Addendum to the 2017 Updated Assessment for the Need for the East-West Tie Expansion

Reliability Impacts and the Projected System Costs of a Delay to the Project In-service Date

June 29, 2018

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Introduction

This addendum is in response to a June 14, 2018 request from the Ontario Energy Board ("OEB") to assess the impacts of a delay to the in-service date of a 230 kV double circuit line from Thunder Bay to Wawa (the "E-W Tie Expansion"). Specifically, this addendum addresses the potential reliability impacts of delaying the in-service date of the E-W Tie Expansion beyond 2020 and the projected system costs associated with managing the capacity gap for each of 2020, 2021, 2022, 2023 and 2024.

The IESO continues to recommend an in-service date of 2020 for the E-W Tie Expansion. If the in-service date is delayed beyond 2020, using interim measures to manage the need will result in additional costs and increased risks to system reliability. This addendum identifies the end of 2022 as the in-service date beyond which these risks to system reliability and the associated cost uncertainties are unacceptable.

The potential reliability impacts and costs of a delay to the in-service date of the E-W Tie Expansion can be addressed under the following categories:

- the incremental capacity need in the Northwest and associated cost of temporarily acquiring that capacity until the E-W Tie Expansion is in service;
- the increased energy costs that will be incurred until the new E-W Tie Expansion is in service; and
- the increased transmission losses and associated costs that will be incurred until the new E-W Tie Expansion is in service.

The following sections describe these impacts and costs in further detail.

Capacity Cost

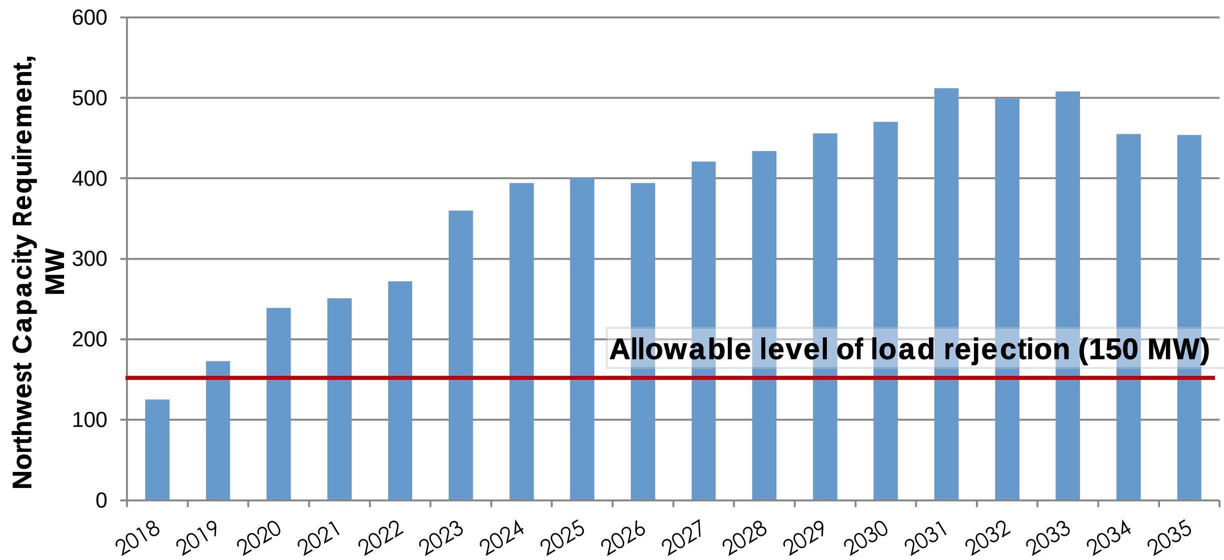
As noted in the 2017 Updated Assessment for the Need for the East-West Tie Expansion ("2017 Update Report"), there is a capacity need which exists prior to the recommended 2020 in-service date. This capacity need can be met on an interim basis by utilizing the existing Northwest Special Protection Scheme[1]. Ontario planning criteria allow for the rejection of 150 MW of load for the loss of the existing East-West Tie line, until new transmission reinforcements come into service, provided load can be restored within 8 hours[2].

[1] The Northwest Special Protection Scheme is an existing Special Protection Scheme ("SPS") that allows for load rejection or cross-tripping of transmission elements (e.g. lines, reactive devices) for a number of contingencies in the Northwest, including the loss of the existing East-West Tie.

