
Transmission Policy Review: Delivering the Electricity of Tomorrow



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1. Introduction

Alberta's *Transmission Regulation* was established in 2004 under the *Electric Utilities Act* and is within the purview of the Ministry of Affordability and Utilities. The *Transmission Regulation* sets the policy framework for the planning and development of electricity transmission infrastructure in the province, as well as the responsibilities of both the Alberta Electric System Operator (AESO) and the Alberta Utilities Commission (AUC) regarding transmission. At the time of its development, the *Transmission Regulation* was intended to attract new generation, increase competition, and serve expected increases in load (i.e., electricity consumers) in an affordable way. The *Transmission Regulation* has not been significantly updated since its inception; meanwhile, the electricity industry has undergone a fundamental transformation, and evolution is expected to continue over the next decade. As a result, many of the foundational policies in the *Transmission Regulation*, which were created at a time when the landscape of both generation sources and load distribution were markedly different, now may not serve the present and future requirements of the Alberta grid in an optimal manner.

Over the last twenty years, a plethora of new technologies have emerged in the electricity sector affecting both generation and load, including an exponential increase in the deployment of renewable generation sources such as solar and wind. Development of these renewable generation sources, and others, which are still relatively nascent, are predicted to grow over the coming years as technology costs decline, development timelines shorten, and policies focused on greenhouse gas (GHG) emission reductions increase in stringency. This is also expected to result in the retirement or abatement of other previously dominant sources of electricity with higher emissions. At the same time, increased electrification - the replacement of technologies or processes that use fossil fuels with electric powered equivalents - is expected to occur in many sectors of the economy including transportation, manufacturing, industrial processes, and more.

Alberta leads the country in renewable electricity projects. As of August 2023, there are over 3,400 megawatts (MW) of wind and solar projects currently under construction, worth an estimated value of over \$2.7 billion. A number of recently-announced policies are intended to deliver affordable and reliable clean electricity to Albertans. For example, the AUC will temporarily pause approvals for new renewable electricity generation projects from August 3, 2023 until February 29, 2024. The AUC will also review policies and procedures for the development of renewable generation and provide its findings and recommendations from its inquiry to the Minister of Affordability and Utilities no later than March 29, 2024. At the end of this process, future renewable projects will be able to move forward at a pace that is conducive to business while maintaining responsible environmental stewardship and preserving Alberta's reliable electricity supply.

The Government of Canada recently published Gazette 1 of the Clean Electricity Regulations in support of Canada's actions to achieving a net-zero electricity system. The Government of Alberta views these draft regulations as unconstitutional, irresponsible and out of alignment with Alberta's emissions reduction and energy development plan that works towards a carbon-neutral power grid by 2050. Alberta will continue to advocate for a reliable and affordable electricity system.

Reviewing Alberta's transmission policy at this critical time is important to provide a comprehensive and clear policy path towards a carbon-neutral power grid by 2050.

In addition to utility-scale development of new sources of renewable generation, deployment of distribution-connected generation and storage has also grown at a rapid pace in recent decades, changing the relationship between the grid and its users. Many of these new distributed energy resources allow for the creation of "prosumers", entities which both consume and produce electricity. This is a stark contrast from the previous generation landscape in Alberta under which the *Transmission Regulation* was first contemplated and featured fewer highly centralized thermal generation units serving large load centers from afar. Further, development of new generation sources

is now outpacing the development of transmission, leading to new challenges related to interconnection not previously considered. For these reasons, a comprehensive review of Alberta's transmission policies is required to ensure the transmission system can continue to effectively deliver affordable, reliable, and clean electricity to Albertans today and into the future.

2. Background

Transmission is a designated monopoly service in Alberta, developed and operated by companies known as Transmission Facility Owners (TFOs). The primary TFOs in Alberta are AltaLink Management Ltd., ATCO Electric Ltd., ENMAX Power Corporation, and EPCOR Distribution and Transmission Inc., which all serve distinct regions of the province. The AESO, a not-for-profit government agency, carries out long-term planning to identify transmission developments required to ensure that generators can transmit the power they generate, and to connect load customers to the grid, either directly or indirectly through further distribution networks. The electric grid in Alberta includes approximately 26,000 kilometers of transmission lines and connects over 400 generating units to the wholesale market. The costs associated with building a transmission line are submitted for approval to the AUC, a quasi-judicial agency that oversees the electricity system. These costs are amortized over the life of the transmission assets and paid almost entirely by electricity consumers, and do not vary significantly based on where those consumers live.

The Government of Alberta has been reviewing and engaging on transmission policy since 2021, with discussions re-initiated in 2022 in response to stakeholder feedback. These engagements included analysis of the effectiveness of locational signals for generation siting on Alberta's transmission system, the zero-congestion policy and exception process, cost management for future transmission builds, the non-wires solutions cost allocation, and the line loss calculation. These engagements have provided valuable feedback on many key transmission policy issues and have formed the basis of government's initial analysis in this paper, which aims to build off recent stakeholder feedback and take the next steps towards determining the appropriate transmission policies for Alberta's success over the coming years.

Analysis of transmission policies today is being undertaken in the context of high electricity prices, surging inflation, and an influx of new investment in electricity generation across a range of technology types and production profiles, with the majority being renewables. A comprehensive review of current transmission policies is occurring now to ensure the transmission system is well positioned to serve today's electricity system and the electricity system of the future.

