Long Term Electricity Outlook for the Northwest and Context for the East-West Tie Expansion

June 30, 2011

ONTARIO POWER AUTHORITY

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1.0 INTRODUCTION

In a letter to the Ontario Power Authority ("OPA") dated April 25, 2011, the Ontario Energy Board ("OEB") wrote that it "is prepared to proceed with a designation process if project planning is justified" for the proposed expansion of the East-West Tie ("E-W Tie") between Northeast and Northwest Ontario. In that regard, the OEB requested a report from the OPA documenting the preliminary assessment of the need for a new E-W Tie line. The assessment should be "sufficiently robust to allow the Board to determine whether the designation process should be initiated".

Further, the OEB also asked that the following information be included in the report:

- The line connection points to the existing system;
- Any specific routing requirements besides the connection points;
- The required carrying capacity of the line;
- Any technical requirements to address the system need identified above; and
- Any available information regarding benefits of the project to ratepayers.

This report responds to the OEB's request and provides further information on the background and rationale for the expanded E-W Tie, as well as the OPA's recommendations on its scope and timing. The report presents a preliminary assessment of need for a new E-W Tie line and provides planning justification to support the implementation of the OEB's transmitter designation process. The OPA will update this assessment as required for future proceedings, such as a Leave to Construct application undertaken by a selected transmitter.

This report is organized into the following sections:

- Section 2 provides background on the Northwest area;
- Section 3 describes the Northwest's electricity conservation and demand;
- Section 4 describes the Northwest's internal and external supply resources;

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- Section 5 discusses planning considerations for the Northwest and context for the E-W Tie expansion project;
- Section 6 provides the OPA's recommendation; and
- Section 7 provides the project scope information requested by the OEB and outlines the major milestones in the implementation of the E-W Tie project.

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2.0 THE NORTHWEST

Northwestern Ontario ("the Northwest") consists of the districts of Kenora, Rainy River and Thunder Bay, which is roughly the area north of Lake Superior stretching from the Wawa area in the east to the Manitoba border in the west (see Figure 1). The area accounts for approximately 60% of the land area in the province and approximately 2% of Ontario's total population. Approximately half of the population in the Northwest resides in the city of Thunder Bay and the remaining population resides in rural and remote communities across the region.

Figure 1: Map of Northwest Ontario

SOURCE: OPA

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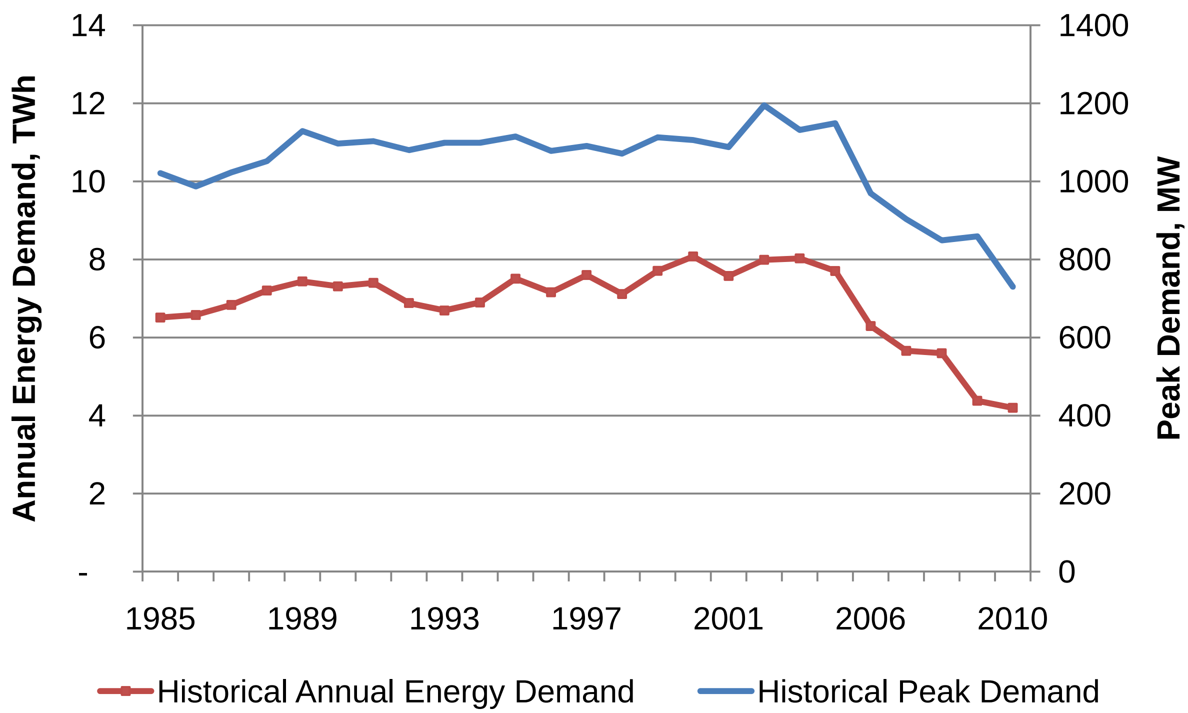
3.0 NORTHWEST CONSERVATION AND DEMAND

The electric system in the Northwest is winter-peaking. Its demand exhibits a relatively flat daily load profile that has less pronounced peaks than occur in Southern Ontario. This is due to the predominance of large industrial loads in the Northwest, which tend to operate on a continuous basis, as well as relatively minor cooling loads compared to Southern Ontario. The concentration of industrial demand in the Northwest also leads to sizable swings in annual energy demand as industries respond to economic changes. This section describes the Northwest's historical and forecast demand.

