EB-2019-0242

ASSOCIATION OF MAJOR POWER CONSUMERS IN ONTARIO

APPLICATION TO REVIEW AMENDMENTS TO THE MARKET RULES MADE BY THE INDEPENDENT ELECTRICITY SYSTEM OPERATOR

EXAMINATION IN CHIEF OF THE INDEPENDENT ELECTRICITY SYSTEM OPERATOR

PANEL NO. 5 – DAVID SHORT AND CANDICE TRICKEY

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PART I - INTRODUCTION

1. The Independent Electricity System Operator's ("**IESO**") Board of Directors ("**IESO Board**") approved MR-00439-R00 to R05 (the "**Amendment**") enabling the IESO's Transitional Capacity Auction (**"TCA"**) on August 28, 2019, with an effective date of October 15, 2019.

2. The Amendment is a first step in broadening and increasing competition in the IESO's capacity auction and addressing a forecast summer 2023 capacity gap of approximately 4,000 MW.

3. As further explained herein, the IESO opposes the Association of Major Power Consumers in Ontario (**"AMPCO"**) Application request that the Amendment be revoked, and the TCA be suspended, until such time as the IESO amends other market rules to provide for energy payments to demand response (**"DR"**) resources in the energy market. It is the IESO's considered opinion that:

(a) It is important for reliability purposes to launch the TCA in December 2019 and to progress the TCA in a phased manner which provides the IESO and TCA participants the opportunity to learn and, as necessary adapt, in advance of the forecast 2023 capacity gap. It is the IESO's view that it would be imprudent, risking future reliability, to delay the TCA and launch it closer to the eve of the 2023 capacity gap;

(b) The TCA will provide an opportunity for existing non-committed generators coming off contract, which may in the absence of the TCA choose to wind down their operations to the potential detriment of Ontario reliability and the interests of Ontario consumers; and

(c) The TCA will increase competition and benefit consumers by allowing for participation by new capacity resource types and increasing the supply of capacity into the auction.

4. The IESO disagrees that AMPCO's members or other DR resource participants will be materially harmed, let alone unjustly discriminated against, by proceeding with the TCA prior to resolving the issue of energy payments for DR resources. No DR

participants who participated in the Demand Response Auction ("**DRA**") have provided any evidence of potential harm. Further:

(a) AMPCO is requesting a fundamental change to Ontario's energy (not capacity) market design and market rules by proposing energy payments for loads and this issue is very complex, particularly in the context of Ontario's hybrid electricity market, and warrants necessary study and analysis. The IESO has prioritized the concerns of AMPCO members by undertaking a comprehensive stakeholder engagement and third party study on energy payments for DR resources, which will be completed in Q2 2020 following which the IESO will make a final determination and, as necessary, initiate market rule changes.

(b) There will be no harm, or negligible harm, to DR resources in the interim. DR participants in the DRA have rarely been economically activated in the energy market and the IESO does not anticipate any material increase in DR activations over the period governed by the December 2019 TCA. DR participants will also be compensated for out-of-market activations, which is their only material exposure to activation.

5. The IESO is pleased to submit to the Board its written evidence, which is presented below in question and answer format.[1]

PART II - LEGAL AUTHORITY

A. Who is the IESO?

6. The IESO is a public agency, that is continued under the *Electricity Act, 1998*, S.O. 1998, c. 15, Sched. A (the "***Electricity Act***") and its responsible for maintaining the reliability of the provincial transmission grid, administering Ontario's wholesale electricity market and planning the province's bulk power system.

[1] Much of the evidence contained herein overlaps with and relies on the Affidavit of David Short, sworn on October 25, 2019, which the IESO submitted to the Board in response to AMPCO's Motion to Stay the operation of the Amendment. For coherence, we have reproduced portions of the said affidavit herein.

7. The IESO's authority under Part II of the *Electricity Act* includes making market rules: (1) governing the IESO-controlled grid; (2) establishing and governing markets related to electricity and ancillary services; and (3) establishing and enforcing standards and criteria relating to the reliability of electricity service or the IESO-controlled grid.

B. What is the IESO's process to amend the market rules?

8. The IESO's Board has ultimate authority and responsibility to amend market rules.

9. The IESO has developed a stakeholder engagement processes to consult with individuals and organizations for the purpose of informing the IESO's decision-making, including proposed market rule amendments. The IESO's stakeholder engagement processes are designed to promote transparency, efficiency and consistency.[2]

10. All proposed market rule amendments are considered by the IESO's Technical Panel, whose members are appointed by the IESO Board of Directors. The IESO's Technical Panel is composed of stakeholders that represent a broad range of electricity resources and constituencies in the IESO-administered markets. The Technical Panel provides advice to the IESO Board on proposed market rule amendments.

11. Each member of the Technical Panel casts a vote as to whether they are in favour of, or opposed to, proposed rule amendments along with the reason for their position. This information is then communicated to the IESO Board for its consideration in determining whether to approve proposed market rule amendments.

12. After the IESO Board has adopted or rejected a proposed amendment, information on the Board's decision with reasons is posted to the IESO's public website along with the approved amendments as applicable.

13. The IESO is also required to provide a copy of any adopted amendment, along with prescribed information, to the Board before the IESO publishes the amendment and the Board may, not later than 15 days after the amendment is published, revoke the amendment.

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[2] The IESO guides its engagement processes in accordance with its Engagement Principles to ensure that the engagement activities follow an efficient and effective process which is conducted with integrity. Attached at **Tab "1"** are the IESO's Engagement Principles, undated.

PART III - THE TRANSITIONAL CAPACITY AUCTION

A. What is the Transitional Capacity Auction?

14. The purpose of the Amendment is to implement the TCA in Ontario. The TCA is the first step in evolving the IESO's existing capacity auction – the demand response auction ("**DRA**") – into a more competitive capacity auction that includes additional resource types and enhanced auction features that will improve reliability. The DRA was limited to dispatchable load and hourly demand response ("**HDR**") resources. The Amendment enables non-contracted and non-regulated dispatchable Ontario generators to participate in a capacity auction alongside dispatchable loads and HDR resources.

15. The Amendment largely leaves the foundation of the DRA in place and begins the transition to a broader capacity auction by expanding eligibility to participate in the TCA to resource types other than DR resources.

B. What does capacity mean in the context of the IESO-administered market?

16. In the context of the IESO-administered markets, "capacity" represents the need to have sufficient resources available to ensure that the demand for electricity in Ontario can be met at all times.

