

# Supply Obligations and Performance Assessments

## Rationale

### Overview of payment adjustments

In exchange for capacity payments, capacity market participants 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. Payment adjustments are an asset-neutral approach developed to encourage capacity market participants to perform in accordance with their obligations. Capacity market participants are expected to reflect the expected cost of payment adjustments. In the long run, the payment adjustments will provide a financial signal to capacity market participants 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 obligation volumes in order to mitigate payment adjustment risk. During the obligation period, asset substitution (both ex ante and ex post) can be used by capacity market participants to manage delivery risk. Asset substitution is being allowed only after the final rebalancing auction with the intent of increasing liquidity in the rebalancing auctions.

## 8.1 Assessment prior to commencement of obligation period

### ***Failure to meet major milestones for new capacity committed assets***

#### 8.1.4 - 8.1.8

Assessing a new capacity committed asset's project development and implementation plan allows the AESO to take action prior to the obligation period if it appears that supply will not be available during the obligation period. This approach helps to ensure required levels of supply adequacy and will apply to new assets at significant risk of failing to come online.

Prior to rebalancing auctions, 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 development milestones especially those on the critical path. New capacity assets identified by the AESO as being more than eight months behind their development schedule at the first rebalancing auction and more than five months behind their development schedule at the last rebalancing auction will be required to buy out their full capacity obligations. At the final rebalancing auction, completed three months prior to the obligation period, it's unlikely that a project delay of five months or more could be remedied prior to the commencement of the obligation period. As discussed in the subsection 2.3 of Section 2 Rationale, *Supply Participation*, regarding delisting, unavailability of five months or greater is not a long enough availability period to delivery adequate reliability value through an obligation period. At the first rebalancing auction, a delay of eight months recognizes the risk of a five month delay but also provides the capacity asset owner the opportunity to remedy some amount of the project delay.

The development of demand response capacity assets will be reviewed at the final rebalancing auction. If a new demand response asset cannot demonstrate that it has obtained load sufficient to achieve a UCAP of at least 75% of its obligation volume it will be required to repurchase the difference between its obligation volume and its achieved UCAP in the final rebalancing auction. This approach recognizes that certain demand response assets may acquire customers up to the

commencement of the obligation period while for reliability purposes requires a substantial portion of the UCAP to be attained prior to the final rebalancing auction.

Overall, the goal of this approach is to ensure that new capacity committed assets that may be experiencing development delays manage their obligation volume prior to the obligation period in order to ensure that the AESO is able to meet its reliability obligations.

The AESO does not believe this approach pushes all new capacity to the month of October. Rather, this approach assesses the readiness of a new capacity asset based on the project development and implementation plan described in Section 8.1.2. If a new capacity asset will not be available within five months of the original timeline the obligation volume for that obligation period will need to be repurchased. Conversely, this provision does not create the requirement that resources have a commercial operation date in October. The AESO anticipates that many resources may target commissioning prior to October to ensure availability during the obligation period. Further, asset substitutions are available for new resources to manage their payment adjustment risks.

### **Updates to qualified UCAP ratings**

- 8.1.9 In addition to availability and delivery assessments during the obligation period, capacity market participants will have an incentive to maintain their asset's ability to perform because the UCAP for capacity assets will be updated annually in each auction qualification round. These updates will include recent operational performance. Over-availability and over-delivery in recent years translates into a higher UCAP, and therefore, greater potential capacity revenue in the future year. Payment adjustments during the obligation period create incentives for the capacity market participants to meet their forward capacity obligations before the obligation period by ensuring that new supply is on time, retaining existing capacity, or by securing a replacement capacity asset through the rebalancing auctions or asset substitution.

## **8.2 Assessment during obligation period**

- 8.2.1 The AESO considered phasing in the application of the performance assessment program but determined that it was not the appropriate approach. The performance framework is an integral part of the overall market design and is required to ensure that incentives for over-performance as well as consequences for under-performance are in place at the beginning of the obligation period. This approach also aligns with the payment of full capacity revenues to suppliers at the outset of the capacity market.

The AESO had suggestions from stakeholders for alternate performance approaches. These suggestions were considered but not reflected in the final market design approach due to failure to meet one or some of these objectives:

- the approach should retain revenue neutrality for over and under performance capacity assets;
- the approach should ensure capacity asset performance is incented more highly during performance events rather than availability events; and
- performance assessment bonuses or penalties should be directly linked to obligation period revenues. Approaches that only assessed penalties against future UCAP determinations did not achieve this goal.

