# Overview of the Alberta Capacity Market

*This section provides an overview of the Comprehensive Market Design Final proposal.*

## 1.1 Overview of the Alberta capacity market

### *Introduction*

In January 2017, the Government of Alberta directed the AESO to design and implement a capacity market in Alberta.[1] The Alberta capacity market will be a mechanism to achieve resource adequacy and meet the government-defined resource adequacy standard at least cost by enabling broad competition among capacity resources. The capacity market will work efficiently and effectively with the energy and ancillary services markets and will be consistent with the lower-carbon electricity system of the future. The first capacity market auction is to commence in 2019 with first delivery of capacity to occur in 2021.

### *CMD Final*

The final Comprehensive Market Design (CMD Final) represents the AESO's proposed technical design for Alberta's capacity market, including associated changes to the energy and ancillary services markets. CMD Final describes a holistic market design intended to achieve the desired end state and criteria developed through input from industry.[2] The technical design for the capacity market that is reflected in CMD Final is a culmination of significant analysis and due diligence completed by the AESO and CMD working group members. It is also a reflection of feedback received and considered over the course of an extensive engagement with stakeholders that commenced in early 2017, following the Government of Alberta's direction to the AESO to design and implement a capacity market for Alberta. CMD Final will form the basis for development of ISO rules necessary for the implementation of the capacity market.

The Alberta capacity market design contains several high level components including prequalification of resources, determination of resource capacity value, determination of a procurement demand curve, auction mechanics, performance measurement, market power mitigation measures, financial settlement and integration with existing energy and ancillary services markets. A summary of the key design elements of these components is provided in the table below.

### *Design Overview*

| Category | High-level Design Elements |
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| **Eligibility and Prequalification Requirements; and**<br><br>**Financial Security Requirements** | • Minimum asset size requirement of 1 MW.<br>• Certain prequalification requirements are asset-specific to accommodate different operating characteristics and ensure feasibility of physical delivery. Assets that are eligible to prequalify include thermal, demand response, external, storage, hydro, variable, and aggregated assets.<br>• Existing generation assets located in Alberta with an estimated UCAP of 1 MW or greater will be automatically prequalified for capacity auctions. New capacity |

[1] Government of Alberta Mandate Letter: https://www.aeso.ca/assets/Uploads/capacity-market-design-AESO-mandate-letter-Jan-10-2017.pdf

[2] Please see the Section 1 rationale document or https://www.aeso.ca/assets/Uploads/Final-DES-criteria-and-assumptions-v2-final.pdffor further information.

| Category | High-level Design Elements |
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| | assets, external capacity assets and demand side assets will be required to prequalify in order to participate in the first transitional auction.<br>• Resources that are the subject of a renewable electricity support agreement in connection with Renewable Electricity Program (REP) Rounds 1, 2 or 3 are not eligible to participate in a capacity auction.<br>• Energy efficiency resources will not be eligible for participation in initial capacity auctions.<br>• Demand response assets will be eligible to participate on the supply side of the capacity market.<br>• Storage assets must demonstrate 4 hour continuous discharge capability at its estimated UCAP level.<br>• A refurbished capacity asset is defined as an asset that has met one of:<br>o increased maximum capability of the asset by the greater of i) 15% of the asset's most recent maximum capability or ii) 40MWs above the asset's most recent maximum capability; or<br>o making an investment of at least $200/kW for the whole asset's most recent maximum capability.<br>The capacity market offers of a refurbished asset will not be subject to capacity market power mitigation. Firms subject to mitigation will be provided a one-time option to provide a mitigated offer for the existing asset to be utilized in a multi-stage market clearing process<br>• A capacity asset may choose to add incremental capability to the asset through increasing an asset's maximum capability. Offers for the incremental capacity will not be subject to capacity market power mitigation. The incremental capacity will need to be prequalified.<br>• New capacity assets will be required to post security in order to participate in a capacity auction. Security requirements will decline through time until the new asset achieves commercial operation.<br>• New capacity assets other than refurbished or incremental will be required to post financial security with the AESO at a rate equal to 5% * grossCONE * 1/ a Capacity Recovery Factor. Refurbished and incremental assets will be required to post financial security at fixed rates.<br>• Prequalified capacity assets will remain prequalified for subsequent auctions subject to certain considerations, including loss of pool participant status, failing to meet development milestones, material changes to the asset, delisting or a change in self-supply designation.<br>• Physical bilateral transactions are not permitted in the Alberta capacity market. However, a site may self-supply capacity provided the load is capable of being served in whole or in part by generation that is located on the same site, and at the same point of interconnection to the electric system (including industrial system designations and sites under the Duplication Avoidance Tariff).<br>• Sites with onsite generation that are only net-metered, and sites with onsite generation that are net-metered and cannot physically flow their gross volumes due to system connection limitations must self-supply. |

| Category | High-level Design Elements |
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| | • The City of Medicine Hat will be required to self-supply capacity.<br>• Self-suppliers who intend to change from participating on a net basis to a gross basis or from a gross basis to a net basis must declare their intention. Changes will only be allowed every four years with the exception that changes to the self-supply designation will be permitted prior to four years due to physical operational changes at the self-supply facility. |
| **Delisting** | • Capacity assets must temporarily or permanently delist before ceasing participation in the capacity, energy or ancillary service markets.<br>• Delisting requests or notifications will either be permanent delisting notifications (asset retirement) or temporary delisting requests. Temporary delisting requests may be for physical or economic reasons.<br>• The AESO may conduct a reliability review prior to finalizing its assessment of delisting requests.<br>• Temporary economic delisting requests will only be allowed for the second rebalancing auction.<br>• The legal owner of a capacity asset that is making a temporary economic delisting request must offer the net avoidable costs of such asset into the second rebalancing auction. Cost submissions will require corporate officer attestation.<br>• An asset will only be allowed to temporarily withdraw from the energy and ancillary services markets for the duration of the obligation period if the second rebalancing auction clears at a price less than the temporary economic delist offer price.<br>• A capacity asset may temporarily economically delist from the capacity market but choose to participate in the energy and ancillary services markets for no more than 5 continuous months in the same obligation period. Avoidable costs and EAS offsets will be calculated based on outage dates provided prior to finalization of the second rebalancing auction<br>• A temporarily delisted capacity asset will be allowed to return to the energy market if the AESO determines a reliability need exists<br>• A capacity asset may not economically delist for more than two consecutive obligation periods.<br>• Temporary physical delist requests must be submitted when a capacity asset is expected to be physically unavailable for five continuous months or more during the obligation period.<br>• Permanent delist notifications may only be submitted during the prequalification period associated with the base auction and first rebalancing auction. Requests for the second rebalancing auction are not permitted. A capacity asset retirement date need not occur at the start of the obligation period. The legal owner of a capacity asset intending to permanently delist may continue to participate in the energy and ancillary services markets until the physical retirement date through submission of a temporary physical delist request for the relevant portion of the initial retirement year.<br>• No economic test will be conducted on permanent delist notifications. |
| **Capacity Value (UCAP) Determination** | • The AESO will calculate and assign a UCAP value for each prequalified asset.<br>• Five years of historical data will be utilized for asset specific UCAP determination for existing assets. The 250 tightest supply cushion hours in each year will be utilized.<br>• Participants will be allowed to choose a UCAP within a range determined as the maximum or minimum values that result from the following approaches: |

| Category | High-level Design Elements |
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| | o eliminating the top and bottom 5% of the data set utilized to determine UCAP<br>o increasing and decreasing the asset's UCAP by 2% of the asset's maximum capability<br>o increasing and decreasing the asset's UCAP by 1 MW<br>• Forced and planned derates and outages, distribution system constraints and transmission outages that result in an asset being electrically disconnected from the transmission system and force majeure events will not be excluded from availability and production data and will act to reduce calculated UCAP values. Transmission system constraints will be excluded and will not reduce calculated UCAP values.<br>• Assets with insufficient historical operating data will have data supplemented by class averages, engineering estimates or information gathered through jurisdictional reviews.<br>• An availability or capacity factor methodology will generally be used to calculate asset-specific UCAPs:<br>o An availability factor will be used when metered generation or load volumes align with energy market dispatches (typically, thermal, storage, large hydro and net to grid dispatched self-supply sites).<br>o An availability factor determined through linear regression will be used for self-supply sites for which the generating assets are dispatched on a gross to grid basis.<br>o A capacity factor will be used when metered generation or load volumes do not align with energy market dispatches (typically, wind, run of river hydro and solar assets)<br>• Demand side resources will be classified as either firm consumption level (FCL) or guaranteed load reduction (GLR):<br>o UCAP for FCL assets will be established as 91% of the difference between an estimated baseline consumption level and the FCL of the asset.<br>o UCAP for GLR assets will be established as 91% of the GLR level provided during prequalification. An availability factor methodology will be utilized once sufficient historical performance data is available.<br>• Assets with UCAP values less than 1 MW may aggregate with other assets in order to participate in the capacity market. UCAP for these assets will be determined using a capacity factor methodology unless all aggregated assets are eligible for UCAP determination using an availability factor.<br>• UCAP for external capacity assets will be based on firm transmission volume held in the external jurisdiction and demonstration that the supply source is a non-recallable resource of sufficient size. This volume will then be derated to reflect the frequency of time during historical supply cushion hours that the respective intertie was out of service with 0 ATC.<br>• UCAP for mothballed or temporarily delisted assets with data available for 250 or more tight supply cushion hours will utilize available data to calculate UCAP. Assets with less than 250 hours of data available will have available data supplemented with class average data such that a total of 250 data points is obtained.<br>• A UCAP refinement process will allow capacity market participants to submit a request to review the UCAP or UCAP range for select reasons. If issues cannot be resolved through the UCAP refinement process, a capacity market participant may utilize a formal dispute resolution process. |

| Category | High-level Design Elements |
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| **Calculation of Demand Curve Parameters** | • The demand curve will be developed in order to satisfy the resource adequacy standard specified by the Government of Alberta.<br>• The AESO will use a forward-looking probabilistic resource adequacy model (RAM) to determine capacity volume requirements. The RAM will consider factors that impact the supply demand balance in Alberta such Alberta gross load, supply availability, forced and planned outages for thermal assets, onsite generation, variable generation profiles, hydroelectric generation profiles, and imports.<br>• Outputs of the RAM will be translated into fleet-wide UCAP values using a formula to align with asset-specific UCAP calculations.<br>• System UCAP requirements will be adjusted to account for self-supplied volumes and ineligible resources (including successful Renewable Electricity Program (REP) Round 1, 2 and 3 projects).<br>o The reference technology used for determining gross-CONE and net-CONE will be a natural gas-fired technology and selected through detailed cost screening. Additional details on the reference technology selection are being developed by the AESO and subject to further consultation.<br>• A comprehensive gross-CONE estimate will be completed by an independent consultant at regular intervals. Annual interim adjustments will be made using cost indices. Finalization of the gross-CONE estimate is underway by the AESO and subject to further consultation.<br>• The energy and ancillary services offset for the reference technology will be determined on a forward looking basis via a forward market methodology utilizing forward market electricity and natural gas prices. Additional details on the EAS offset are being developed by the AESO and subject to further consultation.<br>• The demand curve for the Alberta capacity market will be a downward-sloping, convex demand curve with the following parameters:<br>o The price cap will be set based on the maximum value of either a 1.75 net-CONE multiple or a 0.5 gross-CONE multiple;<br>o The minimum quantity point will be set at a value of capacity equivalent to the Government of Alberta's set minimum of 0.0011% of EUE (for the first auction this is expected to be 964 MWh) in one year ;<br>o The inflection point is set at 0.875 x net-CONE, at a quantity 7% above the minimum acceptable quantity; and<br>o The foot is set at 18% above the minimum acceptable quantity, at a price of zero.<br>• The demand curve for a rebalancing auction will have the same shape as the base auction demand curve. Procurement volumes will be updated prior to each rebalancing auction. |
| **Forward Capacity Auction (Base Auction)** | • Three-year forward period.<br>• A transition period with forward periods shorter than three years for base auctions will be required to establish the three-year forward period.<br>• One-year obligation period, running November 1 – October 31.<br>• No option for seasonal capacity commitments (annual obligations only).<br>• REP Round 1, 2 and 3 resources with a Renewable Electricity Support Agreement will be ineligible. No other adjustments for out-of-market payments will be made for the initial auction.<br>• Uniform price, sealed bid, single round auction. |

| Category | High-level Design Elements |
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| | • Offers may be submitted using up to seven price quantity pairs. There will be limits as to which blocks may be inflexible.<br>• Alberta will clear as a single capacity region with one capacity price set at the unconstrained price level established without consideration of expected transmission constraints. The capacity market auction clearing algorithm will maximize social surplus and minimize deadweight loss.<br>• After considering volumes limited due to expected transmission constraints, any capacity asset volumes required to satisfy the capacity purchase volume determined through unconstrained market clearing that are priced above the market clearing price will receive uplift payments equal to the difference between their offer price and the market clearing price.<br>• External capacity asset offers and any transmission-constrained asset offers will generally be cleared, subject to the principle of maximizing social surplus, based on offered capacity price in the supply curve and, then by pro rata allocation until the transmission constraint limit is reached. Cleared assets will receive the market clearing price.<br>• A dispute resolution process will be established such that participants can dispute determinations made by the AESO in respect to prequalification assessments, UCAP determination, delisting, self-supply or market power mitigation. |
| **Rebalancing Auctions** | • After a transition period, two rebalancing auctions will be held at 18 and 3 months before the obligation period.<br>• During the transition period, ending after auctions for the 2023/24 obligation period, one rebalancing auction will be held three months before the obligation period.<br>• Capacity suppliers may offer repricing bids and incremental sell offers into the rebalancing auction. Capacity suppliers choosing to buy back an obligation for reasons other than UCAP reduction in the final rebalancing auction or missing milestones will not have the ability to submit a price above the price cap.<br>• Offers may be submitted using up to seven price quantity pairs. There will be limits as to which blocks may be inflexible.<br>• Capacity suppliers who are required to buy-out in a rebalancing auction due to failure to meet development milestones or UCAP reductions will be priced marginally above the market price cap to ensure they clear in the market.<br>• The rebalancing auction may clear with a net purchase or sale from the AESO, consistent with an updated demand curve.<br>• The shape of the demand curve will stay the same in the rebalancing auction.<br>• Rebalancing auctions will clear using the same mechanics as the base auction.<br>• Rebalancing auctions will reflect updated assessments of any anticipated transmission constraints. Previously cleared capacity committed assets which are no longer able to deliver all or a portion of their committed capacity volume will not be subject to reduced capacity payments. |
| **Monitoring and Mitigation** | • A must-offer requirement will apply to all qualified capacity assets unless they are permanently delisted or temporarily physically delisted.<br>• The AESO will conduct an ex-ante market power screen prior to each base auction to identify firms who will be subject to capacity market offer price mitigation based on their portfolio size. Rebalancing auctions will not be subject to offer mitigation.<br>• Firms subject to market power mitigation will be identified utilizing the demand curve. A market power screen will be applied to identify firms that have the ability to profitably |