[2] Load rejection via the SPS for the loss of the existing East-West Tie is intended to be used only as an interim measure (Ontario Resource and Transmission Assessment Criteria, section 3.4.1, section 7.2).

Figure 1 presents the incremental Northwest capacity need from the 2017 Update Report, as well as the allowable level of load rejection (150 MW). In order to maintain a similar level of reliability as that provided by the E-W Tie Expansion and comply with Ontario planning criteria, the incremental capacity gap above the 150 MW of allowable load rejection would need to be addressed through other interim measures for the duration of any delay.

Figure 1 Expected Incremental Northwest Capacity Requirement under Reference Demand (2017 Update Report)



A number of resource options were considered as potential interim measures to address this incremental capacity need, including demand response, firm imports from Manitoba, and contract extensions with existing resources. These options and applicable considerations are outlined in further detail:

- The 2018 demand response auction cleared 30 MW of demand response in the summer and winter in the Northwest for approximately $80/kW-year. However, the product's availability limits its contribution to meeting the capacity need in the Northwest and the extent to which additional demand response can be acquired in the Northwest on a cost-effective basis is unknown.

- The cost of firm import capability from Manitoba is uncertain; it would not be known until the time of negotiation and the price could be increased by the short commitment period and reduced competition due to the small size of the Northwest market. Currently, the firm import capability from Manitoba is also limited to between 150 – 200 MW[3]. To inform a decision with respect to acquiring firm imports, the cost of a

[3] It should be noted that estimated firm import levels are based on transmission capabilities considering planning criteria, in accordance with applicable reliability criteria, and not real-time operating limits.

firm capacity import from Manitoba would be compared to the cost of acquiring new local generating capacity. The lifetime levelized cost of new local generating capacity in Northern Ontario is approximately $180/kW-year[4].

- There are resources within the Northwest with contracts currently set to expire throughout the 2020-2024 period. Extending contracts for select facilities could be considered as an interim measure. While the contract terms for these facilities are not public, the capacity cost would be compared to the cost of acquiring new local generating capacity. However, there could be a mismatch between how long the IESO would need the facility to run to meet the need and the facility owner's required commitment period for re-acquiring the facility, which could contribute to additional costs.

Based on these considerations, the IESO believes it is reasonable to estimate the capacity cost of addressing a delayed in-service date of the E-W Tie Expansion using the lifetime levelized cost of new local generating capacity in Northern Ontario. A sensitivity range was also applied, with the low end of the range reflective of the recent cost of winter demand response resources in the Northwest and the high end reflecting a 25%[5] uncertainty range on the levelized cost of new local generating capacity. The incremental capacity required and the associated estimated cost for 2020, 2021, 2022, 2023 and 2024 are presented in Table 1.

To the extent the delay extends beyond the end of 2022, the IESO anticipates that the risk of no longer being able to manage the capacity need through interim measures and the cost of managing the associated risk will substantially increase, for the following reasons:

- There is a step change in the capacity need, requiring more capacity to be acquired.
- To fill this capacity gap an increasing number of interim measures would be required, which increases the risk that the IESO may not be able to implement the required interim measures. For example, prior to the end of 2022, the capacity need can be met by imports from Manitoba and by arming 150 MW of load rejection; however, beyond the end of 2022, additional measures will be required such as demand response or contract extensions.
- Since more than one interim measure would be required beyond the end of 2022, the cost uncertainties increase, especially if one of the measures is contract extensions (e.g. it is unclear over how many years the facility owner would want to recover any capital costs required for the contract extension).

Historical flows are not indicative of what firm import levels are achievable as different contingencies are respected under planning and operating criteria.

[4] The $180/kW-year reflects economies of scale associated with addressing a smaller capacity need in the interim as some of the need is managed through load rejection.

[5] Reflects the same sensitivity range for Northwest capacity costs used in the 2017 Update Report (page 18, line 3).

All of this uncertainty creates a risk that the IESO may not be able to acquire the needed capacity beyond the end of 2022. As such, the IESO's assessment is that the E-W Tie Expansion should not be delayed beyond the end of 2022 due to unacceptable risks to system reliability and the associated cost uncertainties.

