Extending Atikokan Biomass Generating Station (AGS) Operations

A Need and Benefits Impact Assessment

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January 2022

STRATEGIC POLICY ECONOMICS

Executive Summary

The Atikokan Generating Station (AGS) is a 205 MW biomass fueled facility that can provide low-carbon peak, intermediate and baseload electricity in Ontario's northwest (NW). Stakeholders in the region are concerned the IESO's evolving procurement practices currently under development may not consider all relevant factors pertaining to sustaining the AGS' ongoing operations after the station's contract expires in July 2024.

For almost two decades, the Power Workers Union (PWU) has advocated for the ongoing operation of the AGS and support for the local biomass supply chain.[1] Recently the Common Voice Northwest (CVNW) Energy Task Force (ETF) indicated that the IESO plans were not adequately considering the full energy and economic needs of their region.[2] Other local stakeholders, such as the Town of Atikokan and the members of the forestry supply chain that supply the locally produced biomass fuel have expressed similar concerns.

The PWU remains concerned that the IESO Administered Market (IAM) or Resource Adequacy procurement mechanisms will not adequately consider the station's benefits related to full-cost, climate action and the regional economy. These factors are particularly relevant at this time as the government's policies are evolving as captured by the recent direction the Ontario Ministry of Energy has provided to the IESO to: evaluate how the province can reduce its reliance on gas-fired generation;[3] and examine biomass contracts in the north.[4]

This report presents an assessment of the potential benefits of extending the operation of the AGS beyond July 2024 and an overview of the station's critical role in the heart of the northwest (NW) region's electricity system. The following six key findings support the continued operation the AGS and at enhanced output production levels.

1. *Deteriorating Energy Security in the NW*

Reliability in the NW is being negatively impacted by growing local demand, retiring supply, and the region's growing dependence on the E-W tie line and the provincial grid. While the 650 MW E-W tie line may be sufficient to marginally meet the IESO's 2026 NW demand, little reserve capacity is available to meet the IESO's reference case forecast for naturally occurring demand post-2026.[5]

This emerging reliance of the NW region on the rest of the provincial grid warrants consideration of how the NW is being impacted by the IESO's overall planning approach to ensure a reliable electricity system for the entire province.

2. *The IESO's procurement for meeting the provincial capacity gap does not address the needs of the Northwest*

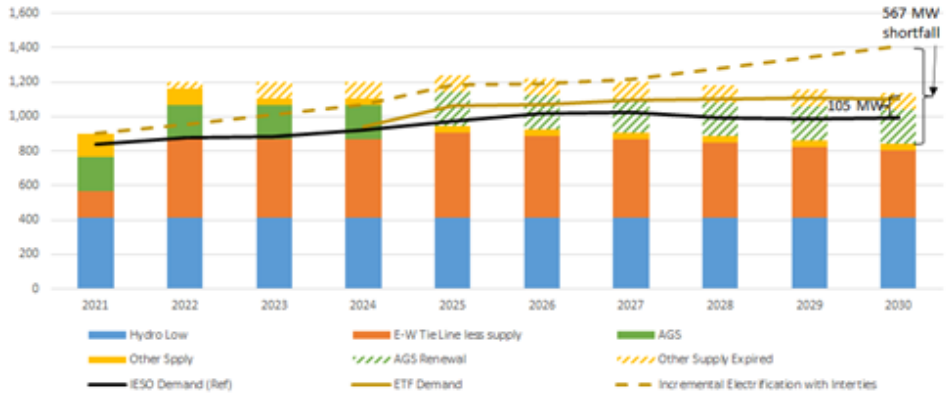
[1] PWU website
[2] CVNW Energy Task Force Assessment of Atikokan Supply Requirements, 2021
[3] Ontario Minister of Energy letter to the IESO, Oct 7, 2021
[4] Ontario Minister of Energy letter to the IESO, Nov 10, 2021
[5] IESO, APO, 2021

The approach to securing capacity under the IESO's resource adequacy framework should value the environmental and economic benefits of this locally-supplied, low-carbon, renewable biomass fueled station. These attributes will become increasingly important as Ontario ramps up its efforts to address climate change. The station's regional and provincial importance suggests that renewing the contract for the AGS should be a ministerial priority and warrants a directive under the IESO's bilateral contracting provision.

3. *The capacity shortfall risk from emerging demand growth in the Northwest is increasing*

Economic growth and electrification of the economy will strain planned electricity resources in the NW as well as in the neighboring regions that supply the NW. The potential capacity shortfall is illustrated in Figure ES-1. Providing a reliable supply to the NW over the next decade will require additional new generation and transmission (Tx) capacity beyond the IESO's current forecasts. With over 350 MW of demand originating north and west of Atikokan, extending operations at the AGS can offset some of this need and reduce planning risks for the entire region.

Figure ES-1: Winter Peak Load vs. Supply in Northwest Ontario
(MW by Year)



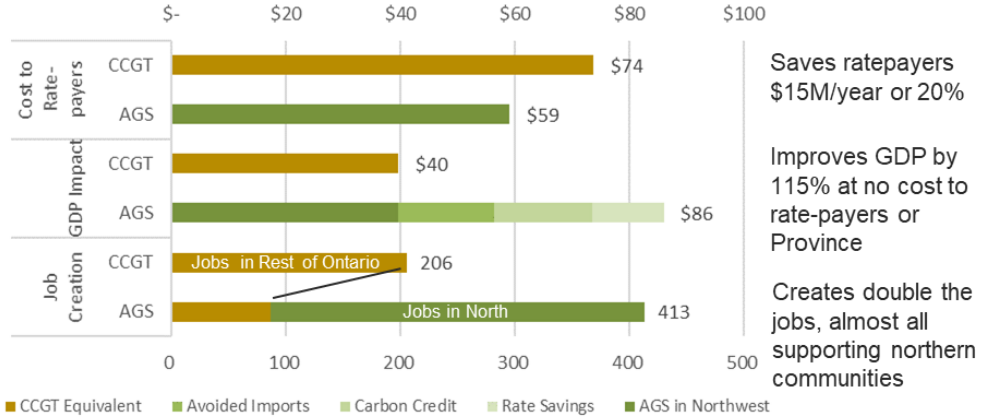
4. *The lower cost of AGS operations is better for ratepayers than the alternative of new gas-fired generation and expanded transmission option (CCGT/Tx option)*

The cost of extending operations at the AGS is estimated to be 20% less than the total system cost to commission and operate a new combined cycle gas turbine (CCGT) generation alternative. The higher cost of the AGS' biomass pellets fuel is offset by the carbon price of a new gas-fired generation facility and the cost of associated transmission system upgrades to connect it.

5. *The AGS contributes significantly to the economic health of the Northwest*

The continued operation of the AGS delivers greater economic benefits to the region and the province than would the gas-fired option. With a reduced cost to ratepayers and avoiding the costs of importing natural gas and the carbon price on its use as a fuel by the gas-fired alternative, the AGS provides an additional 207 jobs and an additional $46M/year in GDP, as shown in Figure ES-2. The Town of Atikokan relies on the AGS for 20% of its employment and 45% of its collectible taxes.

Figure ES-2: Economic Impact of AGS Compared to a CCGT/Tx Option
($M/year & Jobs, 2027)



6. Tripling production from the AGS operations would deliver substantial additional benefits to the NW

By generating electricity all year and tripling production, the AGS may be better able to provide reliability services, mitigate demand risks in the north, and improve costs/benefits for ratepayers. By lowering local generation costs and improving cost-effective transmission utilization, increased production at the AGS will be at 15% lower rate payer costs than the natural gas option. The AGS site represents a unique opportunity to anchor a local, low-carbon energy hub, accelerate the forestry biomass sector in Northern Ontario, attract local commercial businesses and new users, and expand partnerships with Indigenous peoples.

Recommendation

The Government of Ontario and the IESO should consider immediate steps to facilitate the extended and enhanced operation of the AGS for meeting future low-carbon, electricity needs of the NW in the coming decades.

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1 Introduction

The Atikokan Generating Station (AGS) is a 205 MW biomass fueled facility that can provide low-carbon peak, intermediate and baseload electricity in Ontario's northwest (NW). The station's characteristics are summarized in Figure 1. Stakeholders in the region are concerned that the IESO's evolving procurement practices currently under development may not consider all relevant factors pertaining to sustaining the AGS' ongoing operations after the station's contract expires in July 2024.

For almost two decades, the Power Workers Union (PWU) has advocated for the ongoing operation of the AGS and support for the local biomass supply chain.[6] Recently the Common Voice Northwest (CVNW) Energy Task Force (ETF) indicated that the IESO plans were not adequately considering the full energy and economic needs of their region.[7] Other local stakeholders, such as the Town of Atikokan and the members of the forestry supply chain that supply the locally produced biomass fuel have expressed similar concerns.

The PWU remains concerned that the IESO Administered Market (IAM) or Resource Adequacy procurement mechanisms will not adequately consider the station's benefits related to full-cost, climate action and the regional economy. There is also a two-year gap between the timing for procurement and the expiration of the current contract for the AGS. As well, the IESO's bilateral agreement option is currently being employed for other resource adequacy procurements.

