

Information Documents are not authoritative. Information Documents are for information purposes only and are intended to provide guidance. In the event of any discrepancy between an Information Document and any Authoritative Document(s)¹ in effect, the Authoritative Document(s) governs.

1 Purpose

This Information Document relates to the following Authoritative Document:

- Section 206.11 of the ISO rules, *Energy and Ancillary Services Offsets for Assets* (“Section 206.11”).

The purpose of this Information Document is to help market participants understand the approach the AESO will use to calculate the Energy and Ancillary Services offset for assets. This rule will be applied to assets:

- seeking relief from the default offer cap and
- seeking approval to delist on a temporary basis for economic reasons

The values determined from the approach will be deducted from the going forward costs of the assets to establish an asset specific price cap when seeking relief from the default offer cap and a delist offer price when seeking approval to delist on a temporary basis for economic reasons for the asset to be used in an auction for the relevant obligation period.

2 Background

The AESO needs an approach to determine the expected energy and ancillary offset for assets seeking to establish the net go forward costs for assets seeking an asset specific offer cap or for those seeking to temporarily economically delist. To complete this assessment the AESO will establish a common and systematic approach to be used for all assets seeking these treatments. The energy and ancillary services offset will be expressed in \$/kw-year.

3 Approach

The approach to determining the energy and ancillary services offset for an asset will generally be similar to the methodology used to estimate the energy and ancillary services offset for the reference unit and can be summarized as:

Forward Product Energy

- The AESO will select the Forward Power Price based on the forward market power prices that best represent the operational expectations of the asset for that obligation year. All prices will be sourced from the data published by NGX for the AESO indexed swap products. The following considerations will be made:

The values corresponding to forward power price and forward product energy depend on the forward product the AESO selects for each obligation period. The AESO conducts a liquidity and profitability assessment to determine which forward product type is suitable for each obligation period. This assessment will not be disclosed to capacity market participants to prevent undue influence in forward trades. The *Capacity Market Auction Guidelines* released for each auction specify the forward products used for the obligation period in question.

The AESO will calculate the Forward Power Price using a weighted average of the settlements matching the obligation period in question. Specifically, the AESO estimates a weighted average of November and December of calendar year n with January to

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.

October of calendar year $n+1$. The data collection process will be continuous and ongoing. The selection of the sample period of collection will not be disclosed to market participants to prevent undue influence in forward trades. The *Capacity Market Auction Guidelines* released for each auction provides ex post details on the sample period and the calculation of Forward Power Price. Until there is a reliable forward market price published for ancillary services, the AESO will not consider ancillary service revenues in the energy and ancillary services offset calculation.

In all the situations noted below, the AESO will select the Forward Power Price that provides the highest Energy and Ancillary Services offset for the obligation period while also corresponding to the expected hours that the asset will run.

- If the forward curve for power and natural gas, or the asset specific fuel cost as provided by the capacity market participant if the fuel is not natural gas, would suggest that the asset would run most economically for all hours of the obligation period the AESO Flat curve will be used to determine the energy revenue.
- If the forward curve for power and natural gas, or the asset specific fuel cost as provided by the capacity market participant if the fuel is not natural gas, would suggest that the asset would run most economically during the On Peak hours, the AESO On Peak curve will be used to determine the energy revenue.
- For hydro, wind, storage, solar and all thermal assets with an availability factor less than 50% the AESO will apply a scaling factor to the flat energy price for the obligation period to better represent the expected realized revenue from these assets. The scaling factor will be the assets' realized pool price from the last obligation period divided by the all-hours average pool price from the last obligation period. For these assets, the capacity market participant will be required to provide the MWh production assumptions of the asset for the obligation period. The capacity market participant will be required to provide the AESO with sufficient detailed information to substantiate the production expectations. The detailed information may include historical operational data and modeled expectations of future asset energy production based on deterministic or probabilistic methods. The example below is a simplified illustration of how the approach will be conducted. The historically observed ratio of realized prices relative to the flat annual average will be applied to the flat forward price for the obligation period to determine an estimate of future expected energy revenue. .

