

29 January, 2024

Alberta Utilities Commission
1400, 600 Third Avenue S.W.
Calgary, Alberta T2P 0G5

Transmitted electronically via AUC eFILE

Attention: Trevor Richards, Lead Application Officer

RE: Alberta Utilities Commission (“AUC”) Inquiry into the ongoing economic, orderly and efficient development of electricity generation in Alberta – Proceeding 28542

Energy Storage Canada (ESC) is the national trade association dedicated to accelerating the deployment of energy storage projects and technologies. ESC is pleased to provide feedback on AUC Proceeding 28542. Please see our feedback detailed in the Appendices.

Energy storage is one of a critical suite of grid flexibility resources which will be critical to bridging the gap between electricity supply and demand. Energy storage can meet supply adequacy needs, ancillary and reliability needs and even aid in grid expansion as a non-wires alternative. Ensuring energy storage is able to both be deployed and invested in in the Canadian context is essential to the success of our electricity system to both decarbonize and support decarbonization through 2050.

ESC has significant interest in this Inquiry. ESC members currently have energy storage projects in operation and development in Alberta and may be substantially impacted by the outcomes of this Inquiry on the future electricity framework in Alberta.

Our finding is that the reports from Longview and London Economics International provide limited insights into how to reform Alberta’s electricity market. To the extent that they do, ESC has recommendations including, but not limited to:

1. Maintain the existing energy-only market framework
2. Modify the price floor and ceiling of the energy-only market to allow for increased price signals for energy storage and other sources of firm capacity
3. Ensure that storage has access to a cost-allocation that allows it to compete on equal basis with other sources of firm capacity
4. Ensure that a technology neutral approach is continued and fostered in Alberta

If you have any questions respecting this, please contact the undersigned.

Very best regards,



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Appendix A: Analysis of Longview and London Economics International Reports

Looking at the two expert reports commissioned by the AUC to inform Module B, ESC has the following observations and analysis. While both provide analysis regarding the current state of the Alberta electricity market-system, neither report meaningfully includes investigating possible solutions to identified problems, such as proliferating uncertainty or the prospect of inadequate supply mixes.

Longview Communications and Public Affairs Report

The Longview report investigates sentiment towards investor sentiment towards the present condition of the Alberta electricity market as well as sentiment towards potential changes to Alberta's electricity market. While not explicitly stated in the report, ESC understands the purpose of the Longview report as to survey current and future investors in Alberta's electricity sector to understand whether they will be able to contribute to a reliable, affordable and clean supply mix. An market without investment will fail all three goals.

Notably, the Longview report is not composed of feedback from statistically representative constructed sample, as would be used in polls or other public opinion tools. The responses to the interview process used to create the report was heavily weighted towards incumbent thermal technologies, with eight out of 14 participants - representing over half of generator participants – exclusively dealing in thermal generation. The remaining six participants were split evenly between renewable only generators and mixed portfolio investors, with three each. Notably, it is unknown how many participants with interests in energy storage technologies participated, although none exclusively dealing in energy storage participated. Thus, when viewing statements in the report such as “a few participants said X” or “some participants said Y,” this should not be understood to be a representative sentiment of the full electricity community. An exception may be in places with near unanimity amongst stakeholders, such as the level of support for continuing with an energy-only market framework. While Longview maintains that a reasonable cross section of the sector was interviewed, this is not able to be verified as all participation was strictly anonymous.

Key themes raised in the Longview report are the support for the energy-only market, the reduced attractiveness of the Alberta market due to policy uncertainty, and that the prospect of a new Crown Corporation would further impede investment in Alberta. However, there was optimism that the Alberta market can continue to be successful if clarity and a steady approach prevails through the current uncertainty.

Near unanimous support for the continuation of the energy-only market was noted numerous times throughout the Longview report. While participants seemed to have various criticisms of the energy-only market's ability to result in a reliable, affordable and clean system under the current design, the consensus is that an energy-only market with adjustments, such as supplemental ancillary services or adjustments to the price floor and ceiling, is well suited for success.

“Despite the many and diverse comments from participants on the various shortcomings of the energy-only model, it remained the most supported model to incent investment, with near unanimous support.