These factors are particularly relevant at this time as the government's policies are evolving as captured by the recent direction the Ontario Ministry of Energy has provided to the IESO to: evaluate how the province can reduce its reliance on gas-fired generation;[8] and examine biomass contracts in the north.[9]

Figure 1: Atikokan Generating Station

Atikokan Generating Station Profile	
Location	Atikokan
Max capacity (MW)	205
Avg Generation output (GWh/year)	158
Operating Factor	9%
Largest Biomass plant in NA	
Fuel Used (tonnes/year)	90,000
On site Storage (tonnes/year)	10,000
Direct OPG Jobs	64
Contract End Date	July 2024

The Atikokan Generating Station

The Atikokan Generating Station (AGS) is located near Marmion Lake on the outskirts of the Town of Atikokan. It was converted from coal to biomass in 2014 as part of the province's coal closure initiative. The AGS is owned and operated by Ontario Power Generation (OPG) as a non-regulated asset under a 10-year contract with the IESO which expires in July 2024.[10]

With an output capacity of 205 MW, the AGS is the largest 100% biomass-fueled plant in North America, providing

[6] PWU website
[7] CVNW Energy Task Force Assessment of Atikokan Supply Requirements, 2021
[8] Ontario Minister of Energy letter to the IESO, Oct 7, 2021
[9] Ontario Minister of Energy letter to the IESO, Nov 10, 2021
[10] IESO, Active Contracted Generation List, 2021

renewable energy that, unlike wind and solar, can be dispatched when Ontario's power system requires it. Biomass wood pellets are a sustainable fuel recognized as beneficial to climate change mitigation.[11] OPG considers biomass generation from its sustainably managed sources to be one of its low carbon emitting generation sources along with hydro and nuclear.[12] OPG notes that "Although biomass power remains one of the lesser-known renewable energy sources currently used in Ontario, it is a powerful example of ingenuity that is helping shape a cleaner energy future for the province."

Strategic Location of the AGS

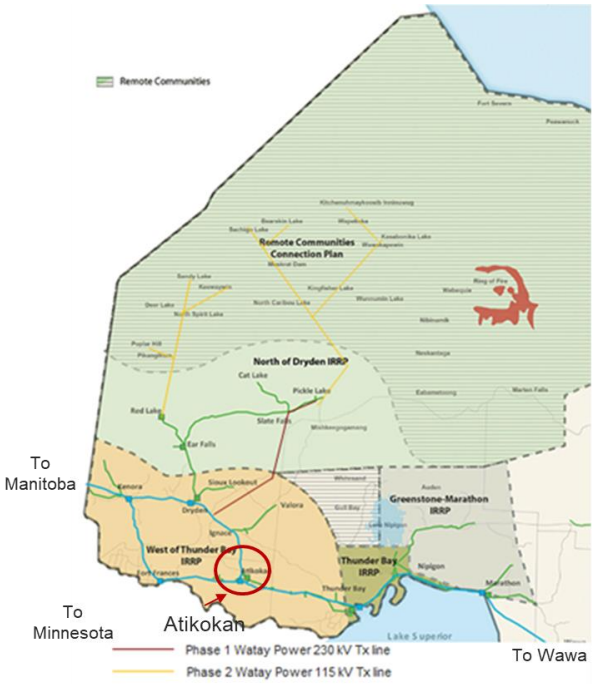
The AGS's location, as shown in Figure 2, makes it a strategic dispatchable electricity resource in the NW region by back-stopping:

- Local supply when weather-related shortfalls in hydroelectric production occur;
- Intermittent local wind supplies;
- The provincial reliability benefits of the Manitoba and Minnesota transmission system interties;
- The E-W tie line supply from southern Ontario to meet growing electricity needs in Thunder Bay.

The AGS provides an optimal source of generation for meeting the IESO's new forecast demand of 125 MW identified in its NW Integrated Regional Resource Plan (IRRP).[13] The drivers of this new demand include:

- Remote Communities to be connected by the Watay Transmission line;[14]and,
- New mining developments planned near Red Lake and Pickle Lake north of the AGS.

Figure 2: IESO Northwest Planning Region



Source: IESO, Planning in Northwest Ontario website

The supply and demand conditions in the northwest are complex and inextricably linked with those in neighboring jurisdictions and the evolving conditions in the northeast (NE) and the rest Ontario.

Structure of this Report

This report examines the key factors that support the continued operation of Atikokan Generating Station to help provide low-carbon electricity to meet growing demand in the NW and Ontario. Demand and supply conditions are assessed and evaluated to confirm the significant role that the AGS can play in helping to meet growing electricity demands. The cost-competitiveness of the continued operations at

[11] OPG, Biomass Power website
[12] OPG, Annual Report, 2019
[13] IESO, Planning in Northwest Ontario website
[14] Watay Power, Project Descriptions

the AGS is compared to new gas-fired generation alternatives, and the emerging carbon pricing implications of Net Zero objectives. Finally, the station's significant economic contributions to the NW region and the province are examined from two perspectives: continued operations at current levels of production; and, operations at greater production levels.

The report contains the following sections:

- Section 2 describes the methodology used for the five critical areas of analysis in this report and the sources considered by the analyses;
- Section 3 discusses the forecasted trends of demand and supply in the NW region and the implications for regional reliability and security of supply;
- Section 4 summarizes Ontario's provincial level emerging capacity gap and the procurement approach that the IESO has been developing to address it and ensure resource adequacy for the electricity system;
- Section 5 outlines additional emerging NW demand, supply, and interregional constraints that are being affected by climate and electrification to achieve emission reductions.
- Section 6 compares the cost of the continued operation of the AGS post-2024 with that of an alternative new gas-fired generation option;
- Section 7 examines the economic benefits of extending the operation of the AGS, given its local supply chain, and contrasts the total provincial benefits against those of a gas-fired generating option located in the NE; and,
- Section 8 explores the additional benefits that could accrue to the region and the province by continuing to operate the AGS at an enhanced electricity production level.

2 Methodology

This report explores the costs and benefits of extending the operations of the AGS. This section summarizes the methodology used to analyze five critical areas and identifies the supporting references:

1. Supply and demand forecasts in the NW

   The impacts of electrification on energy demand in the region and Ontario is central to this analysis. The IESO's supply and demand forecasts included in its NW IRRP provide the starting point. This data was augmented by forecasts from industries within the region provided to the CVNW ETF for its Assessment of Electrical Supply Requirements. The electrification forecasts for the NW and other zones in Ontario were developed using the Strapolec-developed Electrification Pathways model, which reflects parameters such as regional employment, population and industry activity factors. Additional research was conducted to explore other factors. Demand and supply forecasts for Manitoba were obtained from North American Electric Reliability Corporation (NERC) reports.

2. The IESO's procurement approach

   Information regarding the IESO's procurement approach was developed using materials from the IESO's Resource Adequacy consultations and its Annual Acquisition Report (AAR) and Annual Planning Outlook (APO).

3. Operating history of the AGS

   Internet research, industry sources and IESO power data were used to establish the operating history of the station and its contributions to reliability in the region and province.

4. Economic contributions of the AGS compared to alternative scenarios

   The station's economic contributions to the region were developed through internet research, industry sources, including local supply chain companies and the Town of Atikokan. Additional information was obtained from the 2021 report by Keir Corp on the Economic Impact of AGS operations commissioned by OPG and supplemented by Strapolec's prior work on gas-fired generation and transmission systems alternative.

5. Opportunities for additional potential benefits

   These additional potential benefits are supported by internet research and analyses provided in previous PWU submissions to the province's energy system, forestry and climate consultations.

Specific sources are identified throughout this report and a summary is provided in Appendix B.

3 NW demand and supply forecast trends

This section discusses the forecasted trends of demand and supply in the NW region and the implications for regional reliability and security of supply. Demand in the NW is growing faster than expected, while supply in the region is decreasing, as shown in Figure 3. Transmission projects, currently being developed, e.g., the E-W tie-line, were initiated prior to recent demand forecasts that are showing higher demand. The result is a local supply gap and increasing reliance of the NW region on a grid supply from elsewhere in the province.

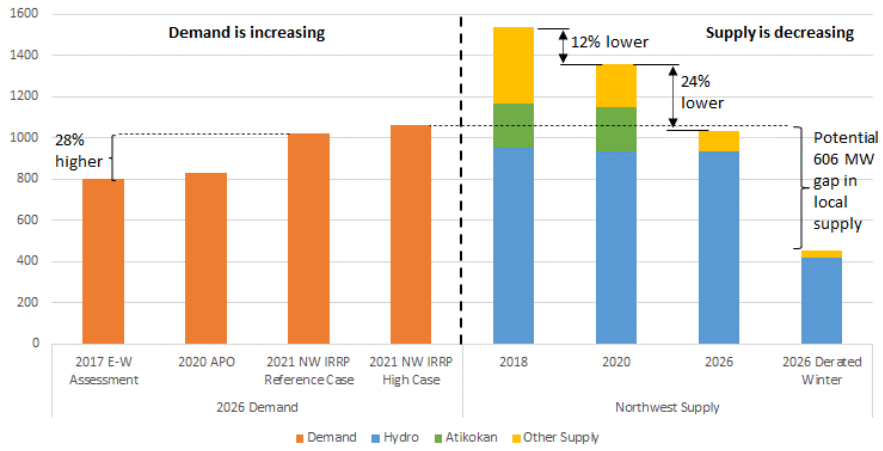
Demand

The IESO's 2026 demand forecast contained in the recent NW IRRP consultation materials is now over 1,000 MW.[15] This is 28% greater than forecast when the decisions regarding the E-W tie-line were last reviewed in 2017. The new demand is driven by:

- *Urban growth:* Growing electricity needs in municipalities and other customers served by the local distribution companies in the region, including Thunder Bay;
- *Remote Communities:* The new Watay Transmission line will connect many new communities; and,
- *New mining developments:* near Red Lake and Pickle Lake, north of the AGS.

A new demand from mining developments of 352 MW was not included in the IESO's 2020 APO forecast for the NW.[16] This 325 MW increase in demand expands the province's overall capacity gap in 2026 by 15%, a challenge that the IESO is working hard to address.[17]

Figure 3: Evolution of IESO's NW 2026 Demand Forecasts and Supply Capacity Attrition
(MW by Source (Demand), and Year (Supply))



Sources: IESO NW IRRP Sept 2021; IESO APO 2020; IESO Power Data; IESO, Updated E-W Tie Line Assessment, 2017; Strapolec analysis.

