Transmission Policy in Alberta

Pembina Institute comments and recommendations

Submitted to: Alberta Ministry of Affordability and Utilities | November 30, 2023
Regarding: Transmission Regulation Review

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Recommendation summary

Expanding and enhancing Alberta's grid infrastructure is key to building a clean, affordable, and reliable electricity system. Transmission policy and planning need to be modernized and recognize the importance of rapidly decarbonizing the electricity system, which can save Albertans on their electricity bills. Pembina Institute recommends that Alberta:

- Proactively plan for the transforming electricity system in a way that is robust in various scenarios, and builds infrastructure to enable clean, low-cost new energy supply, rather than playing costly catch-up later
- Investigate the implementation of Competitive Renewable Energy Zones (CREZs)
- Pursue available federal funding around electricity decarbonization to support investment and develop similar provincial funding.

Context: More Transmission is Important for Alberta

On October 23, 2023, the Ministry of Affordability and Utilities released "Transmission Policy Review: Delivering the Electricity of Tomorrow" (the Green Paper) to select electricity stakeholders via email and is seeking written comments on this paper.

As acknowledged in the Green Paper, **electricity decarbonization is important to power emission reductions across the economy**. The most cost-effective path to grid decarbonization is through accelerating the deployment of low-cost and readily available clean energy solutions: wind and solar generation, energy storage, demand-side management, and interties. The Pembina Institute's analysis has found that reaching a net-zero grid by 2035 can save Alberta households $600 per year in electricity costs, thanks substantially to the electricity

price depressing effect of high renewable energy penetration.[1] New, abated gas assets will also be needed in the net-zero grid and will need to be connected to the grid.[2] **While grid infrastructure requires upfront investment, it will provide the lowest all-in delivered energy cost for consumers** long-term by connecting the lowest-cost non-emitting assets and maximizing grid flexibility.

Therefore, **modernizing and building transmission and other grid infrastructure to connect new renewable and abated gas electricity generators is fundamental to enable the build-out of a clean, affordable, and reliable grid.** The Transmission Regulation under review needs to be modernized to fit the new electricity paradigm and accommodate today's lowest-cost electricity options. As Alberta conducts its transmission review, it must hold rapid decarbonization as a key principle and recognize the benefits of grid infrastructure for delivered electricity costs. Ignoring these benefits of a net-zero grid outcome would leave ratepayers – and potentially taxpayers – on the hook for stranded grid and generation assets that may not be needed or economic as the grid transitions to net-zero.

Current Issues with Transmission Planning

Grid policy and planning should seek the lowest overall system cost and target the net-zero outcome that is now accepted by all orders of government. However, Alberta cannot reach the lowest system cost without addressing two areas of issues:

- **Inadequate/Limited Forecasting** – Problem: the Alberta Electric System Operator's (AESO) long-term transmission planning (LTP) process is informed by the Long-Term Outlook (LTO). However, the LTO continually underestimates the growth of renewables in Alberta, thus underestimating the scale of planning needed in the LTP process and resulting in sub-optimal (overall higher costs, long-term) grid planning and congestion that prevents lowest-cost energy from reaching consumers. Most of Alberta's current congestion and cost issues could have been avoided if previous LTOs had not bet against the uptake of wind and solar energy in the province.

  Solution: The AESO should plan robustly and correct for the directional bias in its methodology that consistently underestimates renewables. In the Pembina Institute's analysis, the most cost-effective net-zero grid will see around 14-18 GW of wind and solar capacity by 2035. The most recent AESO project queue includes 13.4 GW of proposed wind

[1] Will Noel and Binnu Jeyakumar, *Zeroing In: Pathways to an affordable net-zero grid in Alberta* (Pembina Institute, 2023). https://www.pembina.org/pub/zeroing-in

[2] Karambir Singh, Will Noel, and Scott MacDougall. *Grid-Locked: Risks of unabated gas-fired electricity for a clean grid in Alberta* (Pembina Institute, 2023). https://www.pembina.org/pub/grid-locked

and solar projects that could be built by the end of 2025 with a total of 24.8 GW by 2028 – seven years ahead of the 2035 net-zero goal and two times more than in our scenario.[3]

- **Lack of Proactive Planning** – Problem: the transmission buildout process currently relies on generators meeting project inclusion criteria before triggering the AESO's work to ensure sufficient transmission capacity to deliver the generator's energy to market. If the purpose of the approach is to avoid transmission capital costs until they are proven necessary, the approach overshoots its target in practice: the AESO delays planning, routing alternatives, and regulatory approvals process (never mind actual capital investment) until the AESO is certain that congestion would otherwise result. As we are seeing in southern Alberta, the empirical result is congestion well beyond the AESO's mandate, leaving consumers to pay for higher-cost energy because lower-cost energy is curtailed.