| Category | High-level Design Elements |
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| | increase the clearing price of an auction by 10% or more, measured both above and below the inflection point of the demand curve, by withholding capacity from a base auction. The market power screen will be based on a firm's capacity offer control of existing asset UCAP, regardless of resource type.<br>• Firms that fail the market power screen will be required to offer all existing capacity assets at or below the default offer price cap of 0.8 x net-CONE. Assets may be allowed to offer at higher prices subject to demonstrating higher net avoidable costs. Net avoidable cost will be equal to avoidable costs minus the energy and ancillary service offset.<br>• There will be no minimum offer price requirements for capacity suppliers due to net-short capacity positions or out-of-market payments. |
| **Supply Obligations and Performance Assessments** | • Prior to the commencement of an obligation period, a capacity supplier will be required to meet development milestones:<br>o A new source capacity committed asset will be required to meet development milestones tracked by the AESO. If, prior to the first rebalancing auction, major milestones have are delayed by more than eight months, or prior to the second rebalancing auction major milestones are delayed by more than five months, the new capacity asset will be required to buy out its capacity commitment in the rebalancing auction. A new demand response asset that cannot demonstrate a UCAP equal to or greater than 75% of its capacity obligation prior to the second rebalancing auction will be required to buy out of its obligation by the amount the obligation exceeds its UCAP.<br>o In the second rebalancing auction, an existing capacity committed asset with an obligation volume greater than its final UCAP will be required to buy back the difference between its obligation volume and its final UCAP.<br>• During an obligation period, the AESO will assess a capacity committed asset on both an availability and delivery basis:<br>o The availability of a capacity committed asset will be assessed during the 250 tightest supply cushion hours. The AESO will perform a supply cushion analysis at the end of each obligation period to identify the 250 tightest supply cushion hours.<br>o The AESO will apply an unavailability payment adjustment to capacity suppliers with a negative availability volume throughout an obligation period. The unavailability payment adjustment rate will be a $/MWh value equal to 40 % of 1.3 multiplied by the asset specific weighted average capacity revenue per MW across all auctions for the obligation year divided by 250.<br>o A capacity committed asset with a positive availability volume throughout an obligation period will be eligible to receive an over-availability payment adjustment, to be wholly funded from the unavailability payment adjustments received from capacity committed assets with negative availability volumes. The over-availability payment adjustment will be based on a $/MWh rate determined by dividing the total unavailability payment adjustments collected in an obligation period ($) by the total over-availability volume (MWh).<br>o The delivery of a capacity committed asset relative to its capacity obligation will be assessed during EEA events (levels 1 through 3) using actual energy production, level of consumption and/or provision of reserves. The obligation volume will be multiplied by a balancing ratio (energy and reserves produced by all capacity committed assets during a performance assessment period divided by total capacity purchased).<br>– External assets will be considered meeting delivery requirements for the first two hours of a delivery event if they have an offer in the merit order but are not dispatched because the available transfer capability is fully utilized. |

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| | <ul><li>The AESO will apply a non-delivery payment adjustment for a capacity committed asset with a negative delivery volume. The non-delivery payment adjustment rate will be a $/MWh value equal to 60% of 1.3 multiplied by the asset specific weighted average capacity revenue per MW across all auctions for the obligation year divided by the maximum of (Expected EEA hours, 20). The non-delivery payment adjustment rate will then be multiplied by the delivery volume shortfall to determine the non-delivery payment adjustment for the delivery event.</li><li>A capacity committed asset that has a positive delivery volume will be eligible to receive an over- delivery payment adjustment. Over- delivery payment adjustments will be wholly funded from the non- delivery payment adjustments received from capacity committed assets with negative delivery volumes</li><li>In the event availability and delivery assessment periods overlap, both forms of payment adjustments will be applicable.</li><li>The AESO will cap the combined payment adjustment exposure to unavailability and non-delivery payment adjustments for each capacity committed asset. Monthly non-delivery payment adjustments for a capacity committed asset will be capped at 300% of the monthly capacity revenue based on the capacity committed asset's obligation price per MW. The cumulative annual unavailability and non-delivery payment adjustments for a capacity committed asset will be capped at 130% of the annual capacity revenue based on the obligation price per MW.</li><li>Over-availability and over-delivery payment adjustments will be capped at a 1x the capacity committed asset's total annual obligation revenue.</li><li>A capacity committed asset that is constrained down due to limits on the Alberta internal transmission system will be exempt from unavailability payment adjustments and non-delivery payment adjustments on that volume of its obligation. Availability and delivery assessments will not be conducted during market suspension, limited market operations and other specified rare events.</li><li>No other exemptions to the assessment of unavailability or non-delivery payment adjustments will be permitted, including for on-site and/or distribution system constraints, or transmission outages that result in the asset being electrically disconnected from the transmission system.</li><li>A capacity supplier will have the option of *ex ante* asset substitution, or *ex post* volume reallocation to avoid or decrease non-delivery payment adjustments associated with a failure to deliver on its obligation volume during a delivery assessment period.</li></ul> |
| Settlement and Financial Security Requirements | <ul><li>Payments will not be made to capacity suppliers prior to the start of the obligation period.</li><li>Consistent with the energy market, capacity market statements will be issued monthly.</li><li>Monthly capacity payment is equal to the capacity market price for the delivery year multiplied by the capacity obligation cleared in the base auction, minus the difference in cleared quantity between the rebalancing auctions, multiplied by relevant rebalancing price.</li><li>Capacity payment adjustments due to non-availability and non-delivery will be deducted from monthly capacity payments. Remaining payment adjustment balances will be carried over to subsequent months until the total payment adjustment is collected.</li><li>Costs of procuring capacity will be allocated to customers according to the approved capacity cost allocation methodology.</li><li>No net settlement instructions for capacity will be enabled.</li><li>Capacity assets looking to buy back in rebalancing auctions, as well as new capacity assets, will need to demonstrate sufficient credit and may have to provide security.</li></ul> |

| Category | High-level Design Elements |
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| | • Capacity obligation is the last obligation following the final rebalancing auction prior to the delivery year. This obligation must be actively tracked by the AESO.<br>• New capacity assets that have not reached commercial operation before the start of the settlement period will not be paid the monthly capacity payment in that settlement period. The monthly capacity payment for that settlement period will be held by the AESO until all penalties for the obligation year are assessed and thereafter will be applied towards the payment adjustment balance.<br>• Financial security is not required for existing capacity assets during the obligation period provided the asset maintains an obligation and is eligible for a capacity payment for the following obligation period.<br>• Any residual funds remaining after all non-availability and over-availability or all non-delivery and over-delivery payment adjustments are made will be returned to load by being applied against the costs incurred by the AESO to procure capacity. |
| **Roadmap for Changes in the Energy and Ancillary Services Markets** | • Current aspects of the energy and ancillary services markets will continue, including, without limitation:<br>  o Current self-commitment rules.<br>  o Current must-offer requirement will continue to apply to a generation asset, regardless of whether or not it has a capacity commitment (available capability must be offered).<br>  o A load asset that does not have a capacity commitment (demand response and price-responsive load) may offer or may continue to self-dispatch.<br>  o A generation asset, regardless of whether or not it has a capacity commitment, must submit information related to asset outages in accordance with current requirements (no outage approval).<br>  o All offers may be between the price cap ($999) and floor ($0), unless mitigated (further explained below).<br>  o The current market structure for ancillary services will remain the same.<br>  o *Ex post* monitoring and mitigation of the market will continue.<br>• New requirements to facilitate implementation of the capacity market and market power mitigation include:<br>  o Offer control information must be submitted.<br>  o Section 306.7 of the ISO rules, Mothball Outage Reporting will be replaced by capacity market delist process. Market participants must offer energy in the delivery period unless delisted.<br>  o Minor changes to the supply adequacy or supply shortfall rules to include assets with capacity commitments.<br>  o A load asset with a capacity commitment must participate by submitting an offer, not a bid (similar to generation assets), and comply with dispatch requirements. In the event of equal priced offers throughout the merit order, including at the offer cap ($999.99), a load asset with a capacity commitment will be the last dispatched assets. A load or aggregated load that has not cleared in a capacity auction will not have a must offer requirement.<br>  o An import or export asset will be provided the option to submit offers in price quantity pairs upon request of a new priced asset, in which case they will be dispatched during the settlement period, and may set system marginal price.<br>  o An import asset with a capacity commitment will not have priority dispatch over an import asset that does not have a capacity commitment. |

| Category | High-level Design Elements |
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| | o An import asset with a capacity commitment must offer its obligation volume into the energy market.<br>o A load asset with a capacity commitment must submit outage information, similar to the existing requirements for generation assets (no outage approval).<br>o A generating unit, aggregated generating facility, energy storage facility, load asset or aggregated load asset must submit its ramp capability during the asset's operational state (ramp table or curve).<br>o A three-part market power mitigation test will be applied:<br>– A market power screen to identify if a firm has market power based on an hourly residual supplier index (RSI) structural screen set at an RSI of 1.0. The RSI calculation will incorporate a voluntary submission of physical and financial supply obligations, which will be netted off the firm's portfolio.<br>– No-look scarcity test: If the supply cushion is forecast to be lower than 250 MW in a delivery hour, there will be no market power mitigation in that delivery hour irrespective of generator concentration or offer prices.<br>– Asset-specific reference price: Calculate the maximum price level that a generator would be expected to offer energy at if it had no market power based on the asset-specific short-run marginal costs adjusted through the use a market-wide marginal cost multiplier to account for cycling and start-up costs or a scarcity multiplier to account for scarcity market conditions.<br>o An offer that fails the market power mitigation test will have its offers or bids mitigated to an asset-specific reference price, calculated as:<br>– For thermal assets, 3 x marginal cost, defined as heat rate x fuel price + variable O&M + carbon price$_t$ x Asset-specific Carbon Efficiency Factor at supply cushions over 1,000 MW increasing to a multiple of 6 x marginal cost at supply cushions from 1,000 to 250 MW; or<br>– For other assets, including an import asset or a non-thermal, energy-limited asset, a formula that captures the concept of opportunity cost.<br>o An asset may submit to the AESO an exception request for the asset-specific reference price, and in doing so must submit its actual short-run marginal cost.<br>• The following design changes are included in the market roadmap (i.e., not included as part of the capacity market implementation for 2021) and will be reviewed and implemented as part of the ongoing evaluation of the market and day to day operations:<br>o Energy market pricing methodology, including those that may be required to ensure efficient dispatch and pricing during shortage and surplus events in the future:<br>– raising the offer cap above $999.99;<br>– negative pricing; and<br>– shortage pricing.<br>o Dispatch and flexibility:<br>– dispatch certainty through tightened dispatch tolerance, ramp by block, and delay times;<br>– introduction of a ramp product; and<br>– shorter settlement. |

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| | • The following design changes will not be included as part of the capacity market implementation or market roadmap, although they may be considered as part of a separate evaluation at another time should the need arise:<br>o locational marginal pricing (LMP);<br>o security constrained unit commitment (SCUC);<br>o security constrained economic dispatch (SCED);<br>o intertie dynamic scheduling;<br>o co-optimization of the energy and ancillary services markets; and<br>o day-ahead market (DAM). |

## 1.2 Auction Timelines and Transitionary Period

Each capacity auction process is expected to take approximately eight[3] months, starting from the prequalification process through to market clearing and posting of auction results. In the transition to the final capacity market structure, auctions will be conducted on a compressed forward period and with a reduced number of rebalancing auctions. The initial base auction process for the 2021/2022 obligation period will start in November 2019 and is anticipated to run through to approximately the end of June 2020. During the transitionary period, base auctions will be held approximately every six months until the full three-year forward period is achieved with the completion in October 2021 of the base auction process for the 2024/2025 obligation period. Please see CMD Final Sections 5 and 6 for additional detail.

[3] Subject to adjustment based on further assessment during the implementation phase of capacity market introduction. Finalized auction timelines will be provided before each auction.

# 2 Supply Participation

*This section address the requirements and processes for prequalification, self-supply designations and delisting*

## 2.1 Prequalification applications

***Prequalification of existing versus new capacity assets***

2.1.1 A new capacity asset must be prequalified by the AESO in order for such asset to be eligible to participate in a capacity auction. A new capacity asset includes brand new assets, as well as incremental and refurbished capacity assets that meet the qualification thresholds stated in subsections 2.1.12 and 2.1.14 below.

2.1.2 All existing generation assets located in Alberta that currently participate in the energy market and have an estimated UCAP equal to or greater than 1 MW will automatically prequalify to participate in the first transitional capacity auction. As described in subsection 10.2.2 of Section 10, *Roadmap for Changes in the Energy and Ancillary Services Markets,* capacity assets with a maximum capability less than 5 MW but greater than or equal to 1 MW will have the option to offer in the energy market.

2.1.3 A potential external capacity asset (import) that currently participates in the energy market must submit a prequalification application to the AESO in order to participate in capacity auctions for the first time.

***Ineligible assets***

2.1.4 An asset that is the subject of a renewable electricity support agreement in connection with Renewable Energy Program (REP) Rounds 1, 2 or 3 is not eligible to participate in a capacity auction. There is no requirement for such asset to be prequalified by the AESO.

2.1.5 An energy efficiency resource is not eligible to participate in the initial capacity auctions.

***General prequalification requirements***

2.1.6 Parties seeking to have a new capacity asset prequalified by the AESO to participate in a capacity auction must submit a prequalification application to the AESO before a prescribed deadline. The prequalification application must contain:

(a) contact information (e.g., the names of the authorized contact person(s) responsible for liaising with the AESO, telephone numbers, registered address and email address of the contact person(s) with respect to the prequalification application);

(b) a description of the new capacity asset;

(c) a detailed project development and implementation plan that includes:

i. an overall project plan for delivery of the new asset, including the commissioning period and target in-service date;

ii. a project timeline (e.g., Gantt chart, or similar schedule diagram) with an in-service date that is no later than the start of the obligation period for a capacity auction that the party is seeking prequalification for;

iii. a concise supporting narrative describing the basis for expectations and rationale for such timeline;

iv. the current status of the project's progression along the timeline, and key activities and major milestones that have been completed to date;

v. the critical path(s) in the timeline and the major milestones that form each critical path (such as environmental studies, construction permits, procurement lead times for critical equipment) and the key elements to be completed, addressed or achieved within the critical path;

vi. start/end dates and durations of key activities and dates of major milestones that have not been completed; and

vii. if applicable, any required distribution system connection approvals or agreements, including any which have already been attained and identification of the connecting authority and distribution facility owner involved with such activities.

