

# Settlements and Financial Security Requirements

## Rationale

### 9.1 Capacity market statements

9.1.1 The AESO will issue monthly statements for settlement of capacity payments to capacity market participants based on the following rationale:

- (a) The capacity market should operate on a monthly billing cycle to align with the energy market. Aligning the settlement period of the two markets will reduce the administrative requirements by leveraging existing processes and will align the timing of common settlement activities across markets.
- (b) Statements across the capacity and energy markets will be kept separate to simplify the implementation. The AESO may consider consolidating statements in the future.

9.1.2 The information on the statement will roll up the settlement results into summary line items to better understand the statement. Details behind the line items will be available through settlement reports supporting the statement.

### 9.2 Settlements applicable to capacity assets

#### Capacity payments

9.2.1 A capacity market participant will receive capacity payments for their cleared obligation volume during the obligation period. This is consistent with other capacity markets and Alberta's current energy market. In addition to the capacity payment, a capacity market participant may receive a payment adjustment as described in Section 8, *Supply Obligations and Performance Assessments*.

Until a new asset has reached commercial operation it may accrue payment adjustments based on performance assessments for availability and/or delivery. The AESO considered and rejected an alternative option to not pay or penalize a new asset for the months of the obligation period prior to reaching commercial operation. To be consistent with existing capacity assets, which are subject to performance assessments for the entire obligation period, new capacity assets should not get a performance exemption in the obligation period.

#### Calculating capacity payments

9.2.2 The capacity payment needs to include the change in obligation from the base auction through to the associated rebalancing auctions. The formula to calculate capacity payment provided in the Final CMD ensures that all changes in obligations are incorporated in the capacity payment.

Below is a settlement example with payment adjustments. This example does not apply the payment adjustment caps. The example below is of a capacity asset that reduces its obligation prior to the obligation period by buying back a portion in each associated rebalancing auction:

*Capacity Payment = { [  $O_b * P_b$  ] - [  $(O_b - O_{r1}) * P_{r1}$  ] - [  $(O_{r1} - O_{r2}) * P_{r2}$  ] } / \# months in obligation period*

**Table 1 – Capacity payment example**

For a 12 Month Obligation Period	Obligation (O) in MW	Price (P) in \$K
<b>Base Auction (b)</b>	80	200
<b>1<sup>st</sup> Rebalancing Auction (r1)</b>	30	150
<b>2<sup>nd</sup> Rebalancing Auction (r2)</b>	10	400

$$\text{Annual Capacity Payment} = \{[80 \times 200] - [(80 - 30) \times 150] - [(30 - 10) \times 400]\}$$

Annual Capacity Payment = \$500,000 for a 10 MW final obligation

### 9.3 Calculating capacity payment adjustments

9.3.1 The rationale for payment adjustments for unavailability, over-availability, non-delivery and over-delivery is provided in Section 8, *Supply Obligations and Performance Assessments*.

The below is a continuation from the example above in subsection 9.2.2, where payment adjustments to the capacity payment are applied.

#### **Obligation price per MW**

9.3.2 The obligation price per MW represents the price that the capacity market participant will be paid for each MW. This price is calculated on a per asset basis.

9.3.3  $\text{Obligation Price per MW} = \text{Capacity Payment (\$)} / \text{Obligation (MW)}$

$$\text{Obligation Price per MW} = 500,000 / 10 = \$50,000 / \text{MW}$$

#### **Payment adjustment for availability**

9.3.4 Please note in the example below that division by the number of small supply cushion hours has been removed to simplify the example. However, the concept and ultimate outcome remain unchanged.

$$\text{Unavailability Payment Adjustment Rate (\$/MW-Year)} = 40\% \times 1.3 \times \text{Obligation Price per MW}$$

$$\text{Unavailability Payment Adjustment Rate (\$/MW-Year)} = 0.4 \times 1.3 \times 50,000 = \$26,000 / \text{MW-Year}$$

**Table 2 – Annual unavailability payment adjustment example**

Obligation Volume	Actual Availability Volume*	Availability Assessment Volume*	Unavailability Payment Adjustment Rate	Annual Unavailability Payment Adjustment
10	7	-3	26,000	26,000 * (-3) = -78,000

\* determined at the end of the obligation period as described in Section 8, *Supply Obligations and Performance Assessments*.

$$\text{Capacity Payment} = 500,000 / 12 = \$41,666 \text{ (per month)}$$

Annual Unavailability Payment Adjustment = \$78,000 assessed at the end of the obligation period as shown in Table 2.

