

February 12, 2020

Independent Electricity System Operator
1600-120 Adelaide Street West
Toronto, ON
M5H 1T1

Via email to engagement@ieso.ca

Re: Exploring Expanded DER Participation in the IESO-Administered Markets

The Power Workers' Union ("PWU") represents a large portion of the employees working in Ontario's electricity industry. Attached please find a list of PWU employers.

The PWU appreciates the opportunity to provide input on the first of the Innovation and Sector Evolution White Paper Series papers titled "*Exploring Expanded DER Participation in the IESO-Administered Markets: Part 2: Options and Considerations for Enabling Distributed Energy Resource Participation*". The PWU is a strong supporter and advocate for the prudent and rational reform of Ontario's electricity sector and recognizes the importance of low-cost energy to the competitiveness of Ontario's economic sectors.

The PWU believes that IESO processes and initiatives should deliver energy at the lowest reasonable cost while stimulating job creation and growing the province's gross domestic product (GDP). We are respectfully submitting our detailed observations and recommendations.

We hope you will find the PWU's comments useful.

Yours very truly,

Mel Hyatt
President

Encl.

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List of PWU Employers

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AMEC Nuclear Safety Solutions
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Westario Power

Options and Considerations for Enabling DER Participation

The Power Workers' Union (PWU) is pleased to submit comments and recommendations to the Independent Electricity System Operator (IESO) regarding the second part of the Innovation and Sector Evolution White Paper Series papers titled "*Exploring Expanded Distributed Energy Resources (DER) Participation in the IESO-Administered Markets: Part 2: Options and Considerations for Enabling DER Participation*". These IESO papers are intended to create a shared, fact-based understanding of the issues impacting the evolution of Ontario's electricity system. The PWU is a strong supporter and advocate for the prudent and rational reform of Ontario's electricity sector and recognizes the importance of planning for low-cost energy solutions that enhance the competitiveness of Ontario's economic sectors.

In the first part of the series on DER participation, the IESO examined the existing barriers to DER participation in the IESO Administered Markets (IAM). In November, the PWU developed a response to the first part of this series, but regrettably, that submission was unintentionally not submitted to the IESO. It is attached as Appendix A for consideration by the IESO.

The PWU's November submission (Appendix A) made five broad recommendations regarding the IESO's first white paper. The recommendations are as follows:

1. Quantify the degree to which customer preference vs. policies are driving DER adoption;
2. Establish that DER is truly the lowest total system cost solution to meet requirements;
 - The IESO has indicated they will be looking at distribution system impacts on cost and reliability through the interoperability design option in this second white paper. This partially addresses our concern with respect to total system cost. The PWU recommends extending the analyses to include total system level impacts on cost and reliability.
3. Quantify the level of DER adoption that would justify the system upgrades needed to accommodate DER and to "eliminate barriers";
4. Consider what incremental value small DERs would provide to the system were barriers removed; and,
5. Move prudently with IAM reforms that accommodate DER.

In the second part of this series, the IESO explores potential options and considerations to address the identified barriers that could be considered in future market design work. The PWU makes one recommendation:

System Impacts of Increased Aggregation and/or Smaller DER Should be Quantified

Many of the proposed design options in the IESO's second white paper investigate how to enhance and/or increase aggregation of DER. Aggregation could impose system impacts and increase total system costs for ratepayers. Some of these potential cost impacts have been identified by the IESO for aggregation participation models and include:

- Reliability risks depending on the location in the system of aggregation;
- More co-ordination with LDCs required to ensure reliability and feasibility of dispatch;
- Negative impacts to the distribution grid;
- LDC visibility and control over constituent resources within aggregations;

- Increased co-ordination of IESO system that may be done manually (initially) or automatically (future);
- Real-time scheduling risk requiring more manual intervention; and,
- Increased information sharing to be balanced with availability of IESO resources.

