

## Summary

- Reliability and affordability are key tenets for all Albertans as the province's electricity system transitions to a decarbonized grid in the future.
- One key measure of reliability is resource adequacy, which is paramount for the safe and reliable operation of Alberta's electricity system.
- The AESO uses sophisticated probabilistic tools to determine future resource adequacy based on future supply and demand outlooks that incorporate drivers, including potential changes to environmental regulations and technology.
- In response to the first draft of the Clean Electricity Regulations (CER), the AESO has modelled many key components and detailed its analysis in a preliminary assessment.
- The results of the assessment indicate that the CER creates significant reliability risk when the CER comes into effect in 2035; this is further exacerbated by potential impacts of cogeneration that may stop exporting electricity to the grid that were not modelled.
- The AESO will continue to model resource adequacy and other forms of reliability via Long-term Outlooks (LTO) and the Reliability Requirements Roadmap.

## Background

The AESO plays a leadership role in enabling the energy transformation while maintaining affordability and system reliability, including resource adequacy. The LTO is the AESO's forecast of Alberta load and generation requirements over the next 20 years and is used as one of many inputs to guide transmission system planning, market evaluations, and system reliability, including resource adequacy. The LTO includes a forecast of what current market structure, regulations and technological trends are anticipated to develop over this timeframe.

The AESO monitors resource adequacy and reports on the ability of an expected resource mix to meet forecast load for various forecast periods. The AESO utilizes its Resource Adequacy Model (RAM) to assess set years within the LTO to evaluate the risk of lost load. This model evaluates the tradeoff between capacity (MW) and reliability (expected unserved energy MWh) using a stochastic probabilistic approach that varies load and generation. Supply shortfalls have many drivers, including high load, limited dispatchable generator availability, limited variable resource output, water inflows to energy-limited hydro, and limited inertia availability. Developing robust results requires accurately characterizing the magnitude of uncertainties associated with each driver. Due to the infrequency of reliability events in Alberta, it is important to review the underlying drivers of historical reliability events and ensure that the key drivers are represented. These results are measured against the Long-Term Adequacy Threshold as outlined in section (6) of ISO Rule 202.6, which defines the threshold level of unserved energy due to a supply shortfall at which the AESO is empowered to take out-of-market action.

On August 19, the Canadian government released<sup>1</sup> the proposed Clean Electricity Regulations and opened a 75-day consultation period. The regulations are intended to have a significant effect on the operation and build options for unabated fossil fuel generation resources. The majority of this policy was modelled within a preliminary Decarbonization by 2035 Scenario within the LTO analysis and was found to have a significant impact on the Alberta resource mix outcome. These results were shared at our June 6 preliminary results stakeholder engagement session<sup>2</sup>.

<sup>1</sup> [Canadian Gazette, Part 1, Volume 157, Number 33: Clean Electricity Regulations](#)

<sup>2</sup> [2023 LTO Preliminary Results Engagement Session](#)

## Insights/Outcomes

The AESO has subsequently performed resource adequacy analysis on the preliminary results of a Decarbonization by 2035 scenario that includes modelling of the CER consistent with the current proposed parameters.

- Proposed start and effective dates
- Applies to unabated fossil fuel generation resources
- Allowable hours of operation: 450 hr/year
- End of Prescribed Life of 20 years
- Size application of units that are greater or equal to 25 MW
- Units that employ Carbon Capture and Storage meet the Emission Performance Standard
- Behind the Fence Generation (Cogeneration) is assumed to employ carbon capture and meet the standard

Within the current Decarbonization by 2035 scenario, the resource adequacy analysis shows that Alberta's grid has sufficient resources to meet its adequacy standard for forecast years 2028 and 2033 and shows an acceptable amount of risk of lost load as defined by the Long-Term Adequacy threshold.

However, with the Clean Electricity Regulations binding in 2035, the LTO-forecasted generation mix is constrained from operating in a manner to meet the adequacy standard. The expected unserved energy starting in 2035 for the Decarbonization by 2035 scenario exceeds the standard by a significant and concerning margin<sup>3</sup>. The resource adequacy risk increases with time, which is attributed to both increasing load requirements and a reduction in firm peaking capacity. Supplementary analysis around adjusting several of the parameters, including unit size or allowable hours of operation, reduces the unserved energy risk but the values remain well above current thresholds.

The AESO will continue to review and assess this analysis in the forthcoming LTO report. The risk drivers identified in the modelling will be monitored and these results are intended to inform and provide sufficient time to mitigate anticipated risks as they become more certain.

## Next Steps

Incorporating the information noted above, the AESO is currently enhancing its LTO scenarios, which will include a Decarbonization by 2050 view and anticipates it will complete its analysis and update the LTO and supporting data later this year. The final modelling results, data and presentation will be provided to stakeholders in preparation for a stakeholder session, details of which will be posted to the Forecasting Insights page. The AESO looks forward to stakeholders' continued participation and engagement in this important initiative.

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<sup>3</sup> The anticipated threshold value for 2035 is 1,118 MWh, the expected unserved energy value for forecast year 2035 is ~36,000 MWh