3.1 Historical Northwest Demand

Between 1985 and 2005, Northwest annual energy requirements and peak demand have been in the range of 6.5 to 8 TWh and 950 to 1,150 MW, respectively. Since 2005, there has been a significant decline in Northwest demand, due primarily to a downturn in the pulp and paper industry. Northwest annual energy and peak demand declined by 45% (from 7.7 to 4.2 TWh) and 35% (from 1,150 MW to 730 MW) respectively, between 2005 and 2010.

Figure 2: Historical Northwest Peak and Energy Demand



SOURCE: IESO

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3.2 Northwest Demand Scenarios

The Northwest's future electricity demand is expected to continue to be driven largely by industrial activities in the area. Key considerations are listed below.

- The pulp and paper sector demand in the Northwest has declined over recent years. In 2010, the sector's electrical demand was approximately 30% of 2005 levels. The extent and pace of recovery of the sector will influence the region's electricity demand.

- The mining industry is growing in the Northwest. Mining operations have resumed at the Lac Des Iles palladium mine north of Thunder Bay and requests have been made for additional supply for gold mines in the Red Lake and Pickle Lake areas. There have also been several inquiries related to the development of new mines or resuming operation at old mines in the area. Together, these developments will contribute to electricity demand growth in the area.

- There is the potential to develop an area situated about 300 km northeast of Thunder Bay, known as the Ring of Fire, which has been found to contain high quality rare earth metal ores, including chromite. Each active mine in the Ring of Fire could have a demand of approximately 20 to 25 MW.

- In addition, the OPA is developing a plan to connect remote communities beyond Pickle Lake. This could add approximately 24 MW of load in the Northwest by 2020.

The extent to which these developments will materialize is still uncertain. To manage this uncertainty, the OPA is considering two demand scenarios. The annual energy demand in each scenario is shown in Figure 3 and the peak demand in each scenario is shown in Figure 4. Scenario A illustrates a future in which the pulp and paper industry experiences a partial recovery by 2020, and mining and related industries increase their demand in the Northwest. Scenario B incorporates a similar recovery in the pulp and paper industry, but assumes less mining expansion than Scenario A. These scenarios both include forecast conservation savings, except demand response, which is included as a supply resource in Section 4.1. These savings total approximately 0.5 TWh in 2031.

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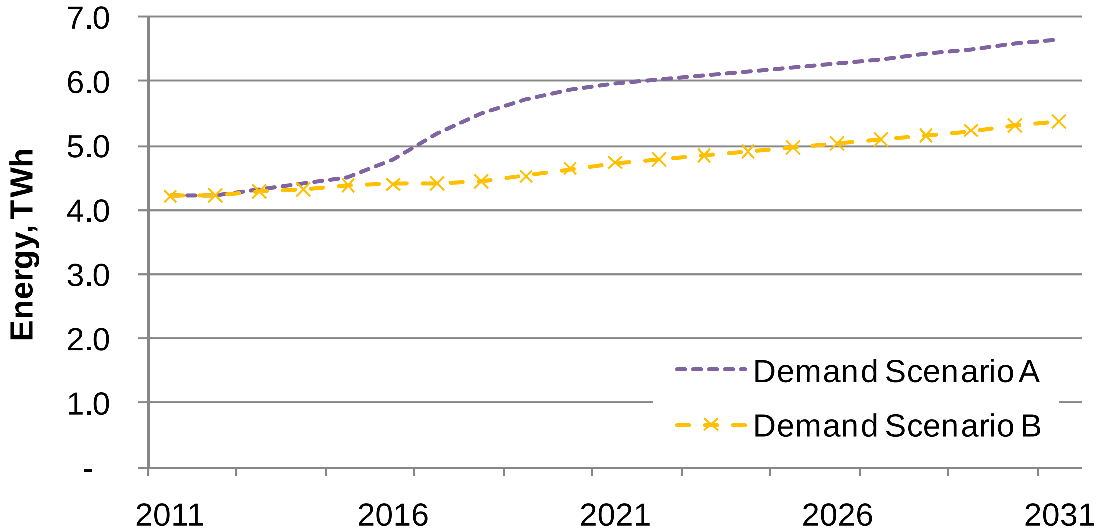
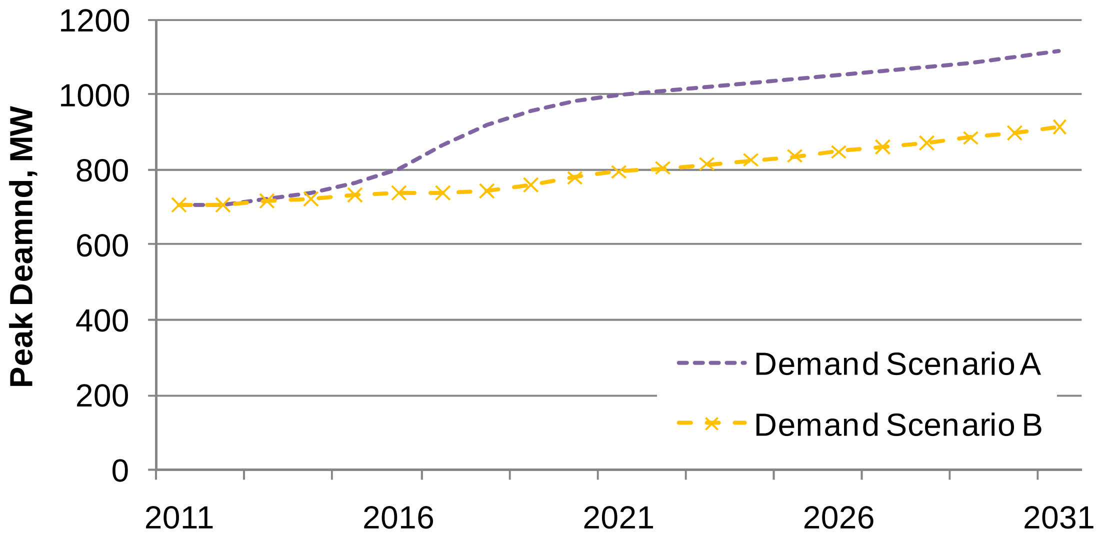
Figure 3: Northwest Energy Demand Scenarios