The AESO also believes, based on design changes in the eastern US capacity markets, that performance penalties are required to incent compliance. The eastern markets have designed somewhat similar penalty structures in response to past non delivery on capacity obligations.

### **Unavailability payment adjustment**

#### 8.2.2 - 8.2.3

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 include emergency event hours where delivery payment adjustments are assessed. Availability will be assessed during the same number of hours as the UCAP assessments described in Section 3, *Calculation of Unforced Capacity (UCAP)* 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 respond 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.

### **Availability assessment period**

#### 8.2.4 - 8.2.6

Unavailability payment adjustments will be assessed by comparing each capacity asset's capacity obligation to its availability during a fixed number of hours during the obligation period. Availability assessment will be conducted during the obligation period over the 250 tightest supply cushion hours. These hours will include the hours in which EEA events occur. This means that if a delivery assessment and availability assessment hour overlap, both the availability and delivery of the capacity committed asset will be assessed.

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 (250 hours annually) is based on the average number of hours historically between 2011 and 2017 in which supply cushion was approximately 500 MW; conditions which characterize system tightness (see Section 3, *Calculation of Unforced Capacity (UCAP)*).

### **Availability assessment volume definition**

8.2.7 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.

In measuring availability for firm consumption level assets, the calculated lookback baseline represents an ongoing baseline of consumption. This ensures that the characteristics of the capacity asset, including calculated capacity value assumed in the auction process are being delivered

### ***Unavailability payment adjustment for negative availability assessment volume***

8.2.8 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 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 auctions corresponding to a particular obligation period. Therefore, setting a penalty based on asset-specific capacity payment will not lead to disproportionately 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 not 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 an asset that will occur through the unavailability payment adjustment. The 40% weighting is the difference between 100% and the AESO's choice of a 60% allocation factor to non-delivery payment adjustments. The 40% allocation of payment adjustments to availability reflects a higher weighting to delivery period assessments given that these periods represent hours when the system is at greater supply adequacy risk. The Working Groups through Q1 and Q2 2018 reviewed a number of scenarios for these values<sup>1</sup>. The 40% weighting for availability assisted the AESO in achieving a 1.3x maximum penalty structure for the poorest performing assets.

The factor of 1.3 scales the total payment adjustment level up above the capacity auction price. A value greater than one 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, 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.

### ***Over-availability payment adjustment for positive availability assessment volume***

8.2.9 - 8.2.12

In alignment with multiple stakeholders' feedback, the AESO agrees that capacity assets that have average availability greater than their obligation volume should be eligible to receive an over-availability payment adjustment. This design change would make the unavailability payment adjustment revenue-neutral as collected unavailability payment adjustments will be directed to capacity committed assets which are eligible for over-availability payment adjustments.

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 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 would result in only negative payments. While over-availability would be rewarded with higher UCAPs and higher capacity market revenues in future years, the timing of that over-availability payment doesn't provide as timely feedback to assets as within the

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<sup>1</sup> <https://www.aeso.ca/assets/Uploads/Payment-Adjustment-Mechanism-CM-DWG-S1-13-Feb-2018.pdf>  
<https://www.aeso.ca/assets/Uploads/Payment-Adjustment-Mechanism-UPDATED-March-28-2019.pdf>

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.

The AESO considered but did not include non-capacity committed assets as eligible for the over-availability incentive as these assets do not have a capacity obligation. The availability assessment is meant to ensure capacity committed assets are meeting their obligation during tight supply cushion hours.

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

### ***Delivery payment adjustment***

#### 8.2.13 - 8.2.14

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

### ***Delivery assessment period***

#### 8.2.15 - 8.2.16

Delivery 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 delivery assessment period will begin. A declaration of EEA 0 (i.e. a termination alert issued when energy supply is sufficient to meet AES load and reserve requirements) will mark the end time of a delivery 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 EEA 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.

### ***Delivery volume definition***

#### 8.2.17 - 8.2.24

The performance of a capacity asset is calculated as the capacity asset's actual performance minus the obligation volume, measured during performance assessment periods in MWh. The capacity asset's obligation volume is multiplied by the balancing ratio to determine the volume subject to an over-delivery or non-delivery payment adjustment.