[15] IESO, NW IRRP, Sept 2021
[16] IESO, APO, 2020
[17] IESO, AAR, June 2021, IESO, APO, 2021

Supply

Local supply capacity in the NW has dropped by 12% since 2018,[18] substantially due to the closure of the Thunder Bay GS. Today, the region's local supply is primarily hydro plants and the AGS. The local resources include:

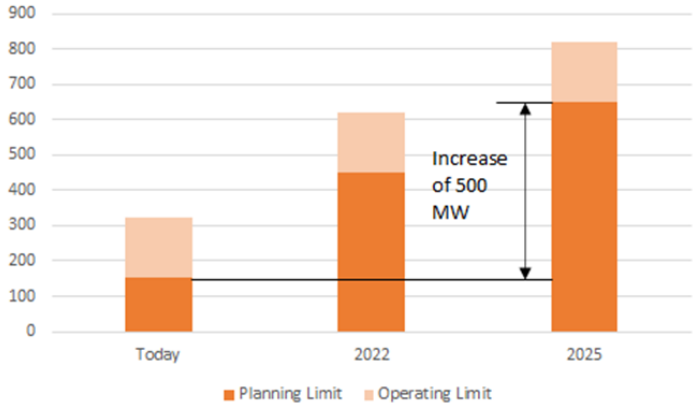
- 21 hydro dams, the largest of which is Pine Portage GS (151 MW);
- 3 biomass plants, largest of which is AGS (205 MW);
- 1 wind farm, Greenwich, 99 MW;
- 1 gas plant, Nipigon GS, 23 MW, to expire at end of 2022.

Contracts for all of the biomass plants and the gas plant will expired by 2026,[19] further reducing local capacity by an additional 24%. In 2026, the resulting available de-rated supply from local resources will be 60% lower than the winter peak demand, leaving a 600 MW local capacity gap in the NW.[20]

The East-West (E-W) Tie Line

Enhancing the capacity of the East-West (E-W) tie line—between Wawa and Thunder Bay-- was identified by the IESO as a priority project in 2010. A 2014 analysis of the options confirmed the E-W tie line as the lowest cost option for meeting forecast demand growth. A 2015 assessment of thermal limitations on existing E-W tie line infrastructure showed the NW would otherwise rely on support from Manitoba for contingencies.[21] A 2017 update confirmed the need for the project to add 500 MW of planning capacity involving a new Tx line running roughly parallel to the existing line, with staged construction of station facilities as shown in Figure 4.[22] The first stage is intended to provide 450 MW of total planning transfer capability and the second stage another 200 MW for a total of 650 MW of planning capability.

Figure 4: East-West Tie Line Planned Capacity Enhancement
(MW by Year)



Sources: Updated E-W Tie Line Assessment, 2017; Strapolec analysis.

[18] IESO Power Data
[19] IESO, Active Contracted Generation List, 2021
[20] Derated assumptions reflect overall provincial metrics by fuel source type from the IESO's 2020 APO
[21] IESO, Assessment of Rationale for East-West Tie Expansion, 2015
[22] IESO, Updated E-W Tie Line Assessment, 2017

Summary

Reliability in the NW is being negatively impacted by growing local demand, retiring supply, and the region's growing dependence on the E-W tie line and the provincial grid. While the 650 MW E-W tie line may be sufficient to marginally meet the IESO's 2026 NW demand, little reserve capacity is available to meet the IESO's reference case forecast for naturally occurring demand post-2026.[23]

This emerging reliance of the NW region on the rest of the provincial grid warrants consideration of how the NW is being impacted by the IESO's overall planning approach to ensure a reliable electricity system for the entire province.

[23] IESO, APO, 2021

4 IESO's approach to ensuring resource adequacy

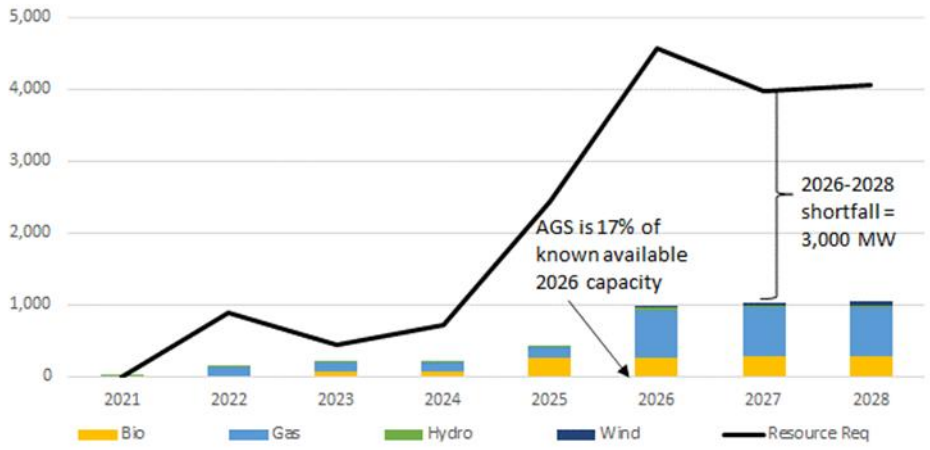
This section summarizes Ontario's provincial level emerging capacity gap and the procurement approach that the IESO has been developing to address it and ensure resource adequacy for the electricity system. This widely recognized capacity shortfall will increase Ontario's dependence on gas-fired generation for resource adequacy and system reliability.

The AGS represents a large source of local, renewable, lower carbon generation that can reliably provide peak, intermediate and baseload electricity to the region and supports Ontario's climate and energy objectives. However, the IESO's current procurement approach does not provide a level-playing for resources such as the AGS.

4.1 Ontario's emerging capacity gap and rising electricity sector emissions

Ontario's capacity gap emerges in 2025/26 with retirement of the Pickering Nuclear Generating Station (PNGS) and is forecast to grow for the foreseeable future.[24] By 2028, Ontario's summer peak capacity needs exceed available supplies by 3,000 MW as shown in Figure 5. Existing resources with contracts expiring by 2026 represent approximately 1,050 MW of capacity. The AGS's 180 MW derated capacity represents 17% this. Furthermore, the AGS represents 10% of the overall provincial capacity gap in 2025, one year after the station's current contract expires.

Figure 5: Ontario Summer Peak Resource Requirements and Expiring Contracts
(Effective MW by Year)



Source: IESO, 2020 APO data; IESO, 2021 AAR; Lennox and Brighton Beach removed from demand and supply due to bilateral contracts, Pickering retires in 2024 and 2025. Post 2025, only 750 MW of expiring contracts are planned to be renewed by the MT RFP.

The IESO's APO assumes that all of Ontario's energy needs over the next decade can be met by gas-fired generation.[25] This increased dependence on natural gas fired-generation has direct consequences for Ontario's emission performance. The challenge is further complicated by the Ontario government's recent direction that the IESO assess the impacts of a moratorium on new gas-fired generation and

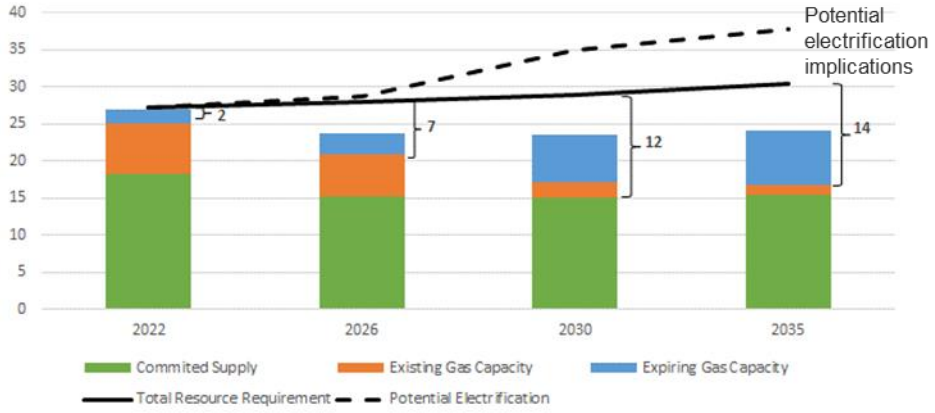
[24] IESO, AAR, 2021. Note that in the APO 2021 released subsequent to this analysis, the capacity gap has grown.
[25] IESO, APO, 2020. In the IESO 2021 APO, this assumption relies on 30 TWh of imports as well.

identify a pathway to phase out existing gas.[26] The IESO has been directed to consider system reliability, the cost to ratepayers and implications of meeting Ontario's climate targets.

The results of the requested IESO assessment can be expected to demonstrate several, negative impacts on Ontario's capacity needs with subsequent impacts on system reliability, as illustrated in Figure 6, including:

- A phased gas-capacity reduction could create a capacity gap of 14 GW by 2035;
- Anticipated electrification demand growth could add another 6 GW to Ontario's capacity needs by 2030;[27] and,
- Total new capacity requirements could exceed 20 GW, double the capacity of Ontario's existing nuclear fleet.

Figure 6: Summer Effective Capacity and Resource Requirements
(MW by Year)



Sources: IESO APO, 2020; Strapolec analysis.

The low carbon emission attributes of the AGS represent an opportunity to support a long-term strategy to reduce Ontario's reliance on natural gas-fired generation.