17. At a high level, capacity can be provided by supply resources through energy injections or from loads in the form of demand response.

C. What is the IESO's plan for the TCA?

18. The TCA is the first step in evolving the DRA into a more competitive capacity auction that includes additional resource types and enhancing auction features that will improve reliability. Whereas in the past, most capacity in Ontario has been procured through long-term contracts, the TCA will be a market-based mechanism for securing needed incremental capacity.

19. The TCA will run on December 4, 2019 for a one-year commitment period of May 1, 2020 to April 30, 2021. The commitment period will consist of two seasonal obligation periods.

20. The successful participants in the TCA auction will be required to become authorized as Capacity Market Participants, which will enable them to register resources with the IESO to deliver on their capacity obligations. TCA participants will receive availability payments for providing auction capacity, subject to non-performance charges.

21. Following the TCA, the IESO is planning subsequent phases of its capacity auction design that will enable additional resource types to participate (such as imports and storage) and will introduce new auction features to improve reliability and market efficiency. Each phase is expected to require further changes to the market rules.

22. The IESO plans to increase the forward period[3] for future capacity auctions. The IESO's intention is to run future capacity auctions in June 2020 (for a May 1, 2021 to April 30, 2022 commitment period), December 2020 (for a May 1, 2022 to April 30, 2023 commitment period) and in 2021 (for a May 1, 2023 to April 30, 2024 commitment period).

PART IV - THE DEMAND RESPONSE AUCTION

A. What is demand response?

23. Demand response refers to the change in end-user electricity consumption patterns due to fluctuating market prices. DRA participants who are called upon by the IESO provide capacity by refraining from consuming energy from the IESO-administered grid rather than, as in the case of generators, supplying energy to the grid.

B. What is the DRA?

24. The IESO introduced the DRA in 2015 as a means of securing demand-side capacity for the IESO-administered grid. The DRA differs from former Ontario Power Authority (**"OPA"**) DR programs in that it is a market-based program administered under the market rules and DRA participants are integrated into the IESO-administered market, as opposed to the former OPA contract based DR programs.

[3] A forward period is the time between the execution of the auction and the first day of the commitment period.

25. DR participants in the DRA (**"DRA participants"**) participate in the energy markets either (1) dispatchable loads that responds to a five-minute schedule, or (2) as Hourly Demand Response (**"HDR"**) participants where participation limited to hourly blocks (up to 4 hours per day) with activation notice required at least two hours in advance of the need.

26. The DRA procures capacity for (1) a summer commitment period which occurs from May 1 to October 31 and (2) a winter commitment period which occurs from November 1 to April 30.

C. What are the mechanics of the DRA?

27. DRA participants are required to submit offers in the DRA for quantities between 1 MW and the DR capacity for which they were qualified in the DRA pre-auction process and are allowed to use offer laminations reflecting the prices of providing various levels of capacity. The prices offered must represent the minimum prices at which the participant is willing to provide each incremental quantity of capacity.

28. DRA participants must be willing to provide DR capacity – by reducing their consumption – starting on the first day of the commitment period, failing which they are subject to non-performance charges.

29. After DRA participants submit their offers, the offers are stacked against the demand curve to determine the clearing price for each zone and for each commitment period. The process of determining the auction clearing price is summarized in Market Manual 12.0.

30. After running the auction, the IESO communicates a Public Post-Auction Report to the public and a private Post-Auction Participant Report to market participants.

31. All successful DRA participants in a zone receive the same availability payment per MW day for their capacity obligation. This is referred to a "price as cleared"[4] where all successful participants are paid the same availability payment. As such, assuming resources offer into the auction at or near their costs, lower priced resources would

[4] *Price as cleared* is a standard auction and energy market mechanism where all successfully scheduled resources are essentially paid the highest price for that zone.

receive more profits as compared to resources that clear near the final auction price. Typically a number of auction participants are not price competitive, do not clear the auction and do not receive an obligation to supply capacity.

32. DRA participants who have incurred a DR capacity obligation through the DRA receive a monthly payment for every month of the commitment period for being available to supply capacity if called upon (referred to as an availability payment).

D. How are DRA resources activated or called upon?

33. All DRA resources are expected to be available to reduce their consumption during the summer commitment period from 12:00 to 21:00 EST, and during the winter commitment period from 16:00 to 21:00 EST.

34. Dispatchable load resources are activated (dispatched automatically by the IESO's Dispatch Scheduling Optimization software) on a 5-minute interval if the bid in the energy market is economic, either to meet Ontario's provincial need or a local energy need.

35. HDR resources have restrictions on their ability to be reduce consumption so they require a standby notice from the IESO at any time between 15:00 EST day-ahead up to 07:00 EST on the day of. HDR resources that are on standby can then receive an activation at least two hours in advance for one to four hour hourly blocks of reduced consumption – and only if they are economic compared to other resources for the hour(s) they are activated. HDR resources can only receive one activation per day.

E. What's the frequency for the activation of DR resources under the DRA?

36. DRA participants have been activated in the energy market in very limited circumstances since the DRA was launched in 2015. This is likely due to the relatively high prices at which DRA participants have bid into the energy market.

37. During this period, the Hourly Ontario Energy Price (**"HOEP"**) has averaged approximately $25/MW. During the same period, dispatchable load bid prices have averaged approximately $1500/MWh and HDR bid prices have averaged approximately $1700/MWh.

38. HDR resources have only been economically activated on one occasion since the introduction of the DRA in 2015. The Market Surveillance Panel of the Ontario Energy Board noted, in its Monitoring Report of the IESO-Administered Markets published in May 2017, that "the likelihood of an activation is remote".[5] The Panel observed that between May and December 2016, 82% of HDR resources offered bid prices were $1999/MWh while the remaining 18% of HDR resources offered bid prices were $500/MWh. The Panel further concluded that any bid price over $220/MWh would not have been activated during the period.

39. Dispatchable loads have been economically dispatched less than 1% of the time over that same period.[6] These activations generally occur due to localized short-term price spikes resulting from contingencies such as unanticipated generation and transmission outages.

PART V - ENERGY PAYMENTS FOR DR RESOURCES

A. What are energy payments for DR resources?

40. Reference has been made in this proceeding to both "utilization payments" and "energy payments". A utilization payment is a generic category which includes energy payments.