  Solution: Given the pace of grid transformation needed – and well underway – development should be proactive through better long-term planning. Alberta needs to develop a transparent electricity decarbonization strategy, especially involving the AUC and the AESO. Alberta could learn from the U.K.'s new Future Systems Operator governance model in planning and Electricity Canada's "Build Things Faster" recommendations.[4] The AESO could develop more effective gates to filter serious near-term projects in a manner that better enables timely transmission development.

Once Alberta resolves the forecasting and planning challenges, the following issues outlined in the Green Paper can be more easily addressed.

Contribution to general grid costs – transmission system infrastructure is currently rate-based. Given the public interest of grid decarbonization, the Pembina Institute agrees with others that direct government funding is warranted. The Federal government's clean electricity investment tax credit (ITC) was announced to include inter-provincial transmission infrastructure. Alberta should work with and advocate for the Federal government to enable the ITC and other buckets of federal funding tied to electricity decarbonization (e.g., the Smart Renewables and Electrification Pathways Program and strategic finance pools) to include and prioritize intra-provincial infrastructure. Alberta should similarly develop programs to accelerate the modernization of the electricity system.

[3] Most recent (October 19, 2023) version. AESO, "Connection Project Reporting." https://www.aeso.ca/grid/transmission- projects/connection-project-reporting

[4] Dunsky Energy + Climate Advisors and Electricity Canada. *Build Things Faster* (2023). https://issuu.com/canadianelectricityassociation/docs/ec_sel_frame_-_2023_21_b1a2024679b3b0

Line Losses – the existing line loss factor calculation creates investor uncertainty because it is unpredictable and volatile. It is not effective as a siting signal and therefore has no value in improving grid efficiency. Immediately implementing a system-wide average line loss, as recommended by Energy department officials in June 2022, would improve overall system costs and efficiency.

Non-wire Alternatives (NWAs) – policy decisions made over two years ago, before Bill 86 was introduced in the Legislature, to enable independent power producer investment in NWAs remain unimplemented. If Alberta's concern for transmission costs and reliability is genuine, the enabling regulations need to be implemented immediately so as not to aggravate lost time in capitalizing on NWA opportunities to constrain consumer costs. We agree with the "maximizing efficiency" principle in the Green Paper for maximizing the use of our existing infrastructure and minimizing the costs of build out.

Congestion – the Green Paper's suggested approaches would further delay transmission processes and grid decarbonization. Congestion is expensive for ratepayers because it means lowest-cost electricity can't get to the grid. As mentioned above, the main issue contributing to congestion has been the AESO under-forecasting market interest in developing renewables. Traditional transmission planning involves long lead times. Alberta can maintain a no-, or low-congestion system by being proactive and aligning public investments to support high-capacity transmission lines to regions rich in resources that support zero-marginal-cost electricity, like wind and solar, as done with Texas' Competitive Renewable Energy Zones (CREZ) model (see Appendix A).

This form of proactive planning is already used in industrial heartlands, where roads and utilities are built first, and notably with the Wolf Midstream Alberta Carbon Trunk Line for carbon capture and storage projects. The end result is greater competitiveness and lower all-in energy costs, achieved by enabling low-cost new energy supply through a single upfront grid investment ("doing it right the first time") instead of a series of more incremental grid investments that are cumulatively more expensive. The economic and consumer cost benefits are clear, especially where opportunities exist to attract federal public funding to shoulder the risk underlying this approach.

Ancillary services – the Green Paper implies that a proposed cost-causation approach would reassign ancillary services costs when, in reality, the primary cause of the need for ancillary services is load's need for very high grid reliability. If only some generators support that reliability, those that do should have the opportunity to generate additional revenue through that service. However, those that do not provide the service do not "cause" the need for the service. The determination of cost causation would be highly complicated and subject to

uncertainty and would create risk for generation investors, deterring new capital investment in low-cost energy supply. This would be ironic, as high energy market prices (due to constrained supply and high-concentration of supply ownership) are the main driver of recent ancillary services cost increases. As such, no change should be made to the current system for recovering these costs.