SOURCE: OPA

Figure 4: Northwest Peak Demand Scenarios



SOURCE: OPA

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4.0 SUPPLYING NORTHWEST DEMAND

The Northwest is much more reliant on internal resources to supply demand than any other area in Ontario. This is due to the limited capability of the Northwest's interconnections with neighbouring areas, which only allow a part of the Northwest's demand to be supplied by external resources. The Northwest's internal and external supply resources are discussed in Sections 4.1 and 4.2, respectively, including the ways in which these resources are expected to change over time. The expected contribution of these resources to meeting Northwest demand in 2020 is described in Section 4.3.

4.1 The Northwest's Internal Resources

Today, the Northwest system's internal resources consist mainly of hydroelectric and coal-fired generation, which together account for over 90% of the area's internal resource capacity (see Figure 5 below).

4.1.1 Current (2010) Internal Resources

Hydroelectric Generation

Hydroelectric generation accounts for just over half of the existing installed generation capacity in the Northwest (see Figure 5). Most of the hydroelectric facilities in the Northwest are run-of-river plants which have limited storage capability. The inability to store water from year to year, combined with variations in hydraulic conditions, result in large annual variations in energy production. Between 1985 and 2008, hydroelectric production in the Northwest ranged between 2.5 TWh and 5 TWh per year, averaging approximately 4 TWh per year.

Due to varying availability of hydroelectric generation capacity and energy output, it is not possible to rely on the Northwest's hydroelectric generation to supply a fixed amount of demand every year. Other resources are required to meet Northwest demand in low-water years, as illustrated in Figure 6. This figure shows the types of resources used to meet Northwest demand in 2003 and 2005. These years were chosen as they had similar levels of demand, while 2003 was a low-water year and 2005 was a median-water year. As the figure shows, coal and external resources were relied upon to replace lower hydroelectric output in the low-water year. This illustrates the historical role of coal and external resources as "swing" resources to complement variable hydroelectric output in the Northwest.

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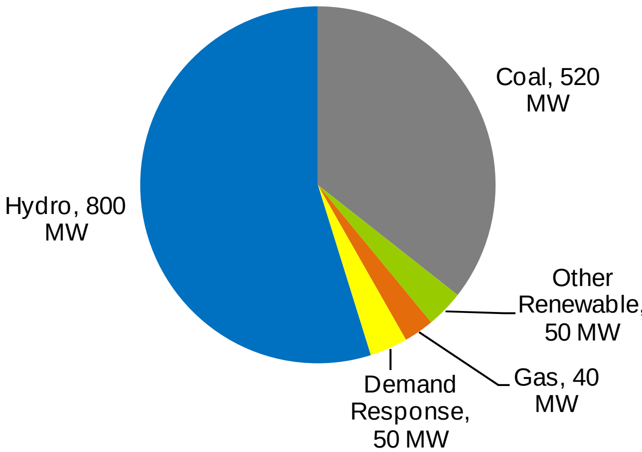
Figure 5: Northwest Internal Resources by Type in 2010 (installed capacity)



Note: capacities have been rounded to the nearest 10 MW.

SOURCE: OPA

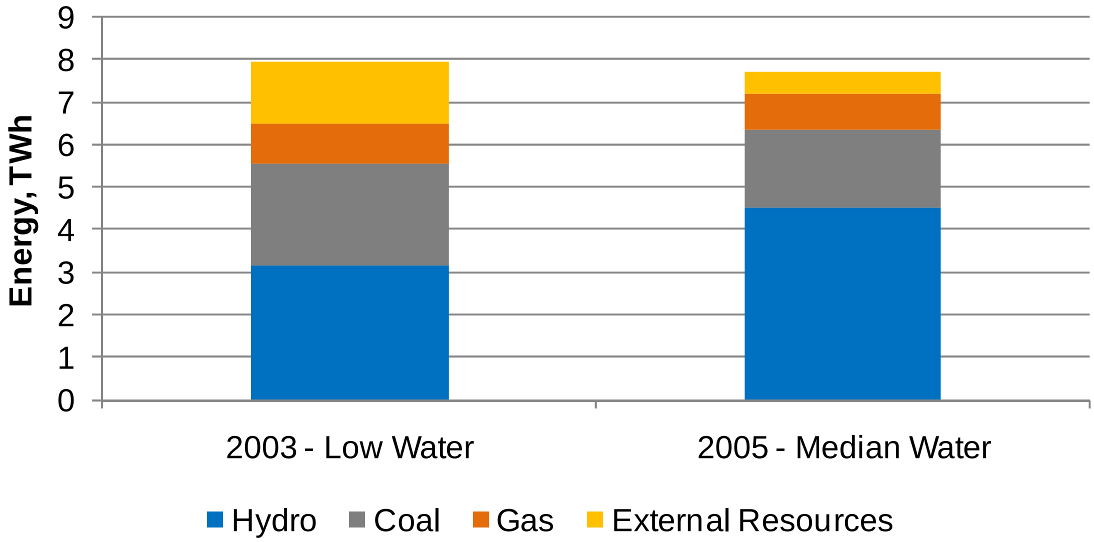
Coal-fired Generation

The Northwest's two coal-fired generating stations, Thunder Bay and Atikokan, currently provide about 500 MW or one third of the generation capacity in the Northwest system. These plants serve as both base and peaking resources and historically have provided up to 3 TWh of generation in the Northwest. The operational flexibility of the coal-fired plants also allows them to complement the output of hydroelectric facilities in the area during low-water years.