The energy-only model was the most preferred option for nearly all of the participants.” – Longview AUC Market Perception Study, page 12¹

Policy uncertainty resulting from various parties, including the current federal and provincial governments, as well as the AESO and the AUC was frequently cited as responsible for a rapid deterioration of the attractiveness of the Alberta market. Disagreement on decarbonization timelines, the final details of the Clean Electricity Regulations, as well as the surprise nature of the provincial pause on renewable electricity permitting were all cited as sources of negative uncertainty. Longview notes that “the overwhelming response to uncertainty was delay” which is an especially poor outcome for an electricity system facing the possibility of supply shortfalls. Investors need certainty to be able to provide the reliable capacity needed for a well-functioning Alberta electricity system.

“Investors were willing to delay investment decisions pending regulatory clarity. ...the prospect of delays could have implications for the achievement of all three objectives of reliability, affordability, and emissions reduction.” – Longview AUC Market Perception Study, page 16²

Longview also reports that a strong majority of participants view the prospect of a Crown Corporation, used to build and operate natural gas assets, would significantly disincentivize investment in Alberta, further challenging reliability and affordability.

Despite these challenges, Longview also reports that most participants view the current challenges as able to be overcome with a resolution to largely tweak the current electricity framework, as opposed to overhaul it with exotic reforms.

Finally, participants noted that enabling energy storage is a key means of achieving a reliable, affordable and clean grid. Specifically, bringing about a energy storage specific tariff solution, such as that utilized in Texas, was noted as a solution to be pursued.

“Several of these also respondents indicated that a functioning energy storage tariff could also provide a means to ensuring reliability within the existing energy-only construct.” – Longview AUC Market Perception Study, page 14³

London Economics International Report

The London Economics International (LEI) report investigates the reliability and affordability impacts of the changing electricity supply mix in Alberta. Notably, this analysis was done exclusively with the current market framework (energy-only market, static \$1000/MWh price ceiling, carbon pricing, zero congestion, load pays, etc) and did not consider alternative tweaks or designs to the current electricity framework. Additionally, the supply mix and demand levels were taken from the AESO’s preliminary 2024 LTO cases and did not significantly investigate alternative supply and/or flexibility resources, including additional deployment of energy storage beyond the conservative amount deployed in the 2024 LTO. Thus, thermal generation (unabated gas, gas with CCS, or hydrogen) is seen as the primary source of firm capacity and alternative sources of firm capacity, such as energy storage, demand response, or new interconnections were not investigated.

¹ 28542_X0047_Market-Perception-Study_AUC_7Feb24_000053, page 12

² 28542_X0047_Market-Perception-Study_AUC_7Feb24_000053, page 16

³ 28542_X0047_Market-Perception-Study_AUC_7Feb24_000053, page 14

One other assumption to note is the exclusion hybrid resources, such as solar+storage deployments, as they were not included in the preliminary LTO results. However, the AESO has since indicated they will be including hybrid resource types in the final 2024 LTO results. Thus, the LEI report should be exclusively viewed as a highly qualified investigation into the ability for a static continuation of the current electricity framework to be viable or not with limited value towards suggesting specific solutions to any identified problems.

Some key findings from the LEI report were that the proliferation of renewables forces firm generation to seek a higher percentage of revenue from high-priced hours, that increasing penetrations of renewables lower average pool prices significantly, and that there is not enough revenue left in remaining high-priced hours to sustain thermal generation, which is the only technology set considered to provide new firm capacity, thus leading to reliability challenges. It cannot be noted often enough that many of LEI's input assumptions, ultimately from the LTO, contribute to these findings. To the extent that the input are limited to a narrow view of the future, so too are LEI's conclusions.

"Again, they are looking at reliability, affordability in the current market structure ... and so I do know that there's a lot of conversations with partner agencies and the government as to the future, but these ones are squarely based off of the market structure as it is today." – Riley Goergsen in AUC Technical Session on February 15, 2024⁴

"...our analysis was forward looking, but forward looking under the current market design and under the current policy framework for electricity, so I know there are probably a lot of questions out here about how would things change under different market design ... we haven't examined those in this work." – Julia Frayer, LEI, at AUC Technical Session on February 15, 2024⁵

The LEI report is explicit, repeatedly, that, in the model, renewables, as a lowest cost marginal resource, reduce pool prices significantly over the 20-year model period, with increasing amounts of zero-dollar hours as well as high-priced hours. It should be noted again that the market framework remains static over the model period, with the price ceiling eroding in value due to inflation, creating less value in high-priced hours. Without a significant investigation into additional resources to bridge between these two market conditions, such as energy storage, increased exports/imports, or demand response and/or increased penetrations of price sensitive loads, thermal resources are the only incremental means of the model pursuing supply adequacy. The strain on investment in thermal generation between near zero emissions performance standards and changing revenue availability limits investment in thermal generation to the point where the model produced an inadequate amount of supply to meet load. The LEI report is clear in its conclusion that there is not enough available revenue in high-priced hours to sustain investment in firm and flexible sources of capacity. Additionally, the effects of inflation on the static price ceiling should be assumed to contribute to deteriorating revenue available in high-priced hours and increasing AESO emergency alerts. The inadequacy of high-priced hours to incentivize firm capacity in the LEI model should not be seen as a fundamental failing of the energy-only framework but a failing on the current design of the energy-only market.

