Information Document
Uniform Capacity Value Determination
ID #[xxxx-xx]

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1   Purpose

This Information Document relates to the following Authoritative Document:

- Section 206.3 of the ISO rules, *Uniform Capacity Value Determination* ("Section 206.3").

The purpose of this Information Document is to provide additional information in relation to Section 206.3. Specifically,:

  (a) uniform capacity value calculation for an import asset;

  (b) uniform capacity value calculation for a self-supply site using linear regression methodology;

  (c) determining the qualified baseline for a load asset providing a firm consumption level;

  (d) maximum and minimum limits for the uniform capacity value range;

  (e) class-average performance factors;

  (f) capacity factor methodology for uniform capacity value; and

  (g) how to submit variances through the uniform capacity value variance process.

2   Uniform capacity value calculation for an import capacity asset

2.1   Methodology for hours not in the historical data set

This section applies to import assets that have not participated in a capacity auction previously, or who have less than 300 hours in the historical data set.

To calculate the uniform capacity value of the import asset, the AESO derates the value declared in accordance with Section 206.1, *Qualification of Capacity*, for the import asset, by the number of hours during the historical data set where the British Columbia transfer path, Montana transfer path or Saskatchewan transfer path, as applicable, was out of service with an available transfer capability of 0 MW.

Example 1 – determining the uniform capacity value for an import asset without operating history

The value declared in accordance with Section 206.1 for transfer over the BC path, is 50 MW. During the 1250 hours of the historical data set, the BC Import ATC, as detailed in the *Historical Intertie Capability Report* (http://itc.aeso.ca/itc/public/historicalIntertieReport.do), is 0 MW in 10% of hours. The AESO calculates the uniform capacity value of this import asset as follows:

$$\text{UCAP} = 50 \text{ MW} * (1 - \text{derate factor}) = 50 \text{ MW} * 90.00\% = 45 \text{ MW}$$

2.2   Methodology for hours in the historical data set

This section applies to import assets that have participated in previous capacity auctions, and have a minimum of 300 hours of operating history. The AESO uses the following methodology to determine uniform capacity value in this case:

  (a)   calculate the lesser of the import asset's available capability or volume of long term firm transmission over the applicable transfer path observed in each hour in the historical data set for which the import asset has operating history;

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[1] "Authoritative Documents" is the general name given by the AESO to categories of documents made by the AESO under the authority of the *Electric Utilities Act* and associated regulations, and that contain binding legal requirements for either market participants or the AESO, or both. AESO Authoritative Documents include: the ISO rules, the Alberta reliability standards, and the ISO tariff.

(b)   calculate an hourly availability factor for the import asset based on the hours with operating history in the historical data set by dividing the value determined in #1 above by the import asset's firm transmission capacity over the applicable transfer path. The AESO completes this calculation hourly and rounds the value to the nearest whole percentage;

(c)   calculate the availability factor by averaging the values determined in b above; and

(d)   multiply the availability factor calculated in c by the import asset's firm transmission capacity over the applicable transfer path, and round to the nearest whole number to arrive at the uniform capacity value for the import asset.

Example 2 – determining the uniform capacity value of an import asset with operating history in the capacity market

An import asset has 80 MW of firm transmission capacity over the Alberta-Saskatchewan intertie and has 300 hours of operating history in the capacity market. Table 1 shows 3 sample hours of the historical data set, and the associated available capabilities in each hour. Note that the example below has been stylized to demonstrate the approach; in practice, the AESO does not group hours in such a fashion.

Table 1: Example 2 sample hours and associated available capabilities

Hours	Available Capability (AC)	Long Term Firm Transmission	Minimum of Firm Transmission or AC	Hourly Availability Factor
1 – 100	80	80	80	80/80 = 100%
101 – 200	70	80	70	70/80 = 88%
201 - 300	75	80	75	75/80 = 94%

Availability Factor = Average of Hourly Availability Factors = Average (100%, 88%, 94%) = 94%

UCAP for Import Asset = Availability Factor * Long Term Firm Transmission = 94.00% * 80 MW = 75.2 MW = 75 MW

In the above example, long term firm transmission stays constant at 80 MW. There may be a case where an import asset procures additional long term firm for a future capacity auction. If that is the case, the uniform capacity value calculation uses the future long term firm value effective for the obligation period in determining the uniform capacity value for the future auction.