(d) evidence that the new capacity asset has an estimated UCAP equal to or greater than 1 MW;

(e) evidence that the new capacity asset meets the asset-specific requirements set out in subsections 2.1.7 to 2.1.14, as required;

(f) evidence that the legal owner of the new capacity asset can satisfy security requirements set out in subsection 2.1.15; and

(g) such other information and evidence that the AESO deems necessary.

### *Asset-specific prequalification requirements*

2.1.7 If a capacity asset or aggregated capacity asset falls into more than one of the following asset-specific categories, the prequalification requirements in each asset-specific category will apply to the asset.

2.1.8 ***Demand response assets.*** A demand response asset is eligible to participate on the supply side of the Alberta capacity market. However, export is not considered a valid demand response asset. A prequalification application for a demand response asset must include:

(a) evidence that the demand response asset is or will be a retail or self-retail asset belonging to a valid pool participant;

(b) a description of:

i. the type of demand response (i.e., guaranteed load reduction or firm consumption level);

ii. how the demand response asset will reduce demand during a delivery period and by how much;

iii. who the likely contributors (sites) are and how and when they will be procured[1]; and

iv. the data acquisition procedure.

(c) evidence of the contributors volume for up to at least 75% of the assets obligation, to be provided to the AESO prior to the second rebalancing auction for the obligation period.

(d) if the asset provides firm consumption level demand response, an estimate of the qualified baseline:

[1] Demand response aggregators will be required to maintain records for all contributors as well as activation notices sent to their contributors specifying the start time, stop times, and dates of demand response activations, in addition to a record of contributors demonstrating the eligible portion of the demand response asset that the contributor is providing to the demand response aggregator.

i. for new loads with no consumption history in Alberta, the qualified baseline will be declared by the applicant; or

ii. for existing sites with consumption history in Alberta, the qualified baseline will be determined based on historical consumption data of the component site(s).

(e) one of the following:

i. a firm consumption level that the capacity asset will reduce to when dispatched; or

ii. a proposed UCAP representing the guaranteed load reduction.

(f) the proposed date for a physical commissioning test that demonstrates the control systems and processes for dispatch, and also checks that a relationship exists between the provider and the contributing resource(s) that results in reduced load; and

(g) site IDs, if the demand response asset is existing load.

2.1.9 ***External capacity assets.*** An external capacity asset will be an import asset and may prequalify to participate in the Alberta capacity market. A prequalification application for an external capacity asset must include:

(a) evidence of firm transmission service from the external capacity asset to the border of Alberta;

(b) evidence that the external capacity asset, or portions thereof which are seeking to participate in the capacity market, will not be used as non-recallable assets in another resource adequacy program in any other jurisdiction; and

(c) evidence from the balancing authority in which the asset is located that capacity deliveries from the external asset will only be curtailed on a pro-rata basis when firm load is curtailed in the balancing authority.

2.1.10 ***Storage assets*.** A storage asset may prequalify to participate in the Alberta capacity market. A prequalification application for a storage asset must include evidence that the asset can maintain its energy production at its estimated UCAP level for at least 4 hours.

2.1.11 ***Aggregated capacity assets.*** Separate resources in multiple locations may aggregate and participate in the Alberta capacity market as a single asset, including assets which have a UCAP less than 1 MW. A single capacity market participant will act on behalf of the resource components of the aggregate. If the aggregated capacity asset is comprised of individual component resources in multiple load settlement zones, a retail asset must be created for each settlement zone and the aggregated capacity asset is then the aggregation of the retail assets. All sites within the retail asset will be considered individual component resources for the aggregated capacity asset. The capacity of individual component resources within the aggregation cannot be offered separately into a capacity auction.

A prequalification package for an aggregated capacity asset must include:

(a) an itemized list of all the confirmed or possible individual component resources of the aggregated asset;

(b) evidence that the estimated sum of the UCAP ratings for individual component resources is equal to or greater than the minimum UCAP size of 1 MW and less than the maximum UCAP size equal to the largest existing generating asset UCAP;

(c) evidence that individual component resources of the aggregated capacity asset meet the necessary asset-specific requirements based on its fuel type; and

(d) evidence that each individual component resource of the aggregated capacity asset has or will have appropriate interval metering.

2.1.12 ***Refurbished capacity asset***. A capacity asset is a refurbished capacity asset if any of the following apply prior to the start of the obligation period for a capacity auction:

(a) retrofits have been made to the capacity asset that will result, by the commencement of the obligation period, in an increase in maximum capability by an amount exceeding the greater of:

i. 15%of the capacity asset's most recent maximum capability; or

ii. 40 MW above the capacity asset's most recent maximum capability;

or,

(b) the amount of capital required to retrofit the capacity asset will be equal to or greater than $200 per kilowatt of the whole capacity asset's most recent maximum capability after refurbishment multiplied by the current capital cost escalation rate. Investment costs may include the costs associated with reactivating a capacity asset that was previously temporarily delisted and in which investment in the asset was undertaken prior to reactivation.

A prequalification package for a refurbished capacity asset must include the cost data associated with the project in sufficient detail to allow the AESO to determine whether the relevant cost threshold is met. A corporate officer must attest that the submitted costs for refurbishment are accurate.

2.1.13 If a capacity market participant that is subject to capacity market power mitigation submits a prequalification application to refurbish one or more of its assets, it must indicate as part of the prequalification application for each asset from the options below what it intends to do if the asset fails to clear the capacity auction:

(a) permanently physically delist the refurbished capacity asset; or

(b) not permanently delist the refurbished capacity asset (i.e., continue to operate) and submit in the auction an unmitigated, inflexible single block offer and, an additional offer to be used in the capacity auction at or below the mitigated offer price in the event the unmitigated offer does not clear.

In other words, if a capacity market participant that is subject to capacity market mitigation chooses option (b) it must submit two independent offers into the capacity auction: one inflexible single block offer based on the desired price needed to refurbish (i.e., the unmitigated offer), the other based on the price the capacity market participant would have submitted had they not submitted a refurbishment plan (i.e., the mitigated offer). As described in subsection 5.8.4 of Section 5, *Base Auction*, the auction will use a multi-stage clearing mechanism taking into account the unmitigated offer first. If the unmitigated offer does not clear, then the mitigated offer is used.

A capacity market participant will only be able to offer in this manner a maximum of one time before the end of the asset life. That is, a capacity asset which elects option (b) and then does not clear will not be able to select that option again for future auctions. In any future auctions, should the capacity market participant re-file a prequalification application to refurbish, the capacity market participant must choose option (a) and permanently delist the asset if it fails to clear in the auction.

2.1.14 ***Incremental capacity asset.*** The capacity market participant may elect to add an increase in UCAP in association with an increase in maximum capability above that used to calculate the asset's most recent UCAP. Such incremental volume will not be subject to market power mitigation in accordance with Section 7, *Capacity Market Mitigation and Monitoring*, if the increase in the capacity asset's most recent maximum capability is 1 MW or greater.

A prequalification application for an incremental capacity asset must include:

(a) the new maximum capabilityin whole number MW that is at least 1 MW greater than the current maximum capability registered with the AESO; and

(b) an indication should the asset fail to receive an obligation in the auction as to whether the asset's maximum capability reverts back to the previous registered value or will remain as declared in the prequalification application.

In the event that the incremental capacity asset fails to clear the auction and receive an obligation, and the capacity market participant chooses to use the maximum capability declared in the prequalification application for future capacity auctions, the incremental capacity will:

(a) be subject to the must offer requirement for future capacity auctions; and

(b) remain unmitigated until it clears a future auction and receives an obligation.

### *Security requirement for a new capacity asset*

2.1.15 A capacity market participant must post security for a new asset before the asset can participate in its first capacity auction. As described above in subsection 2.1.1, a new capacity asset includes brand new assets, as well as incremental and refurbished capacity assets that meet the qualification thresholds stated in subsections 2.1.12 and 2.1.14. Given the cost and increase in UCAP thresholds required to qualify as a new asset, refurbishments projects are deemed new assets and will be required to provide security in order to mitigate the delivery risk.

The amount of security will be calculated in accordance with the following formula:

(a) Security requirement for brand new assets = (CONE * 1/$CRF_{\underline{new}}$) * 5% where CONE equals the gross CONE value used for the reference unit in the demand curve determination; and CRF = {i(1 + i)^n} / {[(1 + i)^n]-1}, where i = discount rate used in the gross CONE determination and n = 20 year plant life.

(b) Security requirement for refurbished assets = $200/kW * escalation rate * 5%.

(c) Security requirement for incremental assets = $100/kW * escalation rate * 5%.

As the asset demonstrates achievement of project milestones progressing toward commercial operation for the obligation period, the security requirement will decline. The declining security requirement will be calculated as follows:

(a) Security requirement rate = security requirement divided by maximum number of auctions before the obligation period.

(b) Declining security requirement = security requirement rate * obligation * number of remaining auctions before the obligation period.

The full financial security will not be returned to the capacity market participant until the asset attains commercial operation to the obligation volume.

Guidelines governing payment for the security requirement for new capacity assets is described in subsection 9.6 of Section 9, *Settlement and Financial Security Requirements*.

### *Prequalification of a new capacity asset*

2.1.16 The AESO will review all complete prequalification applications submitted within the timelines prescribed in the auction guidelines. The AESO has the right to verify any information in a prequalification application, including technical, financial, and operational data, through audits, requests for additional information, site visits and any other means that it deems necessary.

2.1.17 The AESO will prequalify a new capacity asset that meets:

(a) the minimum size requirement of 1 MW;

(b) the evidentiary requirements set out in subsections 2.1.6 to 2.1.14, as applicable; and

(c) the security requirements for a new capacity asset set out in subsection 2.1.15.

2.1.18 The AESO must notify all applicants of the prequalification results. Prequalified capacity assets will proceed to the qualification period. Please refer to Section 3, *Calculation of Unforced Capacity (UCAP) Ratings* for more information.

***Prequalification for subsequent auctions***

2.1.19 A prequalified capacity asset will remain prequalified for each subsequent capacity auction unless:

(a) the capacity market participant loses capacity market participant status; or

(b) the capacity market participant:

i. fails to submit sufficient evidence to the AESO that certain project milestones have been achieved during the forward period;

ii. performs retrofits to the asset that meet or exceed the thresholds for a refurbished capacity asset in subsection 2.1.12 or the thresholds for an incremental capacity assets in subsection 2.1.14;

iii. changes its self-supply designation;

iv. delists the asset; or

v. for an external capacity asset, no longer holds firm transmission for the obligation period for the UCAP of the asset.

## 2.2 Self-supply designations

2.2.1 The following are required to self-supply capacity:

(a) the City of Medicine Hat;

(b) a site with onsite generation[2] that is only net-metered;[3] and

(c) a site with onsite generation that is net-metered and cannot physically flow its gross volumes due to system connection limitations.

2.2.2 A site where load is served by on-site generation that can physically flow its gross volumes to the interconnected electric system has the option to self-supply capacity if it has a bi-directional net-interval meter at the connection point to the interconnected electric system. Legal owners seeking a self-supplier designation must submit a request to the AESO within the timelines prescribed in the auction guidelines.

2.2.3 The AESO will review self-supply designation requests and approve those that meet the criteria in subsection 2.2.2. Self-supply designations will remain in effect for at least 4 years. Self-suppliers may submit a change in self-supply status inside of 4 years provided the participant can demonstrate a physical change to the operation of the site. Sites who intend to self-supply or no longer self-supply must declare its intention to the AESO within the timelines prescribed in the auction guidelines.

2.2.4 The AESO will determine the volume of self-supply capacity by subtracting the sites' net load from its gross load in the 250 tightest supply cushion hours per year for the past 5 years. If the net load equals zero the entire site load is self-supplied.

[2] Sites with onsite generation include Industrial System Designation sites and sites under the Duplication Avoidance Tariff.

[3] Net meters measure electricity at the connection to the grid. Gross meters measure electricity at the electric terminus of the generator.

2.2.5 The excess load (i.e., net load) in a self-supply arrangement may apply to the AESO to prequalify as a demand response asset, in accordance with subsection 2.1.8. However, a self-supply site cannot participate as both a demand response asset and a generating capacity asset in the same obligation period.

## 2.3 Delisting

2.3.1 A capacity  market participant with an asset that is unable to participate in the Alberta capacity, energy and ancillary services markets for physical or economic reasons must submit a temporary delist request or a permanent delist notification, as applicable, to the AESO within the timelines prescribed in the auction guidelines.

2.3.2 A capacity market participant with an asset that is currently on an extended mothball outage pursuant to Section 306.7 of the ISO rules, *Mothball Outage Reporting* must submit a temporary delist request or permanent delist notification if they want to remain mothballed for the first applicable capacity obligation period.

### *AESO review of impacts to the reliability of the interconnected electric system*

2.3.3 The AESO may conduct a reliability review for a temporary delist requests or a permanent delist notification to determine whether the capacity associated with such delist is needed to maintain the reliability of the interconnected electric system during the obligation period (e.g., thermal overloads, voltage, etc.).

2.3.4 The AESO will only review impacts on supply adequacy to assess whether there is sufficient amount of capacity available to ensure the minimum target on the demand curve is met. If the results of the reliability review identify reliability concerns, the AESO may consult with the capacity market participant who submitted the request prior to finalizing its assessment of the temporary delist request or permanent delist notification.

### *Temporary delist request for economic reasons*

2.3.5 A capacity market participant may submit a temporary economic delist request to the AESO during the prequalification period for the second rebalancing auction for the corresponding obligation period. The capacity market participant must specify the capacity proposed to be economically delisted and provide net avoidable cost information for further assessment, as outlined in subsection 7.1.10 of Section 7, *Capacity Market Monitoring and Mitigation*. A corporate officer must attest that the submitted costs for the economic delist or the outage durations for physical delists are accurate.

2.3.6 In addition to completing the reliability review described in subsection 2.3.3, the AESO will, for each request as per subsection 2.3.5 above, review and approve the net avoidable cost information based on whether such costs are economically justifiable. The temporary economic delisting request must include the avoidable cost data that the economic delisting decision was based upon and a corporate officer's attestation to the accuracy of the avoidable cost data.

2.3.7 A capacity asset may temporarily economically delist from the capacity market but choose to participate in the energy and ancillary services markets for no more than 5 continuous months in the same obligation period. The temporary economic delist request must specify which continuous months during the obligation period the capacity asset would be participating in the energy and ancillary services markets. The avoidable cost data associated with the temporary economic delist request must account for the fact that the capacity asset will be online for the specified period in the obligation period.

2.3.8 The AESO will allow temporarily economically delisted capacity assets to delay the start of the outage or return to the energy market before the end of its outage term if: the AESO determines an immediate need, on a short term basis, for services provided by certain assets to maintain the necessary level of reliability or adequacy and there is a high probability that the situation cannot be alleviated through the ordinary course operation of the energy market.