The IESO should consider the impacts of increased DER aggregation to ensure that the cost of DER participation is fully characterized. Integrating a few small DERs into the system is not expected to impose significant costs, however large-scale integration could have large cost impacts on the system. For example, the IESO is looking to increase the visibility of existing embedded generation to allow better forecasting and optimization of dispatch. This suggests that the aggregated behaviour of several small DERs could impact system cost.

Similarly, the benefits of DERs and aggregation should be quantified, such as helping meet system peak needs. However, benefits may be a function of DER penetration, where larger penetration could yield diminishing returns. Solar for example, has a declining capacity credit as penetration increases and thus large levels of solar DER penetration and aggregation could yield decreasing benefits in meeting system peak needs.¹

The IESO should only be investing in infrastructure to support DER participation, where that infrastructure enables a positive cost-benefit system benefit. If the benefits of aggregation do not outweigh the costs, the IESO should not encourage investments to allow more DER participation.

Concluding Remarks:

The PWU has a successful track record of working with others in collaborative partnerships. We look forward to continuing to work with the IESO and other energy stakeholders to advance innovation across Ontario's electricity system. The PWU is committed to the following principles: Create opportunities for sustainable, high-pay, high-skill jobs; ensure reliable, affordable electricity; build economic growth for Ontario's communities; and, promote intelligent reform of Ontario's energy policy.

We believe these recommendations are consistent with, and supportive of the objectives for supplying low-cost and reliable electricity in Ontario. The PWU looks forward to discussing these comments in greater detail at the IESO's convenience.

¹ University of Calgary, "Solar Power Capacity Evaluation – A Review", 2018

Appendix A

Previous PWU Submission on IESO Exploring Expanded DER Participation in the IESO-Administered Markets Submission

The Power Workers' Union (PWU) is pleased to submit comments and recommendations to the Independent Electricity System Operator (IESO) regarding the first of the Innovation and Sector Evolution White Paper Series papers titled "*Exploring Expanded DER Participation in the IESO-Administered Markets*". The PWU is a strong supporter and advocate for the prudent and rational reform of Ontario's electricity sector and recognizes the importance of planning for low-cost energy solutions that enhance the competitiveness of Ontario's economic sectors.

The IESO is currently developing and releasing a series of Innovation and Sector Evolution White Papers. It intends these papers to form a shared, fact-based understanding of issues impacting the evolution of Ontario's electricity system. The first of these papers sets out conceptual models for how distributed energy resources (DERs), such as demand response, can participate in IESO's markets today, and identifies the range of options for how this participation could be expanded. It also provides a working definition for DERs, offers an overview of related efforts in other jurisdictions, and identifies barriers that may limit DER participation in the IESO-administered markets (IAMs). The IESO is seeking input from stakeholders on the barriers it has identified to DER participation in the IAMs, their significance, and impact on DER providers, as well as general comments and feedback.

This white paper comes at a time when the opportunities and challenges presented by DER growth are being tackled in jurisdictions across North America. As the IESO notes, regional transmission operators (RTOs) and independent system operators (ISOs) in several regions of the U.S. are addressing the growth of DERs. Ontario is no stranger to DER either: incentives such as the Feed-in-Tariff (FIT) program, the Green Energy Investment Agreement (GEIA) and Net Metering resulted in over 200 MW of new solar DER being installed in Ontario annually from 2017 to 2019.² Most of these programs are no longer in place. As a result, growth in renewable DER penetration in Ontario is forecasted to decline significantly in coming years.

The PWU believes that given these circumstances, the IESO should undertake the following before expanding DER participation in the IAMs:

1. Quantify the degree to which customer preference vs. policies are driving DER adoption;
2. Establish that DER is truly the lowest total system cost solution to meet its requirements;
3. Quantify the level of DER adoption that would justify the system upgrades needed to accommodate DER and to "eliminate barriers";
4. Consider what incremental value small DERs would provide to the system were barriers removed; and,
5. Move prudently with IAM reforms that accommodate DER.