41. Energy payments for DR resources, which is what AMPCO is seeking in this Application, would be payments to loads that bid into the energy market and reduce energy consumption based on the applicable wholesale market clearing price.

B. How are DR resources treated in the IESO energy market?

42. The design of the IESO energy market was based on the recommendations of the Ontario Market Design Committee and on standard market design in other jurisdictions in North America.

43. Ontario's energy market design, as codified in the market rules, provides that generators and loads may be either dispatchable or non dispatchable; and, that

[5] Attached at **Tab "2"** is the *Monitoring Report on the IESO-Administered Electricity Markets*, Market Surveillance Panel, dated May 2017.

[6] Attached at **Tab "3"** is the IESO Response to the Board Staff's Interrogatory No. 8.

generators receive energy payments, but loads do not. Dispatchable loads bid prices in the energy market represent the point at which the load does not wish to consume electricity.

C. Did DR resources receive energy payments under the former OPA programs?

44. No, they did not. Starting in or about 2005 the former Ontario Power Authority (**"OPA"**) commenced a number of demand-side programs. The OPA held yearly procurement processes in which qualified participants bid for contracts to curtail their electricity consumption during periods of high system demand. These programs paid participants a monthly availability payment in return for the commitment to reduce load when called upon.

45. The final OPA DR program, called the Demand Response 3 (**"DR3"**) program, included utilization payments for activations. These payments, however, were not energy payments. They were contract payments set at a fixed rate of $200/MWh.

46. After the merger of the OPA and IESO on January 1, 2015, the IESO developed a transitional demand response program, governed by the market rules, called the Capacity Based Demand Response (**"CBDR"**) program. The CBDR program bridged the period from the DR3 contract expiration to the commencement of the DRA. For this period, the CBDR program continued some of the features of the DR3 program for the purpose of facilitating the transition to the DRA market-based structure under the market rules. For instance, the fixed rate $200/MWh utilization payment was included in the CBDR program until the expiration of DR3 contracts.

D. Do DRA participants receive energy payments?

47. No, they do not. As stated above, under Ontario's market design and the market rules, only generators are entitled to energy payments. DRA participants are solely entitled to monthly availability payments for the duration of their applicable commitment periods.

E. Will TCA DR participants receive energy payments?

48. No, the Amendment does not change the market rules governing payments in the IESO energy market. DR participants in the TCA will not receive an energy payment in the energy market because, as detailed above, loads are not entitled to receive energy payments under the market design and the market rules that have been in place since market opening.

F. Has the IESO previously studied the issue of energy payments for DR Resources?

49. Yes, the IESO previously commissioned a study of the merit of utilization payments for DR resources through its Demand Response Working Group ("**DRWG**").[7]

50. In the lead up to the launch of the DRA, some stakeholders had inquired about energy payments or utilization payments in the DRA, however, the immediate priority was to implement the DRA.

51. In early 2017, some DRWG members again raised this issue on the basis that "[o]ther jurisdictions (ISO-NE, NYISO, PJM) provide both energy and availability payments to DR [resources]" (p. 19). The IESO therefore agreed to further look into this matter (p. 22).[8]

52. In July 2017, the IESO, in consultation with the DRWG, engaged Navigant, an independent consultant with expertise in DR and electricity markets, to study and prepare a discussion paper on the merits of utilization payments.[9] Stakeholders were invited to provide submissions to inform the scope of Navigant's analysis, which included:

(a) Jurisdictional review - A summary of practices adopted in other markets;

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[7] The IESO established the DRWG in April 2014 to assist in the evolution of DR from a contracted resource into the energy market, as well as to inform the development of pilots and the DRA stakeholder engagement.

[8] Attached at **Tab "4"** is *DR Stakeholder Priorities for 2017*, Demand Response Working Group, dated January 31, 2017.

[9] Attached at **Tabs "5", "6", "7"** respectively are *Utilization Payments for DR Activations*, Demand Response Working Group, dated May 11, 2017; *Utilization Payments – 2017 Work Plan Item*, Demand Response Working Group, dated May 30, 2017; and *Utilization Payments – 2017 Work Plan Item*, "Scope of Discussion Paper", dated July 21, 2017.

(b) Economic efficiency - Arguments for/against providing utilization payments to DR resources in light of current and future system needs;

(c) DR Participation – The likely impacts of utilization payments to the dispatch frequency of HDR resources in Ontario;

(d) Wider market impacts - Spillover effects on the wider market.

G. What were the findings of the Navigant study?

53. On December 19, 2017 the IESO published a discussion paper by Navigant (the **"Navigant Paper"**)[10] which, among other things, presented arguments for and against utilization payments, as summarized in the table below:

Arguments against utilization payments	
Wholesale Price Efficiency	Real-time wholesale prices are an efficient price signal because they match supply and demand based on bids and offers on a minute-by-minute, and hour-by-hour basis, and introducing an additional payment could create an inefficacy in the market because dispatchable loads would receive an out-of-market payment that could alter their bid/offer strategy. In Ontario, this argument applies to loads that receive the wholesale energy price.
Disproportional Benefits	Providing a utilization payment compensates a DR resource disproportionately relative to a supply resource because the DR resource does not incur a cost associated with the production of electricity. Therefore, a DR resource should be treated as if it had first purchased the power it wishes to resell to the market. This argument is based on the premise that the value of a megawatt of electricity curtailed (a "negawatt") is not equivalent to a megawatt of electricity, and assumes that the cost of curtailment for a DR resource is immaterial.
Harm to Other Suppliers	Utilization payments will result in downward pressure on wholesale prices because DR resources are able to bid into the energy market at prices lower than traditional supply and will be dispatched more frequently. However, in Ontario, to have a material impact on capacity or energy prices, utilization payments would have to result

[10] Attached at **Tabs "8", "9"** respectively are Navigant, *Demand Response Discussion Paper* (the "***Navigant Paper***"), dated December 18, 2017; and Navigant Demand Response Discussion Paper (Presentation to DRWG), dated November 16, 2017.

