Supply Obligations and Performance Assessments

Rationale

Overview of Payment Adjustments

In exchange for capacity payments, capacity assets take on an obligation to maintain their availability throughout the year, to perform when called upon by the AESO during shortage conditions, and to offer into the energy market. The payment adjustment mechanism is an asset-neutral approach developed to encourage capacity assets to perform in accordance with their obligations. Capacity assets are expected to reflect the cost of payment adjustments, and the cost of maintaining and improving their reliability into their capacity offers. In the long run, the payment adjustment mechanism will provide a financial signal to capacity asset owners to maintain supply adequacy at lowest cost to consumers, as assets with lower performance risk will have a competitive advantage.

Prior to the start of the obligation period, new capacity assets that are delayed in meeting their in-service date and existing capacity assets that anticipate not being available during the obligation period can participate in rebalancing auctions to reduce their capacity market obligations in order to avoid payment adjustment risk. During the obligation period, asset substitution (both ex ante and ex post) can be used by participants to manage performance risk. Restricting asset substitution to after the final rebalancing auction increases liquidity within the rebalancing auctions.

8.1 Assessment Prior to Obligation Period

8.1.4 - 8.1.7 Failure to Deliver Assessment for New Capacity Committed Assets

The non-delivery assessment process provides a mechanism for the AESO to take action prior to the obligation period if it appears that supply will not be available during the obligation period. This helps to ensure required levels of supply adequacy. This process will apply to new assets at significant risk of failing to come online for any reason (such as construction delays). The non-delivery assessment process encourages assets that have sold capacity to bring that capacity online by the start of the obligation period.

Prior to the last rebalancing auction, the AESO will identify capacity committed assets that are unlikely to be operational by the start of the obligation period. For new capacity assets, this assessment will be based on the completion of the development milestones. Capacity assets identified by the AESO will have the option of addressing any shortcoming by buying out their obligation in the final rebalancing auction.

The goal of this approach is to have capacity assets manage their non-delivery risk prior to the obligation period and to ensure that the AESO is able to meet its reliability obligations through market mechanisms.

8.1.8 Updates to Qualified UCAP Ratings

In addition to availability and performance assessments during the obligation period, capacity assets will have an incentive for delivering, and maintaining strong ability to perform because the UCAP for capacity assets will be annually updated in each auction qualification round, taking into consideration their recent operational performance. Strong availability and performance in recent years translates into a higher UCAP, and therefore, greater potential capacity revenue in the future year. UCAP values will be assessed and updated for every base and rebalancing auction to reflect changes in the capacity asset capabilities. Payment adjustments during the obligation period create incentives for the legal owners of capacity assets to meet their forward capacity obligations before the obligation period by delivering new supply on

time, retaining existing capacity, or by securing a replacement capacity asset through rebalancing auction or asset substitution.

8.2 Assessment During Obligation Period

8.2.2 - 8.2.3 Unavailability Payment Adjustments

Utilizing tight supply cushion hours for conducting availability assessments is intended to encourage availability when the system is at risk of reliability challenges. These hours will not necessarily correspond to emergency event hours where performance payment adjustments are assessed. Availability will be assessed during the same number of hours as the UCAP assessments described in Section 3 in order to align incentives and measurement to periods of greatest reliability risk to the system. The goal of this design element is to encourage readiness to be available and compliance to dispatch instructions during the obligation period, particularly in times when the system is at risk.

As the availability assessment is completed through the obligation period on a large number of hours, providers are able to use periods of higher availability to offset periods of lower availability. Additionally, in response to stakeholders' feedback and to facilitate year by year unavailability payment adjustment risk management, the AESO will allow a capacity committed asset with availability volume greater than its obligation volume to be eligible to receive an over-availability payment adjustment.

8.2.4 - 8.2.6 Availability Assessment Period

Unavailability payment adjustments will be assessed by comparing each capacity asset's capacity obligation to its availability during a fixed number of annual availability assessment hours. Availability assessment will be conducted during the obligation period over the 100 tightest supply cushion hours, when the system faces greatest reliability risk. These hours will not necessarily correspond to EEA event hours where performance payment adjustments are assessed. However, if a performance assessment period and availability assessment hours overlap, availability and performance of the capacity committed asset will be assessed separately and, if applicable, both types of payment adjustments will be applied for the same hours.