² Market Analysis of Ontario's Renewable Energy Sector. Compass Renewable Energy Consulting Inc., June 30 2017, for the Ontario Ministry of Energy.

Recommendation 1: Quantify the degree to which customer preference vs. policies are driving DER adoption.

The IESO's white paper indicates that DER adoption is increasingly being driven by customer preference, while acknowledging that policy incentives have driven much of Ontario's DER adoption to date. The PWU is skeptical of the former and considers the latter to be the real driver. To better characterize the future of DER in Ontario, the IESO should quantify the degree to which these two factors are influencing DER adoption here.

- a. Customer driven preference for DER is not clear:** The IESO claims DER adoption is customer-driven, either for a specific type of generation (e.g. community solar energy) or for increased reliability (e.g. backup power). At a recent Ontario Energy Board (OEB) consultation, the Canadian Manufacturers and Exporters (CME) stated that it does not know who these customers are and was clear that its membership simply wants low-cost power.³ The Association of Major Power Consumers (AMPCO) verbally supported the CMEs commentary at the stakeholder meeting. An unintended consequence of Ontario's Industrial Conservation Initiative (ICI) is that incenting Behind the Meter (BTM) solutions is driving up costs for others—this is policy, not customer driven. It is noteworthy that most Class A electricity consumers eligible for the ICI are CME or AMPCO members. The CME's submission to the Ministry of Energy, Northern Development and Mines (MENDM) recommended that the ICI should be grandfathered and replaced by more effective policies for encouraging innovation and jobs in Ontario.⁴
- b. DER adoption is driven by Provincial policy:** The IESO recognizes that provincial policies have driven adoption of DERs in Ontario. The policies most responsible for DER adoption include the FIT program, the ICI, and net metering. The most impactful policy programs supporting DERs have either been recently cancelled, or are the subject of increasing skepticism.

FIT: The cost of the FIT program and impact on electricity prices led to a crisis in Ontario that became a central issue in the last provincial election. The FIT program overbuilt wind and solar resources to the extent that 19% of grid connected supplies are curtailed.⁵ This program has already been cancelled, bringing to a halt the largest motivator for DER introduction.⁶

ICI: The ICI was originally designed to provide a level playing field for large trade-exposed industrial companies in Ontario. Unfortunately, with the advent of DER technologies, this has become a very high cost program that benefits a few at the expense of cost shifting towards the many.⁷ The efficacy of this program has been criticized by the OEB's Market Surveillance Panel, and, as mentioned above, the group that leverages it the most, has recommended grandfathering the program.⁸

Net Metering: Net metering continues to drive DER adoption because it underpins the viability of rooftop solar.⁹ However, its use is now receiving more scrutiny in jurisdictions such as, New York,

³ CME, Response to OEB Utility Remuneration and Responding to DER Consultation, Sept. 17, 2019.

⁴ CME, Ontario MENDM Industrial Rate Consultation Submission, 2019.

⁵ IESO, Year-end Electrical Data.

⁶ Compass Renewable Energy Consulting Inc., "Market Analysis of Ontario's Renewable Energy Sector", 2017.

⁷ OEB Market Surveillance Panel, "The Industrial Conservation Initiative: Evaluating its Impact and Potential Alternative Approaches", 2018.

⁸ CME, Ontario MENDM Industrial Rate Consultation Submission, 2019.

⁹ Compass Renewable Energy Consulting Inc., "Market Analysis of Ontario's Renewable Energy Sector", 2017.

Saskatchewan, and Hawaii for failing to appropriately coordinate DER deployment with system benefits.^{10,11,12}

NERSC Report: The IESO's Non-Emitting Resource Sub-Committee (NERSC) commissioned a study to evaluate the viability of DER participating in the IAMs and concluded that rooftop solar and distributed batteries, representing the majority of BTM installed capacity, are not economically viable without subsidies.¹³

Given these circumstances, it is important that the IESO quantify the degree to which consumer and policy factors are driving the adoption of DER. If policy-driven DER demand is expected to evaporate with future policy changes, the time and resources required to accommodate DERs in the IAM should be reevaluated.