2.3.9 The AESO will determine a UCAP for a capacity asset that temporarily economically delists and has an outage duration that is adjusted due to the circumstances listed in subsection 2.3.8. The UCAP will be for use in asset substitution for the period of time the capacity asset is available to produce energy during the obligation period resulting from a return to service related to the circumstances listed in subsection 2.3.8.

2.3.10 If the AESO approves the avoidable costs, the capacity market participant must offer at the net avoidable costs of the capacity asset into the capacity auction. If the capacity asset does not clear the auction, the capacity market participant will be required to temporary delist the capacity asset for the obligation period for which the capacity auction is conducted. That is, the capacity asset must be removed from the energy and ancillary service markets for the obligation period, except for the period specified in the temporary delisting request when the capacity asset will be made available to provide energy and ancillary services in accordance with subsection 2.3.7.

2.3.11 A capacity asset may not economically delist for more than two consecutive obligation periods. A capacity market participant must submit a temporary delist request for each capacity auction.

2.3.12 Any capacity obligations attributed to a capacity asset that temporarily economically delists will continue to be attributable to the capacity asset. Unless the obligations are offset through the repricing bids in a rebalancing auction as described in Section 6, *Rebalancing Auctions,* the capacity asset will be subject to the supply obligations noted in Section 8, *Supply Obligations and Performance Assessments*.

***Temporary delist request for physical reasons***

2.3.13 A capacity market participant must submit a temporary physical delist request during the prequalification period of a capacity auction if it is expected that the capacity asset will be physically unavailable to meet its obligation for a period equal to or greater than 5 continuous months in any one obligation period. A temporary physical delist request must include:

(a) an explanation of the physical limitation accompanied by supporting documentation as evidence of one or more of the following:

i. a significant physical operational restriction;

ii. major repair(s) that will extend into the applicable obligation period for more than 5 continuous months. Temporary delisting for physical reasons will not be allowed if the capacity asset is physically unavailable to meet its obligation for a period less than 5 continuous months in any one obligation period;

iii. an order, decision, final rule, opinion or final directive from a regulatory authority specifically mandating the retirement or derating of the capacity asset; or

iv. asset retirement beginning part-way through an obligation period;

or,

(b) a written, sworn and notarized statement of a corporate officer certifying that a new capacity asset, which did not clear in the capacity auction for the obligation period prior to the obligation period of the relevant capacity auction, will not be in full commercial operation prior to the upcoming obligation period.

2.3.14 The AESO will approve a temporary physical delist request if the AESO is satisfied that the capacity asset is physically unable to function for a period equal to or greater than 5 continuous months in any one obligation period. An approved temporary physical delist request for physical reasons for a portion of an obligation period will delist the capacity asset from the capacity market for the entire obligation period. The capacity asset will be required to participate in the energy and ancillary services market for the remainder of the obligation period not included in the temporary physical delist request.

2.3.15 The AESO will allow temporarily physically delisted capacity assets to delay the start of the outage or return to the energy market before the end of its outage term if the AESO determines an immediate need on a short term basis for services provided by certain source assets to maintain the necessary level of reliability or adequacy, and there is a high probability that the situation will not be alleviated through the ordinary course operation of the energy market.

2.3.16 The AESO will determine a UCAP for a capacity asset that temporarily physically delists and has an outage duration that is adjusted due to the circumstances listed in subsection 2.3.15. The UCAP will be for use in asset substitution for the period of time the capacity asset is available to produce energy during the obligation period resulting from a return to service related to the circumstances listed in subsection 2.3.15.

2.3.17 A capacity market participant will not be allowed to temporarily delist a capacity asset for physical reasons for more than two consecutive obligation periods.

2.3.18 Any capacity obligations attributed to a capacity asset that temporarily physical delists will continue to be attributable to the capacity asset. Unless the obligations are offset through the repricing bids in a rebalancing auction as described in Section 6, *Rebalancing Auctions,* the capacity asset will be subject to the supply obligations noted in Section 8, *Supply Obligations and Performance Assessments*.

#### *Permanent delist notifications*

2.3.19 A capacity market participant may submit a permanent delist notification to the AESO during the prequalification period of a capacity auction, excluding however, during the last rebalancing auction for the corresponding obligation period. Once the permanent delist notification is received by the AESO it cannot be withdrawn.

2.3.20 A capacity market participant that is currently participating in the energy market and is intending to permanently delist, if the asset has a must offer requirement in the energy or ancillary services markets, must participate in the energy market until the physical retirement of the asset.

2.3.21 An external capacity and demand response assets which permanently delist may re-enter the capacity market by submitting a prequalification application for a new asset.

2.3.22 The AESO will review each permanent delist notification for reliability concerns as outlined in subsection 2.3.3. If there are no reliability concerns, the capacity asset (or portion of such asset) will be required to fully and permanently retire and will not be eligible to participate in any capacity auctions.

#### *Reporting of delisted MW*

2.3.23 Ahead of a capacity auction, the AESO will publish on its website the total delisted MW differentiating between permanent and temporary delists.

## 2.4 Physical bilateral transactions

2.4.1 A physical bilateral transaction is a contractual arrangement between a load market participant and a capacity asset which leverages the transmission or distribution system to physically delivery of all or a portion of the load’s capacity needs, removing both the supply and demand volumes from the AESO administered capacity market. Physical bilateral transactions will not be permitted; however, a site may choose to self-supply capacity provided the site is eligible to self-supply as described in subsection 2.2 above.

# 3 Calculation of Unforced Capacity (UCAP)

*This section addresses the methodologies for calculating unforced capacity (UCAP) of capacity assets*

## 3.1 Calculation of UCAP

3.1.1 The reliability contribution (UCAP) of a capacity asset will be evaluated based on set methodologies, as described below. The UCAP determined for a capacity asset is representative of the capacity asset's physical reliability during tight supply market conditions.

3.1.2 Before every base auction and rebalancing auction, the AESO will calculate and assign an annual UCAP and UCAP range for each prequalified capacity asset.

3.1.3 The AESO will not calculate UCAP for those assets identified in subsections 2.1.4 and 2.1.5 of Section 2, *Supply Participation* (i.e., Renewable Energy Program round 1, 2 and 3 resources, and energy efficiency).

3.1.4 The capacity market participant may elect a UCAP within a range of the AESO calculated UCAP. Prior to a capacity auction, the AESO will provide each prequalified capacity asset a UCAP range equal to the greater of the following:

(a) the asset-specific UCAP range set out in subsection 3.1.6 below;

(b) +/- 2% multiplied by the asset's maximum capability. These values will be added and subtracted to the UCAP of the asset; or

(c) +/- 1 MW of the asset's UCAP.

The AESO will not provide a UCAP range that will enable the legal owner of the capacity asset to select a UCAP above the maximum capability of the asset or below 1 MW of UCAP.

3.1.5 The UCAP range will not be applicable to external capacity assets, demand response capacity assets or new capacity assets.

3.1.6 The AESO will calculate asset-specific UCAP ranges using the following methodology:

- The upper limit for the UCAP range will be determined by removing 5% of the 1250 tightest supply cushion hours in which the asset's availability factor or capacity factor was the lowest, and averaging the remaining data. This value will be multiplied by the assets maximum capability to determine the UCAP upper limit.
- The lower limit for the UCAP range will be determined by removing 5% of the 1250 tightest supply cushion hours in which the asset's observed performance was the highest, and averaging the remaining data,. This value will be multiplied by the assets maximum capability to determine the UCAP lower limit.

3.1.7 The AESO will automatically qualify all prequalified capacity assets that have a UCAP greater than or equal to 1 MW. If the UCAP of a prequalified capacity asset drops below 1 MW prior to a base or rebalancing auction, the capacity market participant will not be required to delist the capacity asset in accordance with subsection 2.3 of Section 2, *Supply Participation*. However, the capacity asset will not be qualified to participate in a subsequent capacity auction except as may be required to buy back a previously sold obligation volume.

3.1.8 Final asset level UCAPs will be shared publicly during the preauction activities described in section 5.2. UCAP values will be published on the AESO's website.

### *UCAP for capacity assets with availability or production data that meet the minimum threshold for calculating UCAP per section 3.1.11*

3.1.9 A UCAP for a capacity asset with historical generation or consumption data in Alberta will generally be based on one of two methodologies:

(a) ***Availability factor.*** Generally, a straight average availability factor approach will be used to calculate UCAP for capacity assets whose generation or load metered volumes align with the dispatch levels in the energy market.

An hourly availability factor will be calculated using duration weighted available capability as observed in the Energy Trading System divided by maximum capability for each of the 250 tightest supply cushion hours per year for the past five years. Availability factors will incorporate historical derates, forced outages, planned outages and force majeure outages. Distribution system constraints and transmission outages that result in an asset being electrically disconnected from the transmission system will not be excluded from the availability factor.

$$AF_t = \frac{\left( \sum_{i=1}^{n} w_{it} AC_{it} \Big/ \sum_{i=1}^{n} w_{it} \right)}{MC_t}$$

Where $AF_t$ is the availability factor for hour t, and $MC_t$ is the capacity asset's maximum capability in the hour. $w_{it}$ is the duration of time that the availability of the asset has been equal to $AC_{it}$. The numerator (in parenthesis) represents duration-weighted average of available capability over all available capability declarations within the one-hour settlement interval. The hourly availability factors will be averaged to create a straight average availability factor for the capacity asset:

$$SAAF = \frac{\sum_{t=1}^{N} AF_t}{N}$$

Where $SAAF$ is the straight average availability factor and N is the number of observed hours. The straight average availability factor multiplied by the capacity asset's maximum capability anticipated for the obligation period will yield the UCAP:

$$UCAP = SAAF \times MC$$

(b) ***Capacity factor.*** In the majority of cases, a capacity factor approach will be used to calculate UCAP for a capacity asset whose generation or load metered volumes do not align with the dispatch levels in the energy market. Capacity factors will incorporate historical derates, forced outages, planned outages and force majeure outages.

An hourly capacity factor ($CF_t$) will be calculated using historical metered volumes, plus any applicable ancillary services volumes of the capacity asset, divided by maximum capability for each of the 250 tightest supply cushion hours per year for the past five years:

$$CF_t = \frac{MV_t + AASV_t}{MC_t}$$

Where $MV_t$ is the metered volume at hour t that represents the amount of energy delivered to the grid over a one-hour settlement interval. $AASV_t$ is the Applicable Ancillary Services Volume within the hour.

The hourly capacity factors will be averaged to create a straight average capacity factor for the capacity asset:

$$SACF = \frac{\sum_{t=1}^{N} CF_t}{N}$$

Where $SACF$ is the straight average capacity factor and N is the number of observed hours. The straight average capacity factor, when multiplied by the capacity asset's maximum capability anticipated for the obligation period, will yield the UCAP of the capacity asset:

$$UCAP = SACF \times MC$$

### *UCAP for capacity assets that do not meet the minimum threshold hours for calculating UCAP as per Section 3.1.11*

3.1.10 Until operating history becomes available, the AESO will use one of the following approaches to supplement data for the UCAP calculation for a capacity asset that does not meet the minimum threshold hours for calculating UCAP:

(a) ***Class-averages***. Class averages are based on operating data for similarly designed or geographically located environmental assets (such as wind or solar). The class-average will be based on average energy production or available capability declarations as observed during the 250 tightest supply cushion hours per year. The AESO will calculate class-average capacity factors for each of the previous five years.

(b) ***Production or load estimates***. In the absence of comparable assets to form a class average, the AESO will review production and/or load estimates based on engineering data and historical meteorological studies (for wind and solar assets without geographically located comparators) submitted by the legal owner of the capacity asset, if appropriate, to determine an availability or capacity factor.

(c) ***Jurisdictional Review****.* In the absence of a class average or comparable class estimate, the AESO will examine how similar assets or an asset class has performance in other capacity market jurisdictions during tight system conditions.

3.1.11 As operating history becomes available, the AESO will calculate UCAP using a combination of class-average data, production or load estimates, or data based on a jurisdictional review and the capacity asset's observed capability (or production data for capacity factor assets) during the tightest supply cushion hours until the point in time the asset reaches the required minimum number of tight supply cushion hours for calculating UCAP using solely the capacity asset's historical data, as follows:

- Variable capacity assets, such as wind, solar and run of river hydro assets, are required to have production data in a minimum of 300 tightest supply cushion hours.
- All other capacity asset types, apart from variable capacity assets, will require production or available capability data, depending on if the asset is a capacity factor or availability factor asset, in a minimum of 250 tightest supply cushion hours.

### *Asset-specific UCAP methodologies*

3.1.12 Table 1 below contains the asset-specific UCAP methodologies and considerations for the calculation of UCAP.

Table 1 – *Asset-specific UCAP Methodologies*[1]

| Asset Type | Asset-specific UCAP Methodology |
| --- | --- |
| **Wind, solar and run of river hydro** | • A capacity factor will be established for wind, solar and run of river hydro assets. |
| **Thermal (including coal-to-gas conversions and net-dispatched cogeneration)** | • An availability factor will be established for thermal assets. |
| **Storage** | • An availability factor will be established for storage assets.<br>• The UCAP of a storage asset will be capped at its maximum sustainable 4 hour discharge capability. |
| **Self-supply dispatched net-to-grid** | • An availability factor will be established for self-supply assets that are dispatched net to grid. |
| **Self-supply dispatched gross-to-grid** | • An availability factor determined through a linear regression approach will be established for self-supply market participants that are dispatched gross to the grid using the following approach:<br>o The AESO will perform a linear regression of the net to grid metered output of the self-supply site relative to the weighted average energy market dispatches issued to the generating asset(s) on the self supply site as observed in each of the 250 tightest supply cushion hours per year for the past five years.<br>o The AESO will establish a gross UCAP for the generating asset(s) as described above in 3.1.9.a. This value will be the x variable to be used in the linear regression formula y=M*X + B<br>• The AESO will determine the availability factor linear regression UCAP value for the asset using the output from the linear regression formula and the slope calculation. |
| **Hydro** | • An availability factor will be established for existing hydro assets the Bow River system, Brazeau and Big Horn assets. |
| **Demand response**<br>**Firm consumption level** | • Until FCL capacity assets have performance data in a minimum of 250 tightest supply cushion hours, the UCAP level will be calculated as follows:<br>UCAP = CC * (1-derate factor)<br>• The capacity contribution (CC) of new firm consumption level assets will be measured as the difference between the qualified baseline (QB)[2] and the firm consumption level of the demand response capacity asset:<br>CC = QB – FCL |

[1] References to "existing" and "new" in Table 1 mean capacity assets with and without 5-year historical generation or consumption data in Alberta, respectively.