In the case where an import asset has operating history in the capacity market, but has less than 300 hours, the AESO supplements the hours to meet the minimum threshold with the new import asset methodology described in subsection 2.1 above. Table 2 below describes the hourly methodology for an asset with a combination of hours with and without operating history.

Table 2:

Hourly methodology for an asset with a combination of hours with and without operating history

Hour	Methodology for Hourly Performance Factor	
1	Minimum(Hourly AC , Long Term Firm Transmission)/Long Term Firm Transmission	
2	Minimum(Hourly AC , Long Term Firm Transmission)/Long Term Firm Transmission	
3	Minimum(Hourly AC , Long Term Firm Transmission)/Long Term Firm Transmission	Hours in historical data set
....	Minimum(Hourly AC , Long Term Firm Transmission)/Long Term Firm Transmission	
X	Minimum(Hourly AC , Long Term Firm Transmission)/Long Term Firm Transmission	
X + 1	Declared MW * (1-derate factor)	
...	Declared MW * (1-derate factor)	Hours not in historical data set
300	Declared MW * (1-derate factor)	

The AESO averages each of the hourly performance factors to calculate the availability factor. Uniform

capacity value is determined as:

$$\text{UCAP} = \text{Availability Factor} * \text{Long Term Firm Transmission}$$

3   Uniform capacity value calculation for a self-supply site using linear regression methodology

The AESO uses a linear regression uniform capacity value determination approach for self-supply assets that chose to be dispatched at a gross generation meter. The AESO performs a linear regression of the capacity asset's net-to-grid metered output against dispatch level over the historical data set. The linear regression provides a historical review of how gross generation dispatches have translated into net-to-grid energy volumes (Y). This linear regression creates a formulaic representation of this relationship in the form of a line:

$$Y = M(X) + B$$

where M and B are outputs of the regression

This approach relies on historical declarations of a capacity asset's available capability. The AESO uses these declarations to determine a gross uniform capacity value as the (X) variable in the linear regression formula to calculate the self-supply site's net to grid uniform capacity value for use in the capacity market.

Example 3 – linear regression methodology

The linear regression determines the relationship between the self-supply site's gross generation dispatch (gross uniform capacity value in the graphic below) to the self-supply site's net-to-grid energy volumes (net uniform capacity value in the graphic below). This relationship can be expressed as a line formula.

Figure 1 - Example linear regression for self-supply dispatched gross-to-grid
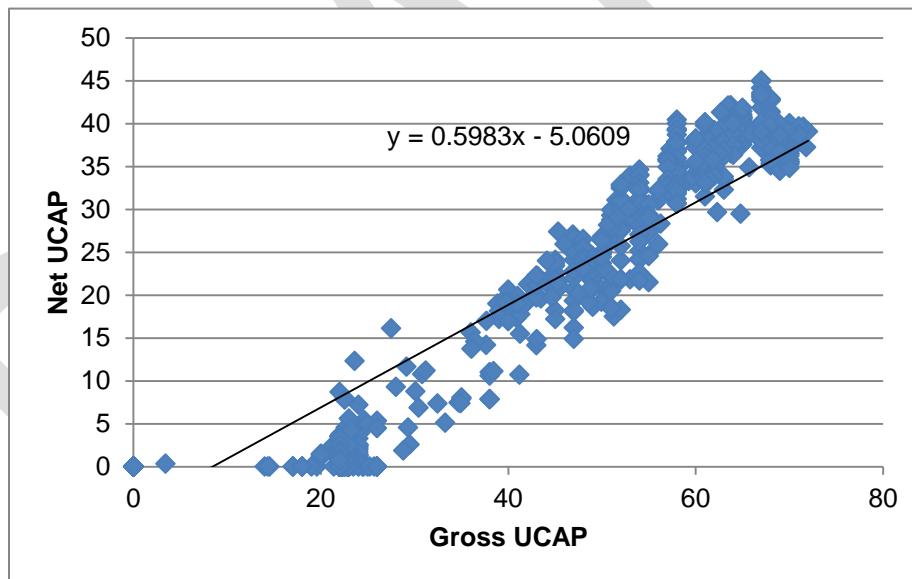
The self-supply site's gross uniform capacity value is calculated using the capacity asset's available capability and maximum capability over the historical data set. In this example, assume that the maximum capability of the asset is 69 MW. The AESO determines the hourly availability factor for each hour in the historical data set as:

$$\text{Hourly Availability Factor} = (AC_h / MC_h)$$

The availability factor is then determined by averaging the hourly availability factors. This value is multiplied by the asset's expected gross MC for the obligation period to calculate the Gross UCAP. Assume that the average availability factor is 72.46%, then the calculation of Gross UCAP would be:

$$\text{UCAP}_{\text{Gross}} = \text{Availability Factor} * \text{MC} = 72.46\% * 69 = 49.9974 \text{ MW} = 50 \text{ MW}$$

The UCAP$_{Gross}$ value is used in the final determination of UCAP::

$$UCAP_{Net} = 0.5983 (UCAP_{Gross}) - 5.0609 = 0.5983 (50) - 5.0609 = 24.85 \text{ MW} = 25 \text{ MW}$$

4 Determining the qualified baseline for a load asset providing a firm consumption level

For a load asset providing a firm consumption level with consumption history, the AESO determines the qualified baseline by establishing the average, typical consumption of a load asset providing a firm consumption level. The AESO removes settlement intervals that consist of any of the hours in the historical data set *calculated per section 3 of ISO Rule 206.3 Uniform Capacity Value Determination*, from the calculation of the qualified baseline to recognize that price responsive loads may have historically reduced consumption as pool prices increase, which typically occurs during periods of tight supply.

For a load asset providing a firm consumption level with consumption history, the AESO establishes the uniform capacity value by determining the qualified baseline of the load asset and subtracting the load asset's declared firm consumption level from the qualified baseline to calculate the uniform capacity value. The firm consumption level value is declared in accordance with subsection 5(1) of Section 206.1 of the ISO rules, *Qualification of Capacity*.

In the case of a load asset providing a firm consumption level with no consumption history, firm consumption level values are declared by the firm consumption level asset in accordance with Section 206.1 *Qualification of Capacity*. For a new load asset providing a firm consumption level, the AESO multiplies the uniform capacity value that results from the declaration of the qualified baseline and the firm consumption level by a class average performance factor to produce a net uniform capacity value for that load asset's use in the capacity auction. The calculation for uniform capacity value is as follows:

UCAP for an existing FCL asset = (QB − FCL)

UCAP for a new FCL asset = (QB − FCL) * derating factor

In determining the uniform capacity value of the load asset providing a firm consumption level, the AESO establishes the qualified baseline by examining the load consumption in the applicable hours from the year (November 1 – October 31) prior to the base or rebalancing auction. For example, for obligation period 2025/2026, the base auction would occur in 2022. The historical data set the AESO uses to determine the qualified baseline, and therefore uniform capacity value, would then be from November 1, 2020 to October 31, 2021. The AESO determines the 250 tightest supply cushion hours (hours in the historical data set). For each of the hours in the historical data set, the AESO performs the steps in subsections 5(5)(a), 5(5)(b), and 5(5)(c) of Section 206.4to determine the qualified baseline

The following example illustrates the approach for establishing the uniform capacity value of a load asset providing a firm consumption level that has consumption history:

Example 4 – establishing the uniform capacity value for a load asset providing a firm consumption level with consumption history

As an illustrative example, the historical data set only contains 2 tight supply cushion hours - an on-peak and off-peak hour. The AESO uses these two hours to establish a qualified baseline for the load asset providing a firm consumption level. Note that this example is for illustrative purposes only. Normally, the AESO uses 250 hours to determine uniform capacity value. Table 3 contains an hour occurring on a business day, and an hour occurring on the weekend. Tables 4 and 5 then describe how each of the two tight supply cushion hours will be used to calculate the qualified baseline, and UCAP of the FCL asset.

Table 3 – Tight supply cushion hours

Day/Date		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
27-Apr	Friday	18.8	19.0	18.6	18.0	18.3	19.7	18.6
6-May	Saturday	23.1	23.7	23.8	23.2	22.1	20.7	19.8

For each of the 250 availability hours from the previous obligation year, the AESO examines the 15 most recent business days prior to the day with the tight supply cushion hour if the hour falls on a business

day, and the 10 most recent weekend days or holidays if the tight supply cushion hour falls on a non-business day. The AESO modifies the load asset's consumption for the tight supply cushion hour to reflect the "normal" consumption of the load asset. The following is an example of a qualified baseline determination for a single hour in the historical data set. In this example, on April 27th from 5 - 6pm, the AESO looks back to the same hour on the 15 most recent business days prior to the day with the tight supply cushion hour. Table 4 below displays the metered volumes for the previous 15 business days:

Table 4 - Determination of qualified baseline for a load asset providing a firm consumption level – business day

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
03-Apr	Tuesday	Day 1	22.3	23.1	23.9	23.1	22.3	19.9	19.1
04-Apr	Wednesday	Day 2	20.0	19.5	11.6	10.2	19.8	23.5	17.6
05-Apr	Thursday	Day 3	24.6	25.4	24.6	24.6	23.9	20.7	20.7
06-Apr	Friday	Day 4	12	13	13.5	11.7	12	22	19
07-Apr	Saturday	Weekend	23.55	23.85	24.3	23.85	23.25	22.5	21.75
08-Apr	Sunday	Weekend	23.25	25.2	24.6	23.25	21	19.5	18
09-Apr	Monday	Availability hour	15.75	15	16.05	15.9	15.9	16.05	15.9
10-Apr	Tuesday	Day 5	15.6	15.9	15.75	15	15.15	15.75	15
11-Apr	Wednesday	Day 6	21	21.75	22.5	21.75	21	18.75	18
12-Apr	Thursday	Day 7	23.25	24	23.25	23.25	22.5	19.5	19.5
13-Apr	Friday	Day 8	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	Delivery Event	15	15.75	15	16.05	15.9	15.6	15
17-Apr	Tuesday	Day 9	15.75	16.2	15.6	15.9	15.75	15	15.15
18-Apr	Wednesday	Delivery Event	21.75	22.5	21.75	21.75	21	20.25	19.5
19-Apr	Thursday	Day 10	12	11.4	11.7	11.25	11.7	22.5	21.45
20-Apr	Friday	Day 11	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 12	15.75	15	16.05	15.9	15.9	16.05	15.9
24-Apr	Tuesday	Day 13	15.6	15.9	15.75	15	15.15	15.75	15
25-Apr	Wednesday	Day 14	23.25	25.2	24.6	23.25	21	19.5	18
26-Apr	Thursday	Day 15	23.25	23.55	23.25	23.25	22.5	22.2	21.45
Tight Supply Cushion Hour			18.8	19.0	18.6	18.0	18.3	19.7	18.6

The AESO averages the load asset's metered volumes during the previous 15 business days prior to the day with the tight supply cushion hour, using the same hour ending (5 – 6pm) as the tight supply cushion hour. The AESO excludes any days from the calculation of the qualified baseline where any of the following occurs:

(a)   a delivery event – in Figure 3 above, a delivery event highlighted in the orange rows above occurred on April 16th and 18th, therefore the AESO excludes these two days from the calculation;

(b)   availability hours – an availability hour occurred on April 9th, highlighted in green in figure 3 above, therefore the AESO also excludes this day from the calculation; and

(c)   weekend days and holidays as the tight supply cushion hour occurred on a business day. Weekends are highlighted by the grey rows above.

