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September 16, 2020

Independent Electricity System Operator
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Via email to engagement@ieso.ca

Re: Reliability Standards Review

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 Reliability Standards Review engagement. 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, low-carbon 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,

Jeff Parnell
President

List of PWU Employers

Abraflex (2004) Ltd.
Alectra Utilities
Algoma Power
Aptum
Atlantic Power Corporation - Calstock Power Plant
Atlantic Power Corporation - Kapuskasing Power Plant
Atlantic Power Corporation - Nipigon Power Plant
Atura - Halton Hills Generating Station
Atura - Napanee Generating Station
Atura - Portlands Energy Centre
Atura – Brighton Beach Generating Station
Bracebridge Generation
Brookfield Power Wind Operations
Brookfield Renewable Power - Mississagi Power Trust
Bruce Power Inc.
Canadian Nuclear Laboratories
Cochrane Telecom Services
Compass Group (Bruce NPD)
Comapss Group (Pickering NGS)
Compass Group (Darlington NGS)
Corporation of the County of Brant
Covanta Durham York Renewable Energy Ltd.
Electrical Safety Authority
Elexicon Energy Inc.
Enwave Windsor
EPCOR Electricity Distribution Ontario Inc.
Erth Power Corporation
Erth Holdings Inc
Ethos Energy Inc.
Great Lakes Power (Generation)
Greenfield South Power Corporation
Grimsby Power Incorporated
Halton Hills Hydro Inc.
Hydro One Inc.
Hydro One CSO
Hydro One Sault Ste. Marie
Independent Electricity System Operator
Inergi LP
InnPower
Kinectrics Inc.
Kitchener-Wilmot Hydro Inc.
Lakeland Power Distribution
Laurentis Energy Partners
London Hydro Corporation
Milton Hydro Distribution Inc.
New Horizon System Solutions
Newmarket -Tay/Midland Hydro Ltd.
Nuclear Waste Management Organization
Ontario Power Generation Inc.
Orangeville Hydro Limited
PUC Services
Quality Tree Service
Rogers Communications (Kincardine Cable TV Ltd.)
Sioux Lookout Hydro Inc.
SouthWestern Energy
Synergy North Corporation
Tillsonburg Hydro Inc.
Toronto Hydro
TransAlta Generation Partnership O.H.S.C.
Westario Power

PWU Submission on IESO Reliability Standards Review

September 15, 2020

The Power Workers' Union (PWU) is pleased to submit comments and make recommendations to the Independent Electricity System Operator (IESO) regarding the Reliability Standards Review engagement. 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, low-carbon energy solutions to enhance the competitiveness of Ontario's economy.

The PWU appreciates the efforts of the IESO to better understand reliability standards and eliminate unnecessary requirements, particularly as Ontario begins to enter a period of capacity shortfall. Nevertheless, the PWU is concerned about the impacts that these changes may have on the reliability of Ontario's electricity, in particular those that may increase the province's dependence on non-firm imports for the IESO's resource planning. The inclusion of non-firm imports could very well reduce the capacity requirements of future years, however, there are several factors that could negatively impact the ultimate benefits achieved. The IESO acknowledges that the anticipated benefits of non-firm imports are contingent on regional availability, deliverability, and optimal management of the maintenance-scheduling of Ontario's electricity resources.

The PWU recommends the following actions be taken to ensure a more robust consideration of the potential risks and mitigation options:

1. Assess and evaluate the uncertainties impacting the need for capacity before decisions are made regarding non-firm imports;
2. Consider non-firm imports as part of the reliability assessment only if they reduce the risk to system reliability;
3. Conduct a cost benefit analysis and only include non-firm imports as part of the reliability assessment assuming that they will reduce total system costs;
4. Analyze the real risks to system reliability associated with the intermittency of renewable resources.

Recommendation #1: Understand the uncertainties impacting the need for capacity before decisions are made regarding non-firm imports.