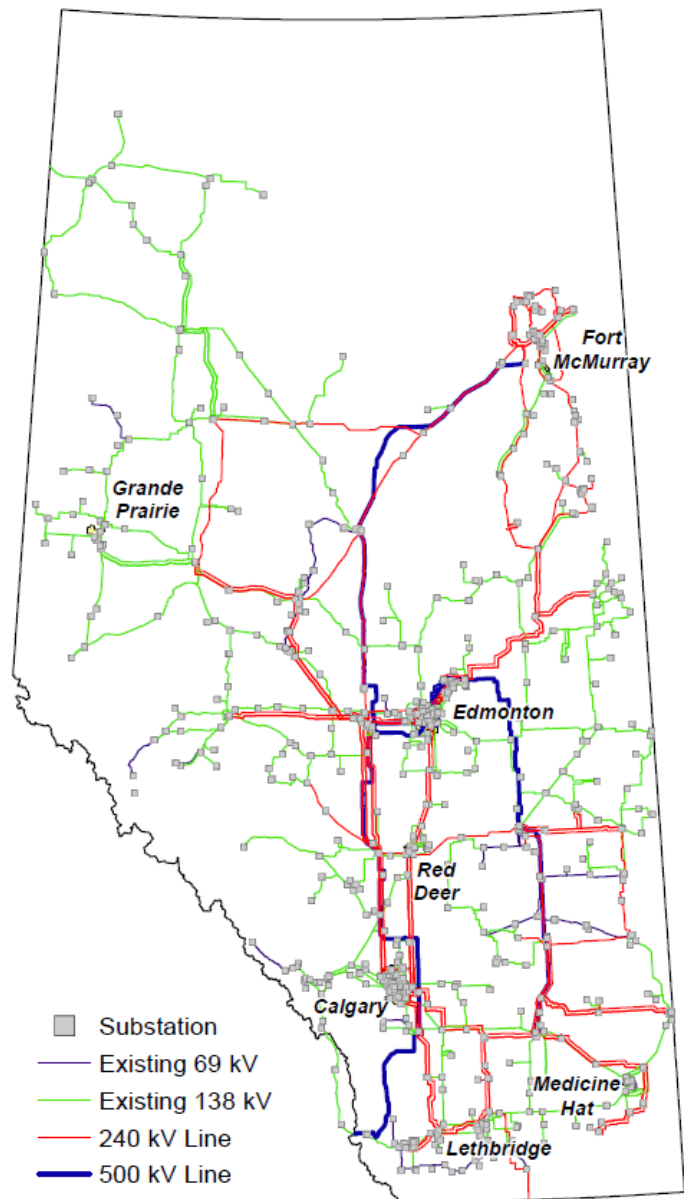


Figure 1. Alberta Transmission System

3. Purpose

The Ministry of Affordability and Utilities has created this discussion paper to present its current analysis of transmission policies and solicit feedback from stakeholders on the direction which should be pursued in order to meet the Government of Alberta's objectives. Questions have been included under the individual topics within section 7 and stakeholders are asked to provide their feedback to these questions at the following link: https://your.alberta.ca/bulk-transmission/survey_tools/transmission-policy-review. The Ministry of Affordability and Utilities is requesting stakeholder feedback by 4:30 pm on November 17, 2023. Following receipt of feedback, the government will analyze responses in order to determine the ideal path of action for Alberta's transmission policies.

4. Objectives

The focus of this policy review and targeted discussion will be to determine transmission policies that achieve the following three objectives:

a. Affordability

Transmission costs on power bills in Alberta have increased by over 500 per cent since 2004 while the Alberta Consumer Price Index has only increased by 50 per cent during the same period. Achieving affordability of electricity for Albertans through managing the total delivered cost of electricity is a paramount priority for the Government of Alberta. Transmission costs make up a meaningful portion of the total cost of delivered electricity today. While the Government of Alberta recently issued electricity rebates to provide immediate bill relief to residents, these actions do not address the root causes of high transmission costs nor do they ensure the transmission system remains affordable in the long-term as the transformation of our energy systems continue.

b. Reliability

Alberta's electricity supply mix is rapidly changing with the retirement of many dispatchable but high-emitting generators such as coal, and the rapid deployment of non-emitting but intermittent generators such as wind and solar. Energy storage resources, which can store energy for dispatch later, are also on the horizon and expected to play a prominent role in the future electricity system and as a means of managing variability of renewable generation. This grid transformation comes with several challenges related to maintaining reliability, or the ability to ensure that electricity will be consistently available when it is needed by Albertans – this includes 1. having sufficient generation to meet demand (i.e. supply adequacy), 2. the ability to transmit that energy, and 3. a system that is robust in terms of power quality and its ability to respond to changes in supply and demand (i.e. voltage, frequency, and flexibility). Transmission policy can impact all three of these areas of reliability. Availability and cost allocation of transmission infrastructure and ancillary services can influence where, when, and what types of generation may be built, and can impact the ability of the independent system operator to meet technical requirements that ensure reliability moment to moment. It is a key priority for the Government of Alberta to ensure that Alberta's transmission policies are up-to-date and aligned with the needs of the grid today and support reliability into the future.

c. Decarbonization

The Government of Alberta is striving to achieve a carbon-neutral power grid by 2050¹. A carbon neutral grid is considered a foundational piece of broader economic decarbonization as it facilitates the ability of other sectors that do not have low-emitting alternatives to electrify and reach their decarbonization goals. The Government of Alberta will consider any potential changes to transmission policies within the broader context of how they will contribute to its stated goal of achieving a carbon neutral power grid by 2050.

5. Principles

While striving towards the aforementioned objectives, the following principles will be foundational and the basis for decisions which may be pursued:

a. Maintain Regulated Transmission

In Alberta, transmission is operated as a regulated monopoly service with planning conducted by the AESO, and development and operation by TFOs. Transmission development is directly assigned to TFOs by service territory, with the exception of intertie projects (as defined in the *Transmission Regulation*) and critical transmission infrastructure (as defined in the *Electric Utilities Act*) which may be determined via competitive process. Though this policy paper discusses specific instances where competitive processes may be advantageous, the foundational principle of operating transmission in a regulated manner remains in place.

b. Maximize Efficiency

Maximizing efficiency of the transmission system by optimizing use of current infrastructure and ensuring that new builds are minimized to reduce cost increases is a key pillar of this transmission policy review. Efficient use of the current system is an essential part of achieving affordability and will aim to be realized by incentivizing generators to locate near consumers or existing transmission capacity in order to reduce the need for new or upgraded transmission lines, the costs of which are borne by all ratepayers. Moving forward, transmission policy should also ensure that infrastructure is only built when necessary and that when transmission expansion does occur, its efficient use is maximized.

