

Available Transfer Capacity (ATC) stakeholder questions

On July 28, 2020, the Alberta Electric System Operator (AESO) held a virtual stakeholder information session to address the disturbance event on June 7, 2020, due to the tripping of the interties with British Columbia (BC) and Montana (MT).

Unable to answer all questions in the allotted time on July 28, the AESO has provided answers to the remaining questions below.

Category	Stakeholder Question	AESO Response
Generator Response	How was the performance of the units under AGC?	It seems from our initial investigations that the Units under AGC performed as expected, but we have not finalized our review yet.
Generator Response	Is the change in generation response over the years related to the increased renewables penetration?	No, as presented in slide #22, there is no evidence of generation response degradation chronologically, rather it is based on the response of online generation units at the time of the event.
Generator Response	how the generator response changed from around 77 MW/0.1 Hz to 40 MW/0.1 Hz? Is this because some of power plant reach their limit?	The pullback in generator response was due to assets not maintaining their increased output in response to the reduced frequency. The AESO is currently engaging with Generator Facility Owners (GFOs) to determine the root causes of the observed pullback in generator response which exacerbated the situation.
Generator Response	How many of the good responses were from coal fired generators? How many good were gas fired?	Due to confidentiality, the AESO will not be able to precisely declare number of units. The AESO is in the process of working with GFOs whose units' responses require further review.
Generator Response	Slide 35: How different should the response curve look if the generators MARP would have been 85 MW, all else being equal? Particularly, what would the perfect response be for the generator for the period that the 100 MW unit exceeded that level?	Section 502.5 Generator Technical interconnection requirement's sub-section 9, talks about the Frequency and Speed Governing Requirements. The unit is expected to respond to system frequency excursions based on the droop value and available head room at that point of time.
Generator Response	What actions are being taken to the generators that had poor performance. Is it a compliance issue and are they being referred to the MSA?	The AESO is in the process of working with GFOs whose units' responses require further review.

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Generator Response	You do understand that when a GT is base loaded there is no more power, right?	The AESO agrees that if a GT is at full output than there will be no more headroom to respond to an underfrequency event.
Generator Response	in terms of the generation frequency response, good, concerning and bad. For these examples, can we know which kind of generators (i.e., fuel type) provides good response?	Independent of fuel type and as applicable, the frequency response of a Generator depends upon many factors including but not limited to droop value, dead band selection, control valve action, mode of operation and plant DCS control system.
Generator Response	meanwhile, for the good response examples, it seems that there is no initial inertia response (i.e., initial power boost).	Generators highlighted under Good response slides, did provide the initial power boost after the frequency excursion.
Generator Response	Did any generation trip during this event?	One 32MW Generator tripped due to a process disturbance but not because of the under-frequency tripping.
Generator Response	For the examples (good, bad & ugly), could you please let us know the generation technology and whether the unit ever reached its AC limit during the period depicted?	Irrespective of the technology, the generators which had headroom during the event were analyzed for frequency response. During analysis, it was observed that those generators could have provided better frequency response based on their droop setting.
Generator Response	Do you think Generator governor droop value between three to five would ensure good response on the frequency surge event?	The droop value for generators, between three to five per cent as stipulated in ISO rules, is aligned with NERC/WECC reliability standards requirements. There are some North American jurisdictions, including ERCOT, which have adopted a specific droop value for a specific technology. The AESO is looking into this under its multi-year Ancillary Services roadmap initiative.
Generator Response	Would you be able to provide some info at this point what were some of general reasons that caused overall poor frequency response from generators?	The AESO is in the process of working with GFOs whose units' responses require further review.
Generator Response	When are you going to actually talk to the generators that 'underperformed'?	The AESO is in the process of working with GFOs whose units' responses require further review.
Generator Response	What was the available raise range of Reg Reserve at the time of the event	Specific to the June 7th event, the AESO believes that the primary frequency response is the contributing factor rather than regulation reserve, which is a secondary frequency response; please refer to slide 13 for Frequency Response Characteristics