Availability will be assessed annually after the end of the obligation period. The AESO considered assessing availability over shorter hours, quarterly or semi-annually, but was concerned that the split would arbitrarily establish hours for assessment that did not correspond with system tightness. Additionally, if the split was uneven (e.g. 70 hours in the summer/ 30 hours in the winter) the outcome could be an unintended grouping of outages in the period with fewer assessment hours.

Assessing availability during these hours is consistent with how capacity asset UCAP will be determined. The number of recommended hours for the availability assessment (100 hours annually) is based on the average number of hours historically between 2011 and 2017 in which supply cushion was below 400 MW; conditions which characterize system tightness (see Section 3).

8.2.7 Availability Volume Definition

During each year, capacity committed assets will be required to demonstrate that their actual availability was at least equal, on average, to their obligation volume (expected availability) during the availability assessment hours.

Averaging the availability of assets throughout an entire availability assessment period allows capacity assets to compensate their unavailability in some hours with their over-availability in other hours, which also provides a way for assets to manage potential payment adjustment risk exposure.

8.2.8 Unavailability Payment Adjustment for Negative Availability Volume

Tying the payment adjustment to the capacity asset-specific capacity payments - i.e., obligation price per MW - ensures that the payment adjustment level is consistent with the each asset's maximum revenue from the capacity market. This approach most accurately reflects the amount of capacity revenues available for each capacity asset that cleared in any of the three auctions corresponding to a particular obligation period. Therefore, setting a penalty based on asset-specific capacity payment will not lead to disproportionally high penalties in relation to total capacity revenues in the auction rounds when the

rebalancing auction is cleared at a far lower price than the forward capacity auction. As the penalty is no longer based on the maximum of rebalancing and forward auction prices, this is not discriminatory against assets that have received their obligation in the auction which cleared at a lower price. Overall, this design change is expected to reduce risk exposure and provide more revenue certainty because the payment adjustment is directly linked to the amount of revenue received from the capacity market by each asset.

The factor of 40% is an allocation factor representing the amount of the total payment adjustment to a unit that will occur through the unavailability payment adjustment mechanism. The AESO's choice of a 60% allocation factor to non-performance payment adjustments reflects a higher importance of the committed capacity being delivered during performance events.

The factor of 1.3 scales the total payment adjustment level up above the capacity auction price. A value greater than 1 ensures that capacity assets failing to deliver are exposed to a net payment adjustment, after accounting for capacity revenues they will receive. A value larger than one also discourages speculative capacity sales because by committing to a capacity obligation the capacity asset is at risk of losing more through poor availability and performance than through what might be earned through capacity payments. The value is believed to be of a magnitude that is sufficient enough for capacity assets to retain the incentive to deliver on capacity commitments, but will not be so large that new entrants will be discouraged from participating.

8.2.9 - 8.2.12 Over-availability Payment Adjustment for Positive Availability Volume

Based on multiple stakeholders' feedback, the AESO agrees that capacity assets that have average availability greater than their obligation amount should be eligible to receive an over-availability payment adjustment. This design change would make the Unavailability Payment Adjustment Mechanism revenue-neutral as collected unavailability payment adjustments from underperformers will be directed to eligible capacity committed assets which are overperforming.

This change is being implemented to help avoid an asymmetric risk exposure for capacity committed assets. In particular, in the years where capacity assets would have been unavailable, they would have been assessed unavailability payment adjustments; while in the years where capacity assets would have been over-available they would not have been able to receive any additional payments. In the long run, this mechanism would have resulted in only negative payments. While favourable availability would be rewarded with higher UCAPs and higher capacity market revenues in future years, the timing of that over-availability payment mechanism doesn't provide as timely feedback to assets as within the year availability bonuses. Overall, providing a possibility for assets to earn over-availability payments is seen as another way for capacity assets to manage their payment adjustment risk exposure and is expected to decrease the risk premium that would have otherwise been reflected in higher assets capacity offers.

As described below, the maximum potential over-availability and over-performance payment adjustments will be capped at a capacity asset's total annual obligation price per MW.