6. What We've Heard

The Government of Alberta has engaged on a range of transmission policies since 2021 and has received valuable stakeholder feedback that has informed its current direction on several policies. In this section, the Ministry of Affordability and Utilities is aiming to indicate the status of its analysis on those policies where changes are expected, though status quo remains an option depending on feedback received in response to this policy paper.

a. Generating Unit Owner's Contribution

Current Policy

In Alberta, generators make a financial contribution to the AESO at the time of connection, which is refunded over time based on generator size, location, and performance. This payment is known as the Generating Unit Owner's Contribution (GUOC). GUOC is the key existing policy to manage transmission infrastructure development by incentivizing generators to locate near

¹ Mandate Letter – Alberta Minister of Affordability and Utilities, July 19, 2023.

existing transmission capacity and avoid stranded transmission costs. Currently, GUOC is capped in the *Transmission Regulation* at \$50,000 per megawatt (MW) of generating capacity and must be refunded over a 10-year period when the generating unit begins to generate electricity, and if the unit meets performance criteria determined by the AESO. This is intended to incentivize generation to follow through on investments.

Case for Change

The intent of GUOC was to act as a locational signal for new generators; however, the financial contribution in the *Transmission Regulation* of \$50,000/MW and the required 10-year refundability, have not changed in nearly two decades, eroding its impact. The contribution amount as currently set is insufficient to incentivize generation to site close to existing transmission and, as a result, new generation primarily site in locations that are optimal for their production but may come at a high cost to the system due to the need to develop new transmission to ensure they can get their electricity to market, as is required as part of the zero-congestion policy (as discussed in Section 7a below). GUOC is also currently assessed on a regional basis; however, determining the charge by a more granular point of delivery method could also increase its effectiveness. Though changes to GUOC may be required to increase the siting signal to maximize efficient use of the existing transmission system, certain generators may have location-specific characteristics — such as wind and solar, which would prefer to locate in areas with abundant resource, and co-generation, which in turn needs to locate next to industrial operations rather than where transmission capacity is available.

As part of a review of a selection of transmission policies in 2022, significant feedback from stakeholders was provided on ways that GUOC could be adjusted to increase its effectiveness as a locational signal while still achieving the broader goals stated by government.

Analysis

Amendments to Section 29 of the *Transmission Regulation* and others related to GUOC may be explored to ensure that GUOC provides a sufficient locational price signal to drive efficient use of existing transmission capacity, in an effort to mitigate against rising transmission costs for consumers. These amendments could include formally acknowledging that GUOC should be assessed based on proximity to existing transmission rather than load, removal of the legislated cap of \$50,000/MW, and adjustments to the 10-year refundability period, to provide the AESO with the ability to determine the necessary values for GUOC to optimize the locational signal. The requirement for the AUC to approve GUOC values would be maintained to balance impacts on investor confidence and ensure all costs remain within the public interest.

In Table 1 below, the Ministry of Affordability and Utilities has indicated its anticipated direction in the first row based on what has been heard from stakeholders during previous discussions.

Table 1. Potential adjustments to GUOC

| Proposals | Description |
|---|---|
| Remove the prescribed GUOC maximum and minimum, and maintain refundability (Anticipated direction) | Remove the prescribed maximum GUOC rate, set the minimum GUOC rate to \$0/MW, maintain the existing 10-year refundability structure, and allow determination of rates based on transmission capability. |

| | |
|--|---|
| Remove the prescribed GUOC maximum and minimum, and eliminate refundability | Remove the prescribed maximum GUOC rate, set the minimum GUOC rate to \$0/MW, make GUOC non-refundable, and allow determination of rates based on transmission capability. |
| Increase the prescribed GUOC maximum, remove the prescribed GUOC minimum, and maintain refundability | Raise the prescribed maximum GUOC rate to a new value higher than the current \$50,000/MW, set the minimum GUOC rate at \$0/MW, maintain the existing 10-year refundability structure, and allow determination of rates based on transmission capability. |
| Increase the prescribed GUOC maximum, remove the prescribed GUOC minimum, and eliminate refundability | Raise the prescribed maximum GUOC rate to a new value higher than the current \$50,000/MW, set the minimum GUOC rate at \$0/MW, make GUOC non-refundable, and allow determination of rates based on transmission capability. |

Considerations

During recent engagements on GUOC, the Ministry of Affordability and Utilities heard a range of feedback from stakeholders on which levers would be most useful to increase the effectiveness of GUOC as a locational signal, while maintaining a balance between reducing the growth in transmission costs and supporting investor certainty for generators. Generators expressed concerns over the removal of a prescribed maximum for GUOC given potential implications on investor certainty, while consumers indicated that maintaining refundability would not sufficiently strengthen the signal and also require continued administration of refund payments by the AESO. Challenges also exist with attempting to maintain a legislated maximum for GUOC as market conditions change rapidly and it may not be possible to conduct sufficient analysis to determine an effective maximum in legislation. Exploration of changes to GUOC to allow for negative charges (i.e., credits to generators) is not actively being considered at this time. The Ministry of Affordability and Utilities aims to balance these perspectives while achieving the stated objectives in this paper with any policy changes pursued.

The Ministry of Affordability and Utilities also recognizes that changes to GUOC are interrelated with any changes that may be made to the zero-congestion policy in the longer term. While GUOC is utilized as a locational signal to maximize current use of existing transmission infrastructure, the zero-congestion policy primarily impacts long term transmission planning. Feedback on these policy interactions is requested in Section 7a.

b. Line Loss Calculation

Current Policy

Since 2003, generators have been responsible for the cost of electricity that is lost as heat during its transmission along a line. Losses increase when electricity must travel a greater distance across a longer line, or when a line is reaching its full capacity. The AESO recovers the cost of transmission losses from generating units, export and import paths and other services identified by the AESO by establishing a percentage loss factor, for each generating facility or service that reflects its location and contribution to transmission losses. An estimate of the loss factors for each site is calculated prior to the start of each calendar year and an adjustment is made during the second quarter of the same year based on the actual performance to date. A generator can receive a “credit” if their operations reduce the total amount of line losses on the

system. The methodology for determining the annual loss factor is based on hourly calculations for each hour of the year.

Case for Change

Similar to GUOC, this policy was intended to serve as an incentive to generators to locate in areas close to load, thereby reducing overall line losses. However, the cost associated with line losses has not been high enough to incentivize generators to consider transmission impacts in choosing their location. Concerns have also been raised by some stakeholders regarding the annual variability that can occur in loss factors, especially in areas where significant new generation is coming online and causing rapid and unpredictable changes to the loss factors of incumbents. Investors have expressed concerns that this variability results in uncertainty in establishing the business case required for new generation in these regions. Further, the methodology for calculating loss factors for each hour at each generating site is extremely complicated and results in a high level of administrative burden for all parties involved to be able to accurately estimate, implement, and report on.