4.2 IESO's procurement approach

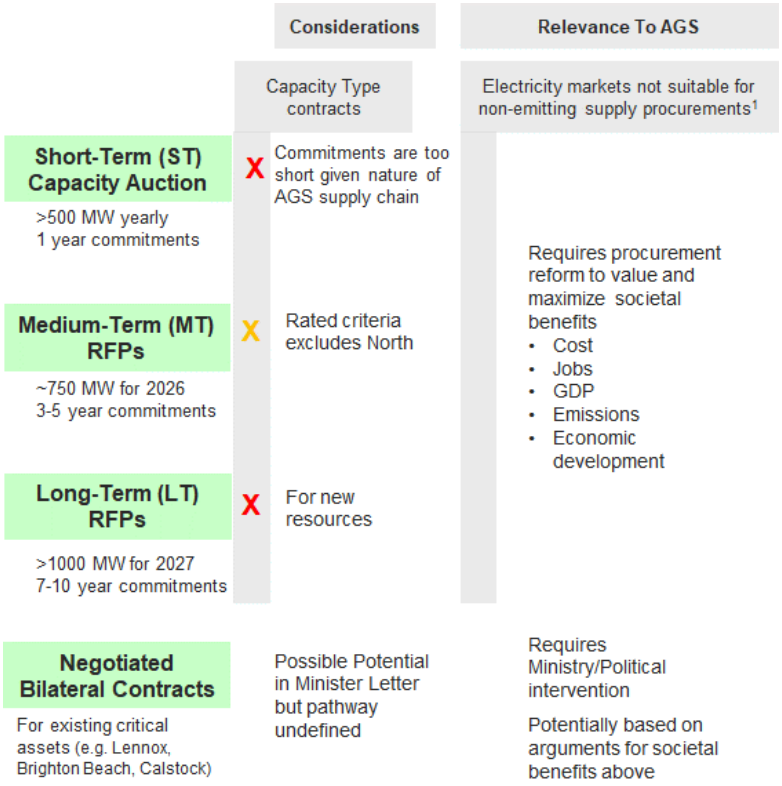
The IESO has been developing a procurement approach to address Ontario's emerging capacity gap.[28] The IESO's approach involves four tools as summarized in Figure 7:

- Short-term (ST) capacity auctions (CA)
- A Medium-term (MT) RFP process
- A Long-term (LT) RFP
- Negotiated bilateral contracts

[26] Ontario Minister of Energy letter to the IESO, Oct 7, 2021
[27] Strapolec analysis based on Strapolec, Electrification Pathways for Ontario, 2021. Note that the IESO's APO 2021 electrification case has virtually identical forecast capacity needs in 2035
[28] IESO, Resource Adequacy engagement, 2020-2021

The Short-term (ST) capacity auctions (CA) and the Medium-term (MT) and Long-term (LT) RFPs are constructed as capacity type contracts. These types of contracts do not specify if the desired supply resource should be ideally suited for baseload or peaking services and relies on energy markets to determine the required generation. While these market-based mechanisms are ideally suited for the procurement of gas-fired generation, analysis shows that they are not at all suitable for procuring any of the known lower-carbon options necessary for meeting Ontario's climate objectives.[29]

Figure 7: IESO's Procurement Framework



The IESO has advised generators with contracts expiring before May 2026, to participate in the semi-annual CA. While this opportunity is available to AGS, the 6-month periodic nature of the CA and its reliance on energy markets to establish financial viability discriminates against the station's participation due to the nature of its supply chain.

Notionally, the MT RFP could be a suitable mechanism for renewing AGS's contract. However, the following constraints exist:

- The RFP rating criteria explicitly devalues any supplies in the NW, despite the clear need for supply in the region;
- Capacity style contracts do not value the societal benefits, such as emission reductions provided by the AGS; and,
- The AGS contract expires prior to current procurement timelines.[30]

The LT RFP is designated for new resources only, making the AGS ineligible to participate.

The IESO's fourth mechanism is a negotiated bilateral contract. This tool is intended to be used for the procurement of existing, critical assets that requiring early decisions. To date, this mechanism has been exercised through ministerial directives. The extension of operations at the Lennox, Brighton Beach and NW region's Calstock biomass generating stations have been procured in this manner. The Ontario Ministry of Energy has indicated that the AGS may be eligible for consideration under this provision at some future date. However, no clear commitment has been made.[31]

[29] Strapolec, Electricity Markets in Ontario, 2020
[30] In the December 2021 Resource Adequacy materials, the bridging mechanisms have been expanded to potentially address AGS related timing issues.
[31] Ontario Minister of Energy letter to the IESO, Nov 10, 2021

4.3 Summary

The approach to securing capacity under the IESO's resource adequacy framework should value the environmental and economic benefits of this locally-supplied, low-carbon, renewable biomass fueled station. These attributes will become increasingly important as Ontario ramps up its efforts to address climate change. The station's regional and provincial importance suggests that renewing the contract for the AGS should be a ministerial priority and warrants a directive under the IESO's bilateral contracting provision.

5 Emerging NW demand and supply constraints

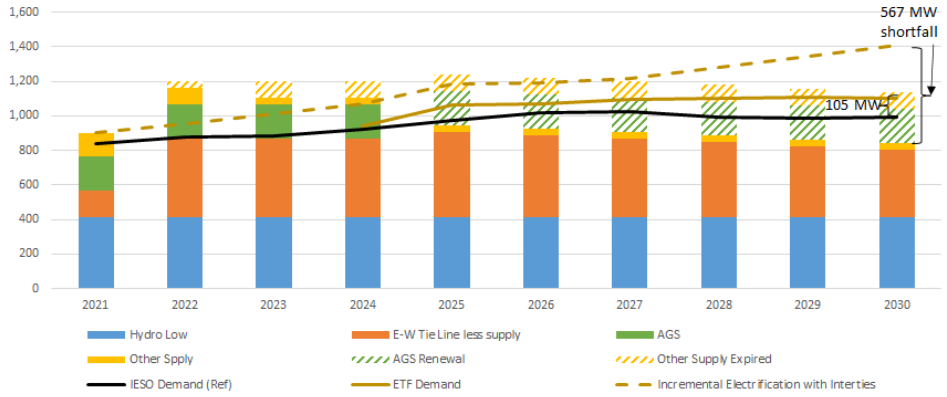
This section outlines additional emerging NW demand, supply, and interregional constraints that are being affected by climate and electrification to achieve emission reductions. These emerging constraints create additional reliability risks for the NW that support extending operations at the AGS.

Three factors are exacerbating the forecast supply gap in the NW:

- Additional emerging demand growth in the NW and supply conditions in Manitoba;
- Hydroelectric station deratings specific to the region; and,
- Constraints on supply to the E-W tie line due to emerging demand growth in the NE.

The NW supply gap emerges in 2024 as the AGS contract expires and worsens to a capacity gap of over 560 MW by 2030, if the station's contract is not extended, as shown in Figure 8.

Figure 8: Winter Peak Load vs. Supply in Northwest Ontario
(MW by Year)



Sources: Energy Task Force, 2021; IESO Power Data; IESO, NW IRRP, 2021; Strapolec Analysis

Additional emerging demand growth in the NW and supply conditions in Manitoba

Demand growth in the region could exceed the forecast in the IESO's NW IRRP by over 415 MW:

- Data from the CVNW ETF and the mining interests in the area north of the AGS are confirming greater mining development activity than the IESO's reference case is considering. This data suggests demand will increase by about 105 MW in 2025—consistent with the IESOs NW IRRP 2026 high case;[32] and,
- Additional demand growth east of Thunder Bay will place greater load on the E-W tie line, reducing the tie line's capacity to serve the region west of Thunder Bay. This additional demand will arise from two sources:
    - Mining activity in Ontario's 'Ring of Fire' could add over 100 MW of baseload sometime between 2027 and 2030;[33] and,

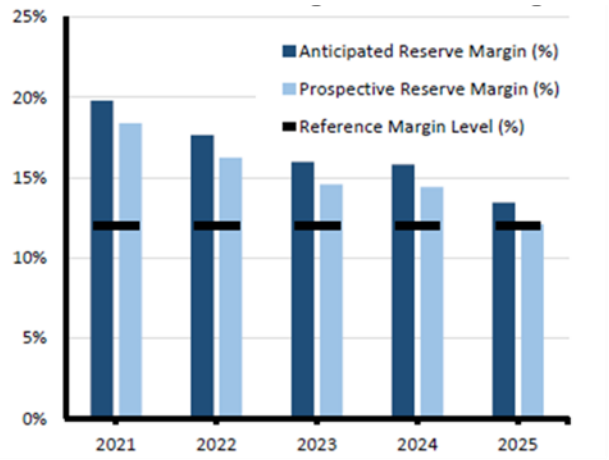
[32] Energy Task Force, email "CVNW ETF Assessment of Electrical Supply Requirements", 2021
[33] IESO, NW IRRP, 2021; Strapolec analysis

- Emerging electrification of the Northwest, such as may be caused by the City of Thunder Bay's Net Zero Strategy,[34] could add another 75 MW by 2030.

Part of the rationale for the E-W tie line was to mitigate the risks of over-reliance on imports from Manitoba during contingencies. In recent years, the NW has been supplying a constant flow of 127 MW to Manitoba & Minnesota during peak hours.[35] While not firm, these flows have provided significant contributions to reliability in those jurisdictions. NERC's long-term reliability assessment for Manitoba suggests a declining export capacity and increasing need for imports as reflected in Figure 9.[36] This situation is anticipated to occur even after the 695 MW Keeyask Dam is completed. In response, Manitoba has stated that it will reduce firm exports to maintain its required reserve margins.

Demand growth, of almost 10% in the next 8 years from electrification in Manitoba, can be expected to further erode this declining reserve margin. In the future, Manitoba may need to import more electricity from Ontario to meet peak demands. By applying the 10% growth, Manitoba's additional requirements from Ontario could approach 8 MW in Winter and 4 MW in summer as the province faces its own supply gap post 2025.

Figure 9: Manitoba Planning Reserve Margins
(MY by Year)



Source: NERC 2020 Long-Term Reliability Assessment

Hydroelectric station deratings specific to the NW

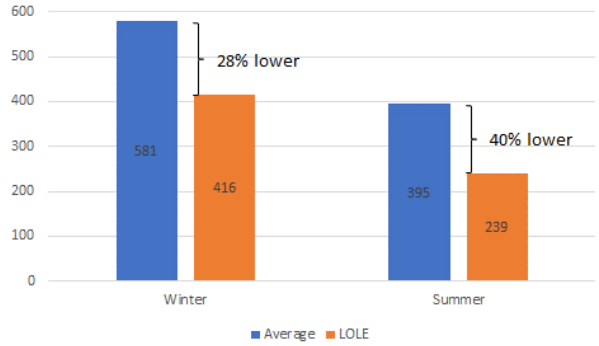
Hydroelectric production in the NW, which is primarily run of river, is vulnerable to the effects of drought. The NW has experienced drought conditions twice in the last five years. The most recent drought in 2021 reduced winter production. The derating factors applied to these NW stations should reflect this regional risk of drought not the derating factors that are applied to all hydroelectric stations across the province.[37] The Loss of Load Expectation (LOLE), used in the provincial reserve margin calculation, can be used to estimate the maximum hydro output contribution during peaks. The

[34] City of Thunder Bay 2021
[35] IESO Power Data, 2020, Strapolec analysis
[36] NERC 2020 Long-Term Reliability Assessment
[37] IESO Power Data, 2015-2018, 2020

threshold can be approximated as the output level that cannot be achieved for 0.1 days per year. For this analysis, that threshold was set by examining the lowest 16 hours of production during the total of the top 100 peak demand hours in each of the last 7 years.