Recommendation 2: Establish that DER is truly the lowest total system cost solution to meet its requirements.

The white paper contains very little discussion about the potential costs of DER to the total system. While benefits may exist, they may not be enough to outweigh the cost of adding further DERs to the system. Before expending resources on accommodating DERs, the IESO should clearly establish that the approach is the lowest system cost solution to meet its goals. Two key factors that should be addressed: the system needs or requirements that must be satisfied; and, the literature that suggests there are many consequential costs that are typically overlooked.

- a. **Be clear about what requirements DERs are addressing.** Accommodating DERs should be a means to an end, not an end in itself. In order to better frame the discussion, the IESO should state the requirements DERs are meant to address. Once these requirements are identified, DERs can be compared against other possible solutions on a cost-benefit basis. The question then becomes whether or not DERs provide the lowest system cost solution to meet the requirements identified. We believe that taking this comparative, requirements-based approach would be the best way for the IESO to consider both the benefits of DERs and that total system costs are minimized. This issue was raised by the PWU in its submission on the ICA.¹⁴ The system has demand for baseload, intermediate and peaking/reserve supplies. The characteristics of DER to address these needs should be assessed, and any consequential impacts to requirements on other supply sources should be quantified.
- b. **DERs have the potential to increase total system costs.** The IESO's white paper claims that DERs can offer "cost effective and reliable energy solutions" competitive with traditional resources. However, research suggests that increased market penetration of DERs, such as solar generation, can cause significant increases in distribution system costs.¹⁵ These results are concerning given that much of the present and future DER in Ontario is made up of such solar resources. Other research has shown that DER consisting of storage coupled with wind and solar would present far higher generation costs to Ontario than distributed energy storage (DES) solutions coupled with other resources such as nuclear (Figure 1). It appears more likely that DERs will increase total system costs rather than lowering them. As mentioned earlier, the NERSC report points to very little DER adoption in the absence of subsidies or out of market payments. Instead it indicates that there is a substantial role for

¹⁰ Lexology, "New York PSC Adopts Order Replacing Net Metering With Value Stack Compensation for Distributed Generators", 2017.

¹¹ Global News, "New SaskPower Net Metering Program Comes Online Nov. 1", October 15, 2019.

¹² Green Tech Media, "Hawaii's Trailblazing Solar Market Continues to Struggle Without Net Metering" 2019.

¹³ IESO NERSC, "Participation in Ontario's Future Electricity Markets", 2019.

¹⁴ PWU submission to IESO on the Incremental Capacity Auction High Level Design Statement, 2019.

¹⁵ The Future of Solar Energy: An Interdisciplinary MIT Study. Massachusetts Institute of Technology, 2015.

natural gas in Ontario’s future market, especially absent a higher carbon price.¹⁶ The PWU submission on the NERSC Report further identified that the assumed analytical basis overstated the likelihood of DER adoption given the demand forecast for Ontario.¹⁷ These findings suggest that DERs are unlikely to emerge in the near term as cost effective solutions to Ontario’s energy needs.

