Media Backgrounder: AESO Perspective on Draft Clean Electricity Regulations

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How does the draft CER unfairly disadvantage Alberta's power system?

- The CER does not consider the vast difference between provinces in terms of generation resource mix.
- Alberta has the highest electricity sector emissions compared with other provinces, with most of its electricity generated by natural gas (72% of the province's electricity was derived from natural gas-fired resources in 2022, with 12% generated from coal-fired resources).
- Among all provinces, Alberta faces the greatest challenge to decarbonize its electricity system, since its starting point has the highest emissions.
    - Alberta has achieved significant emissions reduction to date. In 2005, Alberta's electricity sector emissions were 49.8 Mt and by 2021 the province's electricity system emissions had dropped to 27.7 Mt, a 44% reduction. As the remaining coal-fired generation retires through the first quarter of 2024 and more efficient natural gas generation displaces it, further electricity sector emissions reductions are expected.
    - Uncertainty with developing decarbonization technologies (carbon capture, hydrogen, storage, small modular nuclear) means Alberta is at greater reliability and affordability risk if cost and performance do not materialize as currently anticipated.
    - Current decarbonization paths with solar and wind lack the storage and reliability attributes required to unlock high penetrations without sacrificing reliability.
    - Regardless of how much intermittent wind and solar capacity Alberta has, the provincial grid will need sufficient dispatchable generation to meet cold, dark, windless winter peak-load conditions—otherwise Alberta is at risk of large-scale blackouts, putting lives at risk and economic output in jeopardy.
- Although Alberta has a modest hydroelectric fleet, the province does not have a legacy of vast hydroelectric developments and hydrologic opportunities that other provinces enjoy.
    - Alberta is reliant on peaking natural-gas generation, which enables reliability and balances intermittency of other assets. The CER creates significant operational restrictions to Alberta's flexible generation fleet that cannot be easily met with cost-effective decarbonized technologies presently available in Alberta.
    - Alberta has a significant cogeneration fleet, which also supplies the electric system, and the CER could put this supply at risk of retirement or disconnection from the grid.
    - A 450-annual-run-hour restriction will not enable flexible natural gas assets to respond to the increasing system demands and to the loss of intermittent generation. A 20-year End of Prescribed Life (EoPL) will create a retirement cliff without the required dispatchable ramping capacity that can reliably replace it.
    - The 25 MW exemption level reduces optionality for managing the intermittent nature of renewables in a cost-effective manner, as larger peaking assets are excluded.

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- Alberta has limited intertie connection capacity with neighboring jurisdictions. Alberta cannot rely on significant increases in non-emitting imports/exports to balance its system, as current ties are constrained and increasing intertie capability by significant volumes to balance intermittent generation across regions will take significant time and coordination between jurisdictions, beyond the 2035 horizon.

- Baseload assets, such as nuclear and small modular reactors, do not ramp at sufficient speeds to respond to the needs of the electric system, and CCUS technology does not functionally capture carbon at the physical threshold requirements of the CER when operating outside of full load conditions (i.e. when starting up and ramping).

- Generation is not centrally planned in Alberta's market, making it unique among provincial electricity systems: A significant portion of Alberta's existing generation assets are integrated into industrial processes spanning multiple economic sectors, including oil and gas, forestry and pulp/paper, materials, chemical production, and institutional combined heat and power.

  - Many generation facilities were built at sites that consume significant amounts of thermal and electrical energy via the most efficient utilization of natural gas available (cogeneration and combined heat and power). These cogeneration facilities are a significant portion of the Alberta supply mix, with around 5 GW of installed capacity and exports to the grid on a net basis of around 1.6 GW (around 23% of Alberta's system load, which averages 7 GW).

  - The CER design related to net exports from cogeneration facilities and End of Prescribed Life could potentially shut in most of those exports to the grid, especially since the economic sectors of those facilities have a net-zero target of 2050 instead of 2035.

  - Nearly 50% of the energy produced on the Alberta Interconnected Electric System (AIES) comes from high-efficiency integrated power/thermal generation facilities (e.g. cogeneration or combined heat and power) or facilities that consume waste products to produce power (e.g. biomass facilities).

- The transmission system evolved to support these economic engines and cannot easily be reconfigured to integrate alternative generation resources.

  - This contrasts significantly with other centrally planned grids, which consolidate generation and transmission into more linear "backbone" transmission systems like B.C., Quebec, Ontario and Manitoba.

  - Development of alternative generation forms would require significant changes to the topography and power flows on the system, stranding capital and requiring additional investment.

- How can Alberta transition to a carbon-neutral grid by 2050 while ensuring a safe, reliable, economic electricity system?

- The decarbonization of Alberta's electricity system is expected to proceed by utilizing the resources available to the province: natural gas reserves and subsurface reservoirs capable of sequestering carbon dioxide emissions.

  - To ensure reliability, Alberta will require future assets that are dispatchable as a significant part of its resource mix with consideration of their fuel supply.

  - Increased intertie capacity may not provide a complete solution, since other jurisdictions will have similar supply challenges (B.C., Saskatchewan and Manitoba). None of these jurisdictions expect to have significant excess capacity in their resource plans, so incremental capacity plus transmission capability would have to be planned and constructed in advance for this pathway to enable large-scale decarbonization in the future.

  - CCUS of post-combustion emission from combined-cycle assets is expected to be the lowest cost option for low-emissions dispatchable power generation in Alberta, given current technologies.

  - Nuclear small modular reactors and hydrogen generation technologies may provide promising opportunities if cost declines materialize or technologies advance dramatically, but the probability of these technologies maturing and commercializing prior to 2035 is highly unlikely; there is value in monitoring and learning from other jurisdictions' experiences deploying utility-scale electricity generation projects (i.e. SMR in Ontario, hydrogen-fired generation in Germany).

  - Similar additional decarbonization technologies, such as geothermal suitable for the Alberta geology and direct air capture, are still in the very early technology stages and are unlikely to be ready for commercial deployment by 2035.

- Labour, regulatory and supply chain issues are more likely to arise under truncated decarbonization timelines, causing inflationary pressures which can suppress economic output and growth.

  - Extending timelines will still result in significant near-term carbon reductions without sacrificing affordability.

- Developing first-of-a-kind generation technologies has a history of burdensomely expensive costs and development risks (e.g., the German solar feed-in-tariffs, wind integration in Ontario, Kemper County IGCC). Integrating next-of-a-kind solutions would mitigate risks, avoid pitfalls and trials, while enabling Alberta to benefit from "lessons-learned" in other jurisdictions. Technologies would also have time to develop and mature, such as flow batteries, and even nuclear fusion technologies.

- The functional offset system that Alberta has developed and administered for the past 15 years will enable the lowest-cost emissions reductions for all sectors and enable decarbonization by 2050.

- Alberta's total load is largely industrial (65%) and in hard-to abate sectors (e.g., oil and gas, mining, petrochemicals, pulp and paper, cement, among others). The path to decarbonization of these sectors involves a certain degree of electrification as well as CCS adoption, which also increases energy consumption. The reliability and cost implications of the CER's 2035 target may jeopardize the path to electrification of these sectors and increase their reliance on the grid.

- A longer and cost-effective runway to a net-zero grid by 2050 will provide greater certainty and enable wide-scale decarbonization. Economy-wide electrification and decarbonization objectives will depend

on a cost-effective and reliable electricity supply. These objectives will be severely undermined if the electricity system is not reliable and affordable.