As a result, hydro assets in the NW are assumed to contribute 416 MW of capacity at winter peak and 239 MW at summer peak as shown in Figure 10.

Figure 10: Northwest Hydro Output During 100 Peak Provincial Demand Hours by Season 2015-2021
(MW by Year)



Sources: IESO Power Data, Strapolec Analysis

Constraints on supply to the E-W tie line due to emerging demand growth in the NE

Growing demand in the Northeast (NE) region, at the gateway to the E-W tie line, could inhibit supply to the E-W tie line, reducing its useable capacity by 50%. Two known factors include:

- 160 MW of baseload supply for Algoma on supply path to Wawa by 2025[38]; and,
- 100 MW capacity shortfall in the NE by 2030 due to demand growth in the NE combined with transmission constraints on lines supplying the region from the south.

The forecast demand growth and emerging capacity gaps in the rest of the province point to another unquantified risk—the availability of supply to the NE from the south that would feed the E-W tie line. The IESO's recent 2021 APO identified these concerns as a risk.[39]

Summary

Economic growth and electrification of the economy will strain planned electricity resources in the NW as well as in the neighboring regions that supply the NW. Providing a reliable supply to the NW over the next decade will require additional new generation and transmission (Tx) capacity beyond the IESO's current forecasts. With over 350 MW of demand originating north and west of Atikokan, extending operations at the AGS can offset some of this need and reduce planning risks for the entire region.

[38] Northern Ontario News, Algoma Steel moving ahead with electric steel furnace transition, Nov. 12, 2021. Calculated by applying an electric arc furnace energy consumption value of 475 kWh/tonnes to 3.7M tonnes/year output, and assuming an 80% operating factor to arrive at an average power consumption of 161 MW
[39] IESO, 2021 APO

6 AGS cost considerations compared with alternative gas-fired generation

This section compares the cost of the continued operation of the AGS post-2024 with that of an alternative new gas-fired generation option. The rationale for the comparison and the cost components considered for each scenario are provided.

While the AGS has higher fuel costs, the gas-fired option entails carbon price premiums and transmission costs that make a gas-fired option a higher cost choice.

Gas-fired Generation Scenario as an alternative to the AGS

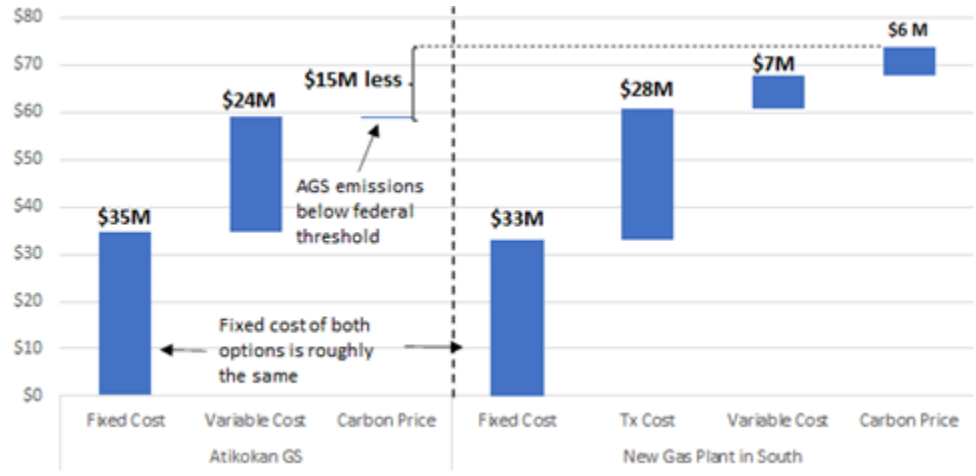
As established by the IESO's provincial supply and demand forecast and Ontario's overall capacity shortfall described earlier, the alternative to extending the operations of the AGS is to construct the equivalent of a new gas-fired facility. This analysis assumes that the new gas-fired generation will be located within the NE region to create sufficient surplus to support the E-W tie line. This supply will be required to support Algoma's electric arc furnaces and to meet growing demand elsewhere in the NE.

To be an alternative to the AGS as a supply source for the region north and west of the AGS, energy from the gas-fired alternative in the NE will have to be transmitted to the AGS location. The incremental energy flows will require the equivalent incremental transmission capacity to deliver the energy from the NE to Atikokan. Two transmission components will be impacted: additional E-W tie line expansion to Thunder Bay; and, bulk transfer capacity to Atikokan from Thunder Bay.

Total system incremental cost categories

Four categories of costs were assembled for comparison as shown in Figure 11. The total cost comparison shows that the AGS option would cost ratepayers $15M/year less than an alternative gas-fired generation option.

Figure 11: Cost and Benefits Comparison of AGS vs. Gas Option
($M per year by category, 2027 Reference)



Sources: IESO, 2020 APO HOEP forecast; Environment Canada, Output-Based Pricing System; Keir Corp, AGS Economic Impact Analysis, 2021; Strapolec analysis

Annual fixed capacity costs are similar at $33M to $35M per year

- The fixed operating costs for the AGS have been extracted from a third-party consulting report commissioned by OPG.[40] These results have been validated independently based on historical public information and the Thunder Bay generating station prior to its closure.
- The fixed operating costs for the gas-fired generation facility have been estimated for a 205 MW facility using IESO's forecast of $161K/MW-year for the Cost of New Entry (CONE) of a new CCGT.[41]

Tx annualized fixed costs allocated to the gas-fired generation option of $28M/year

- Investment recovery is based on the E-W tie line expansion cost of $984M annualized over 70 year for the Tx lines and over 45 years for Tx stations using the 4% interest rate assumed by the IESO.[42] Costs were prorated from the 500 MW E-W upgrade capacity to the 205 MW AGS equivalent required capacity. This estimate yields $18M/year in fixed costs.
- Operating and maintenance (O&M) costs have been proxied from the overall Hydro One O&M budget on a per $M of asset under management.[43]
- The Tx costs presented here are conservatively low reflecting only the costs of upgrading the E-W tie line leg of the corridor from Wawa to the AGS. Related Tx upgrades to deliver energy from TB to the AGS and potentially through the NE from Essa were not assessed or included, and could represent an even higher cost.

Variable costs, mostly but not entirely fuel costs

- The variable cost of biomass operations are $17M higher than for natural gas, even considering line losses.
- Biomass fuel costs have been extracted from a third-party consulting report commissioned by OPG.[44] These results have been validated independently against several research reports.[45]
- The variable costs of gas-fired generation are based on the IESO forecast of the HOEP for the period of 2026 to 2028 in the 2020 APO. The on peak average is estimated at $39/MWh.
- Incremental Tx line losses of 15% were included as part of the variable cost for the gas-fired generation option. The marginal losses assume an 80% capacity factor which is consistent with the periods of peak demand when the AGS would be required.[46]

[40] Keir Corp, AGS Economic Impact Analysis, 2021
[41] IESO, Capacity Auction Engagement Net CONE forecast, Sept. 2020
[42] IESO, Updated Assessment of East West Tie Expansion, 2017
[43] Hydro One, 2020 Annual Report, 2020
[44] Keir Corp, AGS Economic Impact Analysis, 2021
[45] Visser et. al., "Wood pellet supply chain costs - A review and cost optimization analysis", 2019
[46] Cortes Currents, Transmission Grid Loss, 2014; NACAA, Implementing EPA's Clean Power Plan, Chapter 10: Reduce Losses in the Transmission and Distribution System; IESO, Updated Assessment of the Need for the E-W Tie Expansion 2017; Strapolec Analysis

Carbon emission costs are $6M/year higher for the gas-fired option

- Natural gas-fired generation has higher net emissions. The applied carbon price for the period of 2026 to 2028 is $125/tonne derated to a value of $83 based on the federal Output-Based Pricing System (OBPS) formula.[47] The value is estimated to be $32/MWh and is expected to increase over time.
- In 2026 to 2028, net AGS emissions will remain below the federal OBPS threshold leading to an estimated zero dollar ($0) carbon price.

Summary

The cost of extending operations at the AGS is estimated to be 20% less than the total system cost to commission and operate a new gas-fired generation alternative. The higher costs of the AGS biomass pellets fuel are offset by the carbon price of a new gas-fired generation facility and the cost of the transmission system upgrades to connect it.