Analysis

Government may consider alternative approaches to the current line loss methodology to increase certainty and ease the administrative burden for generators and the AESO.

In Table 2 below, the Ministry of Affordability and Utilities has indicated its anticipated direction in the first row based on what has been heard from stakeholders during previous discussions.

Table 2. Potential adjustments to line losses

| Proposals | Description |
|--|--|
| System-wide average approach (Anticipated direction) | Shifting the loss factor calculation methodology to a system-wide average approach that would apply similarly to each generator regardless of their location and operating profile. Under a system-wide average approach, a loss factor for the entire system would be calculated each year. This system average factor would then be charged to each generator and importer of electricity utilizing the transmission system. |
| Regional average approach | Shifting the loss factor calculation methodology to a regional average that would apply to all generators within a given region regardless of their specific location and operating profile. Under a regional average approach, a loss factor for a defined regions of the transmission system would be calculated each year. This would be charged to all generators and importers of electricity utilizing the transmission system within that region. |

Considerations

Moving to a system-wide average approach would result in some generators paying more for line losses than they currently do, and others paying less. Generators that would pay more have stated that a system-wide average does not align with the general principle of cost causation. Moving to a system-wide average would eliminate the mild signal that line losses can provide to locate generation closer to load centers. A system-wide average would, however, improve investment certainty for many companies considering constructing new generation in Alberta as line losses for the duration of the generator’s life would be much easier to estimate. Utilizing a

system wide average would also bring Alberta in line with other jurisdictions such as British Columbia (B.C.) and Ontario.

Moving to regional averages would increase certainty and reduce regulatory burden to a degree, however not as significantly as a system-wide average. A regional average approach also would not address the issue of line loss charges being too small and unpredictable to act as a meaningful locational signal.

Other suggestions, such as assessing line losses on a monthly basis, instead of an hourly basis, were considered but did not have the support of the majority of stakeholders.

c. Non-Wires Solutions

Current Policy

Non-wires solutions are an electricity grid investment or project that uses non-traditional transmission and distribution solutions, such as distributed generation, energy storage, and energy efficiency measures, to delay or avoid the need for specific wire upgrades. In the early days of deregulation, 20-year contracts for services were put in place to incent the development of generation in select locations as an alternative to transmission. As a result, tight boundaries on the use of non-wires solutions were included in the *Transmission Regulation* as a means of providing investors' confidence that non-wires solutions wouldn't distort market outcomes.

Under certain conditions, the *Transmission Regulation* gives the AESO the ability to propose a non-wires solution to relieve congestion on the transmission system. Specifically, the regulation allows the AESO to propose the use of non-wires solutions in specific circumstances:

1. In areas where there is limited potential for growth of load, and the cost of the non-wires solutions is materially less than the life-cycle cost of the transmission wires solution, compared over an equivalent study period.
2. If the non-wires solution is required to ensure reliable service due to its shorter lead time, for a specified period.

Case for Change

Now that the energy-only market is mature and a range of new technologies that can defer the need for additional wires are becoming more prominent, there is an opportunity to broaden the use of non-wires solutions as a mechanism to manage transmission costs. However, any increased use of non-wires solutions still needs to ensure it supports fair, efficient, and openly competitive market outcomes. Non-wires solutions, such as energy storage resources, can also store electricity when there is an excess of production and dispatch it when there is a need, deferring transmission investments by providing congestion relief.

Analysis

To maximize the value of the current system and promote affordability, government is considering the following alternatives.

In Table 3 below, the Ministry of Affordability and Utilities has indicated its anticipated direction in the first row based on what has been heard from stakeholders during previous discussions.

Table 3. Potential adjustments to non-wires solutions

| Proposals | Description |
|-----------|-------------|
|-----------|-------------|

| | |
|---|---|
| <p>Expand the use of non-wires solutions (Anticipated direction)</p> | <p>This option would expand the use of non-wires solutions and ensure that additional wire solutions are not the default solution to reliability challenges. Non-wires solutions would be procured as a service or as a regulated asset. As a service, the AESO would competitively procure the transmission attributes of non-wires solutions from market participants operating in the market via short-term contracts (i.e., a period shorter than the life of the transmission asset need). The short-term nature of these contracts would give the AESO the ability to assess the need for these contracts on a regular basis. When procured as regulated assets, the AESO would file a Need Identification Document (NID) with the AUC and procure the non-wires solutions from TFOs.</p> |
|---|---|

Considerations

Upon proclamation of *Electricity Statutes (Modernizing Alberta's Electricity Grid) Amendment Act*, energy storage resources, a type of non-wires solution, will be defined within relevant legislation. Additional changes could be required to ensure that other non-wire solutions which are currently classified as generation (i.e., distributed energy resources) may be used as transmission resources. These required legislative changes would be in addition to changes implemented with the proclamation of the *Electricity Statutes (Modernizing Alberta's Electricity Grid) Amendment Act*. Currently, generators are not allowed to offer or own transmission infrastructure and TFOs are not allowed to own generation or operate in the energy-only market.

In 2021 and 2022, stakeholders provided widespread feedback in favour of expanding the use of non-wire solutions. However, stakeholders differed on who should be allowed to own them. Most load and incumbent generators did not believe that regulated ownership of non-wire solutions should be allowed, instead non-wire services should be procured from generators operating within the electricity market. These stakeholders argued that regulated ownership would cause an unlevel playing field in the electricity market. Taking an alternative position, TFOs and Distribution Facility Owners (DFOs) argued that they should be allowed to own non-wires solutions. Specifically, non-wires solutions should be procured via short-term contracts from incumbent generators only when they are cheaper than the traditional wire solutions. According to the DFOs and TFOs, this would ensure the total delivered cost of electricity was minimized.

Should the use of non-wires solutions be expanded, the Ministry of Affordability and Utilities recognizes that level-playing field concerns would need to be considered and a transparent framework for deciding between regulated or market-based assets be established.