	in a considerable increase in levels of participation and activation Under the current market structure in Ontario, most generators are under contract or receive regulated rates and hence consumer costs are largely fixed.
Harm to Economy	Utilization/energy payments will incentivize loads to reduce production to provide demand reductions into the electricity market, reducing the supply of other goods in the economy and increasing prices.
Arguments for utilization payments	
Reducing Consumer Costs	Utilization payments will increase the level of DR participation and activation, which is a less expensive form of capacity and energy than traditional supply resources, and hence will result in lower consumer costs
Disconnect Between Wholesale and Retail Prices	Retail prices do not reflect the real-time fluctuations in the cost of electricity and are inefficient and utilization payments are a way of improving the economic efficiency of the retail price by providing an additional financial incentive during high-price events. However, this argument is only valid for customers on retail rates and not exposed to real-time energy prices.
Fairness	Generation resources receive a utilization payment in the form of an energy payment when they produce electricity and DR resources should be treated fairly and receive a utilization payment when they curtail electricity. The argument is based on the FERC Order 745 which requires that the energy payments result in a *net benefit* to consumers. However, this argument is based on the assumption that, in Ontario, a megawatt of electricity curtailed (negawatt) is equivalent to a megawatt of electricity.
Other Costs Associated with Curtailment	There is a cost associated with curtailing demand (or producing a negawatt of electricity), which is equal to the value of lost load, which can be higher than the avoided cost of electricity, utilization payments compensate DR resources for these costs. However, for large commercial and industrial customers, the value of lost load can be very high, which could result in limited activation of DR resources regardless of whether utilization payments are offered.

54. In its conclusion, Navigant commented on the complexity of the matter and also expressed doubt on whether the benefits associated with energy payments to demand resources in other markets would apply in Ontario:

> The arguments for and against utilization payments are nuanced and prudent. Responsible stakeholders can arrive at different conclusions based on preferences for evaluation criteria.
>
> A unique consideration for Ontario is that today, almost all generation resources are compensated under long-term contract or through regulation that guarantees a certain level of revenue. The economic efficiency arguments under this current market structure are different than they would be if considering the future state of the wholesale power market where generation resources are largely compensated through energy and capacity market revenues. Under the current conditions, more DR activation (as a result of bidding into the market at prices lower than traditional generators) would not actually lead to reduced costs to consumers since generators have their compensation guaranteed (section 3.2).

H. What was the feedback from DRWG members to the Navigant Paper?

55. The IESO encouraged DRWG members to review, ask questions and provide feedback about the Navigant Paper.[11]

56. In early 2018, the DRWG convened to continue discussion on Navigant Paper and the issue of utilization payments in the DRA.[12] The IESO responded to feedback from the DRWG members which generally fell into three categories: (1) impact on utilization; (2) fairness; and (3) market efficiency:

(a) The IESO addressed stakeholder comments that utilization payments would incentivize residential DRA participants to bid lower energy prices, which could increase utilization (p. 5). The IESO acknowledged that in

[11] Attached at **Tabs "10", "11", "12"** respectively are IESO, *Communication to DRWG Members,* dated December 19, 2017; *Utilization Payment Discussion Paper*, Demand Response Working Group (Presentation), dated January 30, 2018; and IESO, *Communication to DRWG Members*, dated February 12, 2018.

[12] Attached at **Tabs "13", "14"** respectively are *Utilization Payments Discussion*, Demand Response Working Group, dated March 1, 2018 (**"*DRWG Presentation of March 1, 2019*"**); Demand Response Working Group, *Meeting Notes – March 1, 2018*, dated April 5, 2018.

theory this could incentivize participants to lower energy bid prices, which could lead to increased utilization of DR resources. However, the IESO observed that stakeholder feedback indicated utilization payments might not lead to increased utilization.

(b) The IESO addressed stakeholder comments that under the former Capacity Based Demand Response ("**CBDR**") regime, CBDR resources were prepared to be activated at $200/MWh provided they received this payment demonstrating that revenue is a strong incentive for activation (p. 7). The IESO responded that the historical contracting programs required DR energy bids to be priced at $200/MWh. Once the $200 price requirement was removed for HDR resources, the IESO observed that the majority of DR bids were priced by participants much higher than $200/MWh. This phenomenon implied that that DR participants' value of energy consumption was much higher than this level.

(c) The IESO addressed stakeholder comments that if paying a DR resource for utilization reduces the cost of electricity, then DR payments are a positive system benefit (p. 8). The IESO acknowledged that if DR utilization payments could reduce total system costs then it would yield a positive system benefit. However, the IESO observed that on balance, it was not clear that there would be a positive system benefit. Even if providing a utilization payment might reduce the energy price of electricity for that event, other system costs such as uplift and capacity costs would increase.

(d) The IESO addressed stakeholder comments that DR utilization payments based only if "negawatts" and megawatts are functionally and economically equivalent (pp. 10- 14). The IESO provided some illustrative examples where resources could receive additional payments – creating an unequal treatment depending on the configuration of the capacity contribution.

I. Did the IESO reach any conclusions after the publication of the Navigant Paper?

57. No, the IESO did not come to any definitive conclusions on this issue. After further consultation with stakeholders, the IESO, however, did offer the following observations as part of March 1, 2018 presentation to DRWG members:

(a) It appears that the current practice for compensating DR utilization is equivalent treatment and a DR utilization payments would introduce non-equivalent treatment;

(b) There was no clear indication that utilization payments would increase activation for most load types;

(c) For resources exposed to market prices, further discussion did not appear to be merited; and

(d) For resources not exposed to market pricing, the IESO did not see merit in continuing discussion on utilization payments - however, the IESO expressed uncertainty regarding the impact of utilization payments on these type of participants and the IESO requested more input from stakeholders;

(e) Based on the quantity of stakeholder feedback received, the IESO did not see a strong interest from the DRWG on the topic of utilization payment. Only two members submitted feedback on and members declined to present their views for discussion at the DRWG.[13]

58. The issue of utilization payments for DR resources in the DRA ceased to be a priority item for the DRWG after the spring of 2018.

PART VI - THE NEED FOR THE TCA

A. Why did the IESO decide to evolve the DRA into the TCA?

59. As part of its Market Renewal initiative, the IESO had been planning an Incremental Capacity Auction (**"ICA"**) to address Ontario's future incremental capacity

[13] *DRWG Presentation of March 1, 2018*, pp. 16-18

needs. The ICA, which was to be a competitive auction open to participation by a broad range of supply and demand resources, was intended to replace the DRA. The IESO planned to launch the ICA in 2022.

60. On September 13, 2018 the IESO released an updated Electricity Planning Outlook that forecasted a capacity deficit in summer 2023 of 3844 MW (p. 51).[14] Shortly after this, the IESO came to the realization that it was not feasible to launch the ICA in time to address the projected 2023 capacity gap (the **"2023 capacity gap"**) and that alternative measures were required.