[2] As described in subparagraph 2.1.7(c) of Section 2, *Supply Participation*, new FCL loads with no consumption history in Alberta will declare their qualified baseline to the AESO during the prequalification period.

<table>
<tr><th>Asset Type</th><th>Asset-specific UCAP Methodology</th></tr>
<tr><td></td><td>

- Derating Factor:
  - o Until Alberta capacity market performance data can be observered, demand response assets will have a derating factor of 9% or an availability factor of 91%.
  - o When Alberta capacity market performance data is available, a new firm consumption level capacity asset will receive the class-average availability factor for all demand response assets.
- Once an FCL capacity asset has had a capacity market obligation in a minimum of 250 tightest supply cushion hours, UCAP will be calculated as:

UCAP = QB - FCL

- The value the AESO will use to determine the qualified baseline in each tight supply cushion hour will use the following methodology:
  a. Average the load consumed in “like” hours on:
     - the 15 day non-holiday weekdays prior to the tight supply cushion hour ; if tight supply cushion hour fell on non-holiday weekday.
     - the 10 day weekend and holiday days prior to the tight supply cushion hour. If tight supply cushion hour fell on weekend or holiday.
  b. Days with tight supply cushion hours and performance event days will be excluded from the adjusted qualified baseline:

The FCL will be declared by the owner of the asset during prequalification.

- The asset must demonstrate the ability to reduce down to its firm consumption level during a performance event.
  - o If the asset is not capable of demonstrating an ability to reduce down to its firm consumption level the AESO will physically test the asset.
  - o If after the first obligation period there have not been any performance events then the asset is to demonstrate a reduction down to its firm consumption level via a physical test, the capacity asset will need to demonstrate load reduction at or below the firm consumption level value, and maintain the reduction for 1 hour. Failure to perform to meet the physical test successfully will result in UCAP reduction for subsequent capacity auctions. The firm consumption level will be adjusted to reflect the observed load reduction.

</td></tr>
<tr><td>Demand response Guaranteed load reduction</td><td>

UCAP = CC * (1-derate factor)

CC = GLR

- The capacity contribution (CC) for new guaranteed load reduction demand response is the guaranteed load reduction declared by the legal owner during the prequalification period.

</td></tr>
</table>

| Asset Type | Asset-specific UCAP Methodology |
| --- | --- |
| | • Derating Factor:<br>o As with FCL assets, in the first three obligation periods demand response assets will have a derating factor of 9% or an availability factor of 91%.<br>o When Alberta capacity market performance data is available,a new guaranteed load reduction capacity asset will receive the class-average availability factor for other Alberta guaranteed load reduction assets.<br>o When Alberta capacity market performance data is available,, individual asset performance will be established using availability factor methodology. |
| **Aggregated assets** | • Depending on the fuel-type of the aggregated capacity asset, an availability factor or a capacity factor may be established. If the assets are both availability factor assets, an availablitiy factor UCAP methodology will be used. If the assets are capacity factor or a combination of capacity factor and availability factor assets a capacity factor methodology will be applied.<br>• The UCAP for an existing aggregated capacity asset will be based on the combined historical performance of the individual component resources during the 250 tightest supply cushion hours during the previous five years.<br>• The UCAP for an aggregated capacity asset that is combining two or more new assets will be based on the individual assets combined asset class-average production during the 250 tightest supply cushion hours during the previous five years. |
| **External assets** | *Determination of capacity limit of each Alberta intertie*<br>During a capacity auction, the capacity procured from external capacity assets will not exceed the capacity limits of the BC intertie, MATL intertie, the combined BC/MATL path, and the Saskatchewan intertie.<br>The capacity limits are determined as follows:<br>(a) The hourly capacity limits of the BC intertie will be determined using the minimum of the hourly BC to Alberta import ATC and the total firm transmission service on the BC intertie for each of the 250 tightest supply cushion hours per year for the past five years. The capacity limit of the BC intertie will then be calculated by averaging the hourly capacity limits for the BC intertie.<br>(b) The hourly capacity limits of the MATL intertie will be determined using the minimum of the hourly MATL to Alberta import ATC and the total firm transmission service on the MATL intertie for each of the 250 tightest supply cushion hours per year for the past five years. The capacity limit of the MATL intertie will then be calculated by averaging the hourly capacity limits for the MATL intertie.<br>(c) The hourly capacity limits of the combined BC/MATL interties will be determined using the minimum of combined firm transmission for the BC and MATL interties, and the combined BC/MATL ATC prior to LSSi arming for each of the 250 tightest supply cushion hours per year for the past five years. The capacity limit of the BC/MATL interties will then |

| Asset Type | Asset-specific UCAP Methodology |
|---|---|
| | be calculated by averaging the hourly capacity limits for the BC/MATL intertie.<br>(d) The hourly capacity limits of the Saskatchewan intertie will be determined using the minimum of firm transmission service on the Saskatchewan intertie, and the Saskatchewan to Alberta import ATC for each of the 250 tightest supply cushion hours per year for the past five years. The capacity limit of the Saskatchewan intertie will then be calculated by averaging the hourly capacity limits for the Saskatchewan intertie.<br>*External asset UCAP determination*<br>• The following methodologies apply for determining the UCAP of external capacity assets.<br>*New external assets*<br>o New external assets must declare the external capacity volume it is willing to sell, and demonstrate that the external asset has firm transmission in the amount of the volume declared.. The declared capacity volume must be from a non-recallable source equal or greater in size than the volume declared. The AESO will derate the declared volume to reflect the frequency of time during historical supply cushion hours that the respective intertie was out of service with 0 available transfer capability, to determine the UCAP volume of the external asset.<br>*Existing external assets*<br>o For existing external assets, an availability or capacity factor approach will be used to determine UCAP, in the same manner as an internal capacity asset.<br>o Until Alberta capacity market performance data is available,, the UCAP for all external resources will be determined based on the UCAP methodology for new external assets. |
| **Mothballed or temporary delisted assets** | • The UCAP for capacity assets that have been mothballed pursuant to Section 306.7 of the ISO rules, *Mothball Outage Reporting* or temporarily delisted in accordance with the process outlined in subsection 2.3 of Section 2, *Supply Participation* will be determined using the following methodology:<br>(a) The AESO will require at least 250 hours of observed asset performance during tight supply cushion hours to calculate the UCAP for all assets, apart from variable assets (wind, solar, run of river hydro), for which 300 hours are required.<br>i. If the delisted capacity asset has the minimum hourly amount of observed asset performance data available, the AESO will average the asset's availability or capability during each hour to determine the UCAP for the asset.<br>ii. If the delisted capacity asset has data available for less than the minimum hourly amount of observed asset performance data available, the AESO will use the asset's actual availability or capability over the observed tight supply cushion hours to determine the UCAP for the asset. |

| Asset Type | Asset-specific UCAP Methodology |
|---|---|
| | The hours that the asset's performance could not be observed will be supplemented with a class average for similarly-designed assets during each of the unobserved hours such that a total of 250 data points is obtained. A simple average of the asset-specific and class average availability or capability will be used to determine the UCAP of the asset. |
| **Long Lead Time Assets, Type 2** | • The AESO will calculate UCAP for a long-lead time asset type 2[3], based on the asset's availability during the 1250 tightest supply cushion hours. An availability factor methodology will be utilized, as applicable to the capacity asset.<br>• Hours where availability was reduced due to a long lead time configuration for economic purposes will be excluded from the sample set used to create the final asset capacity value.<br>• To confirm that availability was reduced due to a long lead time claim for economic purposes, the AESO will review the following:<br>(a) The participant comment in ETS indicating that the unit was offline for a long lead time configuration.<br>(b) The cost assessment for the asset in comparison to pool price during that period.<br>• The number of hours to establish a statistically significant UCAP for thermal assets will be equal or greater than 250 hours.<br>• If a long lead time asset has less than the 250 tight supply cushion hours the asset's availability will be supplemented with a class average for similarly designed assets.<br>In order to avoid underestimating the reliability of long lead time type 2 assets, the availability factor calculation will only include hours that were not impacted by the long lead time configuration. |

## 3.2 UCAP refinement process

3.2.1 In advance of a capacity auction, the AESO will publish on its website the tightest supply cushion hours it will use to calculate UCAP and provide a preliminary UCAP and UCAP range to each capacity market participant.

3.2.2 The capacity market participant may review the preliminary UCAP and UCAP range provided by the AESO and submit a refinement request, along with supporting evidence, to the AESO for the following exemptions:

(a) the metering or Energy Trading System data during the tight supply cushions hours that the AESO evaluated does not accurately reflect the available capability of the capacity asset due to:

i. events such as market suspension, limited markets operations, war, invasion, armed conflict, blockade, act of public enemy, riot, revolution, insurrection, act of

[3] As defined in the AESO CADG definition of "long lead time asset" and clarified in Information Document #2012-007 (R), *Long Lead Time Energy*.

terrorism, sabotage, act of vandalism, fire, lightning, explosion, earthquake and flood; or

ii. reductions to available capability due to Alberta bulk electric system constraint;

(b) the capacity asset has or will undergo physical changes before the start of the obligation period that will increase or decrease the operational capability of the capacity asset compared to how it performed historically. The minimum change in operational capability of the capacity asset must be at least 1 MW; or

(c) the class average data, production or load estimates and/or jurisdicational assessment used in calculating the UCAP for an asset that does not meet the minimum threshold as per section 3.1.11, does not create a comparable representation of the capacity asset's future performance.

Any request must be supported with sufficient evidence to support the refinement request.

3.2.3 The AESO will review UCAP refinement requests and, if the AESO is satisfied with the evidence provided by the capacity market participant, provide a revised UCAP and UCAP range to the capacity market participant.If a capacity market participant does not agree with the AESO's determination or revised UCAP, the capacity market participant may file a dispute through the dispute resolution process as described in subsection 5.3 of Section 5, *Base Auction*.

# 4 Calculation of Demand Curve Parameters

*This section addresses the demand curve for the Alberta capacity market, including the calculations for the components of the demand curve.*

## 4.1 Resource adequacy standard

4.1.1 The Government of Alberta announced it will legislate a minimum resource adequacy standard. This value represents a maximum of 0.0011% unserved energy, described as normalized expected unserved energy. The AESO will develop the demand curve to meet this minimum resource adequacy standard.

## 4.2 Resource adequacy model & procurement volume determination

4.2.1 The AESO will develop and run a resource adequacy model (RAM), which performs a Monte Carlo simulation to probabilistically model hundreds of inputs to consider supply adequacy factors and understand their impacts on reliability. The simulation tool for performing the RAM is a computer program that uses data inputs, methodologies and assumptions to identify the relationship between expected unserved energy (EUE) and installed capacity (ICAP). The RAM will consider factors that impact the supply and demand balance in Alberta, such as:

(a) ***Load forecast.*** The AESO's forecast of gross load includes multiple annual hourly load profiles based on historical hourly weather patterns of the past 30 years and a set of economic growth scenarios.

(b) ***Supply availability.*** Current and anticipated generation and demand response assets with maximum capability of 5 megawatts (MW) or greater are included in the RAM irrespective of technology type or eligibility to participate in the Alberta capacity market.

(c) ***Characteristics of thermal assets***. Thermal assets are modelled using market simulation input assumptions and will be dispatched to load and optimized for both energy and ancillary services. Historical available capability data informs planned outage periods, forced outage rates and temperature derates:[1]

i. *Forced outages* – a seasonal distribution of time-to-fail hours (TTF) and time-to-repair (TTR) hours will be calculated for each generating unit to capture historical estimated forced outage rates in the RAM, which are then used in simulating unit forced outage events.

ii. *Planned outages* – hours on planned maintenance will either be calculated as a percentage maintenance rate or manually scheduled based on historical data. This information will then be used to schedule maintenance events in the RAM.

[1] At this time, transmission constraints within Alberta will not be considered as a factor that will impact resource availability.

iii. *Seasonal outage* – technology output curves that are calculated using historical available capability data and corresponding weather data to capture ambient temperature derates. Such curves will be used to model weather related derates for combined cycle and simple cycle units. The RAM references the curve to an hourly temperature value to look up an associated capacity multiplier to determine the output capacity of a unit.

(d) ***Load served by onsite generation.*** The gross availability of generating assets which serve load onsite (typically large industrial facilities that produce electricity and steam for other processes) in aggregate is correlated to gross load. Using historical hourly data, the daily gross peak load and daily gross peak generation availability can be calculated in aggregate and grouped into a number of different normalized load levels with a number of distribution points. The distributions will be defined seasonally to account for seasonal variances in availability within annual industrial production. The RAM will estimate gross availability in the hourly simulation by drawing an output from the daily gross availability distribution based on the daily peak load.

(e) ***EEA event measurement.*** For purposes of the RAM, an EEA event will be defined as the activation and utilization of contingency reserves to meet demand when there is no remaining available supply. The RAM will begin measuring simulated firm load shed once estimated contingency reserves are depleted. In the estimation of unserved energy, regulating reserves will be maintained during load shed events.

(f) ***Renewable profiles.*** Wind and solar hourly output profiles will be developed to account for geographical diversities and technological advancements:

i. *Wind* – the RAM maps wind resource profiles to the same weather year used for the load profiles in order to capture the correlation between load and intermittent wind generation. Wind profiles are developed by using metered output from existing wind farms and simulated for weather years for which there is no historical metered output. Correlations between aggregated wind zones are maintained.

ii. *Solar* – the RAM maps solar resource profiles to the same weather year used for the load profiles in order to capture the correlation between load and intermittent solar generation. Solar profiles are developed using the National Renewable Energy Laboratories data and simulated for weather years for which there is no data.

(g) ***Hydroelectric generation.*** Hydro is modelled using historical values to develop dispatch schemes so that the simulated dispatch of the hydro fleet closely mimics the actual dispatch of the fleet, taking into account the hydrological nature of a year, month, and system conditions.

(h) ***Imports****.* Historical available transfer capacity (ATC) data is used to develop a distribution of transmission availability to model the impact of import capability from neighbouring power grids and capture the effects of transmission constraints and outages. In addition to historical ATC, the AESO will also use historical gross offers to develop a distribution of supply availability over the Saskatchewan intertie. For this interconnection, ATC alone does not accurately represent the availability of supply during tight supply situations.

4.2.2 The AESO will add or subtract volumes of ICAP to identify the relationship between capacity and resource adequacy (i.e., EUE). The type and characteristics of the capacity added to the RAM will align with the characteristics of the reference technology. The AESO will identify the appropriate ICAP values that meet resource adequacy requirements based on the ICAP-EUE relationship.

4.2.3 The AESO will use a formula to translate the ICAP values into fleet-wide unforced capacity values. The formula will align with the UCAP calculation approach defined in subsection 3.1.4 of Section 3, *Calculation of Unforced Capacity (UCAP)* to ensure consistency of the resource adequacy requirements from the RAM and the resource adequacy contribution of the various capacity assets. The AESO reduces the fleet-wide unforced capacity value by the prequalified volume of self-supply and ineligible assets to determine the procurement volume for the capacity auction.