7. Broader Policy Considerations

The Ministry of Affordability and Utilities has identified the following transmission policy areas as being those which have not recently received extensive or detailed stakeholder feedback. These policy areas require significant consideration given the magnitude of their impacts on Alberta's electricity system. Some of the foundational policies below, if changed, would shift considerations with respect to the direction on policies articulated above, and are heavily interrelated with Alberta's wholesale market policies. Careful consideration of amendments, if any, is required to ensure Alberta's electricity system, including transmission, can deliver the objectives outlined in this paper.

The Ministry of Affordability and Utilities does not have a proposed direction on the policy areas listed below and is seeking stakeholder feedback to inform its path forward. Approaches identified in the policy tables in the analysis sections below may be mutually exclusive, while others may be compatible.

a. Zero-congestion

Current Policy

The *Transmission Regulation* requires the AESO to plan the transmission system to support a competitive electricity market and ensure that all those wishing to exchange electricity through the power pool may do so on non-discriminatory terms. In Alberta, transmission policies require that transmission must be unconstrained and there are no transmission rights assigned to market participants. Instead, transmission is allocated upon dispatch to participants and operated as a market model where access to the transmission system is allocated based on consumption (for loads) and dispatch (for generators), with the intent that sufficient transmission is always available.

Section 15 of the *Transmission Regulation* mandates that the AESO plan the transmission system in a way that enables 100 per cent of all in-merit generation to be transmitted under normal conditions, and 95 per cent of the time when some transmission components are unavailable. If the AESO anticipates the occurrence of congestion, it is expected to file an exception application that requires approval by the AUC. This planning mandate forms the basis of what is known as the zero-congestion policy which was designed during the early periods of deregulation and aimed to incentivize investment in generation and promote competition within the generation sector. Alberta's electricity market design is contingent on the zero-congestion policy.

Over the years, the zero-congestion policy has promoted significant growth in generating capacity, increased competition in the energy-only market, and enabled the success of a relatively streamlined market design compared to other jurisdictions. Until recently, most of the generators that have been attracted to Alberta's market have relied on coal and natural gas to generate electricity. The dispatchable nature of these generators meant that, on average, they generated power at close to their maximum capacity and, as a result, most transmission infrastructure had a higher average flow. In addition, the competitive benefits in terms of consumer savings enabled by the zero-congestion policy have likely outweighed its costs.²

Case for Change

In recent years, Alberta has experienced significant changes in its supply mix. Today, all coal generation is expected to be phased out by early 2024, increasing amounts of generation are connected to the distribution system, and the majority of new generation technologies rely on intermittent resources, such as solar and wind. As a result, average power flows on the transmission network are changing, and in some instances, decreasing. As the province works toward achieving a net-zero power grid by 2050, this trend is expected to continue, and renewable resources are expected to make up a significant portion of Alberta's future supply mix. New investments in transmission infrastructure will be required to integrate new technologies into the transmission system. As a result, the costs associated with maintaining a zero-congestion system are expected to increase, challenging arguments in favour of the policy.

Additional challenges are arising due to the much shorter build and regulatory approval timelines needed for new generation technologies. For example, it can take as little as two years to construct a new wind farm, while it could take up to eight years to build a new transmission line. As a result, Alberta is already experiencing an increased number of real time congestion events which are challenging the credibility of the current zero-congestion policy. As congestion results in generation curtailment that cannot be controlled by the generator, this introduces new

² Frank A. Wolak, Measuring the competitiveness benefits of a transmission investment policy: The case of the Alberta electricity market. Energy Policy Volume 85, Pages 426-444.

investment risks to existing and prospective generators and reduces the competitive benefits of the policy.

Analysis

To verify that the benefits of maintaining the zero-congestion policy still outweigh the costs, the Ministry of Affordability and Utilities is examining alternative transmission planning frameworks which could be implemented, some of which have been adopted in other jurisdictions, such as Texas and New York, and is soliciting stakeholder feedback on these possible approaches set out in Table 4 below.

Table 4. Potential adjustments to zero-congestion policy (mutually exclusive)

| Proposals | Description |
|---|---|
| Optimal transmission planning | <p>Under this framework, new transmission investments would only be triggered when the additional benefits from increased transmission expansion outweigh their additional costs, or transmission investments are required to satisfy reliability requirements. Under this framework, transmission planners would aim to minimize the total delivered costs of electricity and minimize the cost of congestion, rather than eliminating it entirely. The use of this planning framework would imply persistent congestion to some degree in certain areas of the system.</p> <p>There are several ways that an optimal planning framework can be implemented. This includes the introduction of locational marginal pricing (LMP), or the addition of uplift costs (i.e., additional charges added to the energy price) to consumers.</p> |
| Increase the level of allowable congestion | <p>This planning framework would not eliminate the possibility of congestion as it increases the congestion thresholds (under normal and abnormal scenarios) that trigger new transmission builds. Under this planning framework, transmission projects would only be triggered when the risk of congestion is above a new adjusted percentage threshold (i.e., congestion some percentage of the time would be allowed under normal conditions and more than five percent of the time when some components are unavailable). This option would not change current transmission planning methodology but aims to reduce new transmission builds and provide more flexibility around congestion.</p> |

Considerations

As described above, Alberta’s zero-congestion policy is fundamental to the design of the current competitive market design. The policy determines the efficacy and effectiveness of other policies that are implemented within Alberta’s electricity grid. In other words, a move away from the zero-congestion policy would require an examination of other related policies, in particular market policy. Moving away from zero-congestion would also require an analysis of the current single pricing framework and cost allocation principles.

Stakeholders have emphasized in previous engagements that the zero-congestion principle is foundational to the functioning of Alberta’s electricity system and conducting significant analysis is paramount prior to consideration of any changes. Any decision to move away from the zero-congestion policy would aim to create a planning policy that can maximize the value of current transmission infrastructure and minimize new transmission buildouts.

Questions

Please respond to the following questions by 4:30 pm on November 17, 2023, using this link: https://your.alberta.ca/bulk-transmission/survey_tools/transmission-policy-review. Following receipt of feedback, the government will analyze responses in order to determine the ideal path of action for Alberta's transmission policies.

