PEMBINA Institute

SUBMISSION

Bring Your Own Generation

Pembina Institute comments and recommendations

Submitted to the Alberta Electric System Operator

Regarding: Large Load Integration Phase 2A

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Summary

The Pembina Institute appreciates the opportunity to engage with the Alberta Electric System Operator (AESO) on new developments related to Alberta's electricity system. At a high level, we are aligned with the AESO in its decision to implement a bring-your-own-generation (BYOG) process to ensure a reasonable balance between economic development opportunities presented by the emergence of artificial intelligence and data centres and maintaining a reliable and affordable supply of electricity for Albertan ratepayers.

The BYOG process presents a unique opportunity for Alberta to attract investment from a diverse range of new and emerging industries looking for quick access to low-cost, affordable power. Relatedly, it presents an equally unique opportunity for the province to attract investment in a diverse mix of new power generation. As it is written now, the BYOG framework risks missing out on a significant portion of the available capital interested in the intersection of industrial electrification and low-emissions power generation. With the proper amendments, Alberta could be a leading example for how to do data centre development properly, balancing investment, reliability and affordability for new industrial loads and, critically, existing ratepayers with Alberta and Canada's environmental objectives.

A performance-based approach would also better preserve Alberta's competitive electricity market principles. **The AESO should define the reliability outcome required from BYOG applicants but should avoid unnecessarily narrowing the technologies or business models that can meet that outcome.** A framework that allows generation, storage, hybrid portfolios and flexible demand to compete against the same reliability standard would better support affordability, reliability, innovation and investment certainty.

Context

The Pembina Institute welcomes the opportunity to provide input on the integration of large industrial electricity loads (i.e., data centres) to Alberta's electricity system.

Over the past two years, data centre connection applications have grown substantially in the province, rising from 5 gigawatts (GW) in early 2024 to 20 GW in late 2025.[1] For context, Alberta's all-time peak electricity demand is 12.8 GW, set in 2025.[2]

The emergence of artificial intelligence, and the related proliferation of large data centres, presents a unique economic opportunity for Alberta and Canada. However, it also presents a number of risks — economic, environmental, as well as others — if done poorly. To that end, we recommend that the Alberta Electric System Operator (AESO) reconsider its stance on only allowing thermal generators (i.e., natural gas) to qualify in the bring-your-own-generation (BYOG) process, while also urging the parallel adoption and incentivization for large industrial electricity loads to bring their own flexibility — including demand-side management and energy storage. Opening the BYOG framework to include all types of generation and demand-side flexibilities, basing success on reliability outcomes rather than business models, is far better aligned with Alberta's competitive market principles. A technology agnostic approach will also incentivize innovation, driving improved affordability and environmental and investment outcomes.

The following sections contain the Pembina Institute's input to the AESO's Large Load Integration Phase 2A: Bring Your Own Generation Process, which was open for feedback from June 26 to July 13, 2026.[3]

Responses to select questions

Do you agree with the generation types that qualify for BYOG?

The AESO's BYOG process should not be limited by generation type and should instead take a technology agnostic approach, evaluating the performance of a portfolio of generation (and demand flexibility) options. By limiting BYOG exclusively to thermal generation, the AESO is

[1] Alberta Electric System Operator (AESO), "Update on Data Centres," (2025). https://www.aeso.ca/assets/Uploads/grid/Data-Centre/AESO-Data-Centre-Update-September-2025.pdf

[2] AESO, "Annual Market Statistic Reports." https://www.aeso.ca/market/market-and-system-reporting/annual-market-statistic-reports/

[3] AESO, "Phase 2A: Large Load Integration | BYOG Process." https://aesoengage.aeso.ca/pre-engagement-phase-ii-large-load-integration

forcing data centre developers to rely on increasingly expensive natural gas power plants,[4] when a combination of variable renewables, energy storage and dispatchable thermal backup could provide comparable outcomes at a lower total cost and with lower emissions, if evaluated against clear performance requirements. Further, given the current long lead times on natural gas turbines (and therefore natural gas power plants), alternative options such as wind, solar and energy storage provide an opportunity for faster time to power while proponents wait for turbine deliveries.

For example, Google has proposed a hybrid supply approach for data centre campuses located in Texas and Minnesota, pairing load with a combination of wind, solar, energy storage and gas.[5] Similarly, in a recent study, the Business Renewables Centre-Canada demonstrated the cost effectiveness of achieving moderate levels of hourly matching between industrial demand and a portfolio of wind, solar, energy storage and demand flexibility.[6]

Further, a portfolio approach — that is, some combination of wind, solar, energy storage, demand flexibility and gas — would meet all the requirements set out by the AESO in determining qualifying generation, far better than any single source of generation would, including standalone natural gas. In fact, it is unclear how a standalone natural gas power plant meets all the requirements set out by the AESO, namely the "electrical island" test and operations in all weather conditions.