## 4.3 Calculation of gross-CONE & net-CONE

***Reference technology***

4.3.1 The AESO will select a reference technology for use in the development of the demand curve. During the transition period, the reference technology for the capacity auctions will be a natural gas-fired technology determined through detailed cost screening. The technologies that will be assessed in greater detail include:

(a) an aeroderivative simple-cycle gas turbine generation facility, comprised of two LM6000 turbines;

(b) a simple-cycle frame gas turbine generation facility, comprised of one F-class turbine; and

(c) a combined-cycle frame gas turbine generation facility, comprised of one H-class gas turbine and one steam turbine.

Additional details on the reference technology will be developed by the AESO and subject to further consultation.

4.3.2 The AESO will use the following selection criteria to determine the reference technology during each demand curve review cycle (i.e., every four to five years):

(a) ***Frequency of development****.* An assessment of the historical development activities of multiple generation assets, that are the same or a similar type of technology, provides an indication of a generation developer's optimal choice of asset for the Alberta market. This assessment will take into account factors such as overall economics, system requirements and environmental requirements.

(b) ***Impact to market***. An assessment of whether an asset is a suitable new entrant into the Alberta market given the market size and unique market characteristics, as understood by the AESO.

(c) ***Reference plant costs****.* An assessment of the gross and net cost of a new asset will provide an indication of the potential future economic viability of a new asset in the Alberta power market. The assessment of net cost will consider energy margins and factors such as environmental costs and operational limitations.

(d) ***Generation source of last resort / fastest time to energization (months)****.* An assessment of the ability to add new capacity in the timeline required to meet the forward period obligation.

***Approach to gross-CONE estimate***

4.3.3 The AESO will contract with an independent consultant that has Alberta-specific experience in power plant development, engineering/construction and finance to develop appropriate cost, and financing assumptions for the reference technology.

4.3.4 The independent consultant will provide the AESO with a credible gross-CONE estimate, reflecting the plant development and financing costs for the reference technology in Alberta. Plant development costs will incorporate, among other things, equipment, construction labour and materials, emissions control, and related owner costs. Financing costs for the reference technology will be measured as an after-tax weighted average cost of capital (ATWACC). ATWACC will be composed of equity and debt rate components that are weighted according to a debt/equity split. The ATWACC will be used to calculate the levelized annual return on, and return of, capital associated with the reference technology. The levelized annual return will be added to the annual fixed operating and maintenance costs for the reference technology to arrive at the annual gross-CONE value. Additional details on gross-CONE will be developed by the AESO and subject to further consultation.

4.3.5 The AESO will submit an updated gross-CONE study during each demand curve review cycle. In between review cycles, the AESO will follow a defined process to adjust the gross-CONE estimate, annually, using applicable cost indices and interest rates.

### *Approach to energy and ancillary services offset*

4.3.6 To calculate the energy and ancillary services offset (EAS offset) that will then be used to estimate net-CONE, the AESO will use a forward market methodology that is conducted in accordance with the following assumptions:

(a) the new entrant will be a stand-alone entity not within a portfolio of assets;

(b) the EAS offset will be estimated using an approach as if the new entrant will use forward power and natural gas prices to generate a forward commodity margin in the energy market;[2]

(c) the EAS offset will initially exclude revenues from ancillary services; and

(d) the new entrant will assess different forward products (i.e., baseload versus peak products) to maximize its offsets.

Additional details on the EAS offset will be developed by the AESO and subject to further consultation.

### *Approach to net-CONE estimate*

4.3.7 The AESO will determine net-CONE by subtracting the EAS offset from the gross-CONE:

$$\text{net-CONE} = \text{gross-CONE} - \text{EAS offset}$$

4.3.8 The net-CONE will have a minimum of zero and a maximum of gross-CONE. The net-CONE estimate will measure the capacity market based revenue required to ensure the reference technology will recover an annualized return on and of capital. The inflection point and the capacity price cap on the demand curve will be set in reference to net-CONE.

[2] Other components of the commodity margin will include but not be limited to carbon costs, variable operations and maintenance and losses.

## 4.4 Shape of the demand curve

4.4.1 The demand curve for the Alberta capacity market will be a downward-sloping, convex curve consisting of three segments: (i) horizontal section from zero to the minimum quantity; (ii) downward-sloping section from the minimum quantity to inflection point; and (iii) downward-sloping section from inflection point to the foot, at zero price.

(a) In order to achieve a convex shape, the slope on the minimum-to-inflection segment of the curve will be steeper than the slope of the inflection-to-foot segment.

(b) The Y-axis points for the demand curve will be set in reference to price and will be expressed as a multiple of net-CONE and/or gross-CONE. Prices will be expressed in units of dollars per kW (UCAP) per year ($/kW-yr).

(c) The foot will be set at a price of zero.

(d) The X-axis points for the demand curve will be set in reference to the quantity of UCAP MW of capacity and will be expressed as a multiple of the quantity corresponding to the maximum acceptable EUE.

(e) The foot and inflection point of the demand curve will be set at prices and quantities that balance the combined objectives of clearing at procurement volumes above the minimum level at least 95% of the time, controlling capacity price volatility and keeping customer cost low.

4.4.2 The proposed demand curve shape is described below and in Table 1 and illustrated in Figure 1:

(a) The minimum quantity point will be set at a value of capacity equivalent to achieving the Government set minimum of 0.0011% of EUE (for the first auction this is expected to be 964 MWh) in one year, based on the output of the RAM, which is translated into UCAP volume and reduced by ineligible REP capacity (see peach-coloured line in Figure 1). The minimum acceptable quantity point will be defined in terms of the *gross* supply in the market (i.e., *including* self-supply MWs). The point will be left-shifted by the self-supply MWs prior to each auction (i.e., the self-supply MWs will be subtracted from the 964 MWh EUE quantity).

(b) The AESO has determined that the quantity procured in the base auction should only fall below the Government's minimum reliability level, at most, 5% of years. In years where the base auction clears below the minimum, the AESO will be able to achieve the Government's minimum through the rebalancing auctions and, on rare occasions, out-of-market procurements.

(c) The price cap will be set based on the maximum value of either a 1.75 net-CONE multiple or a 0.5 gross-CONE multiple.

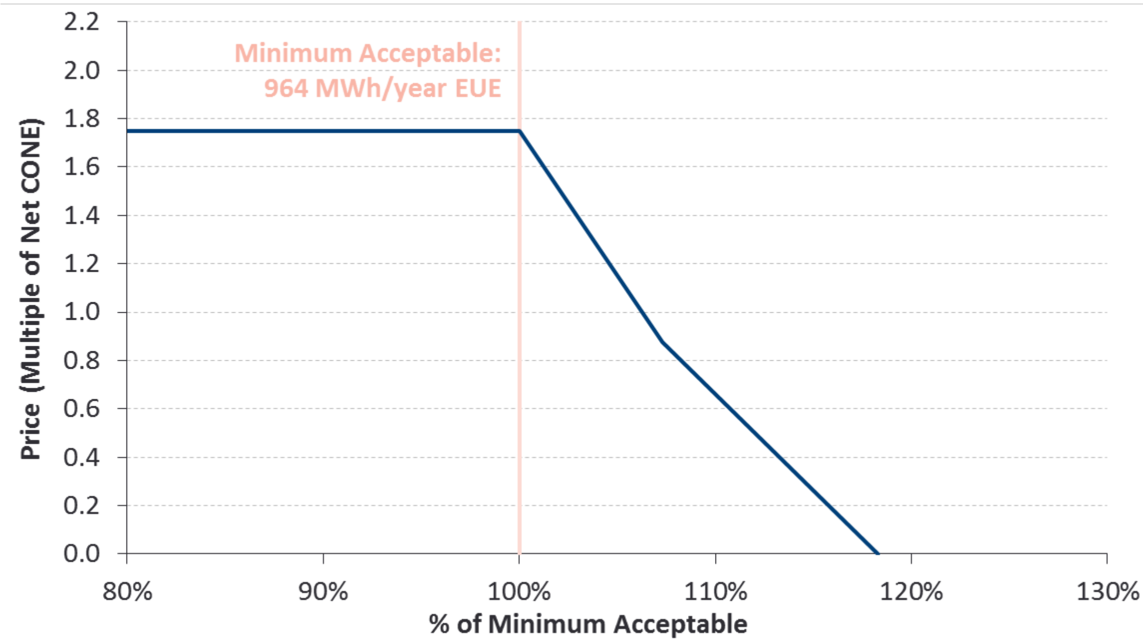
(d) The inflection point is set at 0.875 x net-CONE, at a quantity 7% above the minimum acceptable quantity. The inflection point will be defined relative to the minimum acceptable quantity in terms of the *gross* supply in the market (i.e., *including* self-supply MWs). The inflection point will be left-shifted by the self-supply MWs prior to each auction (i.e., the self-supply MWs will be subtracted from the inflection point based on gross supply).

(e) The foot is set at 18% above the minimum acceptable quantity, at a price of zero.

**Table 1 – *Candidate curve points***

| Point | Price | *Gross* Quantity | *Net* Quantity for Auction |
|---|---|---|---|
| **Price Cap** | Max (1.75 x net-CONE, 0.5 x gross-CONE) | 100% x Minimum Acceptable UCAP MW | 100% x (Minimum Acceptable UCAP MW – Self-Supply MW) |
| **Inflection Point** | 0.875 x net-CONE | 107% x Minimum Acceptable UCAP MW | 107% x (Minimum Acceptable UCAP MW – Self-Supply MW) |
| **Foot** | 0 | 118% x Minimum Acceptable UCAP MW | 118% x (Minimum Acceptable UCAP MW – Self-Supply MW) |

**Figure 1 – *Illustration of proposed demand curve***




## 4.5 Demand curve for rebalancing auctions

4.5.1 The rebalancing demand curve will have the same shape as the base auction demand curve and it will be based on the same net-CONE. However, the procurement volume will be updated using an updated resource adequacy assessment completed prior to the commencement of each rebalancing auction.

# 5 Base Auction

*This section addresses the specific timeline, format and mechanics for a base auction*

## 5.1 Auction forward period and timeline

5.1.1 The AESO will conduct the base auction three years before the start of the obligation period with the exception of the transition period.

5.1.2 The AESO will commence the implementation of the Alberta capacity market by utilizing a transition period. This transition period will commence with prequalification for the first base auction in November 2019 and will continue until the conclusion of the October 2021 base auction.

Following the first base auction, two subsequent base auctions will be held at approximately six month intervals. One base auction will be completed in January 2021 with an approximately 21 month forward period, and another base auction will be completed in June of 2021 with an approximately 28 month forward period. The October 2021 base auction, for the 2024/25 obligation period, will be the first auction conducted with the full three-year forward period. The transition timeline to the three-year forward period is shown in Table 1 below. The dates with asterisks will be finalized in the implementation stage.

**Table 1 – *Timeline for base auction***

| Pre-qualification Starts | Auction Date | Obligation Period |
|---|---|---|
| Nov. 2019 | Jun. 2020* | 2021/22 (Nov. – Oct.) |
| May 2020* | Jan. 2021 | 2022/23 (Nov. – Oct.) |
| Nov. 2020* | Jun. 2021 | 2023/24 (Nov. – Oct.) |
| Mar. 2021* | Oct. 2021 | 2024/25 (Nov. – Oct.) |

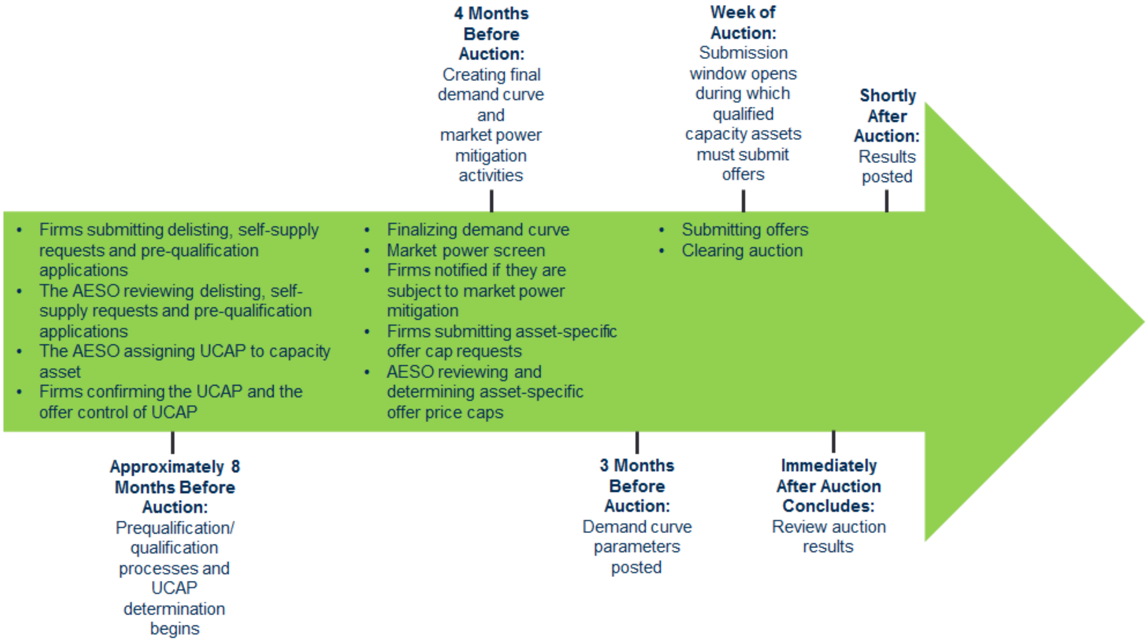
## 5.2 Base auction guidelines and schedule

5.2.1 Prior to the commencement of each capacity auction, the AESO will publish:

(a) auction guidelines that contain the auction format, details on how to prequalify for the capacity auction, the timetable for submission of applications, IT system information, provisional parameters and other general auction information; and

(b) a schedule identifying the key activities that will be undertaken for each base auction. Figure 1 is an illustration of the key activities and the timeline of a base auction. The timeline will be refined in the implementation stage.

**Figure 1 – *Anticipated base auction timeline post transition period***




5.2.2 Once the prequalification is completed, the AESO will assign each capacity asset a specific UCAP rating in accordance with Section 3, *Calculation of Unforced Capacity (UCAP)*.

5.2.3 The AESO will compile capacity offer control information declared by capacity market participants and notify capacity market participants if any portion of their capacity assets is under offer control of a firm that is subject to market power mitigation measures in accordance with the process outlined in Section 7, *Capacity Market Monitoring and Mitigation*.

5.2.4 The AESO will provide notice of the base auction parameters in accordance with the process outlined in Section 4, *Calculation of Demand Curve Parameters*.