- Should Alberta's zero-congestion policy be reconsidered in light of the objectives outlined in this paper?
 - If so, do you support one of the options proposed above? Which one and why? Should other options be considered?
 - If not, why not? What level of real-time congestion is acceptable before broader policy changes are required and why?
- If an optimal transmission planning approach were implemented, what would the implications be on other interconnected policies discussed in this paper and otherwise?
 - What role, if any, would GUOC play within this framework, and why?
 - What role, if any, would the current line loss policy have, and why?
 - How would the implementation of optimal transmission planning impact the energy-only market? What new considerations will arise and why?
- If an optimal planning approach were implemented, what benefits and costs should be considered when determining the need for new transmission?
- If the zero-congestion policy is changed to increase the level of allowable congestion, what level of congestion would be considered acceptable and why? Alternatively, should the acceptable level of congestion be based on principles or be fixed? Please explain.
 - Would other changes be required with a policy change that allows more congestion? If so what and why?
- If the zero-congestion policy is changed to increase the level of allowable congestion, what are the implications on other interconnected policies discussed in this paper and otherwise?
 - What role if any would GUOC play within this framework?
 - What role if any would the current line losses policy play?
 - How would the increasing the allowable level of congestion impact the energy-only market?
 - What new considerations will arise and why? How do they compare to moving away from the zero-congestion policy entirely?
- If the current zero-congestion policy remains, are there tools that can be used to validate its effectiveness?

b. Cost Allocation

Transmission costs are primarily comprised of infrastructure-related costs (wires) and services required other than transmission or supply to keep the grid reliable (i.e., ancillary services that maintain the required level of flexibility, frequency, and voltage). Cost allocation refers to the dispersion of costs paid for wires and ancillary services between ratepayers in Alberta's electricity system.

i. Wires

Current Policy

The *Transmission Regulation* assigns the majority of infrastructure, or "wires" costs to load (this includes all costs related to building and maintaining transmission lines). As per Section 30 of the *Electric Utilities Act*, these assigned costs are recovered via a

“postage stamp” rate which cannot vary based on where customers reside or operate. This system of cost allocation is known as the “load-pays policy” and was intended to ensure that:

- Transmission costs do not introduce any distortions into the wholesale price of electricity.
- Consumers are provided with transparent pricing for transmission services.
- Alberta’s wholesale electricity market and pricing rules were aligned with those of neighbouring jurisdictions.
- A customer’s location relative to the transmission grid does not impact their transmission costs.

Assigning the majority of transmission costs to loads rather than generators ensures that transmission costs are not a barrier to generation investment. The load-pays policy also gives generators the freedom to locate in areas that minimize their overall costs and maximize their access to resources, giving them the best chance to compete. This puts significant downward pressure on the price of electricity.

The costs of direct connection of a generator to the transmission system, the cost of line losses, GUOC and line loss are currently the only exceptions to the load-pays policy, with all other costs assigned to load. Throughout this section, wires costs refers to costs that are recovered from load.

Case for Change

In the past, high market concentration and a high rate of load growth necessitated significant investments in generation. As a result, during the early days of deregulation, it was believed that the competitive benefits received from shifting the cost burden of new transmission infrastructure would outweigh the added costs of these investments. Over the years, this policy has contributed to attracting significant investments in generation and has led to increased competition which has depressed wholesale electricity prices.

In recent years, technological innovations and global policy mandates have made significant changes to generator investment decisions. New investments in generation are now not only motivated by capture of the pool price of electricity, but also by government mandates, investment tax credits, and private sector power purchase agreements (PPAs) for environmental attributes, leading to significant changes in the supply mix. As a result, investments in new transmission today are being driven by investments in generation rather than the need to meet demand. Within Alberta specifically, the zero-congestion policy and the load-pays policy have resulted in investments in transmission to connect regions of the province that have high volumes of supply compared to load and limited transmission capacity but are preferred by certain generator types, while excess transmission capacity in other regions remains unused. In addition, new generators in resource rich regions are at times displacing each other as lines become congested rather than displacing high-cost generators (i.e. limiting the competitive benefits to Alberta rate payers).

Alberta ratepayers are accountable for any added transmission costs to the system and generators who are the main drivers of these investments do not internalize the cost of these investments, leading to sub-optimal investment decisions. This changing context raises questions around whether policy should change to have generation internalize costs, so investments are made in the most efficient manner possible considering energy price, carbon price and transmission costs.

Analysis

To ensure that consumers are receiving the maximum possible benefits from transmission investments that will be required in the future, additional stakeholder input and a review of the load-pays policy is required to ensure that the policy remains suitable for Alberta's current and future electricity system. As part of its review, the Ministry of Affordability and Utilities is examining alternative policies that could offer Albertans a more appropriate and efficient allocation of wires costs that incentivizes efficient use of the system and minimizes the growth of future wires costs. To this end, the policies set out in Table 5 below are being examined.

Table 5. Potential adjustments to wires cost allocation (proposals one and two mutually exclusive; proposal three compatible with one or two)

| Proposals | Description |
|--|---|
| <p>Creation of transmission rights</p> | <p>The creation of transmission rights would provide a way for generators to internalize wires costs while providing an avenue for cost recovery. In most cases, the cost of transmission infrastructure and accompanying transmission rights are originally allocated to the entities that pay the capital cost for transmission infrastructure. In Alberta, loads pay the cost of transmission infrastructure; however, in jurisdictions under a transmission rights framework, this varies. Transmission rights give holders the right to transmit power across a pre-specified transmission path (physical transmission rights) or the right to revenues associated with price differential between two locations (financial transmission rights). Given the centralized dispatch structure within Alberta, financial transmission rights would likely be the most appropriate mechanism should government pursue this alternative to the current policy. However, changes to the current single price framework to implement locational marginal pricing (LMP) would be required to define the value of financial transmission rights.</p> <p>While transmission rights are not a direct cost allocation mechanism, used in conjunction with locational pricing schemes, they can present an indirect way of offsetting transmission infrastructure costs. Transmission rights sold in the open market are used to mitigate the inherent price risks that come with locational prices. They could be procured by local DFOs, generators, industrial load consumers or investors with no financial interests within the electricity market.</p> |
| <p>Alternative cost sharing framework</p> | <p>This framework would split wires costs between load and generation, shifting more costs to generators. This policy would be intended to ensure that generators are able to internalize some of the impact they have on transmission. This reduces the cost burden on Alberta ratepayers and ensures that generation is built in a more efficient manner. Historically, transmission costs were split equally between generation and load. This cost assignment was changed to spur investments in the generation required to meet the growing demand. Reverting to some form of this historic cost</p> |

| | |
|--|--|
| | <p>allocation formula could bring up issues related to transmission rights along existing transmission capacity. Specifically, it would be expected to raise questions concerning the allocation of wires. Moreover, due to the minimal price responsiveness in the energy-only market, the allocation of wires cost to generators are likely to be partially passed along to consumers. The extent of this pass-through would vary based on the design of the rate tariff used to allocate wire costs between generators, which would be largely under the purview of the AESO.</p> |
| <p>Redefine some costs incurred during the connection process</p> | <p>The Ministry of Affordability and Utilities could also pursue redefining some costs incurred during the interconnection process. This could involve redefining some system costs as interconnection costs via amendments to the independent system operator (ISO) rules or providing some clarity on what constitutes an interconnection cost within the <i>Transmission Regulation</i>. Currently, interconnection costs are defined via ISO tariff.</p> |