"LEI's analysis shows that the current compensation in Alberta's energy-only market – the Pool Price for energy – may not be sufficient to remunerate dispatchable generators for their fixed costs and to prevent

⁴ 28542_X0055_Vol_01_2024_02_14_000066, page 6

⁵ 28542_X0055_Vol_01_2024_02_14_000066, page 45

premature retirements or sustain a level of needed incremental investment.” – LEI Overview of Modeling Results and Key Findings, page 16⁶

LEI also investigated the effects demand shocks within the model on reliability and affordability. Findings were that demand shocks had an outsized impact on pool prices. Demand shocks of 3.5% or 7.2%, representing 390MW and 800MW, lowered pool prices by roughly 15% and 35%, respectively. The contribution of the demand shocks to reduced peak demand represents the bulk of these savings, as well as contributes to better reliability outcomes. A healthy participation of energy storage resources would likely mimic the impacts of the demand shocks modelled by LEI, by reducing peak demand, net supply injected from energy storage, either by direction via ancillary services or by responding to relatively high price signals in the energy only market during times of peak demand. Unfortunately, LEI did not investigate increased penetrations of energy storage directly, so the implications of the demand shock cases should be taken as an approximate substitute for the value of energy storage to affordability and reliability.

Finally, LEI looked to quantify the reliability of the modelled system under all cases, especially looking at prevalence, quantity, and duration of expected unserved energy (EUE).

Notably, the illustration of a typical experience of EUE, as shown in figure 1, in the model lines up extremely well with the real-world contribution of energy storage in comparable systems such as ERCOT and Australia’s NEM, with storage outputting especially at morning and evening peaks. See ERCOT behavior for February 28, 2024 in Figure 2, showing energy storage net output at roughly 600MW during morning peak and roughly 900MW during evening peak, providing energy and capacity very similar to that lacking in the LEI model and causing and EUE event. Figure 3 also shows storage regularly meeting peak demand in the late evening, exactly where LEI project EUE events. Storage should be seen as an essential solution to meet supply adequacy needs in response to our changing supply mixes.

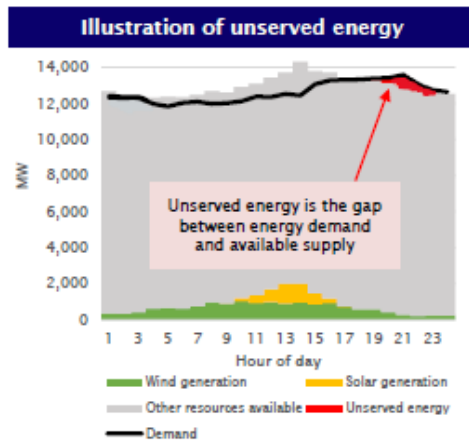


Figure 1: Chart showing typical experience of EUE in LEI model over a 24 hour period⁷

⁶ 28542_X0049_LEI_AUC Renewables Inquiry Cover Report_02-07-2024_000055, page 16

⁷ 28542_X0052_LEI_Annex 3 - Probabilistic Supply Adequacy Analysis_02-07-2024_000058, slide 5

Energy Storage Resources

Energy Storage Resources is a graphical representation of energy storage charging and discharging production using real-time data.