With supply conditions tightening, the IESO sees an opportunity to review and challenge the existing thinking and approach to adequacy assessments. It is important to continually review the implications of such standards. The PWU sees four critical uncertainties with respect to Ontario's future electricity outlook that should be addressed before any decision is made to include non-firm imports in the assessment of reliability standards compliance:

a) Pickering Nuclear Generating Station (PNGS) shutdown and need to replace baseload supply

The closure of PNGS will be a major contributor to the capacity shortfall that is forecast to emerge in the mid-2020s. This closure will mean that Ontario will require new clean baseload electricity and Quebec will have less resources available to export to Ontario. Pickering's closure reduces available peak capacity to support system reliability and also removes 3,000 MW of low-carbon, baseload supply.

Studies also show that imports from Quebec cannot provide reliable, baseload supply and imports available from other jurisdictions will not be from low-carbon electricity sources.[1,2] In addition, the loss of PNGS will impact how much supply Quebec can offer under normal conditions. Quebec has typically imported about 2-2.6 TWh annually from Ontario's undervalued surplus baseload supply at night.[3] Quebec uses this supply to avoid drawing down the capacity that is stored in its hydro reservoirs.

Currently, Ontario's surplus energy also enables Quebec to benefit from pricing arbitrage—Quebec sells this surplus during the day for more than it pays Ontario for the electricity at night. Pickering's closure will eliminate this surplus[4] and Quebec will need to use more of its hydro reservoirs to meet domestic and export obligations. Indeed, Quebec has forecast a supply challenge in the period after Pickering retires.[5] This circumstance directly threatens the availability of non-firm imports going forward.

b) *Increasing Distributed Energy Resources (DER) penetration makes the forecasting of demand more difficult*

During the August IESO engagement meeting, stakeholders noted that the large existent DER deployment in Ontario has made demand forecasting more complex and challenging. In its response, the IESO indicated that it was looking at how DER could impact supply and/or demand. At present, over 4,000 MW of DER is already installed in Ontario.[6] Part of this growth is caused by programs such as the Industrial Conservation Initiative (ICI) which aims to mitigate demand peaks.

This makes it important to better understand how these assets could be more effectively employed. IESO should also understand the implications that are emerging for DER policies going forward, in particular those related to improving, not degrading, system costs and reliability.[7] The IESO needs to better understand the impacts of DER policies on the need for capacity, before assessing the implications of using non-firm imports to help address a capacity shortfall.

c) *Climate change and its impact on weather, emission policy, and demand*

At the August stakeholder session, the IESO noted that their demand uncertainty forecast was based on 31 years of historical data. Stakeholders pointed out that climate change is causing a more rapid shift in weather patterns and increased extreme weather occurrences. These changing weather patterns suggest that future demand conditions may differ significantly from those in previous decades. The IESO has acknowledged the need to consider a more appropriate timeframe of historical data going forward. As well, an analysis of Ontario's emission reduction options has

[1] Strapolec, Renewables and Ontario/Quebec Transmission Interties, 2016
[2] Supply mix forecast from EIA Annual Energy Outlook 2020
[3] Values for recent years are total exports to Quebec based on IESO Intertie Data
[4] IESO, Annual Planning Outlook (APO), 2020
[5] Hydro-Quebec, Portrait des resources énergétiques d'Hydro-Québec, 2019
[6] Energy Transformation Network of Ontario (ETNO), Structural Options for Ontario's Electricity System in a High DER Future, 2019
[7] IESO, Grid-LDC Interoperability Committee Risk Assessment, August 15 2019 identifies several risks that DER introduce to the system

shown that effectively utilizing Ontario's energy assets to reduce emissions could also flatten system demand thereby reducing the need for peak capacity.[8,9]

d) Conservation and its impact on demand peaks

The Ministry of Energy, Northern Development, and Mines (MENDM) is currently reviewing the Conservation and Demand Management (CDM) Framework. This review could result in a new program being in place until 2024. Despite the CDM programs in place over the last decade, IESO noted that grid demand is getting "peakier" due to weather and end uses.[10] A major priority of the CDM review is to find mechanisms to reduce peak demand.[11] The implications of the emerging CDM policies on the need for peak capacity should be understood and clearly reflected in the IESO's resource adequacy forecasts.