61. The IESO determined that the best solution for addressing the 2023 capacity gap was to evolve the DRA into the TCA, for reasons which included the following:

(a) the DRA was directionally aligned with the ICA in that there would be a demand curve based auction that would be executed at regular intervals for a future one-year long capacity need (with two 6-month seasonal periods);

(b) the DRA was a proven mechanism governed by an existing set of market rules;

(c) the DRA provided a platform that could be incrementally evolved into a broader-based and more competitive capacity auction, which would provide the IESO and market participants with opportunities to learn, adapt and make improvements; and

(d) a TCA was preferable to contractually procuring new capacity, which was a less flexible mechanism and risked higher costs for consumers.

62. The IESO also determined that the TCA would provide opportunities for existing off contract generators, which might otherwise decide to wind down their operations to the potential detriment of Ontario reliability and the interests of Ontario consumers. In particular, the IESO was concerned with the risk of permanently losing these existing generation facilities and not having them available when the 2023 capacity gap

[14] Attached at **Tab "15"** is a Technical *Planning Conference Presentation*, dated September 13, 2018, p. 51.

emerged, since these facilities may be able to more cost-effectively satisfy future capacity gaps compared to other alternatives, including the construction of new generation facilities. In addition, these existing resources offer an additional measure of certainty as compared to unknown future alternatives.

63. The TCA was also established to enable the future participation of capacity imports from other jurisdictions. Capacity imports are likely to play an important role in the future and the TCA would establish auctions as a credible and certain mechanism that would entice economic external resources to supply capacity to Ontario.

B. Can the IESO rely upon the DRA to fill the forecast 2023 capacity gap?

64. The IESO cannot rely upon the existing DRA to provide sufficient capacity to satisfy the 2023 capacity gap.

65. The DRA in December 2018 attracted a qualified capacity of over 1000 MW. This is insufficient to meet the 2023 capacity gap, which is now forecast at approximately 4000 MW.[15]

66. HDR resources have also had a history of poor performance during test activations. Between February 2018 and January 2019, HDR resources had a 58% failure rate for test activations which were four hours in duration.[16] These results suggest that the actual capacity available to the IESO under the DRA may be substantially less than the results of prior DRA auctions suggest.

67. HDR resources, which comprise the large majority of DRA participants, are also, unlike dispatchable generators or loads, not dispatchable on a five-minute basis. This presents operability and reliability challenges as compared to relying on capacity from supply or dispatchable load resources. Given the IESO's need to maintain a diverse supply mix of resources to meet system needs, both HDR and DL resources are part of the total solution in meeting Ontario's capacity needs – mixed with other resources that

[15] Attached at **Tabs "16" "17" "18"** respectively are the Stakeholder Advisory *Committee Presentation*, August 14, 2019, p.4 (**"*SAC Presentation*"**); and North American Electronic Reliability Corporation, *2018 Long-Term Reliability Assessment*, dated December 2018 (**"*NERC Report*"**); Northeast Power Coordinating Council, *2018 Ontario Comprehensive Review of Resource Adequacy* (Issue 3.0), dated December 4, 2018 ("***NPCC Report***").

[16] Attached at **Tab "19"** is the *Hourly Demand Response (HDR) Testing Update*, dated April 25, 2019.

can be scheduled on a 5-minute or hourly interval both inside and outside of Ontario. The IESO could not assure reliability if all the 2023 and beyond capacity came from only one resource type – diversity in fuel supply and operating characteristics are needed to maintain reliability.

C. Is the IESO still forecasting a capacity gap in summer 2023?

68. Yes, there continues to be a significant 2023 capacity gap that must be addressed by the IESO to ensure the reliability of Ontario's electricity system.

69. This gap has been recognized by the Northeast Power Coordinating Council (**"NPCC"**) and the North American Reliability Corporation ("**NERC"**),[17] with which the IESO is required to report annually on the state of reliability of Ontario's electricity system, including resource adequacy. The assessments are based on NERC and NPCC planning criteria to ensure a consistent approach to reporting and evaluation of the broader regional and continent-wide power system reliability.

70. There are inherent uncertainties with any planning projection. Ontario's extensive nuclear refurbishment and retirement schedule contributes to the capacity gaps in the near-term as the fleet is readied life-extending work or shutdown. As noted in the NERC Report, "there are uncertainties in the projections that could see the shortfall grow or shrink. As a result, the Independent Electricity Service Operator (IESO) will continue to update and refine its forecasts to gain more certainty about the size of the gap" (p. 15, *Figure 1.5*)".

71. In a presentation to the IESO's Stakeholder Advisory Committee dated August 14, 2019, the IESO provide an updated forecast of a capacity gap of approximately 4000 MW in summer 2023. [18] This is the IESO's most up-to-date forecast.

D. Why is it necessary for the IESO to proceed with a phased implementation of the TCA?

72. The introduction and implementation of the TCA, and subsequent capacity auction phases, is complex and challenging. The IESO has never before undertaken a capacity auction which includes supply resources. The IESO is accordingly initiating this

[17] See *NPCC Report; NERC Report.*

[18] *SAC Presentation*, p. 4.

process gradually and incrementally by, at the outset, only including off-contract dispatchable generation facilities. Thereafter, subsequent capacity auctions will include and add new resource types and broaden resource eligibility criteria. New resource types are anticipated to include storage, system-backed imports, resource-backed imports and self-scheduling generation facilities. Resource eligibility criteria may also be broadened to include, for example, surplus or uprated capacity (i.e. merchant capacity) at existing contracted facilities.

73. These changes will present new requirements and pose additional challenges. For instance, the addition of system-backed and resource-backed imports will necessitate negotiating operating agreements procedures with other independent system operators (**"ISOs"**) and addressing other jurisdictional issues. Likewise, rules governing the participation and compensation of imports must be tailored to reflect the unique operating features of different import types. These differences introduce complexity to the potential participation of imports in the capacity auction and energy market.

74. In addition to the introduction of new resource types and new eligibility criteria, each capacity auction phase, beginning with the TCA, will introduce modified design elements, including capacity qualification criteria, testing and audit requirements, connection assessment criteria, market power mitigation parameters, auction parameters, etc. For instance, introducing new qualifications of capacity will require the IESO to assess each resource's offering into the auction prior to the auction's execution. The intent is to better align the auction results with the IESO's system planning assumption; however, the new process may change a participant's offer strategy and ultimately the auction outcome.