In this example, the AESO will apply the unavailability payment adjustment amount to the last settlement period of the obligation period to reduce the capacity payment to zero (\$41,666 – \$41,666, = \$0). The \$41,666 of the \$78,000 payment adjustment will be made available for over-performers. The remaining \$36,334 will be debited to the asset’s payment adjustment balance (PAB).

- 9.3.5 The over-availability payment adjustment is calculated after all asset settlements are completed in accordance with Section 8, *Supply Obligations and Performance Assessments*.

The following is a simplified example of how the over-availability adjustment will be determined and applied:

$$\text{Over-availability Payment Adjustment Rate (\$/MW-Year)} = \frac{\text{Total Unavailability Payment Adjustments Collected in an Obligation Period (\$)}}{\text{Total Over-availability Volume (MW)}}$$

If we assume only 1 under-performer owed \$78,000 and assume only 2 over-performers totaling 3 MW:

$$\text{Annual over-availability payment adjustment rate} = \$78,000 / 3 \text{ MW} = \$26,000/\text{MW-Year.}$$

**Table 3 – Annual over-availability payment adjustment example**

Asset Name	Obligation Volume	Actual Availability Volume*	Availability Assessment Volume*	Over-availability Payment Adjustment Rate	Annual Over-availability Payment Adjustment
A	10	12	2	26,000	52,000
B	5	6	1	26,000	26,000
					\$78,000

\* determined at the end of the obligation period as described in Section 8, *Supply Obligations and Performance Assessments*.

For over performing asset A the annual over-availability payment adjustment entitled = 2 MW \* \$26,000/MW-Year = \$52,000. Asset A is entitled to this \$52,000, but may have to collect this over multiple months if the payment adjustments collected from other assets do not provide enough to cover the entire \$52,000 in a single month. If the amount cannot be paid in one month, then the amount still owed to Asset A will reside in Asset A’s PAB. The amount used to pay assets that have a positive PAB will come from the payment adjustments collected from assets that have a negative PAB. Payments will be distributed prorata to those with a positive PAB.

**Payment adjustment for delivery**

- 9.3.6 The following example illustrates how a capacity asset was assessed a delivery payment adjustment for an EEA (delivery) event that spanned 4 settlement intervals (22:23 to 01:05). In accordance with Section 8, *Supply Obligations and Performance Assessments* the following formula is used to calculate the delivery volume and non-delivery payment adjustment rate:

$$\text{Delivery Volume (MWh)} = \text{Actual Delivery} - (\text{Obligation Value} * \text{Balancing Ratio})$$

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.

$$\text{The balancing ratio assumed for this example is} = 11,700 \text{ MW} / 13,000 \text{ MW} = 0.9$$

$$\text{Non-delivery Payment Adjustment Rate (\$/MWh)} = 60\% * 1.3 * \text{Obligation Price per MW}/\text{max (Expected EEA hours, 20)}$$

Expected EEA hours will be determined through the AESO’s reliability modelling done in advance of the base auction (three years before the obligation period). For this example we will use 13 hours, and the obligation price per MW of 50,000 from the availability example above.