[47] Government of Canada, Output-Based Pricing System Regulations, SOR/2019; Canada Gazette, Part II, Volume 153, Number 14, Annual facility emissions limits; MoECP, Amendments to support transition and implementation of Ontario's EPS program, 2021; Strapolec Analysis

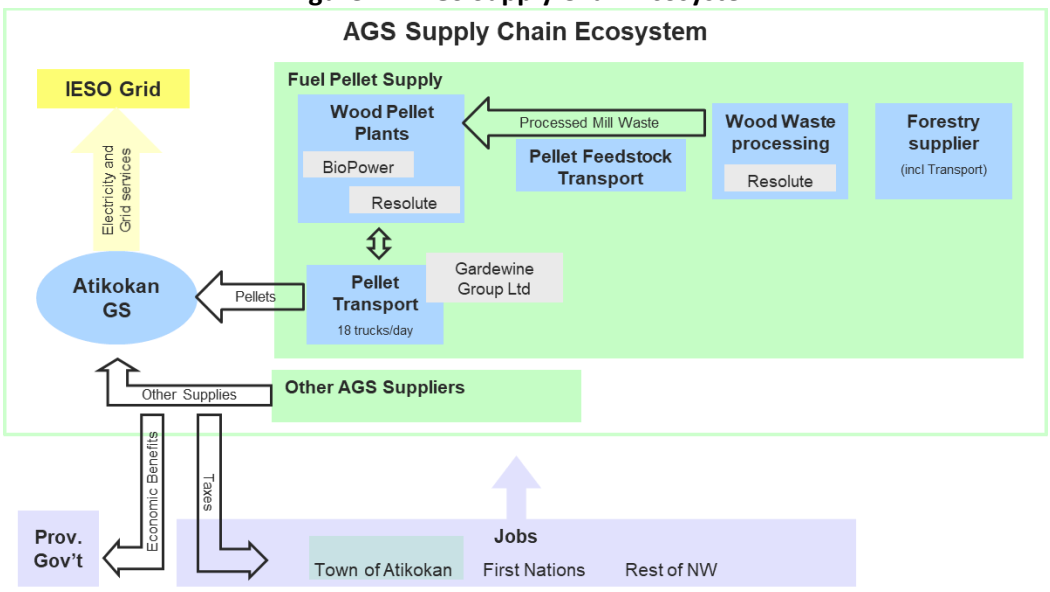
7 Economic considerations of extending AGS operations

This section examines the economic benefits of extending the operation of the AGS, given its local supply chain, and contrasts the total provincial benefits against those of a gas-fired generating option located in the NE. An overview of the AGS supply chain is provided followed by an assessment of the jobs implications with a focus on the Town of Atikokan. Other potential benefits for the NW region are examined. The comparison of the two options shows greater system benefits are achieved by extending the AGS operations.

The AGS Supply Chain and Local Jobs

The AGS is a significant employer in the NW region and also supports an extensive local biomass supply chain that fuels the station with wood pellets, as shown in Figure 12. This local bioeconomy supports jobs in forestry-harvesting; wood waste processing; and transportation. The station's operations also require the purchase of supplies and services from other local businesses and Indigenous communities and from across the province.

Figure 12: AGS Supply Chain Ecosystem



The AGS directly employs 64 people and another 126 local direct supply-chain jobs as shown in Figure 13. In turn, these 190 direct jobs support another 191 indirect and induced jobs in Ontario. Of these, 327 jobs are supported in the region providing benefits to the financial and social sustainability of the Town of Atikokan, local First Nations communities, and the rest of the NW.[48]

[48] Keir, 2021

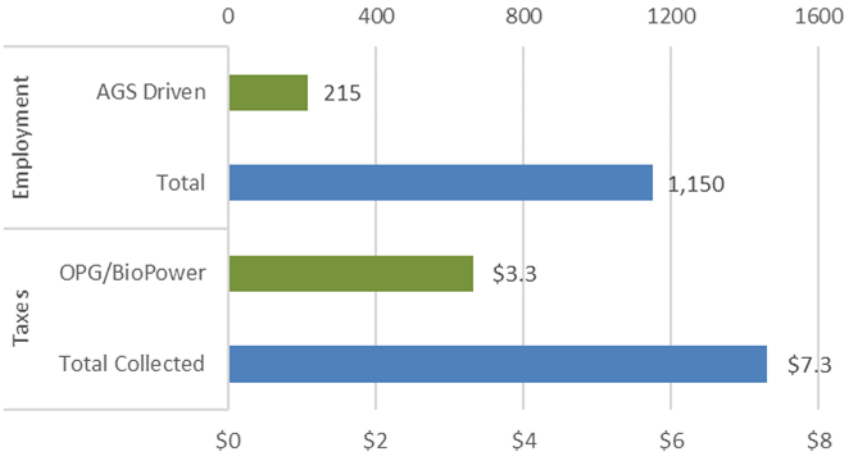
Figure 13: Jobs from the AGS and its Supply Chain

Atikokan Generating Biomass Supply Chain Jobs		
Supply chain element	**Jobs**	**Basis**
Atikokan	64	Keir
Pellet plants	74	BioPower, assume Resolute is similar
Other Direct suppliers	12	Jobs in direct supply chain, Strapolec metric
Transportation and Forestry	40	Derived from Pembina report. BioPower employs 10
Total Direct Jobs from Operations	**190**	
Capital projects	2	Derived from Keir, averaged over 10 years
Indirect and Induced	189	Keir
Total	**381**	Keir. Note 327 jobs located in the NW

Benefits to the Town of Atikokan

The Town of Atikokan's financial viability is bolstered by the AGS and existence of local suppliers as illustrated in Figure 14. The direct jobs at the AGS and BioPower pellet plant sustain 218 induced jobs in the Town, representing about 20% of its total employment.[49] OPG and BioPower's pellet plant also provide 45% of the Town's collectible taxes.[50]

Figure 14: Economic Impact of AGS on Atikokan
($M/year & jobs, 2027)



Sources: Town of Atikokan, 2017; BioPower; Strapolec analysis

Benefits to Ratepayers and the Province

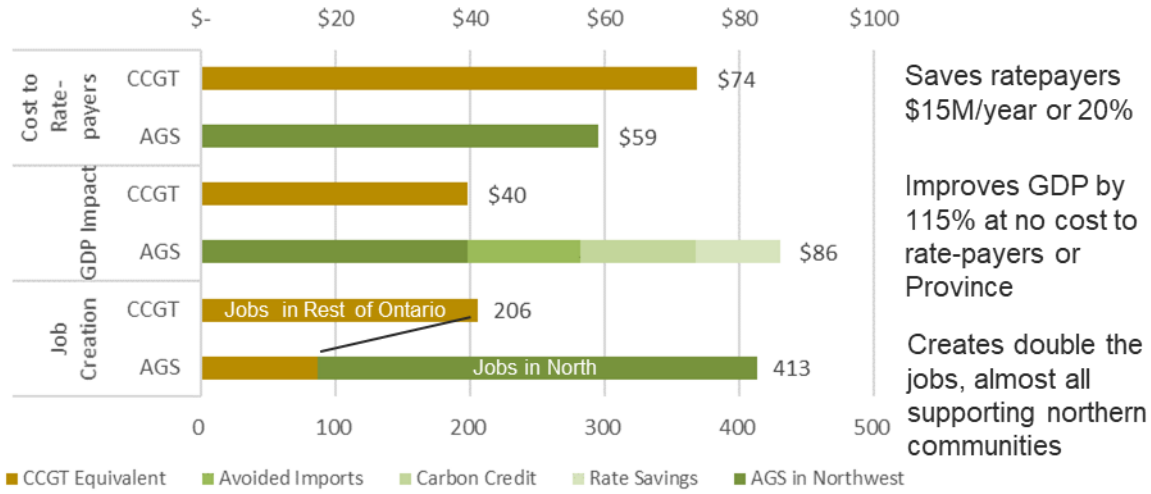
There are three categories of benefits to the province:

- Ratepayer benefits, as described in the previous section on costs;
- GDP impacts; and,
- Job creation.

[49] Town of Atikokan, 2017; Strapolec analysis
[50] Notes from the Town of Atikokan, 2017; Strapolec analysis

The results of a comparison of the overall benefits between extending operations at the AGS versus a new gas-fired generation and transmission supply option (CCGT/Tx) are shown in Figure 15. It highlights the critical economic elements of this choice for decision makers.

Figure 15: Economic Impact of AGS Compared to an Alternative CCGT/Tx Option
($M/year & jobs, 2027)



Sources: Strapolec Analysis

Ratepayer benefits – As described in the previous section, the continued operation of the AGS produces rate payer benefits through its lower total cost of electricity supply to the region. The identified savings of $15M/year, represent a 20% lower cost compared to the gas-fired alternative.

GDP implications – Provincial GDP benefits from continuing to operate the AGS are estimated to be more than double (115%) that from the gas-fired alternative. These benefits are achieved: at the above noted lower cost to ratepayers; by retaining ratepayer expenditures within the province by avoiding natural gas imports from the United States and redirecting the savings to domestic job creation; and opening up potential opportunities to sell carbon offsets.

Job Creation – Continued AGS operations create double the jobs in the province compared to the gas-fired option, with 80% of these jobs being created in the north where they are needed most.[51]

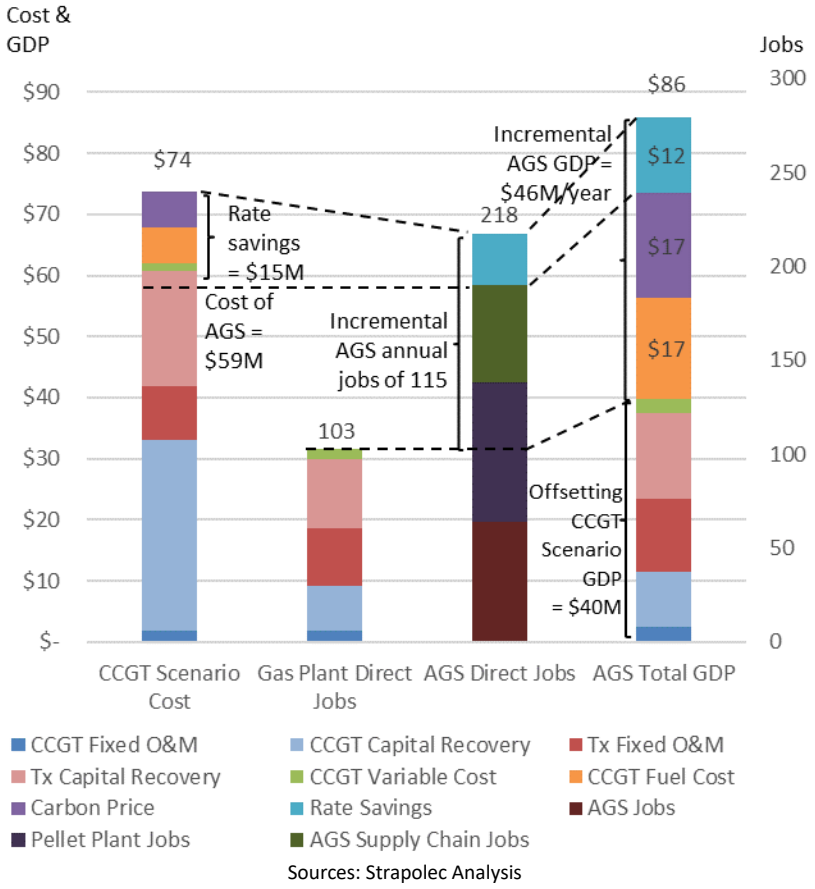
Additionally, the enhanced GDP is estimated to generate $4.5M per year in tax revenue. The annual incremental taxes from the AGS option compared to the gas-fired option is estimated to be $4.4M/year.[52] The additional tax revenues generated by the incremental GDP created from the cost savings to ratepayers is, alone, equivalent to the GDP generated from the gas-fired option.

