit may differ; creating a hybrid of the two may produce more economically efficient outcomes.

(d) LEI believes that any assessment of economic efficiency needs to be based on the specific market rules being applied, and the period of time being analyzed. Furthermore, the fact that something ***could*** happen does not mean that it ***will*** happen; analysis needs to take into account probability, frequency, the degree of harm, safeguards, and net benefits before coming to a determination.

1.5 KCLP-5

Interrogatory

Reference: LEI Report, Section 4, pages 15-32, Rivard Affidavit, Paragraphs 79-85

Preamble: At section 4 (pages 15-32) of the LEI Report, LEI provides an overview of how DR resources are compensated in PJM, ISO-NE and NYSIO.

At paragraphs 79-85 of the Rivard Affidavit, Mr. Rivard provides a summary of the results of a non-exhaustive scan of the academic literature and reports prepared by the RTOs, ISOs and the market monitors for empirical evidence on the effects and implications of the implementation of FERC Order No. 745.

Questions:

(a) Does LEI agree that Mr. Rivard's summary contained at paragraphs 79-85 of the Rivard Affidavit is complimentary to the research and analysis completed at pages 15-32 of the LEI Report?
(b) Please identify any points on which LEI is in agreement with, or disagrees with, Mr. Rivard's summary of the results of his non-exhaustive scan of academic literature and reports. If LEI generally agrees with Mr. Rivard's summary, please confirm this.
(c) If LEI disagrees with any aspect of Mr. Rivard's summary, please explain the basis of this disagreement.

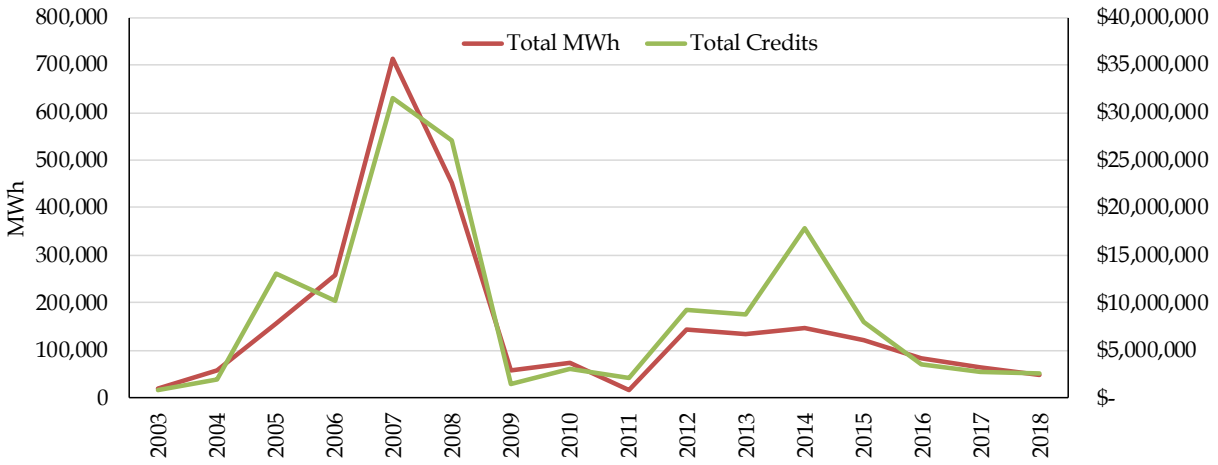
Response

Although LEI sees very little overlap between Section 4 of its report and Paragraphs 79-85 of Dr. Rivard's Affidavit, they can be viewed as complementary. Section 4 of LEI's report was intended to provide an overview of DR participating in programs administered by a selection of US ISOs/RTOs (including those programs to which FERC Order 745 does not apply) and provide some cross-cutting observations, relying primarily on information from the ISOs/RTOs themselves. Paragraphs 79-85 of Dr. Rivard's Affidavit provides a non-exhaustive scan of research on the effects FERC Order 745 has had on wholesale markets, and is focused largely on academic studies. LEI's disagreement is not with regards to Dr. Rivard's summary but rather with regards to the relevance of the articles to Ontario.

Paragraph 80 of Dr. Rivard's Affidavit and Section 4 of LEI's report both reference PJM State of the Market Reports for information on payments made to and dispatch of DR resources. As noted in Paragraph 80 of Dr. Rivard's Affidavit, monthly data from 2010 to 2019 shows an increase in economic demand response reductions and credits in PJM after FERC Order 745 was implemented (April 2012, as compared to the months before FERC Order 745 was implemented).