Gas and Biomass Generation in the Northwest

At present, gas-fired and biomass generation account for a small portion of the Northwest supply mix. Two natural-gas fired stations near Nipigon and Fort Frances have, until recently, supplied approximately 150 MW of capacity and between 0.5 TWh and 1 TWh of energy per year. As of 2010, the Fort Frances facility had been converted to biomass operation and its installed capacity was reduced by approximately 50 MW.

Figure 6: Comparison of Resources Used to Supply Northwest Demand (Historical)



SOURCE: OPA

4.1.2 Changes to Northwest Internal Resources

In the Northwest, the resource mix is changing as government policies related to coal-fired generation and renewable energy are implemented. The most significant changes and the corresponding effects on the Northwest system are listed below.

- The Thunder Bay and Atikokan coal-fired generation stations are to cease coal-fired operation by the end of 2014 in accordance with Ontario Regulation 496/07.
- The OPA has been directed to contract for the conversion of the Atikokan plant to run using biomass fuel. Though it will still have a capacity of about 200 MW, its forecast fuel availability will limit energy production to 140 GWh per year.
- The government has stated that both currently operating Thunder Bay coal-fired units are to be converted to use natural gas by 2014. Under gas-fired operation, the Thunder Bay plant will be capable of providing the same capacity as it does today. However, higher fuel costs under natural gas operation will make it better suited to peaking operation.
- Approximately 200 MW of new renewable resources have been contracted in the Northwest through the RESOP, RES and FIT Programs. These new resources consist primarily of wind and solar resources, but also include some hydroelectric and biomass

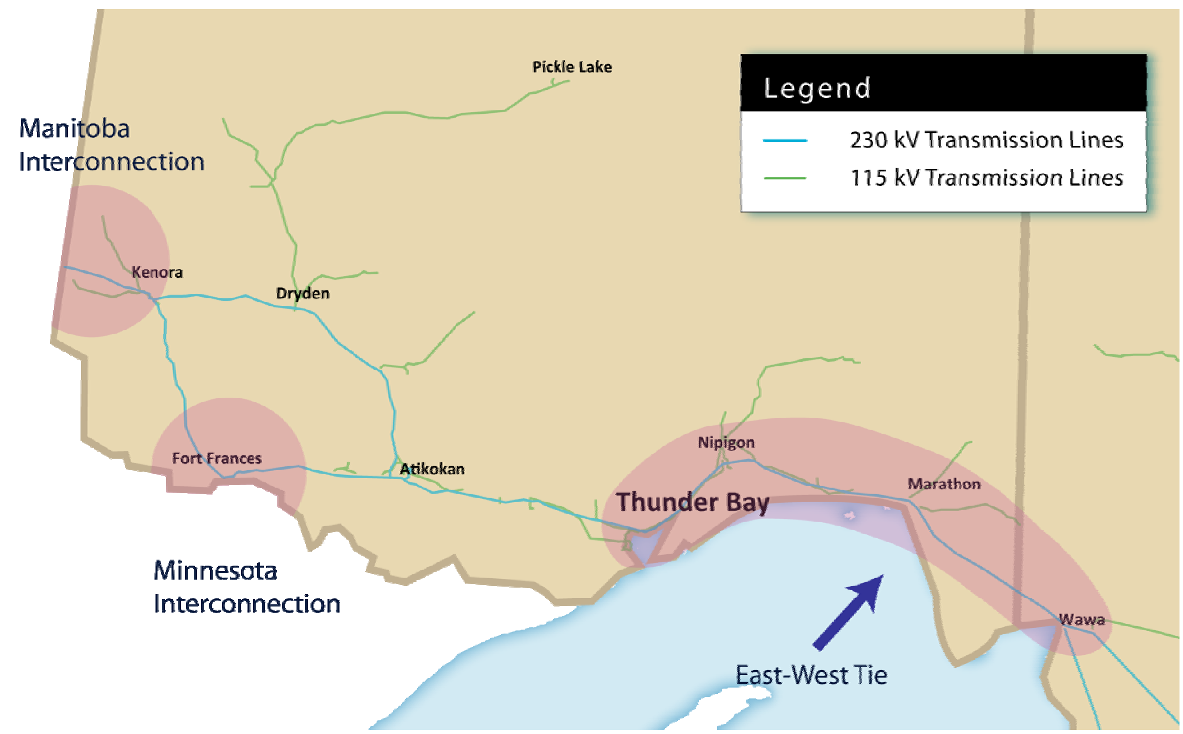
generation. The load-meeting capability of these resources will be considered to determine their contribution to meeting Northwest demand.

- Demand response resources in the Northwest are expected to total approximately 90 MW.

Over the next five years, these changes to the Northwest generation mix will increase the area's internal installed capacity. However, there will be less energy available from these internal resources than has historically been the case. Furthermore, the only internal generation resource that will be capable of providing flexible energy output will be the converted Thunder Bay plant, which will have higher unit energy costs than it currently does.