Methodology for the Comparison of CCGT/Tx Jobs and GDP

[51] Keir, 2021
[52] Keir, 2021

The GDP benefits from the continued operation of the AGS are estimated at $73M/year.[53] A comparison of the costs, jobs created and related GDP enhancements by the new CCGT/Tx option versus the AGS option is illustrated in Figure 16.

Figure 16: Illustrative Financial Leverage on GDP Contribution of AGS vs Alternative CCGT/Tx Option
($M/year & jobs, 2027)



Sources: Strapolec Analysis

The ratepayer costs of the CCGT/Tx option include four factors that generate much less GDP growth, i.e., only $40M/year in GDP.

1. Capital recovery of initial investments (over 60% of cost) – These include the capital and financing costs of the asset. Initial development jobs and related GDP contributions are modelled assuming an economic life of 60-years for Tx and 20-years for the CCGT.
2. Fuel costs (almost 10% of cost) – The cost to import natural gas creates negligible Ontario jobs
3. Carbon price (almost 10% of cost) – A tax system that in and of itself provides no measurable incremental direct jobs for the gas-fired alternative.
4. The gas option costs $15M/year more than the AGS option thereby reducing available ratepayer spending on other items and the GDP growth that spending would entail.

[53] Keir, 2021

The GDP contributing elements of the CCGT/Tx option yields 103 direct jobs.[54] This compares to the 192 direct jobs previously identified for the AGS option in Figure 13.

The $15M/year savings presented by the AGS option would add another 26 jobs. This is determined by scaling 85% of the ratepayer benefits and assuming this amount is applied to job creation. At the provincial level this could contribute $12.5 M to GDP (85% of $15M).

As noted above, ratepayer spending on natural gas imports and carbon premiums in the CCGT/Tx option produces no measurable jobs or GDP. Under the AGS option, the redirected savings from these items contributes to the 88 additional AGS jobs and $34M/year in additional GDP. With these avoided costs being roughly similar in magnitude, Figure 16 illustrates that avoiding these costs in favour of expenditures on the AGS provides about $17M/year each in annual GDP benefits.

Summary

The continued operation of the AGS delivers greater economic benefits to the region and the province than would the gas-fired option. With a reduced cost to ratepayers and avoiding the CCGT/Tx alternative costs of importing natural gas and the associated carbon price, the AGS provides an additional 207 jobs in the province, 115 new direct local jobs, and an additional $46M/year in GDP. The Town of Atikokan relies on the AGS for 20% of its employment and 45% of its collectible taxes.

[54] Strapolec estimate of jobs using historical proxies

8 Benefits potential of enhancing AGS operations

This section explores the additional benefits that could accrue to the region and the province by continuing to operate the AGS at an enhanced electricity production level. This section first examines the operating profile of the AGS and its supply chain constraints to assess the cost-effective potential for enhancing operations. The cost benefits of these extended operations are then again compared to the CCGT alternative. The section concludes with a description of the additional economic, environmental, and social benefits that the AGS option could provide as the anchor for a low-carbon, energy hub in Northwest Ontario.

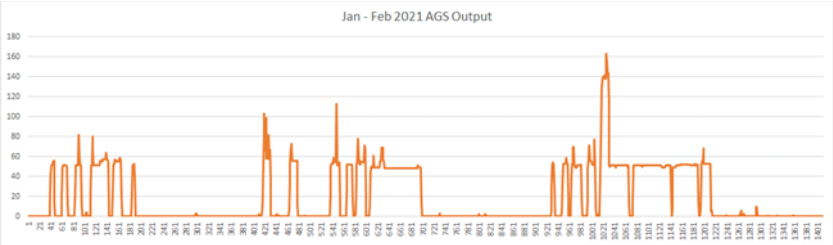
8.1 AGS could contribute to mitigating demand risks by tripling generation output

The NW needs local intermediate supply to manage daily demand and bolster the effective utilization of the E-W tie-line. A reliable and available dispatchable supply would allow the E-W tie line to deliver more baseload power and thereby increasing the tie line's capacity factor while reducing the per MWh cost of transmission for all users. The AGS is a local, dispatchable supply of energy that is capable of meeting intermediate demand.

The capability of the AGS and its local supply chain to cost effectively increase production is established by examining three factors:

1. *Utilization of AGS operations could be increased*
   The AGS only generates electricity 30% of the time yielding 10% of its potential annual output as illustrated by the sample operating profile in Figure 17. Generating hours could be increased by a factor of three without impacting fixed costs and increasing the station's overall capacity factor to almost 30%, typical for an intermediate supply.[55]

Figure 17: Sample AGS Operating Profile
(MW by Hour, Jan-Feb 2021)



Sources: IESO, Power Data

2. *Optimizing pellet supply*
   The AGS typically operates 24x7 at 40 to 50 MW for a few days providing peak supply as required. The station can only operate for about 3 weeks at 50 MW before it runs out of pellets. It has 10,000 metric tons of storage and daily shipments of about 250 tons for 365 days/year. Tripling pellet supply would allow the AGS to support reliability on the NW grid all year round. BioPower has

[55] According to the Canadian Biomass Magazine, April 2021, AGS operates 24x7, 365 days a year and always available to be dispatched on by the IESO.

indicated that it could double the production from its existing facility with cost savings enabled by longer-term commitments to larger volumes.[56]

3. *Renewable forest biomass is available*
   Sufficient waste biomass volumes from forestry operations are available in Ontario's north to support 3.4 TWh of electricity production.[57] This is 10 times more electricity than the biomass facilities in the north currently generate. Separately, other stakeholders suggest that only 50% of the existing harvested waste is being used in the biomass facilities in the north.[58] This includes the pellets consumed by the Resolute and Calstock suggesting that there is enough existing waste biomass to triple Atikokan's pellet supply.[59]

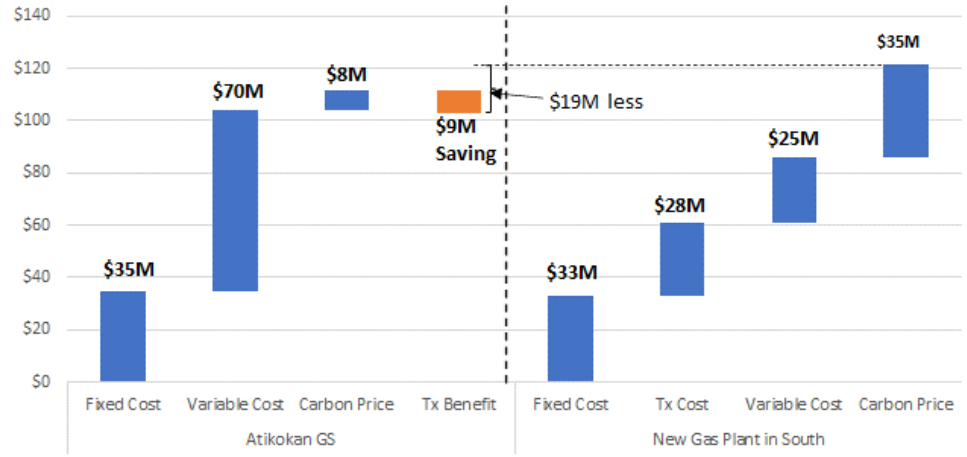
Based on these factors, AGS production could be tripled to 474 GWh/year.

8.2 Increasing production from the AGS is cost-effective

Several factors will impact the costs and benefits should production from the AGS be tripled. Figure 18 illustrates that tripled production the AGS option costs an estimated $19M/year less than the CCGT alternative.

Tripling production will increase the variable operating cost of the AGS by $46M/year to $70M/year. The annual cost of 270 kt of pellets would increase by $42M/year, from $23M/year to $65M/year, reflecting 5% pellet cost savings on greater committed volume.[60] The carbon price would increase to $8M/year.

Figure 18: Cost Comparison of Enhanced AGS Operations
($M/year by category)



Sources: Visser et. al., 2019; IESO, 2020 APO HOEP forecast; Environment Canada, OBPS; Keir Corp, s, 2021; Strapolec analysis

[56] Visser et. al., "Wood pellet supply chain costs - A review and cost optimization analysis", 2019
[57] Pembina, Biomass Sustainability Study, 2011
[58] IESO NW IRRP webinar Nov 17, 2021
[59] Ontario Minister of Energy letter to the IESO, Nov 10, 2021, which claims that Calstock GS also consumes 90,000 tonne/year
[60] Visser et. al., "Wood pellet supply chain costs - A review and cost optimization analysis", 2019

Increased AGS production would provide ratepayer savings on Tx costs that offset production cost increases. Increasing the ability of the AGS to provide dispatchable intermediate, peak and reserve capacity would reduce the reserve margin needed for the E-W. The enhanced AGS operations would enable the station to provide its derated 180 MW of firm contribution at peak and provide 40 MW of intermediate supply. This would mean the E-W would not need to supply 140 MW of peaking and reserve capacity in the NW, freeing up much planning capacity on the E-W tie line. The E-W tie line could transmit an additional 140 MW of baseload increasing the line's capacity factor by over 20%. In turn, this capacity increase will reduce per unit Tx costs to other users of about $20/MWh,[61] a savings to ratepayers of $9M/year.