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

#### *Delivery volume definition for guaranteed load reduction assets*

Delivery of guaranteed load reduction capacity assets will be measured as the actual consumption of electricity during a delivery assessment period as compared to an hourly delivery

baseline consumption at a “business as usual” load level (i.e., what the asset would have been consuming had the delivery assessment period not occurred). The delivery baseline is calculated as a standard day baseline multiplied by an in-day adjustment factor, as described below.

This standard day baseline is meant to capture ongoing asset consumption, as well as mitigate the incentive for loads to inflate consumption for a short period prior to delivery assessment in order to artificially increase potential load reductions and obtain over-delivery payments. The standard day baseline was selected because:

- it is accurate for a variety types of loads both above and below one MW of load reduction;
- it produces the narrowest distribution of errors; and
- this method produces very low load-impact error during the most common delivery events.

The standard day baseline methodology is modelled after the “10 of 10 baseline” analyzed and supported by the Federal Energy Regulatory Commission.<sup>2</sup>

Under the AESO’s standard day baseline, each corresponding hour during the past 10 similar days prior to a delivery assessment period is averaged to establish an hourly average baseline for those 10 days. It is generally accepted that a period of approximately 10 non-holiday weekdays represents normal operation consumption for a load. This baseline is short enough to capture any near-term consumption trends and long enough to limit opportunities for manipulation.

For weekends and holidays the standard day baseline will be set based on consumption during the most recent 5 weekends or holidays, as applicable. The standard day baseline for weekends and holidays is shorter than for non-holiday weekdays because delivery assessment events generally occur during weekdays and therefore the AESO does not require as many samples to establish the normal weekend/holiday consumption level.

The baseline is meant to reflect the normal consumption level or the consumption in the absence of a delivery event or a dispatch. For clarity, the standard day baseline calculation will exclude days:

- where the asset received dispatch instruction for an amount greater than 0 MW;
- a day with a delivery assessment period;
- days in which the load has undergone an outage, either forced or planned; and/or
- days where load was triggered and tripped for the provision of LSSi.

Excluding these days helps estimate the normal consumption level of the load; averaging in hours when consumption has been reduced will unfairly penalize the delivery of a guaranteed load reduction asset.

For example, in order to calculate the standard day baseline from the days in Table 1 below, the following days are excluded because they are not representative of the resources normal operations:

- April 14,15,21 and 22 (in gray) because they are weekend days; and
- April 16 and 18 (in orange) because they include a delivery event.

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<sup>2</sup> Measurement and Verification for Demand Response, February 2013, <https://www.ferc.gov/industries/electric/indus-act/demand-response/dr-potential/napdr-mv.pdf>

**Table 1 – Consumption data for an example standard day baseline calculation**

Date/Day			1-2 p.m	2-3 p.m	3-4 p.m	4-5 p.m	5-6 p.m	6-7 p.m	7-8 p.m
11-Apr	Wednesday	Day 1	21	21.75	22.5	21.75	21	18.75	18
12-Apr	Thursday	Day 2	23.25	24	23.25	23.25	22.5	19.5	19.5
13-Apr	Friday	Day 3	12	11.25	12	11.7	12	21.75	21
14-Apr	Saturday	Weekend	23.55	23.85	24.3	23.85	23.25	22.5	21.75
15-Apr	Sunday	Weekend	23.25	25.2	24.6	23.25	21	19.5	18
16-Apr	Monday	Event Day	15	15.75	15	16.05	15.9	15.6	15
17-Apr	Tuesday	Day 4	15.75	16.2	15.6	15.9	15.75	15	15.15
18-Apr	Wednesday	Event Day	21.75	22.5	21.75	21.75	21	20.25	19.5
19-Apr	Thursday	Day 5	12	11.4	11.7	11.25	11.7	22.5	21.45
20-Apr	Friday	Day 6	25.2	23.85	25.2	24	23.7	23.25	21.75
21-Apr	Saturday	Weekend	24.6	24.3	24.6	23.85	23.25	20.7	20.25
22-Apr	Sunday	Weekend	24	23.85	23.25	23.25	21	20.25	18.75
23-Apr	Monday	Day 7	15.75	15	16.05	15.9	15.9	16.05	15.9
24-Apr	Tuesday	Day 8	15.6	15.9	15.75	15	15.15	15.75	15
25-Apr	Wednesday	Day 9	23.25	25.2	24.6	23.25	21	19.5	18
26-Apr	Thursday	Day 10	23.25	23.55	23.25	23.25	22.5	22.2	21.45
<b>Resource Baseline</b>			<b>18.705</b>	<b>18.81</b>	<b>18.99</b>	<b>18.525</b>	<b>18.12</b>	<b>19.425</b>	<b>18.72</b>