4.2 Supplying the Northwest Using External Resources

Figure 7: Combined Import Capability is up to 570 MW into the Northwest



SOURCE: OPA

The ability to supply Northwest demand using external resources is limited by the capability of the interconnections with neighboring areas. Figure 7 above shows the Northwest transmission system and its three interconnections with neighbouring areas: (1) the rest of the Ontario system via the E-W Tie at Marathon, (2) the Manitoba system via an interconnection at Kenora, and (3) the Minnesota system via an interconnection at Fort Frances. The current use of these interconnections is described in Section 4.2.1 below.

The capability of the three interconnections between the Northwest and neighbouring areas is shown in Table 1 below. It should be noted that these interconnections cannot all be fully utilized at the same time. They are limited to a combined import capability of 570 MW under normal operating conditions, but this can only be achieved if there is sufficient reserve generation on standby in the Northwest system.

Table 1: Capability of Interconnections between the Northwest and Neighbouring Areas

Interconnection	Capability to Transmit (MW)	
	Into Northwest	Out of Northwest
East-West Tie	350	325
Manitoba Interconnection	330	262
Minnesota Interconnection	90	140
Total Simultaneous Capability with Sufficient Standby Generation	Up to 570	Up to 490

SOURCE: IESO

4.2.1 Historical Use of External Resources to Supply Northwest Demand

The Manitoba and Minnesota interconnections provide opportunities for economic power transactions between Ontario and these jurisdictions. However, as there are currently no firm import arrangements in place, these interconnections cannot be relied upon for planning purposes to meet the Northwest's supply needs. Some reinforcement of the Northwest transmission system would be required to accommodate significant firm imports from these jurisdictions. While these two interconnections cannot be used to plan firm capacity and energy to supply the Northwest, they are crucial to the security and robustness of the Northwest power system operationally, because they provide the only connection between the Northwest system and the rest of the North American grid when the E-W Tie is out of service.

The existing E-W Tie is a 400 km double-circuit 230 kV transmission line connecting Wawa TS and Lakehead TS. The E-W Tie, being part of the Ontario system, is an important source of firm supply to the Northwest. It has been relied upon heavily to supply Northwest demand in low-water years or during periods of high demand (see Figure 6).

While the nominal capacity of the existing E-W Tie's westbound transfer is currently 350 MW, there are a number of important considerations regarding this capability listed below.

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- The nominal westbound limit of 350 MW is based on operating the system to respect the outage of one of the two circuits on the E-W Tie, which share a common tower line. Elsewhere in Ontario the bulk electricity system is operated to respect the loss of both circuits on a common tower line, a practice which complies with current IESO reliability criteria and NERC system design standards. Consequently, the nominal westbound limit of 350 MW for the E-W Tie does not conform to current reliability standards. Operating to respect the loss of both E-W Tie circuits would reduce its transfer capability from 350 MW to 175 MW. Loss of the E-W Tie while it is transferring 350 MW could lead to the interruption of load in the Northwest.

- Today, the IESO respects the double-circuit contingency limit (175 MW) on the E-W Tie when an electrical storm is detected over the Northwest, as the likelihood of losing both circuits is more likely during such events.

- Since 2006, there have been over 60 forced outages along the E-W Tie, averaging about 12 outages per year. Over a quarter of these outage events have been double-circuit outages in which both E-W Tie circuits were forced out of service.

The E-W Tie plays a critical role in maintaining a reliable supply to the Northwest. Accordingly, the points above are important considerations that must be factored into determining an appropriate planning limit for the E-W Tie in Northwest supply assessments.

4.2.2 Planning to Current Reliability Standards

In general, the transmission system in Ontario is to be planned in accordance with the IESO's reliability criteria, which must comply with NPCC and NERC criteria. This was reinforced in a memorandum of understanding between the OEB and NERC dated October 25, 2006. IESO and NERC/NPCC reliability criteria all require that planners respect contingencies involving multiple elements, including the outage of a double-circuit line.

The existing E-W Tie has not been designed to consider this level of reliability due to the terrain and distance that the line has to traverse. However, any planned future developments in the Northwest will need to meet current reliability standards. Compliance with these standards will require that the transfer capability of the existing E-W Tie be reduced to 175 MW.

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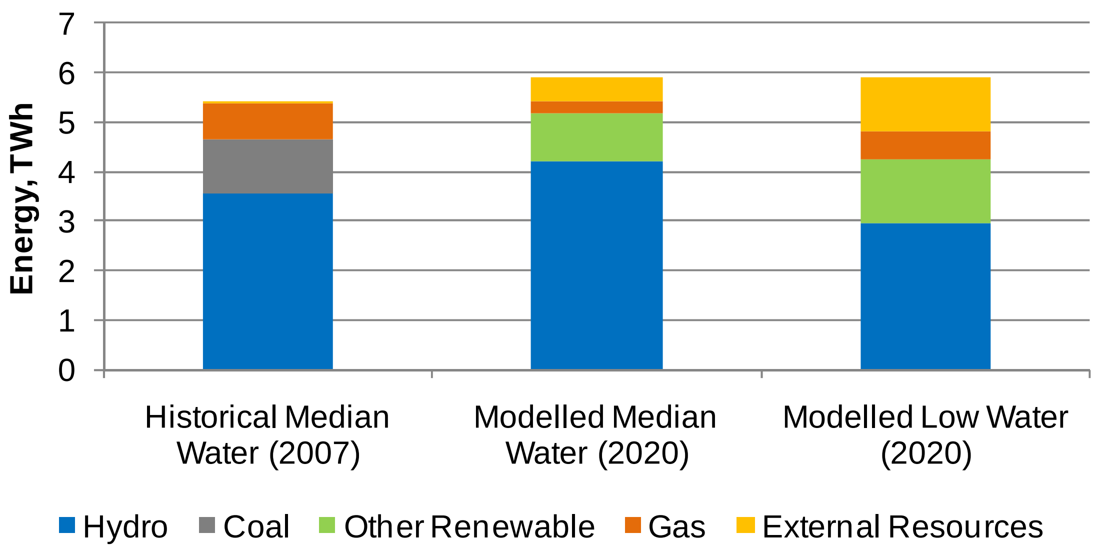
4.3 Expected Contribution of Northwest Resources in 2020 with the Existing E-W Tie

As noted in the sections above, many changes to the Northwest power system will occur over the next five years. The future impact of these changes has been simulated using UPLAN, an energy simulation tool, assuming the existing E-W Tie capability is 175 MW to respect NERC/NPCC criteria.