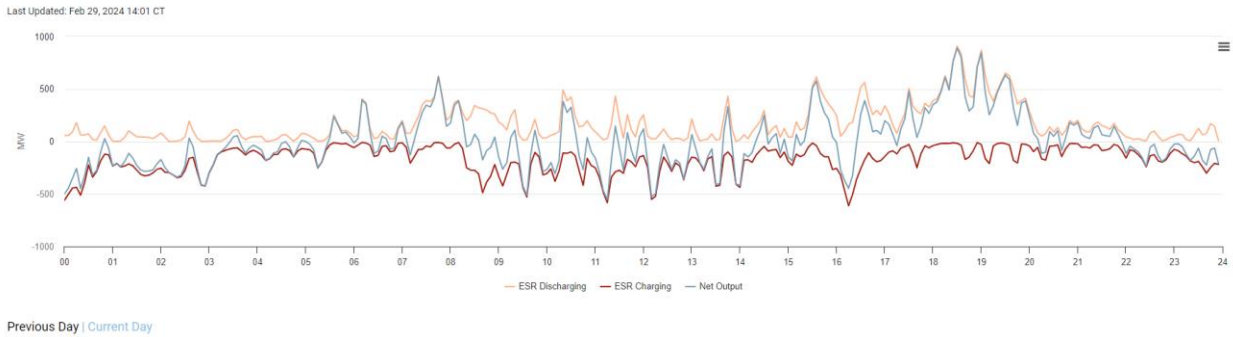


Figure 2: ERCOT Chart of Energy Storage Resources supply levels on Feb 28, 2024⁸

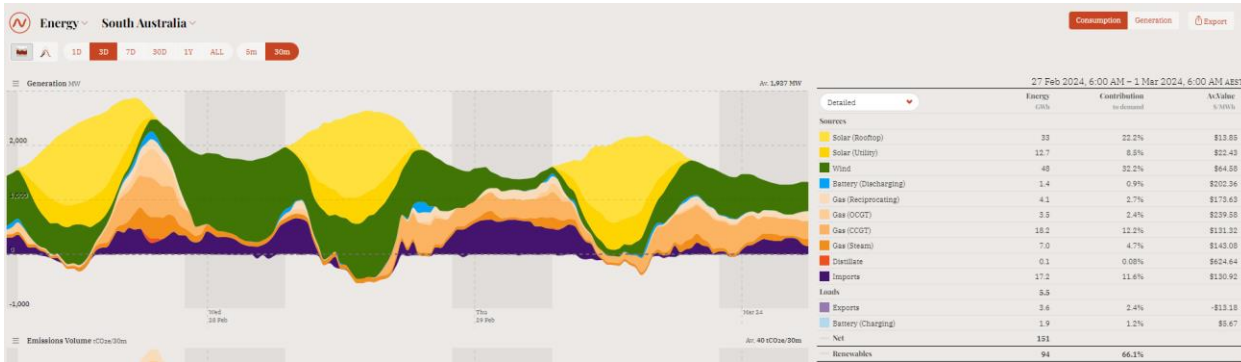


Figure 3: South Australia NEM chart of supply levels from Feb 27, 2024 through Feb 29, 2024⁹

Real world experience in other markets shows that much of the EUE experienced in the LEI model may simply be due to the limitations of the initial assumptions stemming from the AESO LTO. LEI appears to continue the AESO’s assumption that there will not be more than 600MW of storage in Alberta through 2043, devoted exclusively to ancillary services and not in the energy market.¹⁰ Notably, this would give Albert much lower levels of storage as a percentage of typical demand, than seen in South Australia or Texas. When storage is artificially limited to levels far below the level of interest shown in the AESO project connection list or seen in other markets around the world, it is unsurprising that needs served well by storage are found challenging. EUE should, in part, be seen as caused by a lack of storage in the modelling meaning that EUE can be addressed in large part do to reforms to enable the participation of energy storage.

Finally, LEI quantifies the average worst case (as defined as above 95th percentile) EUE events. It is noted that in the 2035 case, the average worst case EUE is for roughly 1GW over a duration of 23 hours in 2038.¹¹ In response to a question from Energy Storage Canada, LEI confirmed that an additional roughly 1GW of demand or supply shock, able to output for 23 hours, would solve at least 95% of EUE events because this resource would be able to meet the average worst case event. The implications of this finding are very important in that it implies that 1GW of capacity, needed infrequently, could solve a vast majority of the reliability issues identified by LEI.

⁸ Clipped from <https://www.ercot.com/gridmktinfo/dashboards/energystorageresources>

⁹ Clipped from <https://opennem.org.au/energy/sa1/?range=3d&interval=30m&view=discrete-time>

¹⁰ AESO 2024 LTO Preliminary Data File from <https://www.aesoengage.aeso.ca/forecasting-insights>

¹¹ 28542_X0052_LEI_Annex 3 - Probabilistic Supply Adequacy Analysis_02-07-2024_000058, slide 20

“So for generalization, you can expect that under the simulated results, if you have a resource that can generate or provide energy for a reduced load for 23 hours by let's say one gigawatt, then you would on average solve 95 percent of the events because you can solve average worst 5 percent event...” - Victor Chung, LEI, at AUC Technical Session on February 15, 2024¹²

Energy storage should be seen as a key means of meeting supply adequacy in the 2030s and avoiding EUE events. Levels of interest in energy storage the AESO project connection list already far exceed this 1GW capacity level and likely begin to come close to the 23-hour metric in aggregate. Unlocking this interest in storage investment should form the key basis of the AUC’s recommendations resulting from this inquiry.