As discussed in Section 4 of LEI's report, considering the size of the PJM market, these credits and reductions are a very small proportion of total DR revenues and PJM's total load. In addition to information contained in Section 4, LEI notes that extending the historic period further back would show that total credits and DR reductions were noticeably higher in 2007 and 2008 as compared to the period from 2012 onwards, which can be seen in Figure 1.

Figure 1. Annual economic program credits and MWh (2002-2018)



Sources: data from 2002 to 2009 relies on Table 6-4 from the 2013 *State of the Market Report for PJM: Section 6 – Demand Response;* data from 2010 to 2018 relies on Table 6-4 from the 2018 *State of the Market Report for PJM: Section 6 – Demand Response.*

1.6 KCLP-6

Interrogatory

Reference: LEI Report, Section 5, pages 33-39, Rivard Affidavit, Paragraphs 58-71

Preamble: At Section 5.4 (pages 37-38) of the LEI Report, LEI identifies the impact of Global Adjustment in Ontario, which according to Figure 30 accounts for 77% of the total electricity wholesale costs (excluding transmission and distribution costs) in Ontario.

At paragraphs 58-71 of the Rivard Affidavit, Mr. Rivard provides an analysis of the impact of Global Adjustment on the calculation of the net benefits test in Ontario.

(a) Does LEI agree with Mr. Rivard that if the intent of the FERC net benefit test is to compensate DR resources only when it results in a reduction in the bills of non-DR consumers (non-DR consumers' surplus), then the IESO would have to take into account the effect of the Global Adjustment in this calculation in Ontario?
(b) Does LEI agree with Mr. Rivard that as a result of the Global Adjustment, the net benefits test will be satisfied less frequently (if ever) than in the US markets?
(c) With specific reference to paragraphs 58-71 and Figures 5, 6 and 7 of the Rivard Affidavit, please explain whether LEI generally agrees or disagrees with Mr. Rivard's analytic approach and Mr. Rivard's findings?

Response

(a) Yes; however, as Ontario is not under FERC jurisdiction, and the market framework has significant differences, the test is not relevant.

(b) LEI does not believe that the net benefits test as configured for US markets is appropriate for developing market rules in Ontario. Due to the generally inverse correlation between Ontario wholesale market prices and the Global Adjustment, there are some changes to Ontario market rules which could improve transparency and change wholesale price outcomes without having an immediate bill impact. However, such rule changes could still incentivize changes to investment and operating behavior which over the long run would still provide benefits to consumers.

(c) Because LEI questions whether the net benefits test as configured for US markets is relevant to Ontario, LEI regards the analysis as largely academic. LEI nonetheless has the following observations:

1. The analysis is largely static; it does not assess how the behavior of various market players would change as a result of the changes in market conditions.
2. Using historical data is a beginning, rather than an end, to the analysis; consideration of future changes in price dynamics is helpful in exploring the impact on final consumers.
3. Changes that impact even a very small number of overall hours may nonetheless be worthwhile, to the extent that they improve the value of the price signal during super-peak hours.

4. The analysis may be targeted at the wrong question: a better question is, under what circumstances would providing energy payments to demand response be beneficial for Ontario, and what tests should be designed to confirm that those circumstances prevail at the time?
5. LEI believes that Ontario should pursue a pragmatic approach based on sustained incremental improvements to market rules, which where appropriate is substantiated by dispatch modeling and scenario analysis.

1.7 KCLP-7

Interrogatory

Reference: LEI Report

Rivard Affidavit

Preamble: The preceding questions asked very specific questions to explore the similarities and differences between the LEI Report and the Rivard Affidavit.

Questions:

(a) Are there any other areas of similarities or differences as between the LEI Report and the Rivard Affidavit that you would like to identify for the OEB?

Response

The two reports differ in the scope provided to their authors.

The LEI report was focused on describing FERC Order 745, conditions in US wholesale and retail markets, and contextual similarities and differences between Ontario and the US. LEI was not asked to develop conclusions with regards to how a net benefits test could be properly designed for Ontario, or whether any particular party would be harmed through any specific configuration of an IESO market rule.

By contrast, Dr. Rivard was asked to offer his "independent views on the economic merit of AMPCO's position in this proceeding".

2 Interrogatories to LEI from the School Energy Coalition

2.1 SEC-OEBStaff-1

Interrogatory

[KingstonCoGen, Evidence of Brian Rivard, para. 53-85] Please provide LEI's views on Mr. Rivard's evidence regarding the application of FERC Order No. 745 to Ontario.

Response

Please see LEI's responses to the KCLP interrogatories, and the following interrogatories specifically: KCLP-2 (d), KCLP-4, KCLP-5, and KCLP-6.