Continuing the example of guaranteed load reduction delivery assessment based on consumption data from Table 1 above:

- An EEA event occurred on April 27 between 5 p.m. to 6 p.m.
- The AESO will measure the consumption of the load for the duration of the delivery assessment period (the assumption is that the load has reduced its consumption).
- The AESO will calculate the delta between the consumption during the actual delivery assessment period and the previous 10 day average load consumption for 5 p.m to 6 p.m. (April 11-13,17,19-20,23-26).
- The average consumption of the load during the last 10 weekdays (5 p.m. to 6 p.m.) is 18 MW. If the load consumed 10 MW during the hour when the EEA occurred, the AESO will credit the asset with eight MW of reduction volume.
- The AESO will then compare the eight MW reduction to the obligation volume (adjusted for the balancing ratio) of the load and determine if the load has met its delivery obligation.
- If the asset has an obligation of eight MW or lower it will be deemed fully delivering.
- If the asset has reduced consumption in the hours prior to the delivery assessment period, due to energy dispatches, and is already consuming at 10 MW at the time of the delivery assessment the load will be deemed fully delivering to its capacity obligation.

“In-day” adjustments are included to align the standard day baseline calculated from recent non-event days with the conditions of the delivery event day to establish a more accurate consumption level for the guaranteed load reduction asset. The adjustment shifts or scales the standard day baseline by a fixed amount so that it matches the actual load during a period before the event start. This adjustment can help correct for load changes due to weather, as well as for variable operations.

The adjustment factor will be limited to +/- 20% of the standard baseline. For greater clarity, the in-day adjustment factor will be rounded either up or down if calculated as being less than 0.8 or greater than 1.2 respectively. Analysis performed in other jurisdictions indicates that a same-day uncapped multiplicative adjustment increased accuracy of the baseline over the capped multiplicative adjustment (20% caps). However, an uncapped multiplicative adjustment does have somewhat greater susceptibility to gross inaccuracies under certain demand conditions.<sup>3</sup>

In the example below in Table 2, the load may have been consuming at a higher rate, than it did in the previous 10 non-holiday weekdays, due to weather conditions just prior to the delivery event taking place. In this case, the in-day adjustment will shift the standard baseline up reflecting the higher consumption during the delivery event day.

**Table 2 – In-day adjustment factor example**

	First 3 of 4 hours prior to delivery assessment period start time				Delivery assessment period			
	9-10 a.m	10-11 a.m	11-12 p.m	Average Load	1-2 p.m	2-3 p.m	3-4 p.m	4-5 p.m
Standard Day Baseline	13.5	15	16.5	15	18.705	18.81	18.99	18.525
Day-of delivery event consumption	15	16.35	19.5	16.95	X	X	X	X
Adjustment Factor					Adjusted Baseline			
Adjustment Factor Calculation	Avg load day-of / Avg load baseline 16.95/15 = 1.13				1-2 p.m	2-3 p.m	3-4 p.m	4-5 p.m
					18.705	18.81	18.99	18.525
					*1.13	*1.13	*1.13	*1.13
adjusted standard day baseline	→				21.14	21.26	21.46	20.93

\*Load consumption in MW

*Delivery volume definition for firm consumption level assets*

For firm consumption level assets, the delivery volume during a delivery event will be measured as the load’s consumption during the event which will need to be equal or less than the qualified baseline, as described in subsection 3.1.12 of Section 3, *Calculation of Unforced Capacity (UCAP)*, minus the capacity obligation multiplied by the balancing ratio. Measuring delivery using the qualified baseline ensures that the load has continued to operate at the level at which it qualified. A reduction in consumption of the obligation volume from this level ensures that the capacity has been delivered.

*Difference between guaranteed load reduction and firm consumption levels baseline determination*

The qualified baseline for firm consumption level assets is fundamentally different from the delivery baseline used to measure if the guaranteed load reduction asset has delivered to its capacity obligation.