Interties – interties are a demonstrated opportunity for Alberta to increase the utilization capacity of renewable energy. Pembina Institute has found that Alberta can become a net electricity exporter by 2025 if it expands the use of interties and renewable capacity within the province. The existing conversation around interties erroneously focuses on whether neighbouring jurisdictions have or are projected to have excess energy. This is a red herring: the key benefit of interties for Alberta is not about net energy import; it is about balancing load and supply and accessing markets for excess supply in Alberta. Both Pembina's and the AESO's analysis find that moving towards a net-zero grid will enable Alberta to become a net energy exporter between 2024-25.[5,6] The Pembina Institute supports Green Paper's proposal to explore additional intertie development.

[5] Interactive dashboard slide 10. AESO, "Imports and Exports," *AESO 2024 LTO Decarbonization Scenario Modeling Dashboard*. https://www.aesoengage.aeso.ca/34307/widgets/141824/documents/118597

[6] Will Noel and Binnu Jeyakumar, *Zeroing In*.

Appendix A: Regulatory Innovation

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An example of a regulatory process that could accelerate the deployment of transmission lines and encourage market-based, cost-efficient energy development, and thereby enable low-carbon generators is through Competitive Renewable Energy Zones (CREZ).

A CREZ is a geographic area that has high quality renewable energy resources, suitable for cost-effective large scale renewable energy development. Environmental impact assessments and other critical regulatory work is done in advance to ensure that CREZ is development ready. CREZ transmission planning involves planning, approving, and development of transmission in advance to easily connect large scale renewable energy projects to the grid.

Because of their targeted purpose of connecting new low-cost non-emitting energy supply, they are very strong candidates for federal net-zero grid investments.

Case Study: Texas' CREZ Success

Texas ran a successful CREZ program between 2005 and 2014. Prior to establishing the CREZ program and building transmission infrastructure, wind energy overwhelmed existing transmission due to the lack of high voltage lines, leading to curtailment, congestion, and stalled investment.[7] To facilitate expansion of wind energy, Texas established CREZs, which included establishment of wind energy-rich areas along with high capacity transmission to connect those areas to load centres. This led to competition among developers and boosted investments into state's wind energy development.

In 2008, a transmission project was launched to increase transmission capacity to CREZs. The project completed in 2013, at a cost of $7 billion USD, and it increased the transmission capacity to CREZs from nearly 7 GW to 14 GW. Existing wind projects benefitted from the project as wind curtailment dropped from 17% in 2009 to 0.5% in 2013. [8] Accounting for the value of reduced emissions damages, the reduced curtailment from existing wind energy was enough to account for nearly half the annualized value needed to offset the cost of constructing CREZ infrastructure.[9]

The benefits of wind energy development, facilitated by the CREZ program, also deliver many economic benefits. Texas consumers saved an estimated $31.5 billion USD on their electricity bills between 2010 and 2022 due to including low-cost renewable energy on the grid.[10]

[7] National Renewable Energy Laboratory, Renewable Energy Zones: Delivering Clean Power to Meet Demand, https://www.nrel.gov/docs/fy16osti/65988.pdf

[8] Reid Dorsey-Palmateer. "Transmission costs and the value of wind generation for the CREZ project." *Energy Policy* 138 (2020): 111248. https://doi.org/10.1016/j.enpol.2020.111248

[9] Reid Dorsey-Palmateer. "Transmission costs and the value of wind generation for the CREZ project."

[10] IdeaSmiths LLC, *The Impact of Renewables in ERCOT (2022 Q4 Update)*, 3. Available at https://web.archive.org/web/20230000000000*/https://www.ideasmiths.net/wp-content/uploads/2023/05/Impact-of-Renewables-in-ERCOT_FINAL.pdf

THE REZ PROCESS: OVERVIEW

Figure 2 outlines the six steps of the REZ process. These steps are individually described in the sections that follow, providing detailed description of their purpose, outputs, and the key decision makers and stakeholders involved.