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Energy and Ancillary Services Offsets for Assets

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Hour in year	Pool Price	Generation	Generation *	Pool Price
1	\$ 18.37	0	\$	-
2	\$ 31.00	0	\$	-
3	\$ 27.19	0	\$	-
4	\$ 29.55	0	\$	-
5	\$ 29.86	55	\$	1,642.30
6	\$ 31.62	60	\$	1,897.20
7	\$ 29.58	68	\$	2,011.44
8	\$ 33.26	0	\$	-
9	\$ 33.26	53	\$	1,762.78
10	\$ 35.97	25	\$	899.25
11	\$ 46.18	17	\$	785.06
12	\$ 75.93	0	\$	-
13	\$ 45.97	0	\$	-
14	\$ 45.97	0	\$	-
15	\$ 45.89	0	\$	-
16	\$ 45.97	48	\$	2,206.56
17	\$ 44.28	55	\$	2,435.40
18	\$ 39.17	66	\$	2,585.22
19	\$ 33.67	0	\$	-
20	\$ 43.64	0	\$	-

Summary Statistics			
a	Average Pool Price	\$ 38.32	
b	Total Generation		447
c	Realized Revenue		\$ 16,225.21
c / b	Realized Revenue / MWh		\$ 36.30
d	Forward Price scaling factor (c / b) / a		94.7%

Forward Energy Price	
f	Flat Energy Price
	\$ 40.00

d * f	Expected Realized Forward Price	\$ 37.89
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Energy Market Expenses

All expenses provided to support the energy market expenses variable in the energy and ancillary services offset for assets must relate only to the variable costs related to the production of expected energy in the obligation period. Fixed costs or other costs that do not vary with the volume of energy produced will not be included by the AESO in the determination of the energy market expense variable.

Where inputs for energy market expenses are not available through public indices² the inputs to allow the AESO to calculate the energy market expenses will be provided by the capacity market participant. The market participant should provide sufficient detail to support these estimated costs. The variable costs provided must be consistent with the variable costs the capacity market participant uses to support Board of Director or senior management approvals of budgets related to the asset for that obligation period.

Non-electricity market revenues

² Generating assets using natural gas as a fuel will use the index published by NGX, supplemented with the commodity fuel charge as noted in rule 206.11

The energy and ancillary services offset for assets will be used to determine the net go forward costs of the asset. Other sources of revenue the asset may be eligible to receive during the obligation period should be deducted from the go forward costs of the asset. To the extent the asset has other sources of revenue a description and value associated with those revenue streams must be provided to the AESO. Forward hedging gains or losses for the asset will not be included as non-electricity market revenues. While the list is not exhaustive, examples of these revenue streams may include the following:

- sale of green attributes
- sale of production by-products such as fly ash

[NTD: The AESO notes that it is currently considering moving the provision of information regarding other revenue streams to the AESO to Section 206.11 of the ISO rules, Energy and Ancillary Services Offset for Assets]

4 Calculation Examples

The following is an example calculation for a non-thermal asset with a forward price determined using a scaling factor.

Forward Power Price			
Forward energy price (\$/MWh)	\$	40.00 a	<i>observed</i>
Expected Realized Forward Price based on scaling factor (\$/MWh)	\$	37.89 b	<i>calculated</i>
Transmission loss rate (%/ MWh)		4% c	<i>observed</i>
Forward carbon price (\$/t)	\$	30.00 d	<i>observed</i>
Nameplate capacity of asset (MW)			
		100 e	<i>observed</i>
UCAP (MW)		82 f	<i>calculated</i>
Forward Product Energy provided by capacity market participant (MWh)		262,800 g	<i>provided</i>
Energy Market Expenses			
variable operations and maintenance (\$/MWh)		1.23 h	<i>provided</i>
water rent (\$/MWh)		0.05 i	<i>provided</i>
pool trading charge (\$/MWh)		0.25 j	<i>observed</i>
transmission losses (\$/MWh)		1.52 k = b * c	<i>calculated</i>
Non-electric market revenues			
Sale of green attributes (\$)	\$	7,884,000 l = g * d	<i>calculated</i>
Expected realized forward price - Energy market expenses (\$/MWh)		34.85 m = b - h - i - j - k	<i>calculated</i>
Revenue prior to non electricity market revenues (\$)	\$	9,157,820.56 n = m * g	<i>calculated</i>
Expected net revenue for obligation period (\$)	\$	17,041,820.56 o = n + l	<i>calculated</i>
EAS Offset in \$/kw-year	\$	207.83 o / (f * 1000)	<i>calculated</i>

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The following is an example calculation for a thermal, natural gas asset.