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		<p>in the presentation file for further details on different tiers of frequency response and associated timelines. For any specific data, please follow the process outlined in the AESO Data Requests available at https://www.aeso.ca/market/market-and-system-reporting/data-requests/.</p>
Inertia	<p>Will the AESO commit to publish system inertia in real time and an accompanying table of levels of inertia where they will curtail imports?</p>	<p>The AESO is looking into a real time inertia calculation for our control center and how adverse inertia conditions will impact the LSSi tables. Inertia may not be the only parameter that may cause ATC reductions so we would need to understand the value of providing real time inertia information to the market.</p>
Inertia	<p>One of your slides shows the inertia vs. demand. It appears the lower inertia in 2020 is largely due to a decrease in demand. Is this correct or is there more at play? Is the decreased demand at all attributed to COVID-19? Also, how much of the demand/inertia change is NOT attributed to COVID-19? i.e. is there an aggressive uptake of renewable generation in your grid?</p>	<p>The slide referenced (slide #21) is inertia vs net demand (AIL + exports - variable generation). The lower net demand is mostly due to lower AIL (COVID-19 and low oil prices), but higher variable generation and imports also contributed to the lower net demand.</p>
Inertia	<p>Please describe the synthetic inertia options you might consider?</p>	<p>Regarding virtual inertia, the AESO is exploring the benefits of synthetic inertia (also known as emulated inertia or inertia-based fast frequency response) for wind facilities and other capable inverter-based technologies; this could potentially result in mandating such requirements in the future in the ISO technical rules</p>
Inertia	<p>Would synchronous generators/synchronous condensers help increase the required inertia?</p>	<p>Yes, Synchronous Generators/Condensers would help to increase system inertia.</p>
Inertia	<p>As we end up with over 3400 MW of wind is there going to be an increased focus on the need for inertia which implies uneconomic generators online at times that will have to be committed by the AESO.</p>	<p>The AESO acknowledges the need to continuously monitor the evolving generation mix and perform studies to understand and address various aspects including low inertia conditions. The AESO will be also exploring different mitigation plans to deal with low inertia including synthetic inertia.</p>
Load Shed	<p>LSSi is supposed to address this exact situation. Correct? If that is the case, why did it not perform?</p>	<p>LSSi is intended to complement the primary frequency response to facilitate higher imports. As presented in slide #19, the LSSi studies consider a set of assumptions regarding inertia, generator and load response, which did not cover the extent of</p>

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		the low inertia and poor primary frequency response response observed during the June 7th event.
Load Shed	If IL RAS was still in operation (direct tripping of load for tripping of 1201L) would this have mitigated this incident?	No, due to several considerations, the AESO replaced the ILRAS with LSSi in 2007 to essentially perform the same functionality of complementing the primary frequency response. Regardless of the choice between the two, the required LSSi/ILRAS volumes would not have been sufficient to compensate for the poor primary frequency response observed in June 7th event.
Load Shed	Can AESO share more information about UVLS and UFLS schedule and how they are spread over different nodes geographically in the AIES? This will help with the risk assessment by major Industrial facilities up North typically at major risk of islanding during winter.	The AESO does not have any UVLS programs. For UFLS, please refer to OPP 804 - OFF-NOMINAL FREQUENCY LOAD SHEDDING AND RESTORATION Procedure.
Load Shed	Why was native load tripped after a single contingency (N-1) event? I understand that industry standards (AESO/NERC) specify that no load is to be shed for a single contingency. How can this be avoided in the future? improved operations? improved planning? other?	Please refer to the presentation file for the system under-performance reasons on June 7th event and also the set of slides on mitigation measures and next steps for the details of the AESO's actions so far and plans in near future to address the risk of UFLS operation during loss of imports, which will consider applicable Alberta Reliability Standards and ISO Rules.
Load Shed	for the three previous events (2012, 569 MW import, 133 LSSI tripped), (2013, 601 MW import, 145 MW Lssi tripped), and (2015, 739 MW import, 133 MW Lssi tripped). It seems that the armed LSSI amount is not monopoly increased with the increased import level. However, should the amount of LSSI be higher for higher import level?	In general, higher import levels do require higher LSSi volumes. Additional considerations for the observation on LSSi volumes are: 1) The LSSi volumes are also dependent on the AIL; higher AIL requires less LSSi due to additional load damping. 2) The arming volumes are periodically updated by detailed technical studies, which resulted in different volumes over different time periods. 3) The volumes reported are the tripped volumes which can differ from the armed volume.
Load Shed	The AESO has procured less reserve and LSSi over time but it appears that pattern of low system inertia was an emergent trend. Why wasn't there an adjustment prior to this event on procurement volumes?	AESO regularly completes detailed technical studies to evaluate the need for LSSi based on observed generation and load response during historic events. The AESO had completed a recent study in 2020 which recommended higher LSSi volumes; however, the increased volumes still assumed average governor and load response per historic events (50 per cent confidence level), which would have not covered the extent of June 7th