75. In addition to known and foreseeable challenges, there are potential unforeseen consequences. The IESO knows from experience that major new market changes and programs invariably have unforeseen implications and consequences affecting market efficiency or reliability that will need to be addressed through market rule and market manual amendments, and possible tool changes.

76. Due to the complexities of creating an enduring capacity auction, it would be impractical and imprudent to attempt to introduce the full suite of changes required in a

single step, or closer to the eve of the 2023 capacity gap which the TCA is required to address. Progressing in a phased approach, as the IESO has planned, allows the IESO to:

(a) introduce new resource types into the auction gradually;

(b) assess and respond to how new resource types behave in the capacity auction;

(c) provide participants with an opportunity to develop and test business processes and business models to support their participation in capacity auctions;

(d) provide participants an opportunity for price discoverability;

(e) ensure that committed capacity resources are capable of satisfying their capacity obligations;

(f) provide sufficient time to assess and evolve auction design features, informed by stakeholder input;

(g) allocate the necessary resources to implement new auction design features in manageable steps; and

(h) monitor and identify unforeseen consequences arising from new auction design features.

77. There are only three planned auctions (December 2019, June 2020 and December 2020) before the IESO undertakes the auction for the critical summer 2023 period. This provides for limited opportunities for the IESO to execute, learn from and evolve the TCA prior to 2023. The IESO, as the Province's reliability authority, is not willing to forgo the important opportunities, experience and learnings that these auctions, each with a year long commitment period, provides and which are critical to implementing a capacity auction mechanism to prudently and cost-effectively address Ontario's future capacity needs.

PART VII - THE IMPLEMENTATION OF THE TCA

A. When did the IESO announce its decision to proceed with the TCA?

78. On January 28, 2019, Peter Gregg, the president and CEO of the IESO, announced that the IESO's plan to expand the DRA to include generators in order to meet immediate resource adequacy needs in Ontario:

> This transition to a capacity auction will start to take shape later this year. As you know, in September we produced a new planning report which indicated a potential capacity gap emerging in 2023. This gap would emerge at a time when Pickering units are closing, as nuclear refurbishments are underway and as some of our generation contracts expire.
>
> While the forecasted gap is relatively small at the moment, our ability to continue to rely on existing resources such as conservation, could affect both the timing and the size of any potential gap.
>
> …[W]e expect to have a clearer picture of our more immediate capacity needs in the third quarter of this year.
>
> We will meet those capacity needs by leveraging the competitive mechanisms we have in place right now such as the annual demand response auction.
>
> […]
>
> In December, we will run an auction to meet capacity needs for 2020. Our goal is to have that auction and subsequent auctions build on the current demand response auction including allowing more resource types to compete. This would provide generators whose contracts are expiring over the next few years an opportunity to compete in our electricity market and help meet emerging capacity needs. It is a staged approach to a much more competitive marketplace … one that we at the IESO and others are striving for. It allows us to realize efficiency, competition and transparency … the key principles of our market renewal efforts – as quickly as possible.

> It's also a sensible approach, allowing both the IESO and market participants to continue to learn and improve our processes as capacity needs increase[19].

B. What stakeholder engagement did the IESO undertake on the TCA?

79. In February 2019, the DRWG convened to discuss the IESO's plan to evolve the DRA to meet Ontario's capacity needs after 2019. At this time, some DRWG members renewed their interest in DR resources receiving utilization or energy payments. The IESO agreed to further consider this issue.[20]

80. In late February 2019, the IESO initiated a stakeholder engagement to inform IESO decision-making in the design and the implementation of the TCA. The first TCA engagement session was held on March 7, 2019 and included representation from generators, consumers, DR resources and other interested stakeholders. At this meeting, the IESO introduced its "Stakeholder Engagement Plan", which set out the following objectives:

(a) understand the changes involved in the development of the TCA;

(b) understand how proposed changes to the DRA may affect stakeholders; and

(c) gather stakeholder feedback on any significant issues and potential solutions associated with the proposed design features[21] (pp. 16-19).

81. Most participants in the stakeholder engagement were generally supportive of the decision to transition the DRA to the TCA, however, some DR representatives, including AMPCO, objected to launching the TCA without first resolving the issue of energy payments for DR resources. AMPCO and other DR representatives said DR participants would be at a competitive disadvantage vis-à-vis generators in the TCA if they were not entitled to energy payments.

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[19] Attached at **Tab "20"** is *Remarks by Peter Gregg at Ontario Energy Network Luncheon*, dated January 28, 2019, pp. 8-9.

[20] Attached at **Tab "21"** is *Demand Response Working Group Meeting Notes for February 12, 2019*, dated February 12, 2019, p. 11.

[21] Attached at **Tab "22"** is *Meeting Ontario's Capacity Needs*, "Evolving the DR Auction to Transitional Capacity Auction", dated March 7, 2019.

82. The IESO advised participants in the stakeholder engagement that the IESO intended to proceed with the TCA in December 2019, which would serve as an important learning experience for the IESO and market participants in preparation for the 2023 capacity gap, including allowing for price discoverability. The IESO, however, advised stakeholders that the issue of energy payments would be further considered as part of DRWG, including prioritizing the issue as part of the 2019 DRWG Work Plan, and that the IESO would follow up on the Navigant Paper and consider a "made-in-Ontario rationale supported by a good business case" [22]

83. In May 2019, The IESO posted the draft TCA design documents and draft market rule amendments, which were thereafter discussed by stakeholders at a stakeholder engagement session on May 22, 2019.

C. How else did the IESO respond to AMPCO and other DR representatives concerns?

84. In response to AMPCO's and other DR representatives' concerned about energy payments, the IESO decided to commence a separate stakeholder engagement initiative entitled *Energy Payments for Economic Activation of Demand Response Resources* (**"*Energy Payments Stakeholder Engagement*"**). The IESO commissioned a third-party consultant, Brattle Group, to support the research and analysis and sought stakeholder feedback on the inputs and outputs of third party research and analysis to inform the IESO's decision on the energy payment issue. This engagement and the Brattle study will follow up on some of the important matters identified for further consideration in the Navigant Paper.

85. On October 10, 2019, IESO issued the proposed reference question for consideration in the Energy Payments Stakeholder Engagement – "Should demand response resources receive energy payments when they are activated in-market?" (p. 17) – followed by the proposed scope for the engagement and associated Brattle third party study:

(a) What is the relevant Ontario context and history?