First, in 2025 Alberta's combined-cycle, gas-fired steam, and simple-cycle fleets had availability factors of 85%, 82% and 62%, respectively, which are all notably below 100% as no single generator can reasonably be available 24/7 due to maintenance, planned and unplanned

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[4] For example, the 932 MW Greenlight Electricity Centre has an estimated capital cost of $4 billion, which is 2.6 times higher than the 900 MW Cascade combined-cycle natural gas plant commissioned only two years ago. The primary driver behind these cost increases is rapidly rising natural gas turbine costs, caused by supply chain shortages.

Pembina Pipeline, "Pembina Pipeline Announces Positive Final Investment Decision on the Greenlight Electricity Centre," July 2, 2026. https://www.pembina.com/media-centre/news/details/3403fb77-2257-466b-a8e2-f043f4cd4650

Alberta Major Projects, "Cascade Power Project." https://majorprojects.alberta.ca/details/Cascade-Power-Project/3710

GridLab, Energy Futures Group, and Halcyon, "The New Reality of Power Generation: An analysis of increasing gas turbine costs in the U.S.," (2026), 6. https://halcyon.io/hubfs/GridLab_Halcyon_Gas-Turbine-Costs-Report.pdf

[5] Google, "Google and Intersect Deepen Texas Roots with New Data Center and Energy Investments in Gray and Roberts Counties," June 4, 2026. https://storage.googleapis.com/gweb-uniblog-publish-prod/documents/Google_Intersect_Texas_Announcement_-_June_2026.pdf

Xcel, "Xcel Energy to power new Google data center in Minnesota," February 24, 2026. https://newsroom.xcelenergy.com/news/xcel-energy-to-power-new-google-data-center-in-minnesota

[6] For example, the average cost of achieving 70% hourly matching across all sectors considered was only 40% more expensive than a traditional annually matched renewable energy PPA.

Business Renewables Centre Canada, *Momentum at Risk: Evaluating proposed amendments to the GHG Protocol's scope 2 requirements*, 10. https://businessrenewables.ca/resource/momentum-at-risk

outages, and thermal derates.[7] Second, while gas may be less susceptible to changes in weather than wind and solar, the available capacity of all thermal generators decreases with increasing temperature which, importantly, aligns with peak cooling demand of data centres. On the other hand, while wind and solar generation profiles vary diurnally and seasonally, they are less susceptible to thermal derating. In fact, peak cooling demand would closely align with peak solar insolation, further cementing that a hybrid (or portfolio) approach would better align with the AESO's stated goals of minimizing the impact of new loads on the grid.

Pairing new data loads with wind and solar also come with various co-benefits not offered by relying solely on natural gas. These include lowering market prices during periods of oversupply and protecting consumers from fuel price volatility.

Do you agree with the ratio for generation to load required for BYOG?

The BYOG tethering ratio should include the consideration of dispatchable/flexible demand in order to further avoid the risk of overbuilding generation and grid infrastructure. The ratio should be based on net firm import and dependable portfolio performance, not only gross load versus nameplate generation. Otherwise, the AESO may inadvertently overbuild generation by ignoring demand that can be curtailed, capped or shifted. The technical and economic feasibility of flexible data demand is already being demonstrated in the United States and Europe through the Electric Power Research Institute's DCFlex initiative.[8]

Similarly, the AESO should consider borrowing from the Conditional High-Impact Large Load Service (CHILLS) and High-Impact Large Load Generation Interconnection Assessment (HILLGA) frameworks being developed and tested by the Southwest Power Pool.[9] CHILLS seeks to balance grid reliability and interconnection speed by providing quick connections to loads while system operators retain the right to curtail them first in emergencies — similar to the "connect and manage" concept implemented by the Electric Reliability Council of Texas. Through the HILLGA path, co-located generation is packaged into and studied under a single process, mitigating the bottlenecking issues present under the typical interconnection framework.[10]

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[7] AESO, "Annual Market Statistics Datafile." https://public.tableau.com/app/profile/market.analytics/viz/AnnualStatistics_16161854228350/Introduction