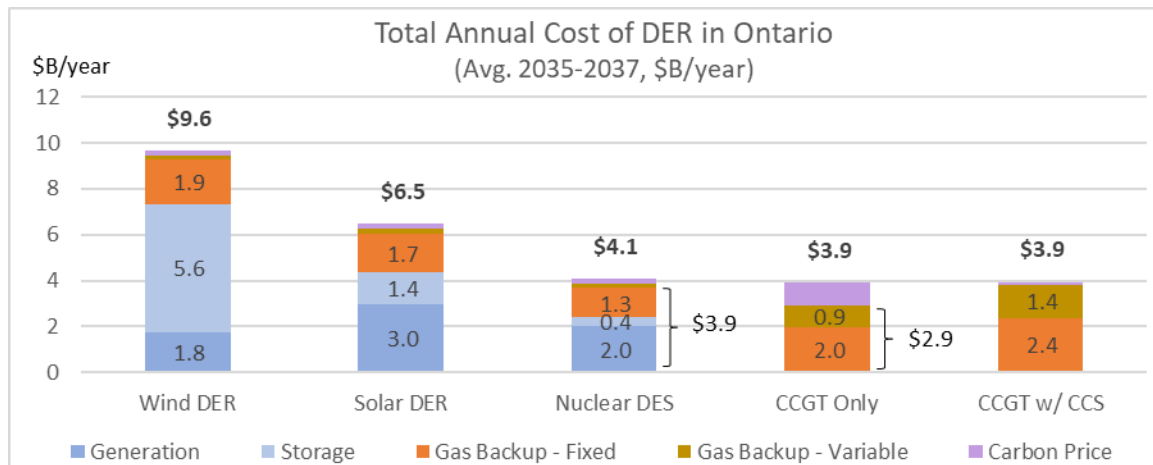


Figure 1 Annual Cost of Meeting Ontario's Capacity Gap 2035

Source: Council for Clean and Reliable Energy, DES is distributed energy storage, CCGT refers to combined cycle gas turbines, CCS to carbon capture and sequestration, carbon price illustrated is \$115/tonne

Recommendation 3: Quantify the level of DER adoption that would justify the system upgrades needed to accommodate DER and to “eliminate barriers”.

At present it is unclear what volume of DER adoption would justify the cost of the system upgrades under consideration by IESO. Our analysis suggests that a low volume of new DERs would unlikely justify the costs. In addition, IESO should determine if the value to the system provided by the expected DER adoption outweighs the cost of the system upgrades.

- a. **Inherent value of DER adoption is not a given.** The IESO suggests that DER participation on the IAMs could provide distribution and environmental benefits, increase resiliency, and generate greater competition. These benefits are premised on an implicit assumption that any level of DER adoption provides a justifiable basis for system upgrades. As previously demonstrated in this submission, it is not clear that the DER system costs outweigh their benefits. Even if DERs do turn out to provide a net benefit, system upgrades often entail significant costs. In order to determine whether these upgrades are justifiable, the threshold of DER adoption must be quantified.
- b. **It is not clear what additional incremental value of existing DERs will be enabled by the elimination of the barriers identified.** The IESO identified several existing requirements for IAM participation that may act as “barriers” to DER operators, with the implication that these requirements may warrant reconsideration. Many of these barriers, such as measurement & verification and rules governing aggregations exist for good reason, and so a substantial benefit to the system must be shown in order to justify their removal. While allowing existing DERs to add greater value to the system may be one possible justification for doing so, this value would need to be quantified. We believe that in order to

¹⁶ IESO NERSC, “Participation in Ontario’s Future Electricity Markets”, 2019.

¹⁷ PWU submission to the IESO on the draft NERSC report, March 18, 2019.

determine that removing these requirements will actually provide a benefit to the system, the IESO should consider what additional incremental value these changes would unlock from existing DER resources, if any.

Recommendation 4: Consider what incremental value small DERs would provide to the system were barriers removed.

The white paper discussed the option of allowing small DERs (less than 1MW) to participate in the IAMs, and the system and rule changes that would be required to accommodate them. There are several issues associated with this option.