Figure 8: Gas and External Resources Make Up the Shortfall in Low-Water Years



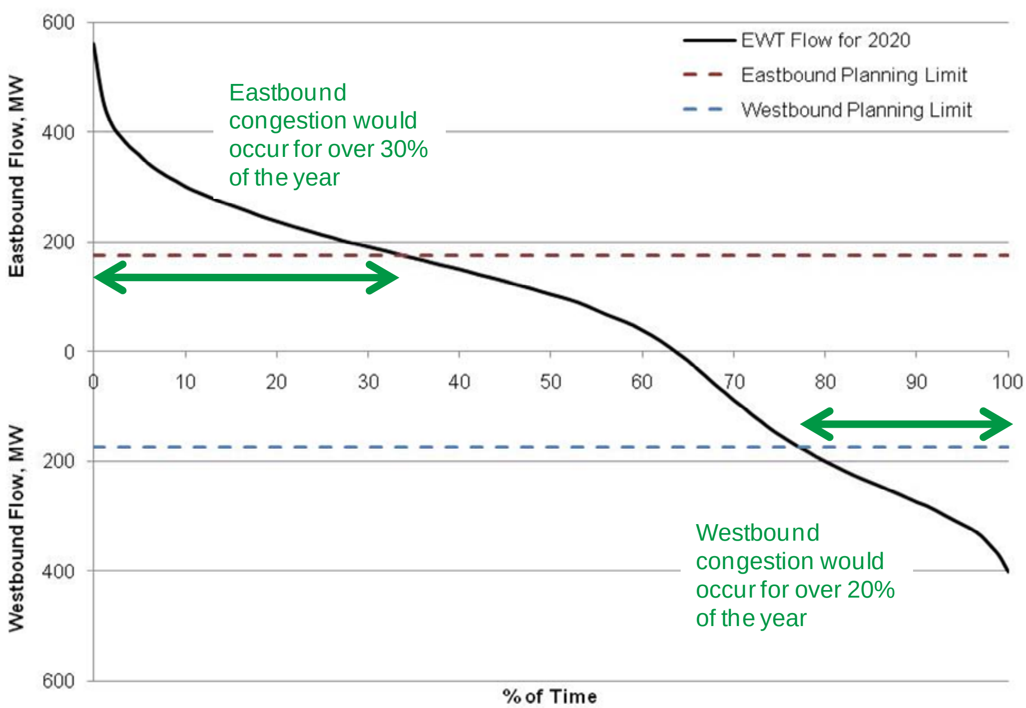
SOURCE: OPA

Figure 8 shows the types of resources expected to supply Northwest demand in 2020, under both median-water and low-water conditions. These are compared to the resources used to meet Northwest demand in 2007. The annual Northwest energy demand in 2007 is similar to the forecast demand for the area in 2020. Figure 8 shows that under median-water conditions, external resources and new renewable resources will be sufficient to provide most of the energy that had been previously supplied by coal-fired generation. There will still be a need, however, to dispatch the Thunder Bay plant uneconomically to meet Northwest demand. In a low-water year, the reduced output from the hydroelectric plants must be replaced to meet Northwest demand, and the contribution of the Thunder Bay plant is much higher than under median-water conditions. Almost all of the output from Thunder Bay in the low-water simulation is associated with uneconomic dispatch of the plant.

The OPA also simulated congestion on the E-W Tie in 2020 as part of its assessment. Figure 9 shows an illustrative duration curve for the unconstrained flow on the existing E-W Tie in 2020 under median-water conditions, expressed as a percentage of time. The duration curve represents the flow on the E-W Tie assuming no transmission constraints, and shows that the E-W Tie would be relied upon approximately one-third of the time to supply the Northwest. This is represented by the westbound flow into the Northwest through the E-W Tie. The remainder of the time, the E-W Tie would supply energy to the rest of the Ontario system under unconstrained conditions (which is represented by eastbound flow).

Both eastbound and westbound flows would have to be curtailed by operators in order to respect the 175 MW transfer limits. Figure 9 shows the impact of the 175 MW eastbound and westbound transfer limits on the operation of the existing E-W Tie. Under this simulation, there would be congestion for over 50% of the time: approximately 20% of the time for westbound flow, and 30% of the time for eastbound flow. When there is westbound congestion, generation within the Northwest needs to be dispatched uneconomically to supply the area's demand. When there is eastbound congestion, Northwest generation needs to be constrained off to respect the E-W Tie's transfer limit.

Figure 9: Unconstrained E-W Tie Flow and Planning Limits



SOURCE: OPA

5.0 PLANNING CONSIDERATIONS AND CONTEXT FOR THE EAST-WEST TIE EXPANSION

In the last fifty years, increasing Northwest demand led to three major investment decisions: the construction of the current E-W Tie, the Thunder Bay Generation Station and the Atikokan Generation Station. The need for enhancing supply to the area is not driven by increased demand or near term adequacy, but is primarily to maintain reliable, cost effective supply over the long term in the Northwest reflecting the changes to the region's supply mix, including the phase-out of generation from coal. While the capacity of the Atikokan and Thunder Bay plants will be maintained following conversion, the economics, availability and flexibility of the plants will be altered.