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		event. In light of June 7th event, the AESO added incremental LSSi volumes to achieve a 90 per cent confidence level to ensure coverage for the wider range of the poorer operating conditions observed on June 7th.
Operational Effectiveness	The AESO announced reduced AS procurement volumes as a part of their cost management initiatives in response to the pandemic and low oil prices. Has the AESO implemented this change, and does this event change this initiative?	The AESO has implemented the reduced regulating reserve procurement volumes. The June 7th event will not change this initiative.
Operational Effectiveness	Isn't the MATL tie far too weak to be connected to the AESO system without the BC tie supporting it?	Yes, currently due to the weak MATL connection and associated system stability concerns MATL must be tripped off when 1201L trips; however, this dependency could be eliminated by upgrading MATL to a back-to-back HVDC as discussed verbally in the last slide during the presentation and included as a consideration in the AESO's 2020 Long-term Transmission Plan.
Weather Impact	Was there any lightning warning prior to the event? How would have been the situation if all the wind farms were providing virtual inertia?	At the time of June 7th event, there was lightning in the vicinity of the tripped circuit in BC Hydro area. Regarding virtual inertia, the AESO is exploring the benefits of synthetic inertia (also known as emulated inertia or inertia-based fast frequency response) for wind facilities and other capable inverter-based technologies; this could potentially result in mandating such requirements in the future in the ISO technical rules
Weather Impact	What is the source for the AESO to determine there is lightning in the inter tie area.? This should be verifiable by participants as it could drive market behaviour.	The AESO utilizes a commonly used tool developed by a third-party vendor to determine inclement weather including lightning in the intertie area. The Transmission Facility Owners (TFOs) also use similar tools in their control centers, which may be consulted in real-time by the AESO to verify observations, if required.
Weather Impact	When inclement weather/lightning is present along 1201L, what specific indicators are system operators looking at when deciding to de-rate the line (i.e. lightning strikes only, radar, weather warnings)?	The AESO utilizes a commonly used tool developed by a third-party vendor to determine inclement weather including lightning in the intertie area. The Transmission Facility Owners (TFOs) also use similar tools in their control centers, which may be

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Weather Impact	How is “inclement weather” determined to require a limitation of imports to 550 MW? Is there any ability to forecast these out further based on weather reports? They tend to change with very little notice.	While the AESO continuously monitors the performance of its forecasting tools and makes adjustments as needed for improvements. it should be noted that similar to LSSi, which are offered and armed in real-time, weather condition is another factor which could impact the ATC in real-time operation.
Other	Why was native load tripped after a single contingency (N-1) event? I understand that industry standards (AESO/NERC) specify that no load is to be shed for a single contingency. How can this be avoided in the future? improved operations? improved planning? other?	Please refer to the presentation file for the system under-performance reasons in June 7th event and also the set of slides on mitigation measures and next steps for the details of the AESO’s actions so far and plans in near future to address the risk of UFLS operation during loss of imports, which will consider applicable Alberta Reliability Standards and ISO Rules.
Other	Is this presentation being posted or will be posted on AESO website?	Yes