5.2.5 A capacity market participant or a firm which has offer control of a capacity asset may have an opportunity to dispute determinations made by the AESO, per the dispute resolution process outlined in subsection 5.3 below.

5.2.6 The AESO will review and report the auction results following auction clearing and post the results shortly after the auction is completed.

## 5.3 Dispute resolution

5.3.1 The AESO will determine a dispute resolution process such that a capacity market participant or a firm which has offer control of a capacity asset may have an opportunity to dispute determinations made by the AESO, such as determinations made in respect of the following:

(a) prequalification assessments;

(b) UCAP;

(c) Delisting;

(d) self-supply; and/or

(e) market power mitigation.

5.3.2 The AESO is continuing to assess and evaluate an appropriate framework with respect to the resolution of all capacity market related disputes.

## 5.4 Obligation period

5.4.1 Each obligation period will be one year in duration, starting on November 1 and continuing through to and including October 31 of the following year.

## 5.5 Supply participation and offer format

5.5.1 Each qualified capacity asset may submit up to seven blocks and must specify, in its offer, a number of characteristics that will be used to facilitate the clearing process. Offers must include the following:

(a) **Capacity asset ID.** The capacity asset ID is the unique identifier assigned to a capacity asset.

(b) **Flexibility.** Whether a block is flexible or inflexible. The first block of a qualified capacity asset offer may be designated as inflexible or flexible. All the other offers from that qualified capacity asset with higher offer prices than the inflexible block must be flexible.

If both existing capacity and incremental capacity are offered from the same capacity asset, they may use up to seven blocks in total and the following rules will apply with respect to flexibility of blocks:

- the first block that contains existing capacity may be designated as inflexible or flexible;
- all blocks with higher offer prices containing existing capacity must be flexible;
- the first block that contains incremental capacity may be designated as inflexible or flexible; and
- all blocks with higher offer prices containing incremental capacity must be flexible.

(c) **Price.** The price in $/kW-year for each block.

(d) **Quantity.** The quantity in UCAP MWs for each block.

5.5.2 Other requirements that will apply to the submission of offers in a capacity auction include:

(a) offer prices in a base auction will be bound by a minimum of $0/kW-year and a maximum of the price cap established by the demand curve;

(b) the minimum block size will be one MW;

(c) each offer block must identify the firm that has the capacity offer control of the block; and

(d) the offer curve of each qualified capacity asset formed with price-quantity pairs is required to be monotonically increasing.

5.5.3 A capacity market participant must offer the entire qualified UCAP for its qualified capacity assets in each base auction.

## 5.6 Out-of-market capacity payments

5.6.1 No adjustments will be made to capacity market offers from qualified capacity assets for the purposes of adjusting for out-of-market payments.

5.6.2 Resources from REP Rounds 1, 2, and 3 will not be eligible to participate in the capacity market.

## 5.7 Single-round uniform price auction

5.7.1 A sealed-bid, single-round, uniform pricing auction will be utilized for each capacity auction.

5.7.2 When an auction clears in an unconstrained manner, a single capacity price will be established for all qualified capacity assets that clear the market.

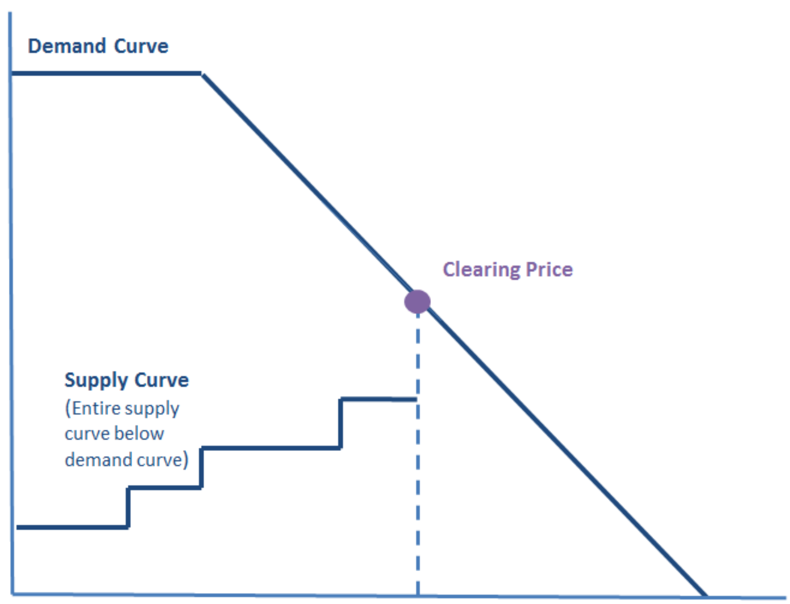
## 5.8 Auction clearing and price setting

5.8.1 The AESO will utilize a capacity market auction clearing algorithm that will seek to maximize social surplus and in so doing, minimize deadweight loss.

5.8.2 The AESO will utilize a capacity market auction clearing algorithm that will, where the market cannot clear at the intersection of the supply and demand curve, clear the capacity offers that maximize social surplus.

5.8.3 The AESO will set the capacity market clearing price at the demand curve where the entire supply curve is below the demand curve, or where the entire procurement volume is below the demand curve. For clarity, the capacity market clearing price will be set at the intersection between the vertical line drawn from the procured volume and the demand curve as set out in Figure 2 below:

**Figure 2 – *Auction price setting when entire supply curve is below demand curve***




5.8.4 In the event that a capacity market participant submits offers as outlined in subsection 2.1.13 of Section 2, *Supply Participation*, the auction clearing process outlined in subsection 5.8.1-5.8.3 above may take multiple iterations before establishing the final clearing price. The procedures described in subsections 5.8.1- 5.8.3 would apply in each iteration.

5.8.5 In the event there are transmission constraints that limit the full selection of a capacity offer at or below the unconstrained clearing price, the capacity market clearing price will be set at the unconstrained price level established without consideration of transmission constraints. A qualified capacity asset offering capacity volume at prices higher than the unconstrained price level, where such capacity volume is required to satisfy the total volume determined through unconstrained market clearing, will receive an uplift payment for such capacity volume equal to the difference between their offer price and the unconstrained clearing price.

## 5.9 Addressing intertie transmission constraints

5.9.1 Prior to each base auction, the AESO will estimate the joint scheduling limits across interties expected during the relevant obligation period as per the methodology referenced in subsection 3.1.9 of Section 3, *Calculation of Unforced Capacity (UCAP)*. Should a constraint be identified which prevents the simultaneous delivery of external capacity assets across multiple interties, external capacity assets will not have their individual UCAP ratings reduced. Capacity offers will generally be cleared as follows subject to the principle of maximizing social surplus:

(a) lower-priced capacity offers will be cleared with priority to higher-priced capacity offers;

(b) when there are multiple external capacity assets with the same capacity offer price at the constraint volume level, external capacity asset offers that maximize the social surplus in the auction will be cleared first. This will provide priority to offers that are composed of flexible blocks;

(c) should qualified capacity asset volumes in addition to those in (a) and (b) be available then capacity offers will be cleared on a pro rata basis; and

(d) volumes remaining after the constraint level has been reached will be considered not to have cleared the market and will not receive a capacity obligation. All capacity-committed assets will receive the overall capacity market clearing price set in accordance with subsection 5.8.

## 5.10 Addressing internal transmission constraints

5.10.1 Prior to each auction, the AESO will identify the location and impact of any intra-Alberta transmission constraints that are anticipated to impact the ability for capacity to be delivered during the relevant obligation period.

5.10.2 Clearing of qualified capacity assets that are located behind an identified transmission constraint will be done based on qualified capacity asset UCAP levels up until the level of the constraint. Capacity offers will generally be cleared as follows subject to the principle of maximizing social surplus:

(a) lower-priced capacity offers will be cleared with priority to higher-priced capacity offers;

(b) when there are multiple external capacity assets with the same capacity offer price at the constraint volume level, external capacity asset offers that maximize the social surplus in the auction will be cleared first. This will provide priority to offers that are composed of flexible blocks;

(c) should qualified capacity asset volumes in addition to those in (a) and (b) be available then capacity offers will be cleared on a pro rata basis; and

(d) volumes remaining after the constraint level has been reached will be considered not to have cleared the market and will not receive a capacity obligation. All capacity-committed assets will receive the overall capacity market clearing price set in accordance with subsection 5.8.

# 6 Rebalancing Auctions

*This section addresses the rebalancing auctions that will enable the AESO to purchase additional capacity and provide opportunities for capacity assets to either increase or reduce their capacity commitments*

## 6.1 Rebalancing auction timeline and procedures

6.1.1 The AESO will utilize a rebalancing auction to enable the purchase or sale of capacity to reflect changes to expected capacity volume requirements, enable a capacity-committed asset to rebalance an obligation volume based on UCAP redetermination or project milestones, enable a capacity-committed asset to reduce or exit a capacity commitment, and enable new or previously uncommitted capacity asset volumes to establish a capacity commitment.

6.1.2 The AESO will, in the initial stages of Alberta's capacity market, utilize a transition period during which auctions are conducted on a compressed schedule whereby one base auction and one rebalancing auction will be held for each obligation period. Table 1 shows the rebalancing auction timeline in the transition period. The dates with asterisks will be finalized in the implementation stage.

**Table 1 – *Timeline for rebalancing auction in the transition period***

| Rebalancing Auction Qualification Starts | Rebalancing Auction Finalized Date | Obligation Period |
|---|---|---|
| Dec. 2020* | Jul. 2021 | 2021/22 (Nov. – Oct.) |
| Dec. 2021* | Jul. 2022 | 2022/23 (Nov. – Oct.) |
| Dec. 2022* | Jul. 2023 | 2023/24 (Nov. – Oct.) |

6.1.3 Following completion of the transition period, the AESO will conduct two rebalancing auctions after the base auction, at eighteen and three months prior to the start of an obligation period. Table 2 provides an indicative schedule for the base auction and rebalancing auctions with respect to the 2024/25 obligation period.

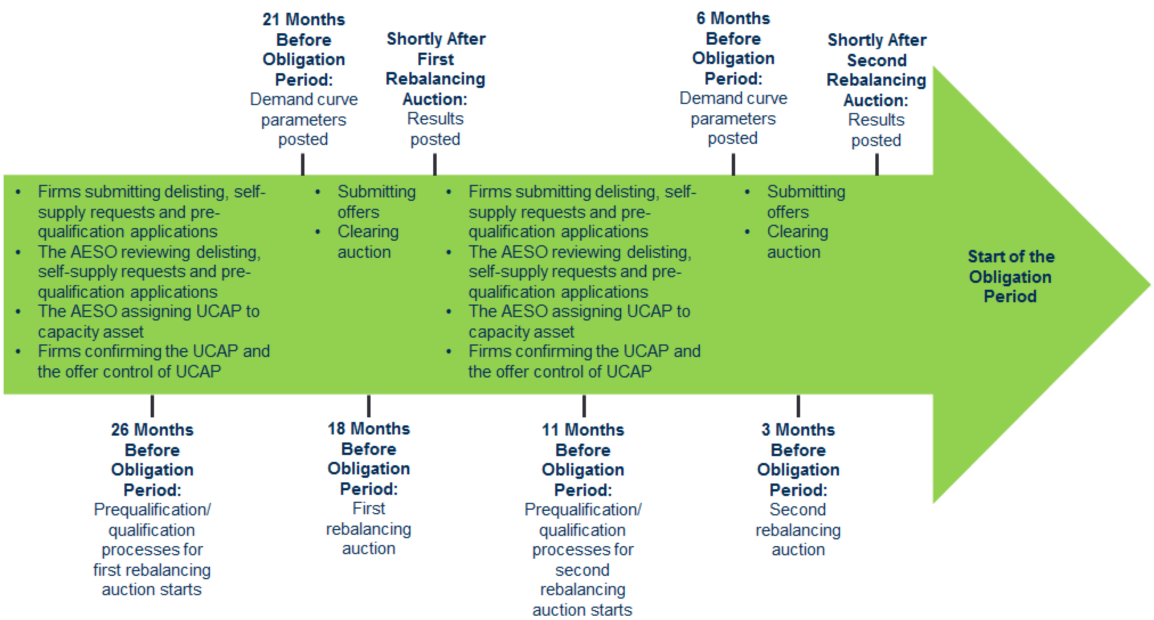
**Table 2 – *Timeline for rebalancing auctions for obligation period of 2024/25***

| Auction Finalized Date | Forward Period | Auction Type |
|---|---|---|
| Oct. 2021 | 36 Months | Base Capacity Auction |
| Apr. 2023 | 18 Months | First Rebalancing Auction |
| Jul. 2024 | 3 Months | Second Rebalancing Auction |
| Nov. 2024 | N/A | Start of Obligation Period |

6.1.4 The AESO will conduct rebalancing auctions in a similar manner to the process to be used for a base auction, which is described in Section 5, *Base Auction*. Figure 1 below provides an indicative timeline of activities contemplated for a rebalancing auction. A rebalancing auction will include both prequalification and qualification stages, commencing approximately eight months ahead of the auction.

6.1.5 The AESO will notify participants of the auction results shortly after the submission window closes.

**Figure 1 – *Timeline for rebalancing auctions***




## 6.2 Bids and offers by capacity market participants

6.2.1 Capacity market participants will have the opportunity to participate in rebalancing auctions to adjust their positions ahead of the obligation period. In addition to the AESO, only capacity suppliers with capacity commitments can buy capacity in a rebalancing auction. Capacity assets that did not clear the prior auction(s), capacity available from uprates and UCAP increases made available subsequent to the prior auction(s) or capacity from new capacity assets that may have been qualified for a rebalancing auction must submit offers to sell into a rebalancing auction. Capacity suppliers that wish to reduce their capacity commitments may do so by submitting repricing bids to buy out of their capacity commitments. Capacity suppliers that are obligated to reduce their capacity commitment due to a UCAP reduction must submit a UCAP reduction bid.

6.2.2 A capacity committed asset that is physically unable to meet its capacity commitment due to UCAP reductions or because it has not achieved development milestones (and therefore will not be operational by the commencement of the obligation period) by the time the second rebalancing auction is conducted will be required to participate in a rebalancing auction by submitting a bid price marginally above the price cap to ensure they clear in that rebalancing auction. Each capacity committed asset that does not submit a repricing or UCAP reduction bid will be treated as a price-taker in the rebalancing auction and will not be subject to rebalancing auction clearing or capacity market settlement. The types of rebalancing transactions are described in more detail below:

(a) ***Incremental sell offers.*** The must offer requirement will apply to a rebalancing auction. All qualified capacity volumes that have not previously cleared in an auction for the obligation period have a must offer requirement, subject to delisting.