8.2.13 - 8.2.14 Performance Payment Adjustment Mechanism

Capacity assets failing to deliver during EEA events will be assessed a non-performance payment adjustment based on the shortfall between their actual and expected performance. Similarly, capacity assets with capacity obligations that over-deliver will receive a favourable over-performance payment adjustment. These payment adjustments are intended to create a strong marginal incentive to deliver energy and operating reserves during periods when the system is most in need of supply. By applying a payment adjustment mechanism during EEA events, all capacity assets with capacity obligations effectively face a $/MWh incentive, incremental to the energy price, during these events.

8.2.15 - 8.2.16 Performance Assessment Period

Performance assessment periods will occur during EEA events, when the system is in need of all available capacity in order to maintain reliability, and operating reserve targets. Any time the AESO declares an EEA level 1 (i.e. all available capacity assets are in use) or higher (i.e. EEA level 2: load management procedure is in effect; EEA level 3: firm load interruption is imminent), the performance assessment period will begin, and declaration of EEA 0 (i.e. a termination alert issued when energy supply is sufficient to meet AIES load and reserve requirements) will be an end time of a performance

assessment period. These events are hard to predetermine, and as such, there will be no explicit prior notification before such periods occur. Likewise, there is no maximum duration of the performance events that can be predicted or pre-defined ahead of time. The AESO will continue to provide the real-time supply adequacy report to market participants which may be a help in identifying periods of tight supply adequacy.

8.2.17 - 8.2.22 Performance Volume Definition

The performance of a capacity asset is calculated as the capacity asset's expected performance minus the actual performance, measured during performance assessment periods in MWh. The capacity asset's expected performance is multiplied by the balancing ratio (which is intended to adjust required performance volumes to reflect system conditions) to determine the volume subject to an over-performance or non-performance payment adjustment.

The balancing ratio is the ratio of energy and reserves produced by capacity assets during a performance event to the total committed capacity in that obligation period, and is a number less than or equal to 1. The balancing ratio is intended to adjust required performance volumes to reflect system conditions. The ratio is also meant to adjust an individual capacity asset's capacity market obligation in a performance period to its pro rata share of the total capacity market need during the performance event.

Performance Volume Definition for Guaranteed Load Reduction (GLR) Assets

Performance of Guaranteed Load Reduction (GLR) capacity assets will be measured as the actual consumption of electricity during a performance assessment period as compared to an hourly baseline consumption at a "business as usual" load level (i.e., what the asset would have been consuming had the EEA event not have occurred).

GLR Performance volume = GLR Actual Consumption - GLR Baseline Consumption

The methodology used to calculate baseline consumption for GLR assets during performance assessment periods is the "10-Day Average Baseline". An hourly baseline consumption profile is established for each asset, based on the energy usage during the prior similar 10 days taking place before each performance assessment period; for e.g., an hour ending 10 on peak performance hour would establish a baseline consumption by averaging hour ending 10 load from the immediately preceding 10 on peak days.

This methodology for GLR baseline consumption is meant to capture ongoing asset consumption and to mitigate the incentive to inflate demand for a short period to artificially increase potential load reductions to obtain over-performance bonuses.

Performance Volume Definition for Firm Consumption Level Assets

For firm consumption level assets, the actual performance will be measured as a metered volume minus dispatched contingency reserves. In order to meet the performance expectation, this difference must be equal to or less than firm consumption level, stated by the asset owner in the qualification process.

8.2.23 - 8.2.26 Non-Performance Payment Adjustment

Non-performance payment adjustments will be set based on the obligation price per MW, which would link the payment adjustment rate to the capacity asset's maximum available revenues from the capacity market. The obligation price per MW will be reset every auction period, and the payment adjustment level will be adjusted accordingly.

The non-performance payment adjustment rate will be calculated using the following formula:

Non-performance payment adjustment rate ($/MWh) = (60% x 1.3 x Obligation price per MW) / Expected EEA hours

Tying the payment adjustment rate to the capacity asset-specific auction clearing prices - i.e., obligation price per MW - ensures that the payment adjustment level is consistent with the each capacity asset's maximum revenue from the capacity market. This approach most accurately reflects the amount of capacity revenues available for each capacity asset that cleared in any of the three auctions corresponding to a particular obligation period. Therefore, setting a penalty based on asset-specific

clearing price will not lead to disproportionally high penalties in relation to total capacity revenues in the auction rounds when the rebalancing auction is cleared at a far lower price than the forward capacity auction. As the penalty is no longer based on the maximum of rebalancing and forward auction prices, this is not discriminatory against assets that have received their obligation in the auction which cleared at a lower price. Overall, this design adjustment is expected to reduce risk exposure and provide more revenue certainty because the payment adjustment rate is directly linked to the amount of revenue received from the capacity market by each asset.