Forward Market Costs

Forward energy price Flat (\$/MWh)	\$	40.00	a	<i>observed</i>
Forward energy price On Peak (\$/MWh)	\$	45.00	b	<i>observed</i>
Forward natural gas price (\$/GJ)	\$	1.90	c	<i>observed</i>
Commodity fuel charge (%/ GJ)		1.50%	d	<i>observed</i>
Forward carbon price (\$/t)	\$	30.00	e	<i>observed</i>
Transmission loss rate (%/ MWh)		4%	f	<i>observed</i>
Established emissions benchmark(t/MWh)		0.40	g	<i>observed</i>
Pool trading charge (\$/MWh)	\$	0.25	h	<i>observed</i>

Asset attributes

Nameplate capacity of asset (MW)		90	i	<i>provided</i>
Asset UCAP (MW)		75	j	<i>calculated</i>
Asset heat rate (GJ/MWh)		9.677	k	<i>provided</i>
Asset emissions intensity (t/ MWh)		0.50	l	<i>provided</i>
Asset derating/ outage rate (%)		12%	m	<i>provided</i>
Implied asset production Flat (MWh)		693,792	$n = i * (1 - m) * 8760$	<i>calculated</i>
Implied asset production On Peak (MWh)		395,366	$o = i * (1 - m) * 6 * 16 * 52$	<i>calculated</i>

Energy Market Expenses

Fuel cost (\$/MWh)	\$	18.66	$p = (c * (1 + d)) * k$	<i>calculated</i>
variable operations and maintenance (\$/MWh)	\$	0.25	q	<i>provided</i>
Transmission losses flat (\$/MWh)	\$	1.60	$r = a * f$	<i>calculated</i>
Transmission losses on peak (\$/MWh)	\$	1.80	$s = b * f$	<i>calculated</i>
Emissions Costs (\$/MWh)	\$	3.00	$t = (l - g) * e$	<i>calculated</i>
Pool trading charge (\$/MWh)	\$	0.25	u	<i>observed</i>
All in operating costs of asset flat (\$/MWh)	\$	23.76	$v = p + q + r + t + u$	<i>calculated</i>
All in operating costs of asset on peak (\$/MWh)	\$	23.96	$w = p + q + s + t + u$	<i>calculated</i>
Implied margin Flat	\$	16.24	$x = a - v$	<i>calculated</i>
Implied margin On Peak	\$	21.24	$y = b - x$	<i>calculated</i>

Non-electric market revenues

Non- electricity market revenues (\$)	\$	-	z	<i>provided</i>
Implied Revenue Flat (\$)	\$	11,265,729	$aa = n * x + z$	<i>calculated</i>
Implied Revenue On Peak (\$)	\$	8,396,754	$bb = o * y + z$	<i>calculated</i>
Assessed Revenue (\$)	\$	11,265,729	$cc: aa > bb$	<i>calculated</i>

EAS Offset in \$/kw-year	\$	150.21	$cc = aa / (j * 1000)$	<i>calculated</i>
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Energy and Ancillary Services Offsets for Assets

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The following is a scaling factor and EAS offset for a thermal asset with production less than 50% throughout the forward obligation period.