The variable costs of the gas-fired generation option will also increase. The HOEP is forecast to increase to $46/MWh[62], adding $18M/year on new volume. The carbon price in 2030 will be $170/tonne, fully applicable to all output,[63] adding $29M to the base case.

Tripling AGS generation output remains a cost-effective alternative to any potential new generation in the NE and the associated transmission infrastructure.

8.3 Sustaining the AGS could anchor a local, low-carbon energy hub

Sustaining and enhancing operations at the AGS will: provide long-term business opportunities for local communities, supply chain companies and Indigenous peoples; encourage more investment; and, support Ontario's emerging bioeconomy. The AGS and its 741-acre site represents a unique opportunity to anchor a local, low-carbon energy hub. Its geographic location, transportation and grid connections, locally available biomass and established supply chain, substantial wood waste supply and the station's under-utilized heat output could support an integrated, low-carbon energy centre.

Opportunities include:

a) Ontario Forest Biomass Action Plan

A low-carbon energy hub would support the goals of the developing Ontario Forestry and Biomass plan. It would directly support development of a regional cluster to increase value generation from the use of forest biomass, create new direct employment in the energy, forestry, transportation, and research sectors in the region, and support other government policy objectives: Ontario's Made-in-Ontario Environment Plan; First Nations Economic Growth and Prosperity Table; and, Connecting the North Transportation Strategy.

b) Clean Energy Opportunities

The low-carbon electricity from the AGS could be used to produce low-carbon hydrogen. Investments could be encouraged by a number of existing rate programs. The pending federal clean fuel standard (CFS) could make hydrogen a lower cost option for the heavy transportation sector. This local source of hydrogen would benefit the truck/heavy equipment dependent forestry sector in the NW and would also advance Ontario's climate objectives. Large-scale

[61] 20% of $102/MWh shown earlier for 1.1 TWh (180 x 8760 less the 30% AGS op factor)
[62] IESO, APO, 2020; Note that the recent 2021 APO increase HOEP to over $60/MWh by 2040
[63] Environment Canada, Output-Based Pricing System

Energy Battery Storage could also be accommodated on site to help meet peak/back-up demand. The station's location would make it an ideal site for a regional collection depot for spent commercial batteries and solar panels.

c) Advancing Climate Plan with Carbon Capture

Carbon capture at the AGS is a unique opportunity to help achieve provincial emission targets. Carbon capture may be a significant enabler of the continued use of parts of Ontario's natural gas fleet. If applied to the AGS, which is effectively carbon neutral over its supply chain, the AGS would become a significant net carbon sink, potentially at a much lower abatement cost than for other carbon capture applications.

d) Optimizing Heat and Greenhouse Benefits

Utilizing heat biproducts from the AGS would improve the operating performance of the station and could generate new revenue streams. Combined heat and power plants (CHP) have been deployed around to the world for industrial, large commercial and institutional applications, districting heating, wood pellet production and greenhouses. The value of "bioheating" was noted in Ontario's Forestry Plan. Leveraging captured carbon and waste heat can supply high yield greenhouse applications such as using converted freight canisters for growing produce with hydroponics, allowing for the production of high-quality produce. Local supplies of fresh vegetables from this location would benefit local communities and Indigenous peoples across the region.

e) Biomass R&D Hub

The conversions of the Thunder Bay and Atikokan Generating Stations to renewable, carbon-neutral biomass also helped grow a biomass research cluster in the NW Region. These conversions resulted in multi-million dollar investments in biomass related R&D at Confederation College, Lakehead University and the Centre for Research and Innovation in the Bio-economy (CRIBE). Enhanced production, supply chain activity, and other opportunities will lead to attracting additional R&D activity in the area.

8.4 Summary

By generating electricity all year and tripling production, the AGS may be better able to provide reliability services, mitigate demand risks in the north, and improve costs/benefits for ratepayers. By lowering local generation costs and improving cost-effective transmission utilization, increased production at the AGS will be at 15% lower ratepayer costs than the natural gas option. The AGS site represents a unique opportunity to anchor a local, low-carbon energy hub, accelerate forestry biomass sector in Northern Ontario, attract local commercial businesses and new users, and expand partnerships with Indigenous peoples.

9 Conclusion

This report demonstrates the benefits of extending AGS operations beyond 2024 and increasing production. Six key findings support this conclusion.

1. *Deteriorating Energy Security in the NW*

Reliability in the NW is being negatively impacted by growing local demand, retiring supply, and the region's growing dependence on the E-W tie line and the provincial grid. While the 650 MW E-W tie line may be sufficient to marginally meet the IESO's 2026 NW demand, little reserve capacity is available to meet the IESO's reference case forecast for naturally occurring demand post-2026.[64]

This emerging reliance of the NW region on the rest of the provincial grid warrants consideration of how the NW is being impacted by the IESO's overall planning approach to ensure a reliable electricity system for the entire province.

2. *The IESO's procurement for meeting the provincial capacity gap does not address the needs of the Northwest*

The approach to securing capacity under the IESO's resource adequacy framework should value the environmental and economic benefits of this locally-supplied, low-carbon, renewable biomass fueled station. These attributes will become increasingly important as Ontario ramps up its efforts to address climate change. The station's regional and provincial importance suggests that renewing the contract for the AGS should be a ministerial priority and warrants a directive under the IESO's bilateral contracting provision.

3. *The capacity shortfall risk from emerging demand growth in the Northwest is increasing*

Economic growth and electrification of the economy will strain planned electricity resources in the NW as well as in the neighboring regions that supply the NW. Providing a reliable supply to the NW over the next decade will require additional new generation and transmission (Tx) capacity beyond the IESO's current forecasts. With over 350 MW of demand originating north and west of Atikokan, extending operations at the AGS can offset some of this need and reduce planning risks for the entire region.

4. *The lower cost of AGS operations is better for ratepayers than the alternative of new gas-fired generation and expanded transmission*

The cost of extending operations at the AGS is estimated to be 20% less than the total system cost to commission and operate a new combined cycle gas turbine (CCGT) generation alternative. The higher cost of the AGS' biomass pellets fuel are offset by the carbon price of anew gas-fired generation facility and the cost of associated transmission system upgrades to connect it.

5. *The AGS contributes significantly to the economic health of the Northwest*

The continued operation of the AGS delivers greater economic benefits to the region and the province than would the gas-fired option. With a reduced cost to ratepayers and avoiding the costs of importing natural gas and the carbon price on its use as a fuel by the gas-fired alternative, the AGS provides an

[64] IESO, APO, 2021

additional 207 jobs and an additional $46M/year in GDP. The Town of Atikokan relies on the AGS for 20% of its employment and 45% of its collectible taxes.

6. Tripling production from the AGS operations would deliver substantial additional benefits to the NW

By generating electricity all year and tripling production, the AGS may be better able to provide reliability services, mitigate demand risks in the north, and improve costs/benefits for ratepayers. By lowering local generation costs and improving cost-effective transmission utilization, increased production at the AGS will be at 15% lower ratepayer costs than the natural gas option. The AGS site represents a unique opportunity to anchor a local, low-carbon energy hub, accelerate forestry biomass sector in Northern Ontario, attract local commercial businesses, new users and expand partnerships with Indigenous peoples.

Recommendation

The Government of Ontario and the IESO should consider immediate steps to facilitate the extended and enhanced operation of the AGS for meeting future low-carbon, electricity needs of the NW in the coming decades.

Acknowledgements

This study was proposed by Strategic Policy Economics to explore the important role of low-carbon supplies in the NW region of Ontario as the province embarks on a pathway to a decarbonized electricity grid.

Overview of Strategic Policy Economics

Founded by Marc Brouillette in 2012, Strategic Policy Economics helps clients understand the implications of Ontario's energy and climate policy. The firm specializes in characterizing multi-stakeholder issues stemming from technology-based innovations in policy-driven regulated environments such as energy. Reports on Ontario's climate and energy policy have spanned across all major energy and climate issues including the implications of long-term energy planning, emissions reduction, the integration of renewables and imports from Quebec, the economic benefits of extending the life of the Pickering nuclear generating station, the challenges of integrating DER, and the pitfalls of cap and trade.

Production of this report

The Strategic Policy Economics team deployed to develop this report included Marc Brouillette, Marty Tzolov, and Scott Lawson.

The Strategic Policy Economics team would like to thank the Power Workers Union (PWU) for their support in substantially funding the preparation of this report. We also thank the individuals within these organizations who shared their views and/or reviewed and commented on draft versions of this report, with particular gratitude to Paul Newall of Newall Consulting Inc.

The Strategic Policy Economics team hopes this report provides a constructive contribution to IESO's approach to procurement and enables Ontario to meet its future electricity system needs in the most effective manner.

Appendix A – List of Acronyms

AGS – Atikokan Generating Station

APO – Annual Planning Outlook

CA – Capacity Auction

CAES – Compressed Air Storage

CFS – Clean Fuel Standard

CRIBE – Centre for Research and Innovation in the Bio-economy

CVNW – Common Voice Northwest

Dx – Distribution

EPS – Emissions Performance Standard

ETF – Energy Task Force

E-W – East-West tie line

GDP – Gross Domestic Product

GHG – Greenhouse Gas

GS – Generating Station

GW – Gigawatt

IAM – IESO Administered Market

IESO – Independent Electricity System Operator

LOLE – Loss of Load Expectation

LT – Long-term

MB – Manitoba

MENDM – Ministry of Energy, Northern Development and Mines

MT – mid-term

Mt – Million Tonnes

MWh – Megawatt-Hours

NERC – North American Electric Reliability Corporation

NW – Northwest

NZ – Net Zero

OBPS – Output-Based Pricing System

OPG – Ontario Power Generation

PNGS – Pickering Nuclear Generating Station

PWU – Power Workers Union

RFP – Request for Proposal

ST – Short-term

TWh – Terawatt-Hours

Tx – Transmission

Appendix B – References

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