[22] Attached at **Tab "23"** is *Demand Response Working Group – Meeting Notes, dated April 25, 2019*, pp. 4, 11.

(b) What are the economic first principles that drive the activation decision for demand response resources?

(c) How are in-market activations compensated in other jurisdictions and what are the key takeaways for Ontario?

(d) If compensation is provided, what could the compensation model look like in Ontario?

(e) What are the benefits, risks, and implications of a) the status quo, and b) providing DR with energy payments in the near and longer terms?[23]

86. Stakeholders were invited to provide written feedback by October 25, 2019 on the proposed study scope which will inform the final study scope, which the IESO intends to publish in December 2019. AMPCO is participating in this engagement and provided input on the final study scope.

87. The IESO anticipates that the Brattle study will be completed by Q1 of 2020 and the IESO is targeting June 2020 for its rationale and final decision on energy payments for DR resources. The IESO will then commence the market rule amendment process for any changes that are needed to implement the decision.

88. The IESO does not have an estimated timeline as to when any necessary market rule amendments could be put in place to implement its final decision on the energy payments. The timeline would, among other things, depend on the findings of the study and the scope of implementation.

PART VIII - THE ADOPTION OF THE AMENDMENT

A. What was the recommendation of the Technical Panel on the Amendment?

89. On June 18, 2019, the proposed Amendments were submitted to the Technical Panel for review and comment. At the Technical Panel's meeting, on June 25, 2019, the Technical Panel voted to submit the proposed Amendments for stakeholder review and comment.

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[23] Attached at **Tab "24"** is *Energy Payments for Economic Activations of DR Resources*, dated October 10, 2019, pp 23-24.

90. AMPCO, along with the Advanced Energy Management Alliance ("**AEMA**") submitted a joint legal brief[24] that referenced FERC Order 745 and argued that the failure to compensate DR resources with energy payments in a manner equivalent to compensation provided to generation resources for similar services is unjust and unreasonable, unjustly discriminatory, and anti-competitive. The brief further argued that there exists "no rationale for implementing the TCA prior to the resolution of the issue of just and reasonable compensation for DR resources...."

91. Following further stakeholder review and feedback, the proposed Amendments were submitted to the Technical Panel on August 6, 2019. On August 13, 2019, the Technical Panel voted 11-1 to recommend the proposed Amendments for consideration to the IESO Board.[25] Three of the four consumer representatives on the Technical Panel voted in favour of recommending the Amendment.

92. The Technical Panel recommended the Amendments for approval by the IESO Board for reasons, which included the following:

(a) more competition in the TCA, which will put downward pressure on auction clearing prices and will benefit consumers;

(b) supports the development of a reliable capacity market to address future resource adequacy needs;

(c) implementing the TCA in phases, and making changes and accommodations in the future is a helpful step to gaining experience and developing an efficient and competitive electricity market;

(d) TCA helps to ensure that the power system is adequately prepared to meet future needs by providing additional mechanisms to address capacity and energy requirements;

(e) due consideration will be given to DR resource's concerns about fair and reasonable compensation as part of the planned study;

[24] Attached as **Tab "25"** is AEMA/AMPCO Joint Brief, "IESO Proposed Capacity Auctions and Demand Response Resource", dated July 2019.

[25] Attached as **Tab "26"** is the *Technical Panel Rationale*, dated August 13, 2019.

(f) providing energy payments to economic activations to DR resources is a wider market issue that will require more consultation has implications for the entire design of Ontario's electricity (energy and capacity) market; and it is It is not worth holding up TCA for this;

(g) the issue of energy payments for DR resources' is not-material because economic activations have historically been infrequent, and are projected to be infrequent in the future;

(h) TCA is a first step toward enabling competition to provide capacity;

(i) TCA is a prudent approach to maximizing future participation in advance of more significant capacity gap emerging; and

(j) TCA broadens participation while retaining features and functionality required for participation by HDR and dispatchable loads.

B. What were the IESO Board's reasons for adopting the Amendment?

93. As noted above, the Amendment was adopted by the IESO Board at its meeting of August 28, 2019.[26] The IESO Board provided reasons for its decision (the "**Reasons**").[27]

94. The Reasons state that the IESO Board reviewed the market rule amendment materials, including the positions of stakeholders and issues raised during the market rule amendment process, and decided to adopt the Amendment with an effective date of October 15, 2019.

95. The IESO Board identified the following reasons for adopting the Amendment:

(a) The Amendment is the first phase in evolving the DRA into a more competitive capacity acquisition mechanism that includes new resource types. This allows for increased competition in the acquisition of capacity for the benefit of Ontario customers.

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[26]Attached at **Tab "27"** is the Resolution of the IESO Board, dated August 28, 2019.

[27] Attached at **Tab "28"** are the Reasons of the IESO Board in Respect of an Amendment to the Market Rules, dated August 28, 2019 (the ***"Reasons"***).

(b) The Amendment enables the IESO to begin implementing the TCA in a phased approach in order to be ready to address forecasted capacity needs in Ontario. The implementation of the first phase of the TCA will enable important experience and learnings with respect to integrating and administering new resource types in the Ontario capacity market sufficiently in advance of more significant capacity needs, currently projected to arise in the 2023 timeframe. A phased approach will reduce risk, while ensuring continued evolution of the market through the phased inclusion of new resources. This is a more prudent approach than attempting to implement a new capacity auction mechanism just prior to the time when there is a more significant capacity need.

(c) The Amendment enables non-committed dispatchable generators to participate in the TCA alongside dispatchable loads and hourly demand response resources. The Amendment provides an important opportunity for existing non-committed generators coming off contract to compete to provide reliability services, in this case capacity. In the absence of this opportunity to compete, these generators may choose to wind down their operations to the potential detriment of Ontario reliability and the interests of Ontario customers.

96. In its Reasons, the IESO Board specifically addressed the position of AMPCO that the Amendment unjustly discriminates against demand response resources. The Board noted that AMPCO's position "relies heavily" on FERC Order 745 which requires energy payments to demand response resources when they are dispatched subject to the condition that they meet a "net benefit requirement." The IESO Board observed that FERC Order 745 is not determinative because:

(a) while FERC Order 745 is a relevant consideration, it is not binding in Ontario;

(b) it is unclear whether the net benefit requirement applies in Ontario, given the differences in Ontario's market design;

(c) the IESO has committed to completing an independent study to determine whether there would be a net benefit to Ontario consumers if

demand response resources receive energy payments for economic activations; and

(d) the energy payment issue is not material because economic activations in the DRA have historically occurred in very limited circumstances and are not expected to be a material consideration for the December 2019 auction.