The AESO then calculates the hourly baseline for that hour as the average of the blue highlighted rows in Figure 3, the 15 previous business days during 5-6p.m. This calculation results in an hourly baseline of 18.3 MW, as shown in Table 4 above in the "tight supply cushion hour" cell highlighted in gold.

For the second hour in this example, the hour occurring on the weekend, the AESO establishes the

Information Document
Uniform Capacity Value Determination
ID #[xxxx-xx]

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qualified baseline for that hour by examining the 10 most recent weekend or holiday days prior to the day with the hour. The following is an illustrative example of how the AESO establishes a qualified baseline for a load asset providing a firm consumption level if the hour in the historical data set falls on a weekend:

Table 5 - Determination of qualified baseline for a load asset providing a firm consumption level – weekend

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
25-Mar	Sunday	Day 1	23.55	23.85	24.3	23.85	23.25	22.5	21.75
26-Mar	Monday	Weekday	15.5	16.0	18.0	22.3	10.0	22.0	21.0
27-Mar	Tuesday	Weekday	20.0	20.0	21.0	22.5	19.0	18.6	19.0
28-Mar	Wednesday	Weekday	17.5	19.0	18.9	18.2	16.0	16.5	17.0
29-Mar	Thursday	Weekday	18.0	16.3	16.7	18.0	17.8	17.5	17.5
30-Mar	Friday	Weekday	20.0	21.2	23.0	22.1	19.0	20.0	19.5
31-Mar	Saturday	Availability hour	23.55	23.85	24.3	23.85	23.25	22.5	21.75
01-Apr	Sunday	Delivery Event	16	18.7	19.5	12.6	22.1	19.4	19.08
02-Apr	Monday	Weekday	20.0	19.5	11.6	10.2	19.8	23.5	17.6
03-Apr	Tuesday	Weekday	22.3	23.1	23.9	23.1	22.3	19.9	19.1
04-Apr	Wednesday	Weekday	20.0	19.5	11.6	10.2	19.8	23.5	17.6
05-Apr	Thursday	Weekday	24.6	25.4	24.6	24.6	23.9	20.7	20.7
06-Apr	Friday	Weekday	12	13	13.5	11.7	12	22	19
07-Apr	Saturday	Day 2	23.55	23.85	24.3	23.85	23.25	22.5	21.75
08-Apr	Sunday	Day 3	23.25	25.2	24.6	23.25	21	19.5	18
09-Apr	Monday	Availability hour	15.75	15	16.05	15.9	15.9	16.05	15.9
10-Apr	Tuesday	Weekday	15.6	15.9	15.75	15	15.15	15.75	15
11-Apr	Wednesday	Weekday	21	21.75	22.5	21.75	21	18.75	18
12-Apr	Thursday	Weekday	23.25	24	23.25	23.25	22.5	19.5	19.5
13-Apr	Friday	Weekday	12	11.25	12	11.7	12	21.75	21
14-Apr	Saturday	Day 4	23.55	23.85	24.3	23.85	23.25	22.5	21.75
15-Apr	Sunday	Day 5	23.25	25.2	24.6	23.25	21	19.5	18
16-Apr	Monday	Delivery Event	15	15.75	15	16.05	15.9	15.6	15
17-Apr	Tuesday	Weekday	15.75	16.2	15.6	15.9	15.75	15	15.15
18-Apr	Wednesday	Delivery Event	21.75	22.5	21.75	21.75	21	20.25	19.5
19-Apr	Thursday	Weekday	12	11.4	11.7	11.25	11.7	22.5	21.45
20-Apr	Friday	Weekday	25.2	23.85	25.2	24	23.7	23.25	21.75
21-Apr	Saturday	Day 6	24.6	24.3	24.6	23.85	23.25	20.7	20.25
22-Apr	Sunday	Day 7	24	23.85	23.25	23.25	21	20.25	18.75
23-Apr	Monday	Weekday	15.75	15	16.05	15.9	15.9	16.05	15.9
24-Apr	Tuesday	Weekday	15.6	15.9	15.75	15	15.15	15.75	15
25-Apr	Wednesday	Weekday	23.25	25.2	24.6	23.25	21	19.5	18
26-Apr	Thursday	Weekday	15.6	15.9	15.75	15	15.15	15.75	15
27-Apr	Friday	Weekday	23.25	23.55	23.25	23.25	22.5	22.2	21.45
28-Apr	Saturday	Day 8	21	21.75	22.5	21.75	21	18.75	18
29-Apr	Sunday	Day 9	23.25	23.55	23.25	23.25	22.5	22.2	21.45
30-Apr	Monday	Weekday	23.25	15.6	14.5	14.8	23.4	23.7	21.45
01-May	Tuesday	Weekday	21	21.75	22.5	21.75	21	18.75	18
02-May	Wednesday	Weekday	23.25	24	23.25	23.25	22.5	19.5	19.5
03-May	Thursday	Weekday	22.3	23.1	23.9	23.1	22.3	19.9	19.1
04-May	Friday	Weekday	20.0	19.5	11.6	10.2	19.8	23.5	17.6
05-May	Saturday	Day 10	21	21.75	22.5	21.75	21	18.75	18
Tight Supply Cushion Hour			23.1	23.7	23.8	23.2	22.1	20.7	19.8