In general, there are two basic alternatives for supplying the Northwest following the conversion of the Atikokan and Thunder Bay plants: (1) using internal generation within the Northwest, and (2) using external resources transferred via the E-W Tie. The OPA has compared these two alternatives in terms of their cost-effectiveness, flexibility, ability to remove barriers to renewable generation development, and other benefits in the subsections below.

5.1 Cost-Effectiveness Comparison

Expanding the E-W Tie would increase both the eastbound and westbound transfer capability of this transmission interface. Increased westbound transfer capability would allow the Northwest to be supplied by available lower-cost energy from the rest of Ontario. In the same way, increasing the eastbound transfer capability could allow congested energy in the Northwest to be transferred to the rest of Ontario displacing less economic generation. Increased eastbound transfer capability would also increase the availability of Northwest generation capacity to meet reliability needs in other parts of the province, and therefore delay the future potential need for new capacity in the rest of Ontario.

For these reasons, expanding the E-W Tie, as compared to operating the converted Thunder Bay plant uneconomically and eventually building new generation in the Northwest, holds the potential for reducing the cost of electricity to ratepayers. To conduct a comparative assessment of these two alternatives, it is necessary to evaluate the capital investment required to expand the E-W Tie against the available savings from utilizing lower-cost energy supply and from deferring the need for new generation capacity.

A cost-benefit analysis comparing the 50-year net present value between the existing and expanded E-W Tie was conducted for the two demand scenarios described in Section 3.2. The difference in system costs between the two alternatives was compared to the capital cost of

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expanding the E-W Tie to determine which alternative would be more cost-effective. The system costs consist of the energy and emissions costs to supply demand in the Northwest and the rest of Ontario, and the capital and fixed OM&A cost of additional generation capacity required to preserve system reliability in the Northwest and Ontario as a whole. A range of input assumptions were used for both demand scenarios to account for the potential volatility in natural gas prices, carbon prices and E-W Tie expansion cost. The following assumptions were used in the net-present value analysis.

- For the purposes of modeling, the expanded E-W Tie was assumed to come into service by the end of 2017 and would have a life of 50 years. A base capital cost of $600 million was used for planning purposes.[1] A range of capital costs was also considered.
- The existing E-W Tie has westbound and eastbound capabilities of 175 MW. The expanded E-W Tie has total westbound and eastbound capabilities of 650 MW.
- New capacity needs in the Northwest and the rest of Ontario are added as required to satisfy adequacy criteria. System generation capacity needs for reliability purposes were estimated assuming dependable water (i.e., “low-water”) conditions in the Northwest.
- Median-water hydroelectric energy output was used for energy simulation purposes. Consideration of low-water years would improve the cost-effectiveness of the E-W Tie.
- Natural gas forecast real (2010 $ Cdn) prices are assumed to be $6.8/MMBtu throughout the study. A range of real natural gas prices between $4/MMBtu and $12/MMBTu was considered.
- A base assumption of $0/T for CO_2 emissions prices was used. Real CO_2 emission prices up to $160/T in 2030 were also considered.
- The heat rate of the converted Thunder Bay generating station is assumed to be 10.5 MMBtu/MWh and its CO_2 emissions rate is assumed to be 0.54 T/MWh, compared to CCGT rates assumed at 7.3 MMBtu/MWh and 0.31 T/MWh.
- Future costs were present-valued at 2010 using a 4% real discount rate.

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[1] A capital cost of $600 million was identified in the OPA’s presentation *IPSP 2011 Stakeholder Consultation: Transmission Planning* (May 31, 2011) and in the OPA’s *Response to the Minister’s Request for an Updated Transmission Expansion Plan* (November 8, 2010).

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The results of the OPA's comparative analysis are that, even before any monetary cost of emissions is considered, the expanded E-W Tie provides a net benefit ranging from approximately $20M to $80M when considering the two Northwest demand scenarios under mid-range assumptions for the factors listed above. If the full range of assumptions is also considered, the E-W Tie provides a net benefit as high as approximately $345M and as low as a net cost of about $130M. Overall, this cost-effectiveness analysis shows that the E-W Tie creates a net benefit under the majority of assumptions considered.

In a letter to the OEB dated March 29, 2011, the Minister of Energy stated his expectation that the weighting of decision criteria in the Board's designation process take into account the significance of Aboriginal participation to the delivery of the transmission project, as well as a proponent's ability to carry out the procedural aspects of Crown consultation. The OPA has discussed the E-W Tie with First Nation and Métis communities through consultation sessions, including those related to the Integrated Power System Plan. The interests raised by First Nation and Métis communities through these sessions have been linked to the cost of the project and the importance of beginning consultation early in the project development phase. The OPA heard that it is important to consider potential project costs that may relate to Aboriginal participation in the transmission project and any accommodation of Aboriginal or treaty rights. The Ministry of Energy has identified 14 First Nations and 4 Métis communities that may have interests affected by the proposed E-W Tie.

5.2 System Flexibility with an Expanded E-W Tie

Without an expanded E-W Tie, it would be necessary to closely match internal generation to demand to meet the Northwest's future requirements. Given the inherent uncertainties in forecasting the largely industrial-driven demand in the Northwest, this exposes the system to the risk of under-investment in generation, resulting in resource shortfalls, or over-investment in generation, leading to underutilized assets.

An expanded E-W Tie provides greater system flexibility. By allowing external resources to supply incremental load growth, and by providing a means to transfer excess generation to the rest of Ontario, an expanded E-W Tie reduces the impact of over- or under-investment in generation. Below are some examples of the flexibility afforded by an expanded E-W Tie.