97. The IESO Board concluded that implementing the Amendment was a prudent decision and that delaying the Amendment until the study is complete would be detrimental to the market overall, as it would "delay the introduction of increased competition, create an unnecessary delay in the phased approach to developing the auction in advance of substantial future capacity needs, and risk failing to retain access to existing generation assets coming off contract." [28]

98. The IESO Board also noted that the Technical Panel recommended the Amendment in a vote of 11-1 and that in respect of a process issue related to the AEMA/AMPCO joint brief, "exercised its discretion on an informed and reasonable basis."[29]

PART IX - RESPONSE TO AMPCO'S EVIDENCE

A. What is the IESO's response to Mr. Anderson's statements about the IESO proposing that participants in the DRA include "work around" payments in their bids?

99. The IESO does not know what Mr. Anderson is referring to in this statement. It is up to a DRA participants to determine their auction bid prices, including what costs they factor into their bid prices.

B. Why does the IESO say the impact of the Amendment on DR Resources is not material?

100. As noted above, DRA participants have historically been rarely activated in the energy market because their price bids have been far excess of the HOEP.

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[28] *Reasons,* p. 4.

[29] *Ibid*, p. 5.

101. The IESO does not expect the likelihood of economic dispatch to materially increase in the commitment period under the December 2019 auction (May 1, 2020 to April 30, 2021). There has been no material change in the target capacity for the December 2019 commitment period (675 MW for summer and winter commitment periods) as compared to the December 2018 commitment period (611 MW for summer and 606 MW for winter).[30] The total target capacity is negligible in the context of total system need.

102. As a result, the IESO does not anticipate any activations of HDR resources during the December 2019 commitment period (HDR resources have constituted the significant majority of participants in the DRA). The IESO also anticipates infrequent activations of dispatchable loads during the December 2019 commitment period.

103. Given this low probability of DR resource activation, the inclusion of a work around payment should have no material impact on DR auction offers for the December 2019 commitment period.

104. In the IESO's view, there is no justifiable rationale for DR resources participating in the TCA to include any work around payments in their bids. The amount of any work around should reflect both the costs of being activated and the very low likelihood of activation. The IESO has not been presented with any economic analysis to the contrary, and, in fact, AMPCO's answers to Board staff's interrogatories confirm the IESO's views (see AMCPO's interrogatory response to Board Staff's interrogatory No. 1).

C. Would energy payments increase the likelihood of activations of DR resources under the TCA?

105. The IESO does not expect any energy payments to be material in the December 2019 commitment period. Therefore, the IESO does not expect that the availability of an energy payment would influence frequency of activations of DR resources. As Navigant states in section 3.1.5 of the Navigant Paper, "[l]arge commercial and industrial

[30] Attached as **Tab "29"** is *Demand Response Auction Pre-Auction Reports*, dated September 26, 2019.

customers with a high value of lost load are not likely to change their bids into the energy market because of utilization payments".[31]

D. Does the IESO have a view on the applicability of FERC "net benefit test" in Ontario?

106. No. This is a complex issue, which as noted by Navigant, has to consider the unique aspects of the Ontario market. The IESO has not yet made a final decision on the appropriateness and outcome of the net benefits test in Ontario, which is why the IESO is in the process of engaging with stakeholders and studying this issue as part of the Energy Payments Stakeholder Engagement.

107. That said, the only Ontario-specific analysis available is from Navigant who concluded that "more DR activations (as a result of bidding into the market at prices lower than traditional generators) would not actually lead to reduced cost to consumers since generators have their compensation guaranteed."[32] In other words, any reductions in the IESO market price may simply be offset by out of market Global Adjustment payments.

E. Will the IESO consider energy payments for DR resources?

108. Yes. While DR resources will not be entitled to receive energy payments if activated under the TCA during the December 2019 commitment period, the IESO has not made a final determination on the issue and will not do so until the conclusion of the Energy Payments Stakeholder Engagement. Following the conclusion of this engagement and issuance of the Brattle study, the IESO will make a final determination, including initiating any necessary market rule amendments to provide for energy payments to DR resources.

F. Why won't the IESO delay the TCA until it has resolved the issue of energy payments for DR resources?

109. In summary and as stated above:

[31] *Navigant Paper*, at 3.1.5

[32] *Navigant Paper*, at 3.2.

(a) It is the IESO's judgment as the province's reliability and planning authority that it is prudent to proceed now with the TCA in an incremental and phased manner and that there are real reliability and cost risks to delaying and not proceeding in this manner. These risks include losing the opportunities for the IESO and TCA participants to learn and adapt from a series of TCA auctions, as well as risking the loss of existing off contract generation facilities that may be important and cost-effective for the purpose of addressing the 2023 capacity gap in future capacity needs.

(b) AMPCO does not object to the TCA. It objects to commencing the TCA without changing the market rules to provide for energy payments to loads. This would be a major change to Ontario's electricity market design and it is the IESO's opinion that this sort of fundamental change should not be made without broad consultation and necessary study and analysis. FERC Order 745 is a relevant consideration but it is not binding in Ontario and, as the Navigant Paper makes clear, there are differences in Ontario's hybrid market and there are real doubts as to whether energy payments to DR resources would result in net benefits as conceived by FERC. This is why the IESO is undertaking the current stakeholder engagement on energy payments and third-party study, which the IESO is prioritizing and will result in an IESO final recommendation by the end of Q2 2020.

(c) AMPCO's members' interests are not determinative. The IESO, in accordance with its statutory mandate, must consider system reliability and the broader interests of other market participants and consumers. These considerations, as noted, weigh heavily in favour of proceeding with the TCA without delay. That being said, even if the IESO were to more narrowly focus on the interests of AMPCO members and other DR resources, there is no evidence that they will be materially harmed by proceeding with the TCA. The IESO has not seen any evidence from AMPCO that its members or other DR participants will be harmed. Moreover, AMPCO's assertions that DR participants will be competitively disadvantaged in the TCA auction is contradicted by the fact that DR

resources have rarely been activated in the energy market and the IESO does not anticipate any material change in this respect over the December 2019 TCA commitment period.

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