The delivery baseline for guaranteed load reduction is generally intended to track the daily and seasonal consumption patterns of the underlying load. The standard day baseline and the use of an in-day adjustment are used to capture the most recent, normal consumption pattern of the load. The use of the 10 non-holiday weekdays is best suited for such purpose as jurisdictional overview and load studies indicate that such a sample size (10 days) is appropriate to establish the normal consumption pattern of the load. The five weekend & holiday baseline is shorter as less delivery assessment periods generally fall during off-peak hours, while the five days still

<sup>3</sup> Development of Demand Response Mechanism/Baseline Consumption Methodology – Phase 2 Results Final Report/3-53 [https://www.aemo.com.au/-/media/Files/PDF/Baseline\\_Consumption\\_Methodology\\_Phase\\_2\\_Report\\_Oct13.pdf](https://www.aemo.com.au/-/media/Files/PDF/Baseline_Consumption_Methodology_Phase_2_Report_Oct13.pdf)

provide large enough sample size to establish the normal consumption level of the load in off-peak periods.

The qualified baseline for firm consumption level assets is fixed and does not vary over time. It is meant to capture the top range that a firm consumption level asset may qualify to sell into the capacity auction and helps establish the upper range of the UCAP calculation for the asset. The qualified baseline is intended to capture the average annual consumption of the load providing the reduction. It is based on the asset's consumption during the 250 tight supply cushion hours of the previous year. Tight supply cushion hours may fall in various months and therefore the qualified baseline does not record the loads most recent consumption patterns. In order to recognize if reduction in consumption may have taken place during tight supply cushion hours the load pattern is re-estimated. For the re-estimation of the load consumption, the longer 15 weekday and 10 holiday & weekend timeframes are used to allow the AESO larger sample sets to select data from as a tight supply cushion hours may cluster in certain periods.

The 45 day baseline cutoff for firm consumption level assets is meant to capture longer consumption patterns as days with tight supply cushion hours may cluster. The 35 day baseline cutoff for guaranteed load reduction assets is intended to prevent the phenomenon called a "static" baseline where an asset maintains a baseline which over-represents their consumption level due to higher consumption patterns in summer vs winter or vice versa, measuring performance from such baseline would be inaccurate as it would lead to "phantom reductions".

#### *Demand response outage considerations*

A demand response asset that is on a forced or planned outage will not be exempt from availability or delivery payment adjustments. While a load outage reduces the risk of an EEA event to the system, exempting demand response asset outages is not aligned with the capacity product that the AESO has procured in the market.

This approach is consistent with:

- The treatment of generation facilities that are not exempt from availability or delivery payment adjustments when they are undergoing forced or planned outage.
- How other jurisdictions treat demand response asset's performance obligations during the time when they are offline for planned or forced outages.
- Reducing the perverse incentive that may arise if a demand response asset is considered meeting its capacity obligation during assessment periods when the asset is offline for a planned or forced outage. In the long term this may incent load to be unavailable to provide the reduction to the AESO.

#### *Demand response LSSi Considerations*

A demand response asset may participate in the Load Shed Services for imports (LSSi) program. A demand response asset that is providing LSSi mirrors a generator that is providing operating reserves. A load that is providing LSSi and is continuing to consume is like a generator that has reduced production to provide operating reserves, and will be recognized as such during a delivery event. The provision of LSSi enables the increase of imports which adds to Alberta's supply adequacy.

### ***Non-delivery payment adjustment***

8.2.25 - 8.2.28

Non-delivery 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 obligation period, and the payment adjustment level will be adjusted accordingly.

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 auctions corresponding to a particular obligation period. Therefore, setting a penalty based on asset-specific clearing price will not lead to disproportionately high penalties in relation to total capacity revenues in the auction rounds when the rebalancing auction is cleared at a lower price than the forward capacity auction. As the penalty is not based on the maximum of rebalancing and forward auction prices, this is not discriminatory against assets that received their obligation in the auction which cleared at a lower price. Overall, this 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% in the non-delivery 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 delivery payment adjustments. The AESO's choice of a 60% allocation factor reflects higher importance of delivery periods compared to availability periods. System reliability is most at risk during delivery periods and as such the payment assessments places a greater weighting on delivery events.

The factor of 1.3 scales the total payment adjustment level up above the capacity auction price. A value greater than one 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 delivery 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-delivery 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 delivery 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 for each obligation period based on reliability modelling. The resource adequacy model will define EEA1 and EEA2 events as the activation and utilization of contingency reserves. This is consistent with the current EEA2 procedure that operating reserves will be used to supply energy requirements. The model will then 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.