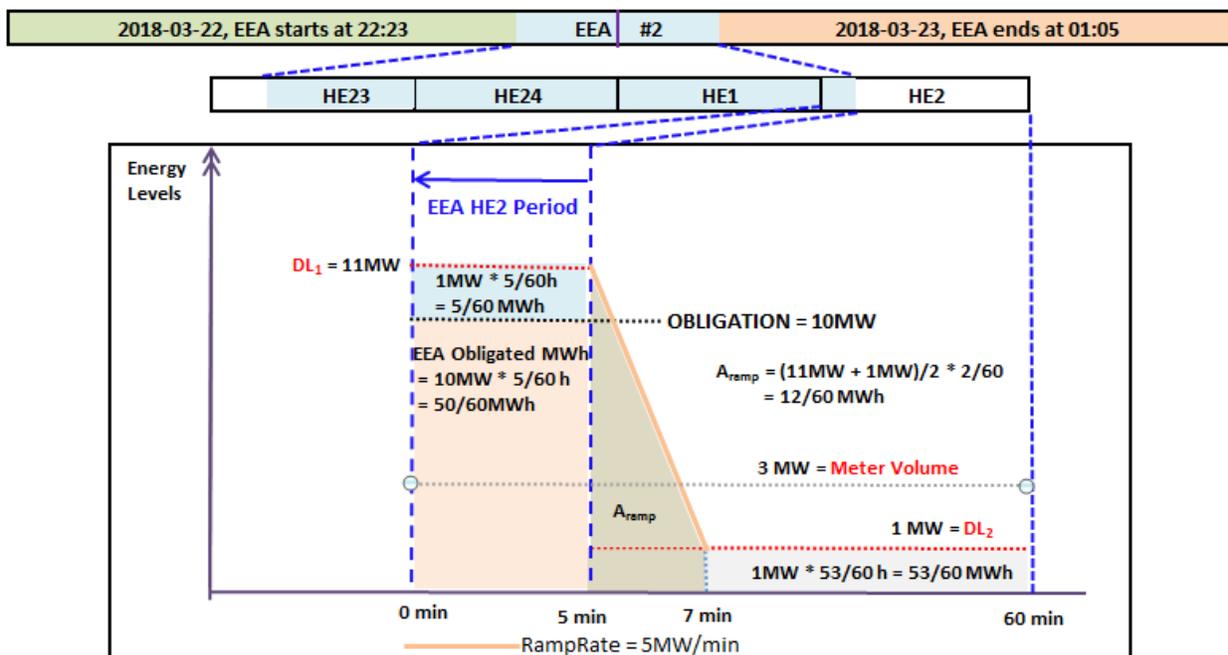
Non-delivery payment adjustment rate (NDPAR) =  $0.6 * 1.3 * 50,000 / 20 = \$1,950/\text{MWh}$

In the event the EEA event straddles a settlement interval or occurs completely within a settlement interval, the determination of the obligation becomes more complex due to the fact that the actual delivery volumes are hourly and the EEA events may be less than an hour. To best approximate the amount of energy delivered during the EEA event, the following methodology will be used for capacity assets that are dispatched in the energy market and UCAP is based on availability factor.

The figure below shows:

- an EEA event that ends 5 minutes into a settlement interval;
- dispatch level during the EEA period was 11 MW;
- after the EEA period ended the unit was dispatched down to 1 MW based on energy merit order dispatch;
- the obligation for this asset was 10 MW and its ramp rate is 5 MW/Min; and
- the actual delivery was recorded at 3 MWh for the entire settlement interval.

**Figure 1 – Qualitative representation of dispatch instructed levels over a settlement interval**



To calculate the energy provided during the EEA event the AESO will apply the following calculations:

EEA obligated energy represents the amount of energy expected to be delivered during a settlement interval segment of an EEA event and is calculated as follows:

$$EEA \text{ Obligated Energy} = \text{Obligation volume} * \text{minutes of the event in the settlement interval} / \text{minutes in the settlement interval}$$

$$EEA \text{ Obligated Energy} = 10\text{MW} * 5 \text{ min}/60 \text{ min} = 50/60 \text{ MWh or } 0.8333 \text{ MWh}$$

To calculate the energy delivered for an EEA event that occurs over part of a settlement interval (EEA MWh), subtract the actual delivery from the energy produced outside the EEA event.

$$EEA \text{ MWh} = \text{Actual Delivery} - \text{Outside Energy}$$

To calculate the outside energy, add the dispatch segments that occur outside the EEA event in the settlement interval, shown as the brown area and grey area in Figure 1.