The manner in which these uncertainties are addressed will impact the need for, and management of, different kinds of capacity and also have implications for available peak supply. Before decisions are made to redefine reliability standards compliance, these factors must be critically considered in context of the need for, and risks of, entertaining the use of non-firm imports.

Recommendation #2: Consider non-firm imports as part of the reliability assessment, only if they reduce risk to system reliability.

By definition, non-firm imports are not guaranteed to be available when needed. Such a guarantee entails a binding contract or agreement, which are the defining characteristics of firm imports. Non-firm imports have risks that are not present with other forms of generation capacity used for that purpose. The mechanism generally used to accommodate capacity options in resource adequacy forecasting is derating. In the case of non-firm imports, the derating factor will effectively establish how much of the non-firm imports should be treated as firm for the purpose of establishing compliance to the reliability standards. The derating factors are determined by a statistical assessment of several risks, the list of which in the case of non-firm imports would differ substantially from other generation supply types. In turn, this presents additional risks and challenges to reliability standards compliance. Additional derating factors for non-firm imports would include: the presence of intertie capacity constraints; supply constraints of surrounding jurisdictions, types of generation eligible to participate in Ontario's market, fuel supply constraints and security; and the vagaries of real time electricity market physical dispatching settlements. All of these factors should be characterized, analyzed and evaluated.

a) Intertie constraints:

Interties have physical limitations established by their capacity and current usage patterns suggest that they may not be fully available to Ontario.

Ontario has several interties with Quebec and with neighboring U.S. jurisdictions. The Quebec interties are operated effectively at maximum import capacity most days during the daytime and always during periods of peak summer demand. In the winter, Quebec relies on a reverse supply from Ontario and hence non-firm imports from Quebec during the winter are unlikely to be a factor

[8] Strapolec, Emissions and the LTEP Report, 2016
[9] Strapolec, Green Ribbon Panel Report, 2020
[10] IESO, Communication during Reliability Standards Review Engagement, 2020
[11] MENDM, 2021-2024 Conservation and Demand Management Framework Proposal, 2020

in mitigating Ontario's peak capacity needs during those times. Ontario has a single year option to secure 500 MW of summer capacity from Quebec by 2025[12], but Ontario may not need this supply during this period if the recently announced potential life extension of the PNGS receives regulatory approval. Analysis indicates that a firm commitment will require some form of capacity payment to Quebec for the power which Ontario already receives and is paying a premium for.[13,14] Inclusion of non-firm imports from Quebec will not change the amount of electricity that Ontario gets from Quebec. It may only impact the IESO's calculations with respect to reducing the need for capacity and associated cost impacts.

In recent years, Ontario's interties with the U.S. have been running at full export capacity almost 24x7. Part of the energy flowing across those interties, about 3.5 TWh, is wheeled through Ontario from Quebec.[15] The rest is from Ontario's generating assets exporting to the U.S. and these situations have two implications:

- Wheeling energy from Quebec through Ontario effectively reduces the available capacity of both the Quebec and U.S. interties for Ontario's use in support of non-firm assumptions; and
- There are commercial motivations for Ontario's natural gas plants to help supply U.S. needs. This places further limits on the available capacity on U.S. interties that the IESO has for making non-firm assumptions to meet its resource adequacy requirements.

These factors are outside the control of the IESO. It is not clear how much of the energy flowing in and out of Ontario to the U.S. is delivered on a firm basis by Hydro Quebec or Ontario's gas plants. This would have to be determined in order to calculate the required aforementioned derating factors.

b) *Resource adequacy in neighboring jurisdictions:*

The available supply in neighboring jurisdictions during periods of Ontario peak demand is a critical factor for making any assumptions about available non-firm imports. Today, the Northeast Reliability Corporation's (NERC) standards only allow for a jurisdiction to use "firm" imports in their resource adequacy assessments if there is a binding agreement or contract to guarantee those imports. These firm commitments must then also be accounted for by the exporting jurisdiction. This helps assure that the same capacity is not being double-booked by two jurisdictions. By extension then, non-firm imports should only be assumed if assurance exists that there is an overcapacity in the markets where the non-firm imports are assumed to be coming from.