**Table 3 – Ancillary services as a percentage 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. The hour count will be determined at the demand curve inflection point, which is appropriate because it is

the point on the demand curve that is closest to the expected average outcome over time. This value will remain constant for that obligation period. This will inform market participants' decisions in the auction bidding process. Additionally, 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-delivery payment adjustment rate value from auction to auction.

### ***Over-delivery payment adjustment***

8.2.29 - 8.2.32

As described above, the over-delivering assets with capacity obligations will be eligible to receive payment adjustments funded from the collected non-delivery payment adjustments. Over-delivery payment adjustments are additive to the energy and ancillary services prices, creating incentives to deliver energy and capacity during shortage events. Over-delivery payment adjustments will allow assets to recover from non-delivery payment adjustments through over-delivery during future events.

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

In the event when there are residual funds remaining or when there were no assets eligible for over-delivery payment adjustments, the collected 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.

### ***Maximum amounts for unavailability and non-delivery payment adjustments***

8.2.33 - 8.2.35

Capacity assets will be subject to annual and monthly caps on payment adjustment exposure from the combination of availability and delivery 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 cumulative unavailability and non-delivery payment adjustment cap at 130% of the annual capacity revenue based on the obligation price per MW. A poor delivering asset, or one that did not show up for the obligation year, would potentially have adjustments of up to 130% of annual revenue. This is also meant to dissuade speculative capacity market entrants that do not intend to materialize. Even with an annual cap on payment adjustments, the AESO anticipates that a profit maximizing firm will always be incented to avoid penalties and deliver energy during delivery and availability events. Even for firms that may own a portfolio of assets and may be able to easily engage in asset substitution, these firms will always be incented to maximize their revenues, which requires maximizing asset performance. Further, an asset that reached the maximum over-delivery payment in one year will still be eligible for energy revenues during delivery events. The energy and ancillary service markets will continue to provide incentive for these assets to provide energy during tight system conditions. By comparison, Great Britain and ISONE limit annual payment adjustments to 100% of a capacity market participant's annual capacity market payments; PJM caps payment adjustments to 1.5x net CONE.
2. Monthly non-delivery payment adjustment cap at 300% of the monthly capacity revenue based on the obligation price per MW. This monthly cap is not set to 100% of monthly revenue, because in a situation when a long-term delivery period or multiple delivery periods take place in a single month, a 100% monthly revenue cap could exempt a non-delivering capacity asset from the payment adjustment amounts, reducing incentives to deliver as expected. A 300% monthly cap limits monthly non-delivery penalties while still allowing the delivery assessment framework to achieve total annual payment adjustments of up to 1.3x annual capacity market revenue for the poorest performing assets. Multiple delivery and

availability payment structures were shared with the working groups through Q1 and Q2 2018 that demonstrated the effectiveness of the payment adjustment structure.

### **Maximum amounts for over-availability and over-delivery payment adjustments**

8.2.36 - 8.2.37

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

## **8.3 Ex ante asset substitution and volume reallocation**

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

### **Ex ante asset substitution**

8.3.3 - 8.3.7

Asset substitution allows a capacity supplier to assign the delivery assessments to another qualified capacity asset as a tool to manage delivery risk while maintaining overall system reliability objectives. A capacity supplier may engage in asset substitution with a qualified but non-committed or partially committed capacity asset.

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. The AESO will allocate the payment adjustments associated with under-delivery and over-delivery of the substitute asset to the original obligation holder and not the substitute 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 delivery assessment between qualified assets.

### **Ex post volume reallocation**

8.3.8 - 8.3.16

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

The *ex post* volume reallocation transaction allows the buyer to meet its obligation via a combination of its own delivery and that acquired from other capacity providers. This provides an additional option for payment adjustment 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 the AESO doesn't want to reduce the incentive for capacity assets to ensure they are able to deliver on capacity obligations during delivery assessment periods. Also, by allowing non-committed capacity assets into the *ex post* volume reallocation process there may be incentive for some capacity suppliers to withhold capacity from the obligation period with the expectation that they can receive a capacity payment through the *ex post* process. The AESO wants to ensure that all capacity assets participate competitively in the base and rebalancing auctions and that assets with capacity obligations have effective incentives to provide capacity when required by the system.

*Ex post* volume reallocation is being implemented to provide an additional way for capacity committed assets to manage non-delivery risk exposure. Volume reallocation lowers financial risk

for capacity committed assets as it provides an additional way to manage cost incurred because of non-delivery 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 incentivize 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.