Considerations

Any changes to the current load-pays policy could have related impacts on the attractiveness of Alberta’s competitive electricity market. Decisions on the zero-congestion policy would also place limits on the range of policy options available to address issues identified related to cost allocation of wires. Moreover, a change in the current load-pays policy is expected to raise questions about transmission rights, as new generation can result in real time congestion that can impact the ability of existing generators to exchange power in the market. Generators may feel more entitled to the right to use the line if they are accountable for the cost of the line. In addition, Alberta’s price cap could be called into question as generators might require assurance that they can recover transmission costs through energy prices. Alberta’s current price cap is low compared to other energy-only markets and within the current framework generators are not assigned transmission rights.

Questions

Please respond to the following questions by 4:30 pm on November 17, 2023, using this link: https://your.alberta.ca/bulk-transmission/survey_tools/transmission-policy-review. Following receipt of feedback, the government will analyze responses in order to determine the ideal path of action for Alberta’s transmission policies.

- Should Alberta’s load-pays policy be reconsidered in light of the objectives outlined in this paper?
 - If so, do you support one of the options proposed above? Which one and why?
- Should other options be considered?
 - If so, which options are missing?
- If transmission rights are implemented, what would the implication be on other interconnected policies in this paper and otherwise?
 - What role, if any, would GUOC play within this framework, and why?
 - What role, if any, would the current line loss policy have, and why?
 - How would the implementation of transmission rights impact the energy-only market?

- If government moves away from the load-pays policy, should some transmission costs be allocated to generators? If so, why?
 - What proportion of costs should be assigned to generators if an alternative cost sharing framework is implemented?
 - What principles should guide the allocation of costs among generators?
- Should generators be responsible for a greater share of connection costs? Provide a rationale.

ii. Ancillary Services

Current Policy

Ancillary services are the additional electricity services that the AESO procures outside of the power pool to ensure that the system remains reliable. These are added to other transmission costs and assigned to load customers as specified in Section 48 of the *Transmission Regulation*³. The AESO is the sole provider of system access in Alberta and is also the sole purchaser of ancillary services. The *Electric Utilities Act* defines ancillary services as “those services required to ensure that the interconnected electric system is operated in a manner that provides a satisfactory level of service with acceptable levels of voltage and frequency.” Ancillary services currently include Operating Reserves, Transmission Must-Run, Load Shed Service for Imports, and Black Start Services.

Case for Change

Operating reserves currently make up the majority of ancillary services costs and are used to manage real-time fluctuations in supply or demand, and to respond to supply contingencies. While the total cost of ancillary services has increased substantially, rising from \$150 to \$500 million per year between 2020 and 2022, increases in the cost of power through the wholesale market has been the primary driver rather than increases in the volume of ancillary services procured.

In 2022, most stakeholders provided feedback that adjusting the cost allocation for ancillary services was not a priority; however, most also provided feedback that the Ministry of Affordability and Utilities should consider other cost allocation structures in the future if the need for ancillary services changed. Since that time, the AESO has indicated in its Reliability Requirements Roadmap that there is a need for more ancillary services to maintain overall system reliability⁴.

Frequency decay is the primary concern expected to require solutions in the immediate future. Thermal generators, which are synchronous, currently provide frequency response to the system without additional compensation. Inverter-based resources such as wind and solar do not currently provide frequency response and are not required to do so by the AESO’s Rules. The AESO is facing operational challenges related to frequency decay and is examining the procurement of more of these services to ensure stability when many synchronized generators are offline (for example when wind displaces a large number of thermal generators from the merit order). The procurement of additional frequency response services will cause additional costs which it could be

³ The *Electric Utilities Act* (Section 30(4)(b)) also allows the AESO to recover the costs of arranging provision of ancillary services by establishing and charging ISO fees; however, they do not currently do so.

⁴ [Reliability Requirements Roadmap » AESO](#)

argued are caused by the absence of frequency response from inverter-based resources.

In the future, the AESO also anticipates needing to procure more operating reserves (in the form of regulating reserves) to respond to more frequent and larger net demand changes and examining incentive structures to ensure synchronized generators are available when needed to maintain system strength (i.e., voltage)⁵. These could also result in additional costs being borne by ratepayers that are arguably caused by the technical characteristics (in this case intermittency and the inability to provide voltage stability) of certain generators.

Analysis

In order to foster efficient outcomes and support affordability, allowing for the reassignment of some ancillary services costs could be considered as set out in Table 6 below.

Table 6. Potential adjustments to ancillary services cost allocation

| Proposals | Description |
|---|---|
| Reassign costs based on cost causation | Government could require the AESO and AUC to take into account the principle of cost causation as a basis for assigning these costs and clarify that they may be assigned to generators, imports, exports and/or loads. |

Considerations

Reassigning ancillary services costs could deliver benefits by ensuring costs are internalized by those that cause them. Given the connection between inverter-based, intermittent resources and the need to procure additional ancillary services, the status quo may be promoting more investment in these resources compared to what would occur if they were required to internalize any caused system costs.

Conversely, assigning costs based on cost causation can be complex. While current ancillary services costs are significant, making up approximately 20 per cent of transmission costs in 2023, when power prices are lower, they can make up less than 10 per cent of the annual transmission revenue requirement and an even smaller proportion of this cost would be directly related to the presence of certain generators. Given that generally ancillary services make up a small share of overall transmission costs, pursuing a reassignment of these costs may exceed the potential benefits.