While Quebec is likely to have generation name plate capacity available in the summer, its long-term forecast suggests that sufficient water may not be available in its reservoirs to provide the energy. In addition, Quebec is actively pursuing firm contracts to provide more supply to New England. In the case of Ontario, bordering U.S. jurisdictions are currently net importers from

[12] IESO, Summary of Capacity Sharing Agreement between Ontario and Quebec, 2015
[13] Financial Accountability Office, Electricity Trade Agreement, 2018
[14] Strapolec, Ontario/Quebec Electricity Trade Agreement, 2017
[15] IESO, Ontario-Quebec Interconnection Capability, 2017

Ontario and are undergoing significant supply mix changes that are placing pressure on their own resource adequacy needs.

These factors need to be understood in order to apply derating and again, these factors are outside the IESO's control.

c) *Emissions:*

Another important consideration for Ontario's IESO should be the type of supply available from the U.S. and its associated emissions profile. Currently, the IESO's market reform activities would prohibit Ontario from accepting coal generation capacity from other jurisdictions.[16] During peak times when supply conditions are tight, coal will inevitably be on the margin in neighboring U.S. jurisdictions for the foreseeable future. If Ontario imported electricity from the U.S. at peak demand times, those jurisdictions will burn more coal causing an increase in emissions in Ontario's airshed. If the coal related restrictions are applied to non-firm imports used for the purpose of resource adequacy calculations, in which coal capacity is not eligible, then there may be no non-firm imports available from the U.S. These are relevant considerations germane to the use of non-firm imports.

d) *Fuel Supply Constraints:*

Typically, tight natural gas fuel supply conditions arise during periods of extreme weather which in turn increase peak demand on the grid. While the IESO has suggested that system peaks between the jurisdictions (i.e. Ontario and its neighbors) may occur at different times, extreme weather conditions usually occur in neighboring jurisdictions at the same time. This increases the demand on natural gas supplies and delivery infrastructure. Ontario competes for this supply in a North American marketplace that is subject to supply/demand price volatility. There are two risk factors of some significance: The closure of PNGS will see Ontario increase its reliance on natural gas fired generation; and, the continuing trend in the U.S. to switch from coal to natural gas for electricity generation.

Two recent events illustrate the risks that are present with a dependence on natural gas generation – the 2014 Polar Vortex and the cold snap of 2017/2018. These events strained fuel delivery infrastructure, and caused natural gas and electricity prices to increase drastically in Ontario and neighboring jurisdictions. In both cases, Ontario was, on paper, in an over capacity scenario, yet no amount of non-firm imports would have helped. In fact, if an allocation for the use of non-firm imports was being used, they would not have been able to be relied upon.

In July 2020, Ontario experienced a heat wave that created the highest demand since 2013.[17] This occurred amidst the pandemic which had caused a 5% decline in demand.[18] Absent the pandemic, Ontario would have run into capacity challenges. If the capacity were reduced due to non-firm import assumptions, these challenges would be exacerbated.

[16] IESO, Proposed December 2020 Capacity Auction Presentation, 2020
[17] July Stakeholder Engagement Opening Address, 2020r
[18] IESO, July 22 Forecasting and Planning Update, 2020

The reliability standards aim to achieve a level that assures that there will be insufficient supply no more often that one day every ten years. The above mentioned three events in the last 5 years shows how important it is to properly assess the capacity needs to meet peak demand. The IESO has no direct influence on available natural gas distribution capacity and natural gas supplies—it is a North American marketplace and delivery network operated by multiple jurisdictions with competing demands for energy.

e) *Market Vagaries:*

Markets add further complexity to assessing the availability of non-firm imports for use in resource adequacy calculations. It was mentioned above that many of the conditions that could impact on the availability of non-firm imports are outside of the IESO's planning control. The mechanisms that drive how and when such non-firm supplies are made available is the energy market. The energy market will function by awarding the marginal supplies to the highest bidder. There is no guarantee that an Ontario bidder will outbid those in neighboring jurisdictions for the right to access that supply in their jurisdictions under extreme demand situations.