*Energy outside of the EEA event is the sum of the area outside of the EEA event.*

$$\text{Energy outside of the EEA event} = 12/60\text{MWh} + 53/60\text{MWh} = 65/60\text{MWh}$$

$$\text{Therefore the EEA MWh is equal to } 3 \text{ MWh} - 65/60\text{MWh} = 115/60\text{MWh or } 1.92\text{MWh}$$

The table below shows the delivery calculation for the entire EEA event. Once each settlement interval is calculated the asset was found to under-deliver in hours ending 23 and 24. The asset was found to over-deliver in hours ending 1 and 2. The over-delivery adjustment is explained later in this section.

**Table 4 – Example EEA event from 22:23 on March 8 to 01:05 on March 9**

EEA Event Time	Mins	Actual Delivery	EEA MWh	Original Obligation	EEA Obligated Energy	BR Adjusted Obligation	Delivery Adjustment Energy	NDPAR	Hourly Delivery Payment Adjustment
22:23 to 23:00	37	2	1.62	10	6.02	$6.02 * 0.9 = 5.4$	$1.62 - 5.4 = -3.94$	\$1950	$-3.94 * 1950 = -7683$
23:00 to 00:00	60	5	5	10	10	$10 * 0.8 = 8$	$5 - 8 = -3$	\$1950	$-3 * 1950 = -5850$
00:00 to 01:00	60	11	11	10	10	$10 * 0.8 = 8$	$11 - 8 = 3$	\$1950	$0 * 1950 = 0$
01:00 to 01:05	5	3	1.92	10	0.8333	$0.83 * 0.9 = 0.74$	$1.92 - 0.74 = 1.18$	\$1950	$0 * 1950 = 0$
total									\$-13,533

*Note: the balancing ratio can change from hour to hour and in the above table fluctuates from 0.8 to 0.9.*

The total non-delivery payment adjustment for the entire event equals **(\$13,533)**. This non-delivery payment adjustment will reduce the monthly capacity payment. If there is a remaining balance owing for the non-delivery payment adjustment; it will be added to the outstanding payment adjustment balance.

9.3.7 In the example shown in Table 5, hours ending 1 and 2 are eligible for an over-delivery payment adjustment. The over-delivery payment adjustment is calculated after all asset settlements are completed as described in Section 8, *Supply Obligations and Performance Assessments*.

Over-delivery payment adjustments are revenue neutral and will never exceed the under-delivery payment adjustments collected for a settlement period.

$$\text{Over-delivery Payment Adjustment Rate (\$/MWh)} = \frac{\text{Total Non-delivery Payment Adjustments Collected \$}}{\text{Total positive Delivery Volume MWh}}$$

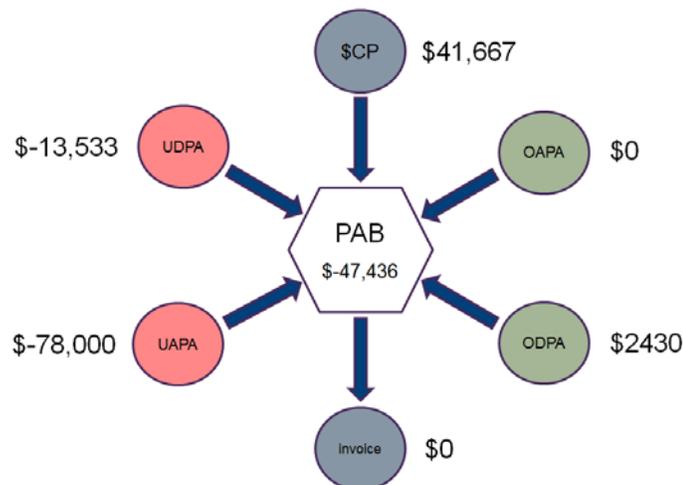
Assume for the example over-delivery payment adjustments of \$600/MWh and \$500/MWh as shown in Table 5.