- In low-water years, internal generation would not need to be run uneconomically to meet demand.

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- In high-water years, excess generation could be transferred to meet demand elsewhere in the province.
- In the event of significantly higher demand than forecast, additional generation capacity investment could be avoided or deferred.
- Under a lower than forecast demand scenario, excess generation could be utilized in the rest of the province.

These potential flexibility benefits are in addition to those considered in the cost-effectiveness analysis presented in Section 5.1.

5.3 Remove Barriers to Renewable Generation Development in the Northwest

Currently, the development of new renewable generation in the Northwest is constrained by the ability to transfer power out of the Northwest toward Southern Ontario. An expanded E-W Tie would remove the largest barrier to renewable generation development in the Northwest, which is the limited capability of the existing E-W Tie to transfer surplus power out of the Northwest. While other transmission congestion currently limits additional flow from new generation in the Northwest, increased demand and/or changes in the operation of generation in the Northeast, combined with the expansion of the E-W Tie, would provide opportunities for further resource development in the Northwest.

5.4 Other Benefits

In addition to providing cost-effective, reliable supply to the Northwest, the E-W Tie expansion is expected to provide additional benefits. These benefits are summarized in Table 2.

Table 2: Summary of Other Benefits of an Expanded E-W Tie

Benefit	Description
Reduced Congestion Payments	Once in service, an expanded E-W Tie is expected to reduce congestion in the Northwest system by approximately 40%. Market congestion payments (CMSC) in the Northwest have averaged $40M per year over the last 9 years since market opening. Under the current market structure, an expanded E-W Tie could create savings of roughly $15M per year through congestion payment reduction. As this payment is borne by Ontario ratepayers, any reduction in CMSC payments would be a benefit to them. This benefit is not included in the cost-effectiveness analysis presented in Section 5.1.

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Reduced Losses	With the addition of a new double-circuit line, the electrical resistance between the Northwest and the rest of Ontario would be reduced by half, and therefore transmission line losses would be reduced for all levels of flow across the E-W Tie. The monetary benefit of this loss reduction is captured in the cost-effectiveness analysis presented in Section 5.1.
Improved Operational Flexibility in the Northwest	A double-circuit contingency resulting in the loss of the existing E-W Tie would cause the Northwest system to become electrically separated from the rest of Ontario and to rely solely on the interconnections with Manitoba and Minnesota to maintain system integrity. By providing an additional transmission connection between the Northwest and Northeast systems, the expanded E-W Tie would greatly reduce the risk of system separation due to double-circuit contingencies, and would allow the Northwest system to be operated without relying on special protection schemes and operational procedures during high risk weather conditions.

SOURCE: OPA

6.0 THE OPA'S RECOMMENDATION

The OPA has carried out a preliminary assessment of the long-term supply needs of the Northwest and the two basic alternatives that address this need: internal generation and an expanded E-W Tie. Based on this assessment, the OPA finds that expansion of the E-W Tie is the preferred alternative based on economic, flexibility, technical, operational and other considerations. The OPA therefore recommends that development work be initiated on this project. Proceeding with this project after development work has been completed will depend on many factors, including the capital cost of the E-W Tie and the extent of the developments in the Northwest described in Section 3.2.

In accordance with the Minister of Energy's March 29, 2011 letter to the OEB, the next step in the implementation process would be the selection of a transmitter to carry out development work. Development work includes but is not limited to: project design, specification and costing; routing and siting; preparation of necessary approvals; and consultation and communications. In most cases, development work represents a small fraction of the project cost – typically 2 to 5 percent. The OPA believes this cost is justified in order to maintain the viability of this option. The development work for the E-W Tie project will provide the necessary information to guide a final decision on whether to proceed with the project through the OEB Leave to Construct process.

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7.0 PROJECT IMPLEMENTATION

7.1 Project scope

The OPA has assumed that the proposed expanded E-W Tie would be a new double-circuit 230 kV overhead transmission line. This is based on the knowledge that a 500 kV line or a high-voltage direct-current line would be more costly than a 230 kV line, while providing a similar benefit. A single-circuit 230 kV line would likely have a similar cost to a double-circuit 230 kV line, but would have reduced operability during planned and forced outages. Therefore, the OPA believes that the double-circuit 230 kV line is preferred, but other options could be proposed to the extent that they meet the other project scope criteria outlined below.

- The new line is to connect to both Wawa TS in the Northeast and Lakehead TS in the Thunder Bay area - a distance of approximately 400 km - and is to include all station termination facilities.

- The new line is to be switched at Marathon TS, which is an existing station between Wawa TS and Lakehead TS. The existing E-W Tie is switched at this station.

- The new line in conjunction with the existing tie is to provide total eastbound and westbound capabilities on the order of 650 MW, while respecting all NERC, NPCC and IESO reliability standards.

- The project should also include any reactive facilities that are to be identified in a pending IESO study. It is anticipated that this study will be available prior to the commencement of any designation process.

- The target in-service date of the new line and associated reactive facilities is currently estimated to be 2017, based on typical transmission project lead times.

- The new line should be designed to have a lifetime of at least 50 years.

7.2 Key project milestones

- June 2011 – OPA submits E-W Tie report to OEB

- TBD – OEB Designation Process

- TBD – Submission of Environmental Assessment ToR

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- TBD – Submission of Leave to Construct Application
- 2017 – Target in-service date for new line

It is expected that a designated transmitter would carry out all required technical, environmental, regulatory and any other approvals needed to bring the new E-W Tie line into service. The OPA will provide support to a designated transmitter during the project's implementation process.

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