- a. **Small DERs are likely just as beneficial BTM as on the IAM.** Small BTM DERs already provide value to the system since customers use them to respond to Time-Of-Use (TOU) pricing signals that have large variability between on-peak and off-peak times. The value to the system results from shifting the load to off peak hours which reduces peak demand and increases the efficiency of Ontario’s nuclear and hydro baseload resources. TOU pricing under the Regulated Pricing Plan (RPP) that is applicable to most Class B customers, varies from 20.8¢/kWh on-peak to 10.1¢/kWh during off-peak hours. This creates an arbitrage difference of 10.7¢/kWh.¹⁸ In contrast, the wholesale market variability is 1.9¢/kWh – on average the HOEP ranges from 3.2¢/kWh at peak hours to 1.3¢/kWh at off-peak hours.¹⁹ The pricing arbitrage benefits to consumers is a factor of ten, and could be higher, if the consumer is not participating in the IAM. In fact, the NERSC Report showed that even in a scenario with wide-scale DER adoption, rooftop solar and distributed battery resources provide similar value whether they are participating in the wholesale market or not.²⁰ This raises an important question—should resources be expended to enable these small DERs to participate in the IAMs, when they provide similar value at the retail level?
- b. **Small DERs may not see the need for aggregation.** The IESO suggests that small DERs may need to aggregate in order to achieve the economies of scale required to offset the costs of participating in the IAM. However, as previously noted, this need may not materialize. While it is possible to achieve some incremental system benefits from optimizing the function of small DERs through aggregation, it is not clear how much benefit can actually be achieved. The IESO should consider what additional value small DERs would achieve from aggregating before investing resources into easing the entry of such aggregations into the market.
- c. **Net value of adding many small DERs to the system is not clear.** The IESO’s white paper, suggests that reducing the minimum size threshold of 1MW for participation in the IAMs to 100 kW may allow more participants in the market than its operational capabilities could handle. This raises questions about the value of increasing the complexity of the system to this degree. We believe it would be worthwhile to get an estimate of how many such participants would actually enter the market. These numbers would help to better inform the increased complexity that could be expected from the entry of small DERs to the IAMs. This in turn would better inform the net cost or benefit small DERs could bring to the system.

¹⁸ OEB, Regulated Price Plan (RPP) Winter TOU Prices November 1, 2019 – October 31, 2020.

¹⁹ IESO, 2012 HOEP Hourly Data (2012 was used because it represents a year when gas was on the margin a majority of the time as it will be after Pickering retires).

²⁰ The Brattle Group, NERSC Phase 2, “Future of Ontario’s Electricity Markets”, 2018.

Recommendation 5: IESO should move prudently with IAM reforms to accommodate DER.

- a. Ontario's past experiments as a first mover in green energy have resulted in high costs to the system, and high rates for consumers.** Far from kickstarting a green industry in the province, the Green Energy Act ballooned electricity prices and harmed Ontario's economy. Just as environmental and green industry groups were touting the value of solar and wind in 2005, there are stakeholders encouraging the speedy accommodation of DERs today. Yet DERs are still a new technology, and adoption carries significant risks. Rather than rushing into DERs, IESO should take the time to evaluate the DER story as it plays out in other jurisdictions. The best way to price DERs is still being sorted out, and policies like net metering are being reconsidered in light of DER-imposed challenges. The province may be better served by exploring smart rate design.
- b. There is no need to rush.** Despite the hype around DER, there is no reason to expect a large increase in adoption any time soon, and therefore little to motivate DER accommodation within the IAMs in the near term. Most existing DERs in Ontario will remain under contract until the late 2020s and beyond, so there is time to deal with these resources. As discussed earlier, potential policy changes may put the brakes on new DER going forward. And while new climate policies may further influence DER adoption, the current federal and provincial Output-Based Pricing System (OBPS) solutions for natural gas, which currently only apply the carbon price to about 20% of the output, guarantee that natural gas will be the generation fuel of choice for some time. IESO has the time to carefully consider what may be appropriate for Ontario's markets.

Concluding Remarks:

The PWU has a successful track record of working with others in collaborative partnerships. We look forward to continuing to work with the IESO and other energy stakeholders to advance innovation across Ontario's electricity system. The PWU is committed to the following principles: Create opportunities for sustainable, high-pay, high-skill jobs; ensure reliable, affordable electricity; build economic growth for Ontario's communities; and, promote intelligent reform of Ontario's energy policy.

We believe these recommendations are consistent with, and supportive of the objectives for supplying low-cost and reliable electricity in Ontario. The PWU looks forward to discussing these comments in greater detail at the IESO's convenience.