The factor of 60% preceding the non-performance payment adjustment rate formula is an allocation factor, representing the amount of the total expected payment adjustment a non-delivering unit will incur through the performance payment adjustment mechanism. The AESO's choice of a 60% allocation factor reflects the ultimate focus of capacity construct and payment adjustment mechanism: ensuring delivery during periods of supply shortfall.

The factor of 1.3 scales the total payment adjustment level up above the capacity auction price. A value greater than 1 ensures that capacity assets failing to deliver are exposed to a net payment adjustment, after accounting for capacity revenues they will receive. A value larger than one also discourages speculative capacity sales because by committing to a capacity obligation the capacity asset is at risk of losing more through poor availability and performance than through what might be earned through capacity payments. The value is believed to be of a magnitude that is sufficient enough for capacity assets to retain the incentive to deliver on capacity commitments, but will not be so large that new entrants will be discouraged from participating.

Normalizing by the expected EEA hours ensures that on average, the total non-performance payment adjustment for a non-delivering asset will be 1.3 times the relevant capacity price. Due to variability in system conditions, the number of EEA hours during which performance payment adjustments are assessed will vary from year to year. Since the payment adjustment rate is based on the expected number of hours, it will not vary as much from year to year as the actual number of EEA hours.

The specific value of expected EEA hours will be revised each year based on reliability modelling. The resource adequacy model (RAM) will define EEA1 and EEA2 events as the activation and utilization of contingency reserves. This is consistent with current EEA2 procedure that operating reserves will be used to supply energy requirements. Then the model will measure the average amount of hours that supplemental reserves and spinning reserves are dispatched over the number of iterations that are run to evaluate asset adequacy. The model will shed firm load once contingency reserves are depleted but regulating reserves will be maintained during load shed events. Ancillary services in the model are reported as a percent of gross load.

Ancillary Service Type	AESO
Supplemental Reserves Requirement	2.5%
Regulation Up Requirement	1.5%
Spinning Reserves Requirement	2.5%

The AESO will determine and communicate to market participants the specific value of expected EEA hours in advance of each base auction using the AESO's reliability modelling. This value will remain constant for that obligation period. This will inform market participants' decisions in the auction bidding process. Additionally, the AESO proposes that if the expected EEA hours based on the reliability modelling is lower than 20, a floor of 20 hours will be used, which will add increased predictability to the non-performance payment adjustment rate value from auction to auction.

8.2.27 - 8.2.29 Over-Performance Payment Adjustment

As described above, the over-performing assets with capacity obligations will be eligible to receive payment adjustment payments funded from the collected non-performance payment adjustments. Over-

performance payment adjustments are additive to the energy and ancillary services prices, creating strong incentives to deliver energy and capacity during shortage events. Over-performance payment adjustment payments will allow assets to recover from non-performance payment adjustments through strong performance during future events.

Over-performance payment adjustments will be made for each MWh of over-delivery during EEA events, and will be paid at the $/MWh over-performance payment adjustment rate:

> *Over-performance Payment Adjustment Rate ($/MWh) = Total Collected non-performance payment adjustment funds / All eligible for over-performance payment adjustment MWh*

In the event when there are residual penalty funds or when there were no eligible for incentive over-delivered MWh, the collected penalty funds will be directed to reduce total capacity charges to consumers. The rationale for doing so is that if capacity assets with capacity obligations do not deliver, the consumers pay less for the service that has been underprovided.