A tight supply cushion hour falls on May 06 between 2-3 p.m. In order to establish the qualified baseline of the load asset providing a firm consumption level, the AESO performs the following steps:

(a) identify the metered energy for the settlement intervals with the same hour ending as the hour in the historical data set in the 10 most recent weekend days or holidays prior to the day with the hour in the historical data set;

(b) exclude days from the calculation of the qualified baseline as follows:

    (i) Delivery event – in Figure 4 above, a delivery event has occurred on one of the weekend days on April 1st as shown by the orange highlighted row. Therefore, the AESO excludes this day from the calculation; and

    (ii) availability hours – an availability hour has occurred on March 31st, as shown by the green highlighted row. The AESO also excludes this day from the calculation; and

(c) calculate the hourly baseline for that hour as the average of the 10 previous weekend days or holidays, during 2-3 p.m. This calculation results in an hourly baseline of 23.7 MW, as shown in Table 5 above in the "tight supply cushion hour" cell highlighted in gold; and

(d) calculate the qualified baseline by averaging the hourly baselines. In this two period example:

$$QB = \text{Average} (18.3 \text{ MW}, 23.7 \text{ MW}) = 21 \text{ MW}$$

Finally, the AESO determines the uniform capacity value by deducting the declared firm consumption level of the load asset from the qualified baseline. In this example, the capacity market participant has declared a 10MW firm consumption level.

$$UCAP = QB - FCL = 21 \text{ MW} - 10 \text{ MW} = 11 \text{ MW}$$

5 Maximum and minimum limits for the uniform capacity value range

A capacity market participant may, for its existing generation assets, elect a uniform capacity value within a range the AESO establishes. The uniform capacity value range does not apply to assets with new capacity, refurbished capacity, incremental capacity, a load asset, or an import asset.

Prior to each base and rebalancing auction, the AESO calculates 3 ranges for a uniform capacity value on an asset-specific basis. The high and low values for the range will be established as follows:

(a) the 5% range (see example below on how the AESO determines this range);

(b) +/-2% multiplied by the asset's maximum capability. These values will be added and subtracted to the uniform capacity value of the asset to arrive at an upper and lower limit; or

(c) +/-1 MW of the asset's uniform capacity value.