All of the above examples amplify the real critical complexities associated with "derating" a non-firm import assumption. As previously noted, irrespective of whether a derating is applied, these non-firm imports may not be available to Ontario at times of peak demand. Should imports be derated to the extent that their contribution is negligible? Will the use of non-firm import increase the risk of non-compliance to reliability standards and result in lack of supply in times of crisis? A fulsome analysis is required to answer these questions.

Recommendation #3: Non-firm imports should only be included in the resource adequacy assessment if they reduce total system costs.

When supply conditions are tight, neighboring jurisdictions are typically exposed to similar circumstances. This helps drive up the marginal costs within regional markets for those jurisdictions. The IESO should demonstrate that relying on non-firm imports during tight supply conditions has a lower cost than securing capacity ahead of time.

Using non-firm imports in resource adequacy reliability calculations reduces the need for contracted capacity and lowers the capacity in Ontario's electricity system. This in turn changes the market conditions under which suppliers bid for energy as supply would be more constrained than otherwise. This constraint puts upward pressure on energy prices, the cost of which would multiply, as it accrues to all suppliers in the market.

It is clear that there is a cost trade-off between the capacity costs avoided by using non-firm imports to meet reliability criteria and increased energy costs. The question becomes whether it is cheaper to pay for capacity ahead of time or to pay the higher market price of energy at the time of need.

The IESO should conduct a cost benefit analysis of these factors, and confirm that the use of non-firm imports will not drive up total system costs.

Recommendation #4: Reconsider how renewables contribute to reliability given the real risk of their supply not being available

Ontario's significant investment in renewable generation requires that the derating factors used for their respective resource adequacy calculations are robust and clearly defined. A better understanding of the "reliability" contributions made by Ontario's renewable energy resources will help inform the definition of Ontario's capacity needs in the same manner as the PWU suggests they will resolve the other concerns raised in this submission, as well as previously raised PWU concerns, e.g., renewables capacity contribution to peak demand.[19] These concerns have parallels to the aforementioned assumption risks for non-firm imports.

Ontario's resource adequacy requirement is an expected loss of load equivalent (LOLE) of less than 0.1 days/year. This means that the risk of having insufficient capacity should be less than 0.027% of the time. As a result, the derating for intermittent renewables should be assessed based on the lowest available capacity that exists for 99.973% of the hours that are coincident with peak demand. An analysis of solar and wind systems compared to Ontario's demand showed that of the top 30 demand hours in each of the last 3 years, both types of generation had multiple hours where they produced little to no generation.[20] This is far less reliable than the 33% and 11% derating factors currently used by the IESO solar and wind, respectively. [21]

This material over-allocation of their reliability assumptions puts Ontario at risk and may partially explain why Ontario faced three extended shortage events in the last 6 years despite notionally being in a surplus capacity situation.

Similar over-allocations on non-firm imports could put Ontario at greater risk than perceived. The IESO should analyze these concerns to help better understand the reliability contributions from renewables and non-firm imports and provide a more reliable estimate of Ontario's resource needs.

Closing

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 strengthen and modernize Ontario's electricity system. The PWU is committed to the following principles: Create opportunities for sustainable, high-pay, high-skill jobs; ensure reliable, affordable, environmentally responsible 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 Ontario's objectives to supply low-cost and reliable electricity for all Ontarians. The PWU looks forward to discussing these comments in greater detail with the IESO and participating in the ongoing planning stakeholder engagements.

[19] PWU, Response to ICA High Level Design, 2019
[20] Strapolec, Distributed Energy Resources in Ontario: A Cost and Implications Assessment, 2018
[21] IESO, 2016 Ontario Planning Outlook, 2016