¹² 28542_X0055_Vol_01_2024_02_14_000066, page 175

Appendix B: Energy Storage Canada Recommendations

Expert reports from Longview and LEI were not intended to provide solutions to issues with the current market design and provide only limited information about how to proceed, such as consensus around the continuation of the energy only market. Thus, ESC has the following recommendations for the AUC's consideration of its own recommendations to the Government of Alberta.

Continuation of the Energy-Only Market

Along with the overwhelming majority of participants in the Longview report, ESC supports the continuation of the energy-only market framework, but with adjustments to ensure supply adequacy and reliability more generally. The energy-only market has the means to efficiently incentivize supply if it supplies enough value and if given a certain environment to operate in.

Price Ceiling/Floor

Price volatility is the market signal for investment firm, clean, dispatchable source of supply, such as energy storage resources. The LEI report is clear in its conclusion that there is not enough available revenue in high-priced hours to sustain investment in firm and flexible sources of capacity. As the \$1000 price ceiling in the Alberta market has remained static for decades and, in the model, is assumed to remain static, the ceiling is continuously lowering, in real terms, due to inflation, which is also inhibiting the value in high-priced hours, the main means of incentivizing supply adequacy in the energy-only market. This should not be seen as a fundamental failing of the energy-only framework but a failing on the present design of the energy-only market. The price ceiling should be raised to incentivize clean, firm and flexible sources of capacity, such as energy storage, and then increased on a regular basis in line with inflation. The increased ceiling should be set at least to the real value of the original price ceiling but could be set higher to reflect the expected more volatile market conditions.

Further, the price floor should be lowered from its current level of \$0/MWh to better reflect the real value of energy in oversupply conditions and avoid external management of supply by the AESO. The magnitude of the price floor below zero should be set such that it reasonably allows for market-based means of managing oversupply. The magnitude of a negative floor should also be paced to inflation. Negative prices will send signals to exporters, energy storage and price sensitive loads to increase demand to match supply. Energy storage, in particular, will be suited to match negative priced hours with high-priced hours, moderating average pool prices, and therefore increasing both reliability and affordability.

Energy storage contributes to a market that is affordable, reliable, and increasingly decarbonized, but its ability to participate will be limited

Energy Storage Tariff

Other barriers to energy storage in the current electricity framework should also be reduced. Currently, the lack of a workable tariff treatment for energy storage resources significantly and artificially undermines the economics of energy storage in Alberta. By allocating costs of firm service to storage for both demand and supply, storage is disadvantaged relative to other sources of supply with access to non-firm sources of fuel. Additionally, energy stored and discharged does not generally increase system use, and instead optimizes the system by shifting energy from times of surplus supply to times of tight supply or system need, as reflected in

either the energy price or ancillary service obligations. Jurisdictions, such as Texas, have acknowledged this and only allocate cost to storage for energy consumed through inefficiency of the storage system and not on energy stored and released which is classified “wholesale storage load.” In Alberta, Electricity Statutes (Modernizing Alberta’s Electricity Grid) Amendment Act, 2022 identifies energy storage resources as a unique grid resource from demand and supply, but Alberta does not yet have a tariff solution that reflects this unique nature. Regardless of the precise solution, ensuring access to tariff treatment that reflects storage’s unique nature and benefits will allow for substantial improvements to both affordability and reliability from energy storage resources.

Technology Neutral Approach

Finally, ESC recommends that any recommendations from the AUC fundamentally be focused on a technology neutral approach that allows for increased access for a variety of technologies to compete to provide needs such as energy, capacity, and ancillary services. Any means of competition to provide those needs through a market framework must be fundamentally fair and performance based in a way that allows the widest variety of technologies to compete. Adjusting the bounds of the energy-only markets price cap and floor allows for any technologies to meet needs as reflected in the energy price. Ensuring storage has access to a tariff structure reflective of its unique nature ensures that storage can compete on a level playing field with other sources of supply and ancillary services.