The following illustrative example can be used to describe how the AESO uses each of the above methodologies to establish a uniform capacity value range for a capacity asset.

Example 5 – determining upper and lower limits for uniform capacity value range

In this example, capacity asset ABC has a maximum capability of 100 MW and an average availability factor during the 10 tight supply cushion hours in Table 6 of 80%. Therefore, the AESO calculates the uniform capacity value of the capacity asset as:

$$UCAP = 80\% * 100 \text{ MW} = 80 \text{ MW}$$

Information Document
Uniform Capacity Value Determination
ID #[xxxx-xx]

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Table 6 – hourly availability factors of capacity asset ABC

Date and HE	Availability Factor	
8-Apr, HE 12	90%	
15-Mar, HE 16	100%	Highest performing hour
9-Jul, HE 15	95%	
15-Jul, HE 12	88%	
5-Aug, HE 10	82%	
10-Aug, HE 14	81%	
8-Sep, HE 15	5%	Lowest performing hour
15-Sep, HE 9	99%	
20-Nov, HE 15	70%	
8-Dec, HE 17	85%	

Average Availability Factor	80%

The AESO establishes the upper limit of the 5% range by removing 5% of hours identified in the historical data set in which an asset's availability factor or capacity factor, as applicable, was the lowest. In this simplified example, 5% of 10 hours is 1 hour using normal rounding practices. Therefore, the AESO removes the lowest performing hour which occurred on September 8th, HE 15 (highlighted red). The AESO averages the remaining data set and then multiplies it by the capacity asset's maximum capability to establish the upper limit of the 5% range. In this example, the average of the availability factors once the AESO removes the lowest performing hour is 88%. The AESO then establishes the upper limit as follows:

$$UCAP_{upper} = 88\% * MC = 88\% * 100 \text{ MW} = 88 \text{ MW}$$

The AESO establishes the lower limit of the 5% range by removing 5% of hours identified in the historical data set in which an asset's availability factor or capacity factor, as applicable, was the highest. In this simplified example, 5% of 10 hours is 1 hour using normal rounding practices. Therefore, the AESO removes the highest performing hour which occurred on March 15, HE 16 (highlighted green). The AESO averages the remaining data set and then multiplies it by the capacity asset's maximum capability to establish the lower limit of the 5% range. In this example, the average of the availability factors once the highest performing hour is removed is 77%. The AESO then establishes the lower limit as follows:

$$UCAP_{lower} = 77\% * MC = 77\% * 100 \text{ MW} = 77 \text{ MW}$$

The AESO establishes the +/- 2% range by multiplying 2% by the maximum capability of the capacity asset. The AESO establishes the upper limit by adding this value to the uniform capacity value, and the lower limit by subtracting this value from the uniform capacity value. See below methodology using the illustrative example data set above:

$$UCAP_{upper} = UCAP + 2\% * MC = 80 \text{ MW} + 2\% * 100 \text{ MW} = 82 \text{ MW}$$

$$UCAP_{lower} = UCAP - 2\% * MC = 80 \text{ MW} - 2\% * 100 \text{ MW} = 78 \text{ MW}$$

The AESO establishes the +/- 1 MW range simply by adding and subtracting 1 MW to the uniform capacity value to establish the upper and lower limits for the range. See below:

$$UCAP_{upper} = UCAP + 1 \text{ MW} = 80 \text{ MW} + 1 \text{ MW} = 81 \text{ MW}$$

$$UCAP_{lower} = UCAP - 1 \text{ MW} = 80 \text{ MW} - 1 \text{ MW} = 79 \text{ MW}$$

The capacity asset then receives the maximum and minimum of the three ranges above. See below:

$$UCAP_{upper} = Max(88 \text{ MW}, 82 \text{ MW}, 81 \text{ MW}) = 88 \text{ MW}$$

$$UCAP_{lower} = Min(77\ MW, 78\ MW, 79\ MW) = 77\ MW$$

6   Class average performance factors

The AESO uses the class average approach to determining uniform capacity value for capacity assets without operational history and which are of similar design or have similar operational characteristics to other capacity assets in Alberta. The AESO determines a class average performance factor based on similar assets, and multiplies it by the maximum capability of the capacity asset to calculate uniform capacity value. Pursuant to subsection 9(1)(b) of Section 206.3, the AESO has provided the class averages in Appendix 1.