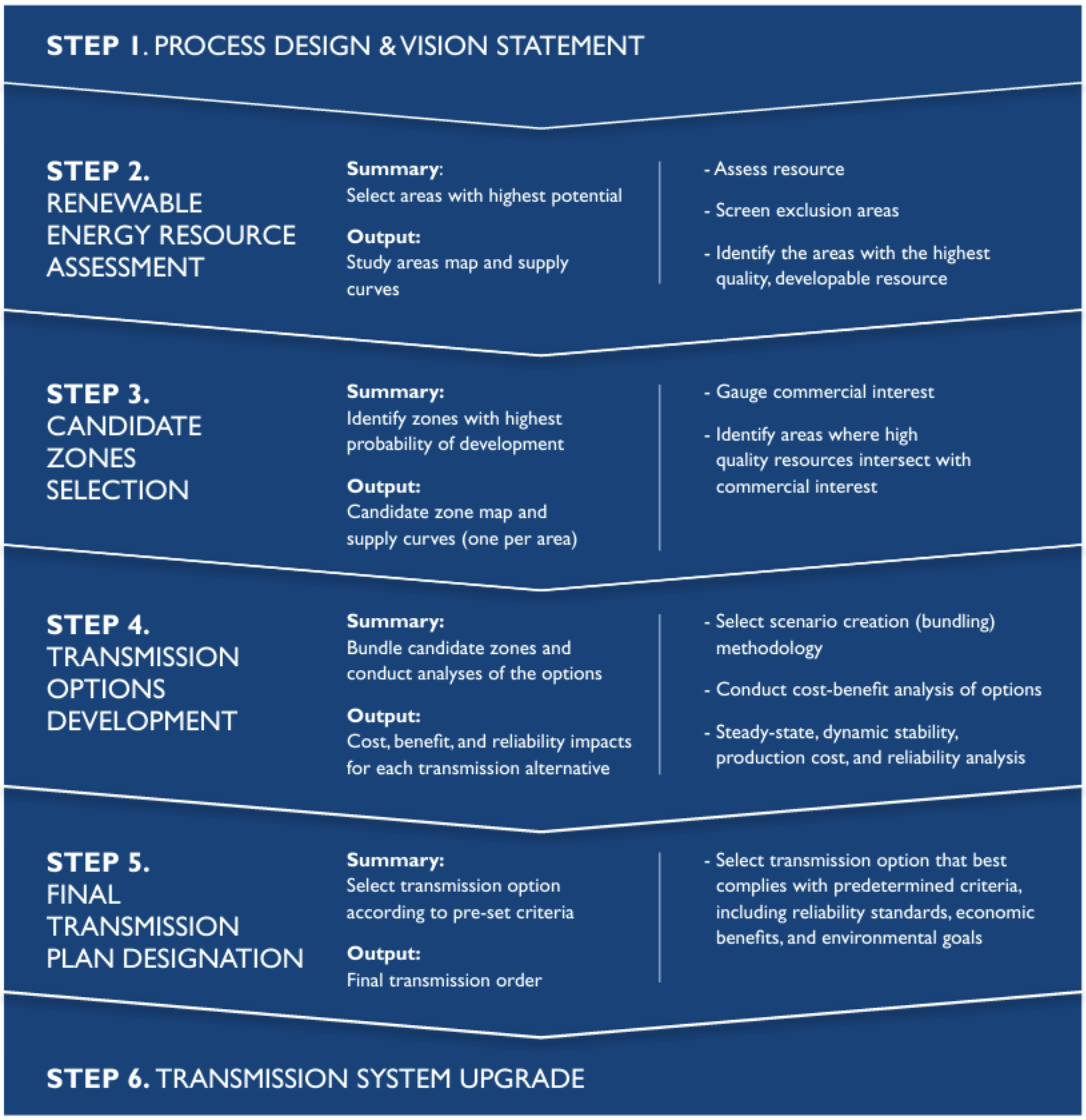

Figure 2. Renewable energy zones transmission planning process outline

Renewable Energy Zone (REZ) Transmission Planning Process | 3

Source: Nathan Lee, Fancisco Flores-Espino, and David Hurlbut, Renewable Energy Zone (REZ) Transmission Planning Process: A Guidebook for Practioners (2017), 3, www.nrel.gov/docs/fy17osti/69043.pdf