Table 1 Projected Cost of the Incremental Capacity Requirements (2020-2024)

Year	Requirement (MW)	Allowable Load Rejection (MW)	Incremental Requirement (MW)	Projected Cost (2017$ millions)	Projected Cost Range (2017$ millions)
2020	239	150	89	$16	$7 to 20
2021	251	150	101	$18	$8 to 23
2022	272	150	122	$22	$9 to 27
2023	360	150	210	$38	$16 to 47
2024	394	150	244	$44	$19 to 55

The IESO plans the electricity system to required standards, set out in the Ontario Resource and Transmission Assessment Criteria ("ORTAC") and by the North American Electric Reliability Corporation ("NERC"). The IESO's recommended in-service date is based on these criteria, which require that a solution be implemented by 2020 when the potential capacity shortfall can no longer be met through permitted load rejection. In the event the E-W Tie Expansion is delayed beyond the recommended 2020 date, the IESO would take necessary action to acquire the required additional capacity.

The short duration being contracted for combined with the small size of the Northwest market means these costs are uncertain. Acquiring this capacity may come at a higher cost if there are insufficient or limited resources competing to provide this short-term capacity.

In summary, the costs associated with a delay beyond the end of 2022 are very uncertain and may materially increase, as new resources or capital investment in retired facilities would likely be required in addition to any interim measures taken during the 2020 to 2022 period. The number of interim measures that would need to be employed and the risks associated with each interim measure increase the overall reliability risk to the Northwest. In the event of a delay to the in-service date, the IESO does not support allowing the E-W Tie Expansion to be delayed beyond the end of 2022 as the increased risks to system reliability and the associated cost uncertainties are unacceptable.

Energy Cost

The existing East-West Tie is one of the northern Ontario transmission interfaces currently subject to congestion, contributing to an increase in the average cost of energy. As a result of congestion on the East-West Tie and the downstream interfaces, low-cost energy from hydro facilities is sometimes bottled in the Northwest, leading to higher priced – and often higher-emitting – resources being dispatched in southern Ontario to meet Ontario's energy needs.

The IESO used an energy dispatch model to estimate future congestion costs due to a delay to the in-service date of the E-W Tie Expansion; the model assumed median water levels. The estimated difference in energy production costs from delaying the in-service date of the E-W Tie Expansion is approximately $0.5 million (2017$) per year.

Additional Costs due to Losses

Due to the long length of the existing East-West Tie line, paralleling the facility with the new line will provide energy cost savings by decreasing the line losses. The projected hourly flows across the East-West Tie, from the IESO's energy dispatch model, were used along with power flow studies to produce an estimate of the cost savings. The estimated combined yearly savings that would be foregone due to a delay to the in-service date of the E-W Tie Expansion is approximately $0.7 million (2017$).

Conclusion

The IESO continues to recommend an in-service date for the E-W Tie Expansion of 2020. The recommended in-service date is based on applicable planning and reliability criteria to ensure the reliability needs in the Northwest are met and to avoid the additional risks and associated costs of not having expanded transmission capability between the Northwest and southern Ontario.

A summary of the annual costs that may be incurred if the E-W Tie Expansion is deferred is presented in Table 2 below.

Table 2 Summary of Potential Cost of Delay to In-Service Date (2020-2024)

Year	Potential Capacity Cost (2017$ millions)	Energy Cost (2017$ millions)	Foregone Loss Savings (2017$ millions)	Total Potential Cost of Delay (2017$ millions)
2020	$16	$0.5	$0.7	$17
2021	$18	$0.5	$0.7	$19
2022	$22	$0.5	$0.7	$23
2023	$38	$0.6	$0.7	$39
2024	$44	$0.6	$0.7	$45

While interim measures may be able to address the incremental capacity need for all years considered in Table 2, an increasing number of interim measures, each with their own risks, would be relied on as the capacity requirement grows throughout the early 2020s. The costs associated with implementing alternative measures to address a delay beyond the end of 2022 are highly uncertain as new resources (such as new Northwest generation) or capital investment in retired facilities would likely be required in addition to any interim measures taken during the 2020 to 2022 period.

The IESO continues to recommend an in-service date of 2020 for the E-W Tie Expansion. If a delay is to be incurred, relying on interim measures will result in additional risks to reliability and increased costs. In this case, the IESO does not support delaying the in-service date of the East-West Tie Expansion beyond the end of 2022 as the increased risks to system reliability and the associated cost uncertainties are unacceptable.