Example 6 – uniform capacity value determination using class average methodology for a new wind asset

A new wind asset with maximum capability of 100 MW is planned in the NW region of Alberta. To estimate the class average capacity factor for this wind asset, the AESO reviews other wind assets with similar operating characteristics, and in same geographic region if available. The following wind assets currently exist in the province:

Table 7 – wind capacity factor

Asset name	Geographical location	Capacity Factor (%)
Wind Farm # 1	NW	15.3
Wind Farm # 2	NW	12.5
Wind Farm # 3	NW	16.8
Wind Farm # 4	SE	10.2
Wind Farm # 5	SE	9.5
Wind Farm # 6	NW	11.8

For the new wind asset, the AESO averages the capacity factors of all wind assets located in the NW area, as follows:

$$Average\ (15.3\%, 12.5\%, 16.8\%, 11.8\%)\ /\ 4 = 14.1\%$$

The AESO then multiplies this capacity factor by the new wind asset's maximum capability to determine the uniform capacity value of the new asset, as follows:

$$UCAP = 14.1\% * 100\ MW = 14.1\ MW = 14\ MW$$

7   Capacity factor methodology for uniform capacity value

The AESO calculates the uniform capacity value for all capacity assets whose generation capability is dependent on a fuel supply that is uncontrollable (e.g. wind, solar, or non-dispatchable hydro) using a capacity factor approach.

The AESO calculates the hourly capacity factor by adding metered energy and applicable ancillary services volume observed in each hour of the historical data set, and dividing by the maximum capability of the asset. The AESO then calculates the uniform capacity value of the capacity factor asset by averaging the hourly capacity factors, and then multiplying by the asset's maximum capability. Below is an example of the approach:

Example 7 – capacity factor methodology for determining uniform capacity value

A wind aggregated generating facility has a maximum capability of 200 MW, and does not currently qualify to provide ancillary services. The sample historical data set has only 10 hours. See the following:

Table 8 – hourly capacity factors

Date and HE	Metered Volume (MW)	Applicable AS Volume (MW)	Hourly Capacity Factor (%)
8-Apr, HE 12	10	0	= (Hourly Metered Volume + Applicable AS)/ Maximum Capability = (10 MW + 0 MW)/200 MW = 5%
15-Mar, HE 16	100	0	50%
9-Jul, HE 15	0	0	0%
15-Jul, HE 12	0	0	0%
5-Aug, HE 10	10	0	5%
10-Aug, HE 14	0	0	0%
8-Sep, HE 15	100	0	50%
15-Sep, HE 9	180	0	90%
20-Nov, HE 15	5	0	3%
8-Dec, HE 17	0	0	0%
Average capacity factor	**Capacity Factor**		**20.25%**

The AESO calculates the hourly capacity factor as:

Hourly Capacity Factor = (hourly metered volume + applicable AS)/maximum capability

The AESO then calculates the uniform capacity value by averaging all of the hourly capacity factors and then multiplying by the capacity asset's maximum capability, rounded to the nearest whole number. See below:

UCAP = Average(hourly capacity factors)*Maximum Capability = 20.25%*200 MW = 40.5 MW = 41 MW

8   How to submit variances through the uniform capacity value variance process

The AESO is continuing to develop the variance process and will release further details at a later time.

9   Appendices

Appendix 1 - *Class Averages*

Revision History

Posting Date   Description of Changes

Initial release

Appendix 1

Class Averages

To be completed when available.