**Table 5 – Over-delivery payment adjustment example**

EEA Event Time	Mins	Actual Delivery	EEA MWh	Original Obligation	EEA Obligated Energy	BR Adjusted Obligation	Delivery Adjustment Energy	ODPAR	ODPA Owed
00:00 to 01:00	60	11	11	10	10	$10 * 0.8 = 8$	$11 - 8 = 3$	\$600	$3 * \$600 = \$1800$
01:00 to 01:05	5	3	1.91	10	0.8333	$0.833 * 0.9 = 0.74$	$1.91 - 0.74 = 1.18$	\$500	$1.18 * \$500 = \$590$
								total	\$2390

The overall settlement for the month for this example asset is a net of the capacity payment and the payment adjustments as shown in Figure 2 below. In that month the asset is entitled to a capacity payment of \$41,667 but receives a \$0 payment for capacity and debits the asset's PAB by \$47,436.

**Figure 2 – Illustrative example of capacity net settlement**



The over-delivery payment adjustments paid to over-performers will depend on the amount of monthly reduction of the overall capacity market payment adjustment balance and balances owing to over performers may be paid over multiple months.

***For under and over-delivery for capacity factor resources:***

- Dispatch levels and ramp rates are not applicable;
- As with availability factor resources, contingency reserve dispatch volumes and regulating rise range will be added to the actual delivery; and
- The AESO will prorate the difference between the actual delivery and balancing ratio adjusted obligation by the minutes of EEA event in the settlement period.

**9.4 Capacity cost allocation settlements**

- 9.4.1 The AESO's application for approval of a cost allocation methodology will be filed with the Commission for review, approval, and implementation before the beginning of the first capacity market obligation period. Details of the rate design will be developed, including stakeholder consultation, prior to filing.
- 9.4.2 The timing of cost allocation settlement will align with capacity market settlement. Further details will evolve through the stakeholder consultation to be held in late 2018.

**9.5 Net settlement instructions (NSI)**

- 9.5.1 Net settlement instructions will not apply to the capacity market. Buying back obligation volumes in rebalancing auctions and asset substitution and volume reallocation are tools capacity market participants can utilize to facilitate the management of capacity resource obligation risk.

NSI works in the energy market because the price paid for a MW of energy is equal to the price consumers will pay for a MW of energy in the same time period. Given the current thinking on cost allocation in the capacity market, this will not be the same for the capacity market. A volume-based NSI approach no longer works because the price paid for capacity no longer equals the price paid by consumers in that same time period. Facilitating NSIs will cause a discrepancy between the amount paid to capacity providers and the amount collected from capacity consumers. This does not eliminate the ability for counterparties to enter into independent financial hedges with each other; however, these will not be registered with the AESO and accounted for in capacity market settlement.

**9.6 Financial security requirements for capacity assets**

- 9.6.1 The AESO will leverage the existing forms of allowable security established for the energy market for capacity market participants. The existing forms of security are appropriate, reliable and established within industry.
- 9.6.2 The assessment of availability is conducted at the end of the delivery period and looks back at the entire obligation period. To minimize the financial security risk, the AESO settlement will only claw back up to 100% of the capacity market payment on any one monthly statement until the balance of the (availability or delivery) payment adjustment is paid. If the capacity market participants' asset does not continue to have an obligation in the next obligation period the AESO may require security against the estimated outstanding payment adjustment balance. In this case there is no offsetting revenue stream owed to the asset so default risk (consequence to consumers) increases.

**9.7 Measurement, verification and tracking of capacity resources**

- 9.7.1 The capacity market will use metering data, ancillary service data, LSSI, transmission constraint data and available capability (if applicable), for the purposes of capacity settlement,  
Capacity will be measured based on historical observed availability factor or capacity factor in the obligation period depending on the type of capacity resource being settled.
- 9.7.2 In order to perform the settlement calculations and monitor rule compliance, the established metering and SCADA practices used in the energy market will be used in the capacity market.

## Alignment with criteria

- The CMD should provide mechanisms for consumers to hedge the cost of capacity if and where appropriate. As described above, it was determined that facilitating capacity market NSI was not an appropriate tool for hedging the costs of capacity. Financial hedges may still be developed by market participants.
- Settlement design ensures the capacity market is compatible with other components of the existing electricity framework, such as load settlement and retail customer choice, and should be robust and adaptable to different government policy initiatives related to the electricity sector.