Questions

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- Should cost causation be a driving principle in the assignment of ancillary services costs?

⁵ AESO, Reliability Requirements Roadmap 2023.

- Are ancillary services costs substantial enough to warrant the regulatory changes that would be associated with assigning them to be based on cost causation principles?
 - If yes, please provide feedback on how cost causation could be determined?

c. Interties

Current Policy

Electricity transmission connections to other jurisdictions, commonly referred to as interties, support the operation of the electricity system by providing the AESO with a level of flexibility to maintain system reliability by providing near immediate response to generator outages and intermittent generation. Alberta currently has three interties that facilitate the import and export of electricity, one with each of B.C., Montana, and Saskatchewan. Imports currently offer at \$0 per megawatt hour (MWh) and exports offer at \$999.99/MWh, and transmission access across the interties must be coordinated with other jurisdictions that currently dispatch hourly. On an annual basis, Alberta is currently, and has historically been, a net importer of electricity. Interties are an essential part of a competitive market as a means to import power when needed to maintain reliability, to export surplus energy for additional generator revenue, and to ensure that the competitive wholesale market functions effectively.

Case for Change

Increasingly, interties have become a central topic in Alberta's electricity system as intermittent generation sources are increasing and reliability and affordability are primary concerns. The *Transmission Regulation* contains several sections with a focus on interties including policies on development of new interties, restoration, and imports and exports. Interties play a crucial role in achieving affordability, reliability, and decarbonization. First, interties allow for more \$0/MWh priced imports to access the Alberta market, putting downward pressure on the wholesale pool price by increasing competition and displacing high-cost generators. Next, interties can provide key grid balancing, load management, and reserve capacity services. Finally, interties can facilitate decarbonization by allowing for surplus intermittent clean electricity generated in other jurisdictions to flow into Alberta and provide an avenue for export revenue for surplus intermittent clean electricity generated in Alberta. Unlike other transmission projects, the *Transmission Regulation* allows for intertie project proposals to be merchant led. Given the important role interties will play in Alberta's ability to maintain reliability and affordability with a changing generation mix, analysis of current policies is required to determine whether amendments are needed to achieve the desired level of intertie development by the province.

Analysis

In order to have effective interties as part of Alberta's electricity system, amendments to the *Transmission Regulation*, as set out in Table 7 below, may be needed to provide further clarity for both existing and new interties.

Table 7. Potential adjustments to interties policy (compatible)

| Proposals | Description |
|---|--|
| Increase clarity on intertie restoration timelines | Amendments to the <i>Transmission Regulation</i> may be explored to increase the prescriptiveness of Section 16 to more clearly indicate when restoration of interties to their path rating must be completed, including the Alberta-B.C. intertie, while maintaining flexibility on |

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| | how this may be achieved. This would increase certainty to stakeholders and facilitate investments across Alberta's electricity system by providing added clarity on issues such as available transfer capability (ATC), Most Severe Single Contingency (MSSC), Fast Frequency Response (FFR), Load Shed Service for Imports (LSSi), and more. |
| Increase clarity on future intertie developments | Amendments to the <i>Transmission Regulation</i> may be explored to formally outline the Government of Alberta's intent to develop additional interties with its neighboring provincial and state jurisdictions and clarify how these developments may fit into the broader planning of the Alberta interconnect electricity system. |

Considerations

The Ministry of Affordability and Utilities is aware of the need to balance intertie development and restoration with fair, efficient, and openly competition outcomes in the wholesale electricity market and the reliability of the electricity system as a whole. The Ministry of Affordability and Utilities would look to ensure appropriate market measures to mitigate any negative impacts associated with imports were in place given that imports and exports affect prices, which consequently affect longer term incentives to build or refurbish existing generation capacity within the province. Measures such as payment in lieu of taxes for imports, among others, would be within consideration as part of this analysis as a possible mechanism to balance additional use of interties with Alberta's competitive deregulated energy-only market and ensure all market participants are operating on a level playing field. Section 27 of the *Transmission Regulation* currently states that the cost of planning, designing, constructing, operating and interconnecting an intertie must be paid by the person proposing the intertie and other persons to the extent that they directly benefit from the intertie. Ensuring a level playing field may trigger a re-evaluation of this section to ensure that importers are recognized as a beneficiary of intertie expansion.

Questions

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- What changes to intertie policy are required to ensure sufficient levels of timely restoration and expansion can be achieved to meet government's goals?
- What are the principles that should be considered in balancing intertie policy with the integrity of Alberta's competitive market and system reliability?
 - To what extent should the competitive process be maintained as it relates to the development of new, or upgrade of existing, regulated and merchant interties?
- What mechanisms, if any, are required to ensure a level playing field for imports in Alberta's electricity market if interties were to be restored or expanded?

8. Conclusion

The electricity industry is undergoing a rapid evolution, both in Alberta and worldwide, as a result of new technologies and decreases in their costs, growing imperative to reduce emissions, and societal shifts towards electrification. In light of these changes, the Government of Alberta is undertaking a comprehensive analysis of the province's transmission policies to ensure they are well suited to meet

the needs of the electricity system of today and are prepared for the changes coming tomorrow. This paper has analyzed several major transmission policies which have been fundamental to the design of Alberta's electricity system for nearly 20 years and have been successful in delivering cost effective and reliable electricity to consumers. However, those policies may no longer be optimal for the new supply mix and needs of users.

The Ministry of Affordability and Utilities has reflected on what has been heard to date from stakeholders and indicated the option in grey (Section 6). The Ministry of Affordability and Utilities has also identified potential alternative options where further consideration of related effects across the broader electricity system and more significant stakeholder feedback is still needed (Section 7). Government is hopeful that this paper will stimulate feedback which will result in advice for policy makers to determine the direction needed on Alberta's transmission policies.

9. Next Steps

The Ministry of Affordability and Utilities is requesting feedback from stakeholders by 4:30 pm on November 17, 2023, by completing the questionnaire at the following link https://your.alberta.ca/bulk-transmission/survey_tools/transmission-policy-review. Following receipt of comments, the Ministry of Affordability and Utilities will be analyzing responses determining the ideal path of action for Alberta's transmission policies.

For general inquiries, please contact the Ministry of Affordability and Utilities at electricity@gov.ab.ca