8.2.30 - 8.2.32 Maximum Amounts for Unavailability and Non-performance Payment Adjustments

Under-performing capacity assets will be subject to annual and monthly caps on payment adjustment exposure from the combination of availability and performance assessments. The payment adjustment caps are necessary to protect participants from excessively high risk of participating in the capacity market by keeping payment adjustment exposure in line with revenues. This helps maintain the investment attractiveness of the Alberta market. Total payment adjustment exposure will be capped in two ways:

1. Annual unavailability and non-performance payment adjustment cap: at 130% of the annual capacity revenue based on the obligation price per MW. A poor performing asset – or one that did not show up for the year – would potentially have revenue adjustments of up to 130% of annual revenue. This also is meant to dissuade speculative capacity market entrants that do not intend to materialize.
2. Monthly non-performance payment adjustment cap: at 300% of the monthly capacity revenue based on the obligation price per MW. The monthly cap will prevent a situation in which an annual revenue sized payment adjustment is charged to a capacity asset in a single month. This monthly cap is not set to 100% of monthly revenue, because in a situation when a long-term performance period or multiple performance periods take place in a single month, a 100% monthly revenue cap could exempt non-performing capacity asset from the payment adjustment amounts, reducing incentives to perform as expected.

8.2.33 - 8.2.34 Maximum Amounts for Over-availability and Over-performance Payment Adjustments

Maximum potential over-availability and over-performance payment adjustments will be capped at a capacity asset's total annual capacity payment. This is implemented to mitigate potential excessive over-performance and over-availability payments in the situations when the number of over-performers is significantly smaller than the number of under-performers (e.g., extreme case of one over-performer and multiple under-performers) would result in eligible payments potentially exceeding annual capacity revenue on small volumes of over-provided capacity.

8.3 Ex ante Asset Substitution and Ex post Volume Reallocation

The Comprehensive Market Design supports *ex ante* asset substitution and *ex post* volume reallocation.

8.3.1 - 8.3.7 Ex ante Asset Substitution

Asset substitution allows a pool participant to assign the performance and availability assessments to another qualified capacity asset as a tool to manage performance risk while maintaining overall system reliability objectives.

The proposed *ex ante* asset substitution approach is modelled on the existing AESO approach found in the ancillary services market for operating reserve, as well as other capacity markets.

Financial arrangements between counterparties will be outside the AESO's purview, because the AESO will allocate the payment adjustments associated with under-performance and over-performance of the substituted asset to the original obligation holder and not the owner of the substituting asset. This will simplify settlement, should not impact credit requirements, and will allow counterparties to work out the terms of their agreement independently.

Asset substitution will not transfer the obligation from one customer to another, but rather transfer the performance and availability assessment to another qualified asset.

8.3.8 - 8.3.16 Ex post Volume Reallocation

Volume reallocation represents another way to mitigate the risk of non-performance payment adjustment.

The ex post volume reallocation transaction allows the buyer to meet its obligation via a combination of its own performance and that acquired from other capacity providers. This provides an additional option for cost management and flexibility.

In contrast to ex ante asset substitution, only capacity committed assets will be allowed to participate in volume reallocation. Primarily, this is because performance assessments are structured as a revenue-neutral mechanism, meaning that collected non-performance payment adjustments will be re-distributed to the over-performing capacity committed assets. Allowing non-committed assets to participate in volume reallocation would reduce the amount of collected non-performance payment adjustments funds, decreasing potential over-performance payment adjustments for over-performing capacity committed assets and a possibility to recover from non-performance payment adjustments through strong performance during performance periods.

Additionally, ex post volume reallocation was primarily implemented to provide an additional way for capacity committed assets to manage non-performance risk exposure. Volume reallocation lowers financial risk for capacity committed assets as it provides an additional way to manage cost incurred because of non-performance to both participants with portfolios and smaller participants. Providing an additional way to balance the financial risk may lower the capacity assets' offers in the capacity auction, decreasing the cost of capacity to consumers.

Supply Obligations and Performance Assessment vis-a-vis the Capacity Market Criteria

The capacity market can achieve desired reliability objectives by creating a real and measurable supply adequacy product in which to assess whether capacity assets met their capacity market obligation and incent providers to live up to their obligation. The incentives are designed in such a way that a wide variety of technologies should be able to compete to provide capacity while ensuring a fair, efficient and openly competitive (FEOC) market. Costs to consumers are minimized by creating a product for which value can be demonstrated via delivery. The capacity market incentive mechanisms, outcomes and relevant data are also transparent.

Leveraging best practices and lessons learned from other capacity market implementations to inform the payment adjustment framework is expected to maintain investor confidence and trigger sufficient private investment.