[8] Electric Power Research Institute, *Win-Win Watts: When Can Data Centers, Efficient Electrification, and New Loads Lower Electricity Prices?* (2026). https://winwin.epri.com/

[9] Southwest Power Pool, "High Impact Large Load (HILL) Integration," (2026). https://www.spp.org/markets-operations/high-impact-large-load-hill-integration/

[10] Arushi Sharma Frank, "From Bottlenecks to Breakthroughs: Rewriting the grid planning playbook in the Southwest Power Pool and Texas," *Centre for Strategic & International Studies*, July 23, 2025. https://www.csis.org/analysis/bottlenecks-breakthroughs-rewriting-grid-planning-playbook-southwest-power-pool-and-texas

How would you define an underutilized facility for the purpose of BYOG?

The definition of an underutilized[11] facility should be expanded beyond generation and energy storage to include transmission infrastructure as well. Siting a data centre (or other industrial load) in highly congested regions — such as southeastern Alberta — could reduce curtailment of wind and solar, decreasing costs for both the industrial load (by providing access to low-cost power when it is windy and/or sunny) and ratepayers in general (by decreasing curtailment and the associated rebalancing charges).

Should the proposed BYOG process apply to underutilized facilities?

Underutilized generation and energy storage facilities present a unique opportunity for co-located industrial electricity demand, in that they avoid the need for investment in new generation capacity. However, given the likelihood of accelerating demand growth, due in large part to industrial and non-industrial electrification, facilities that are currently being underutilized may soon be required (and incentivized through higher prices) to meet growing system demand. Locking underutilized facilities into a contract with a data centre could exacerbate rising prices, placing undue burden on ratepayers.

Do you agree with the proposed terms and conditions for tethering?

No. The proposed approach should include an ongoing performance obligation after commercial operation. While the original load and generation projects may not need to remain permanently paired through a single commercial relationship, the reliability obligation that justified the load's system access should not end once both projects are energized.

If a large load receives additional or accelerated system access because it brings forward qualifying generation, the load should retain an obligation to maintain an equivalent contribution for as long as it benefits from that system access. This could be satisfied through the original generation facility, replacement generation, storage, contracted demand flexibility, a firm-import limit or another approved portfolio that meets the AESO's reliability standard.

Without this ongoing obligation, there is a risk that BYOG becomes a project-advancement mechanism rather than a durable reliability framework. For example, the associated generation could later become unavailable, be retired, change ownership or operating strategy, experience

[11] Noting that the Data Centre Regulation includes provisions for "underutilized facilities."
Government of Alberta, *Data Centre Regulation*, Alta Reg 117/2026. https://www.canlii.org/en/ab/laws/regu/alta-reg-117-2026/latest/alta-reg-117-2026.html

fuel constraints, or fail to operate during system-stress periods, while the load continues to retain the system access originally granted on the basis of that generation.

The AESO should therefore clarify what happens after commercial operation if the qualifying resource no longer provides the capability assumed during approval. The final BYOG process should include clear monitoring, reporting, replacement and enforcement provisions so that the reliability value used to justify the connection is preserved over time.

Do you agree with the approach taken on the BYOG checklist?

The BYOG checklist should include mandatory and/or scored items that assess ongoing performance, not just project readiness. In particular, the AESO should require applicants to demonstrate how the proposed generation, storage and/or flexible demand portfolio will perform during relevant system-stress periods, including planned and unplanned outages, seasonal derates, fuel constraints and low-renewable-output conditions.

The checklist should also recognize demand-side flexibility as a qualifying contribution where it can be measured, automated and enforced. Examples could include firm-import limits, automated curtailment capability, peak-period demand reduction commitments, storage-backed load management, or other operating protocols that reduce the load's impact on the system.

This would support project readiness by ensuring that applicants are not only ready to build, but also able to deliver the system outcome that justified BYOG eligibility.

Please provide any other comments you have about the bridging option in the BYOG process

The AESO should consider whether the bridging option can evolve into a broader flexible-connection pathway. As proposed, bridging appears to treat curtailment primarily as a temporary condition or emergency backstop while the associated generation is being developed. However, some large loads may be able to provide ongoing system value by accepting defined operating limits, automated curtailment obligations or firm-import caps in exchange for earlier or lower-impact connection.

A flexible-connection pathway could help the AESO manage reliability while reducing the risk of overbuilding generation or transmission infrastructure. It could also allow large loads to contribute to system flexibility rather than being treated only as a new source of demand. This should be considered alongside BYOG, rather than deferred entirely to a later phase, because flexibility can directly affect the amount and type of generation needed to support new load.