Hour in year	Pool Price	Generation	Generation * Pool Price
1	\$ 18.37	0	\$ -
2	\$ 31.00	0	\$ -
3	\$ 27.19	0	\$ -
4	\$ 29.55	0	\$ -
5	\$ 29.86	0	\$ -
6	\$ 31.62	0	\$ -
7	\$ 29.58	0	\$ -
8	\$ 33.26	0	\$ -
9	\$ 33.26	0	\$ -
10	\$ 35.97	25	\$ 899.25
11	\$ 46.18	17	\$ 785.06
12	\$ 75.93	65	\$ 4,935.45
13	\$ 45.97	65	\$ 2,988.05
14	\$ 45.97	70	\$ 3,217.90
15	\$ 45.89	76	\$ 3,487.64
16	\$ 45.97	48	\$ 2,206.56
17	\$ 44.28	55	\$ 2,435.40
18	\$ 39.17	0	\$ -
19	\$ 33.67	0	\$ -
20	\$ 43.64	70	\$ 3,054.80

Summary Statistics			
a	Average Pool Price	\$ 38.32	
b	Total Generation		491
c	Realized Revenue		\$ 24,010.11
c / b	Realized Revenue / MWh		\$ 48.90
d	Forward Price scaling factor (c / b) / a		127.6%

Forward Energy Price			
f	Flat Energy Price		\$ 40.00

d * f	Expected Realized Forward Price		\$ 51.05
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Forward Market Costs

Forward energy price Flat (\$/MWh)	\$	40.00	a	<i>observed</i>
Scaled Energy Price (\$/MWh)	\$	51.04	b	<i>calculated</i>
Forward natural gas price (\$/GJ)	\$	1.90	c	<i>observed</i>
Commodity fuel charge (%/ GJ)		1.50%	d	<i>observed</i>
Forward carbon price (\$/t)	\$	30.00	e	<i>observed</i>
Transmission loss rate (%/ MWh)		4%	f	<i>observed</i>
Established emissions benchmark(t/MWh)		0.40	g	<i>observed</i>
Pool trading charge (\$/MWh)	\$	0.25	h	<i>observed</i>

Asset attributes

Nameplate capacity of asset (MW)		90	i	<i>provided</i>
Asset UCAP (MW)		75	j	<i>calculated</i>
Asset heat rate (GJ/MWh)		9.677	k	<i>provided</i>
Asset emissions intensity (t/ MWh)		0.50	l	<i>provided</i>
Asset derating/ outage rate (%) (implied in provided production)		n/a	m	<i>n/a</i>
Implied asset production Flat (MWh)		283,824	n	<i>provided</i>
Implied asset production On Peak (MWh)		n/a	o	<i>n/a</i>

Energy Market Expenses

Fuel cost (\$/MWh)	\$	18.66	$p = (c * (1 + d)) * k$	<i>calculated</i>
variable operations and maintenance (\$/MWh)	\$	0.25	q	<i>provided</i>
Transmission losses flat (\$/MWh)	\$	2.04	$r = b * f$	<i>calculated</i>
Transmission losses on peak (\$/MWh)		n/a	s	<i>n/a</i>
Emissions Costs (\$/MWh)	\$	3.00	$t = (l - g) * e$	<i>calculated</i>
Pool trading charge (\$/MWh)	\$	0.25	u	<i>observed</i>
All in operating costs of asset flat (\$/MWh)	\$	24.20	$v = p + q + r + t + u$	<i>calculated</i>
All in operating costs of asset on peak (\$/MWh)		n/a	w	<i>n/a</i>
Implied margin Flat	\$	26.84	$x = b - v$	<i>calculated</i>
Implied margin On Peak		n/a	y	<i>n/a</i>

Non-electric market revenues

Non- electricity market revenues (\$)	\$	-	z	<i>provided</i>
Implied Revenue Flat (\$)	\$	7,616,788	$aa = n * x + z$	<i>calculated</i>
Implied Revenue On Peak (\$)	\$	-	$bb = o * y + z$	<i>calculated</i>
Assessed Revenue (\$)	\$	7,616,788	$cc: bb > aa$	<i>calculated</i>

EAS Offset in \$/kw-year	\$	101.56	$cc = aa / (j * 1000)$	<i>calculated</i>
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Revision History

Posting Date	Description of Changes
	Initial release