(b) ***Repricing (buy-out) bids.*** Capacity committed assets that have a capacity commitment and wish to reduce their capacity commitment can submit repricing bids. If a rebalancing auction price clears below or at the bid price of that capacity committed asset the obligation volume will be reduced by the volume cleared. If a rebalancing auction clears at a price above the bid price, the capacity committed asset will retain its obligation volume and will not be subject to capacity market settlement as a result of the rebalancing auction.

(c) ***UCAP reduction bids (incorporated in supply offers under gross clearing)***. A capacity committed asset that is physically unable to deliver on a prior capacity commitment must submit a UCAP reduction bid. The reduction bid will be priced marginally above the price cap. This type of bid will be used for: (a) a new capacity asset that has not achieved development milestones and therefore is required to buy out of its capacity commitment, and (b) cases in which a UCAP reduction has caused the existing obligation volume of an existing capacity asset to be greater than its final UCAP. The final UCAP of a capacity asset is determined in accordance to Section 3, *Calculation of Unforced Capacity (UCAP)*. If in the last rebalancing auction, capacity assets have not remedied a situation where an asset's obligation volume exceeds the asset's UCAP, the AESO will post a UCAP reduction bid for the UCAP deficit at a price marginally above the price cap. The capacity supplier will be responsible for all the costs associated with covering the capacity commitment caused by such UCAP reduction.

Unless participating as described in (a) – (c) above, it will be assumed that a capacity committed asset that has already taken on a capacity commitment does not wish to adjust its capacity commitment and will not participate in a rebalancing auction. For auction clearing purposes, all such capacity committed assets will be accounted for in auction clearing but will not be subject to any capacity market settlements as a result of the rebalancing auction nor will that asset's capacity commitments be adjusted.

6.2.3 Capacity supplier repricing bids shall be asset specific. The accumulated volume of the bids associated with a capacity committed asset shall not exceed the capacity commitment established during prior capacity auctions for the same obligation period. Bid quantities in each price-quantity pair shall be incremental quantities, such that the aggregate UCAP bid volume across all price-quantity pairs submitted decreases monotonically with increasing price.

6.2.4 Each capacity committed asset is allowed to submit up to seven bid blocks. The lowest priced bid block may be designated as inflexible or flexible. All higher priced bid blocks must be flexible.

Each qualified capacity asset in a rebalancing auction is allowed to submit up to seven offer blocks. The first offer block may be designated as inflexible or flexible. All higher priced offer blocks must be flexible. If both existing capacity and incremental capacity are offered from the same capacity asset, they may use up to seven blocks in total and the following rules will apply with respect to flexibility of blocks:

- the first block that contains existing capacity may be designated as inflexible or flexible;
- all blocks with higher offer prices containing existing capacity must be flexible;
- the first block that contains incremental capacity may be designated as inflexible or flexible; and
- all blocks with higher offer prices containing incremental capacity must be flexible.

## 6.3 AESO's bids and offers

6.3.1 In a rebalancing auction, the AESO's bids and offers are implied in the rebalancing auction demand curve.

## 6.4 Auction clearing, price setting, and settlement

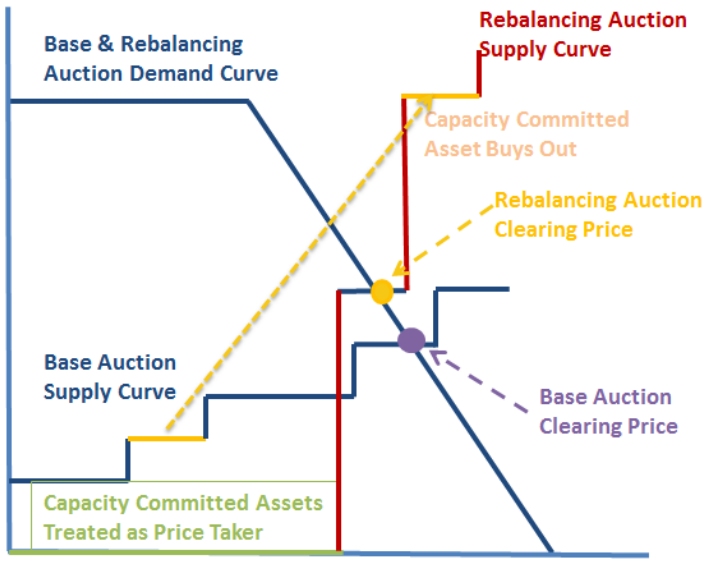
6.4.1 The AESO will clear a rebalancing auction on a gross basis and settle on a net settlement basis (i.e. settled only based on volume changes from the previous auction). All of the AESO's bids and offers will be reflected in the demand curve, as described in subsection 4.5.1 of Section 4, *Calculation of Demand Curve Parameters*. All bids to buy out capacity commitments and offers to sell capacity will be represented on the supply curve. Cleared assets from the prior auction(s) that do not submit bids will be treated as price takers in the rebalancing auction. The rebalancing auction will clear using the same mechanics as the base auction, as described in subsection 5.8 of Section 5, *Base Auctions*. The resulting rebalancing auction clearing price will be used to settle differences between cleared volumes in a rebalancing auction and the prior auction(s) for the same obligation period.

6.4.2 The five examples below illustrate how the first rebalancing auction will function after a base auction is completed. Note that the same principles apply to the second rebalancing auction after the completion of the base and first rebalancing auction.

(a) **Scenario 1: No change in demand curve; a capacity committed asset buys out; and the AESO releases previously procured capacity.**

- The AESO's load forecast is unchanged relative to the base auction, and all else equal, the rebalancing auction demand curve is the same as the base auction demand curve.
- A capacity committed asset fully buys out of its capacity commitment.
- A capacity asset that has not cleared in the base auction sets the market clearing price of the rebalancing auction, which is higher than the base auction clearing price.
- The capacity committed asset that buys out pays the rebalancing auction clearing price multiplied by its rebalancing cleared volume. Because it also receives the base auction clearing price multiplied by its previously cleared volume, this results in net payment from the asset that buys out of its capacity commitment from the base auction for the volume bought out.
- The AESO releases some of the previously procured volume and receives the rebalancing auction clearing price multiplied by its released volume.
- The capacity asset that was not cleared in the base auction but sets the clearing price in the rebalancing auction receives the rebalancing auction clearing price multiplied by its volume cleared in the rebalancing auction.
- Capacity market settlements for all capacity committed assets that did not buy out in the rebalancing auction are unaffected.

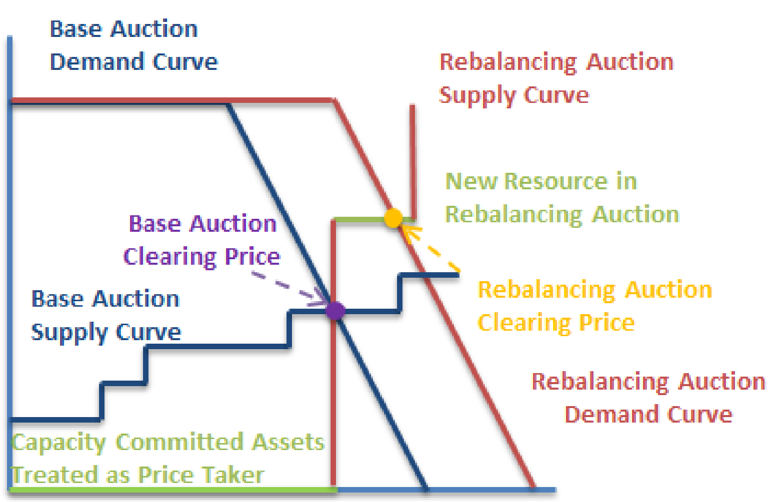
**Figure 2 – *Auction price setting for scenario 1***




(b) **Scenario 2: Load forecast increases; a new capacity asset sells and partially clears; and the AESO procures additional volume.**

- The AESO's load forecast increases relative to the base auction, and all else equal, this shifts the rebalancing auction demand curve to the right.
- A new capacity asset offers, and partially clears, setting the rebalancing auction clearing price above the base auction clearing price.
- The AESO pays the rebalancing auction clearing price multiplied by its additional volume procured in the rebalancing auction.
- The new capacity asset receives the rebalancing auction clearing price multiplied by its volume cleared in the rebalancing auction.
- Capacity market settlements for all previously cleared capacity committed assets are unaffected by the rebalancing auction.

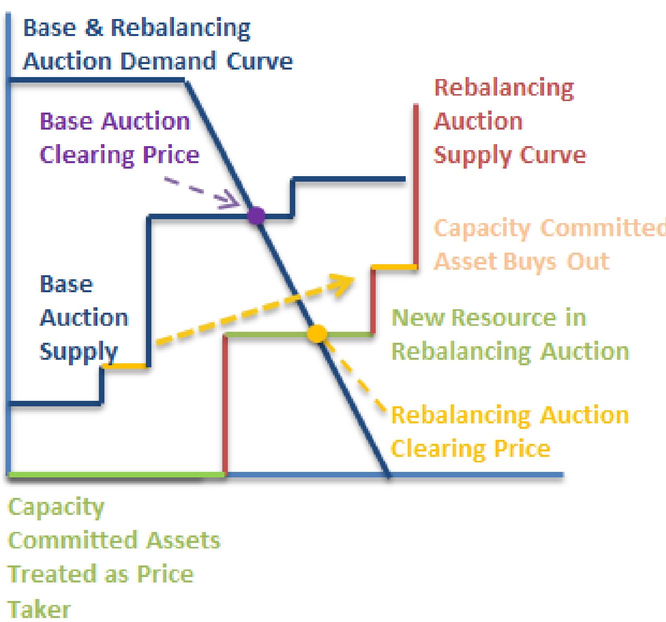
**Figure 3 – *Auction price setting for scenario 2***



(c) **Scenario 3: No change in demand curve; a new capacity asset sells and partially clears; a capacity committed asset buys out; and the AESO procures additional volume.**

- The AESO's load forecast is unchanged relative to the base auction, and all else equal, the rebalancing auction demand curve is the same as the base auction demand curve.
- A capacity committed asset fully buys out of its capacity commitment.
- A new capacity asset offers, and partially clears, setting the rebalancing auction clearing price below the base auction clearing price.
- The capacity committed asset that buys out pays the rebalancing auction clearing price multiplied by its rebalancing cleared volume. Because it also receives the base auction clearing price multiplied by its previously cleared volume, this results in net revenue to the asset that buys out its capacity commitment from the base auction for the volume bought out.
- The AESO buys an additional volume. The AESO pays the rebalancing auction clearing price multiplied by its additional volume procured in the rebalancing auction.
- The new capacity asset receives the rebalancing auction clearing price multiplied by its volume cleared in the rebalancing auction.
- Capacity market settlements for all capacity committed assets that did not buy out in the rebalancing auction are unaffected.

**Figure 4 – *Auction price setting for scenario 3***

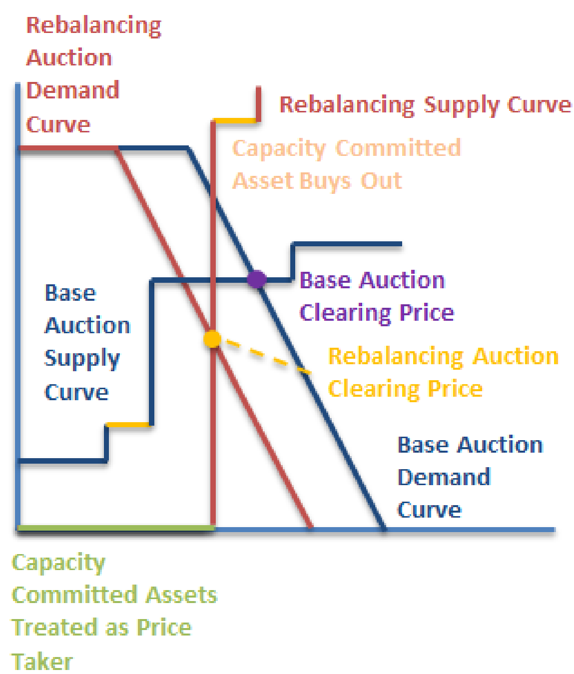



(d) **Scenario 4: Load forecast decreases; a capacity committed asset buys out; and the AESO releases previously procured capacity.**

- The AESOs load forecast decreases relative to the base auction, and all else equal, this shifts the rebalancing auction demand curve to the left.
- A capacity committed asset submits a UCAP reduction bid above the price cap, and fully buys out of its capacity commitment.
- The rebalancing auction clearing price is below the base auction clearing price.

- The capacity committed asset that buys out pays the rebalancing auction clearing price multiplied by its volume cleared in the rebalancing auction. Because it also receives the base auction clearing price multiplied by its previously cleared volume, this results in net revenue to the asset that buys out of its capacity commitment from the base auction for the volume bought out.
- The AESO releases some of the previously procured volume and receives the re-balancing auction clearing price multiplied by its released volume.
- Capacity market settlements for all capacity committed assets that did not buy out in the rebalancing auction are unaffected.

**Figure 5 – *Auction price setting for scenario 4***

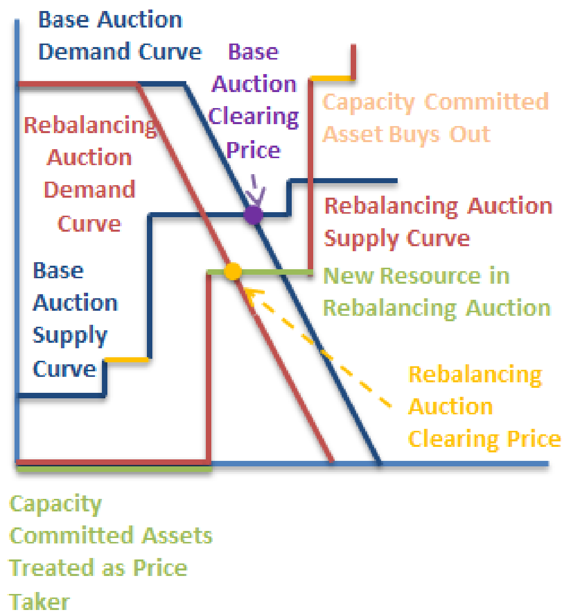



(e) **Scenario 5: Load forecast decreases; a new capacity asset sells and partially clears; a capacity committed asset buys out; and the AESO releases previously procured capacity.**

- The AESOs load forecast decreases relative to the base auction, and all else equal, this shifts the rebalancing auction demand curve to the left.
- A capacity committed asset buys out of its capacity commitment.
- A new capacity asset sells and partially clears, setting the rebalancing auction clearing price below the base auction clearing price.
- The capacity committed asset that buys out pays the rebalancing auction clearing price multiplied by its rebalancing cleared volume. Because it also receives the base auction clearing price multiplied by its previously cleared volume, this results in net revenue for the asset that buys out its capacity commitment from the base auction for the volume bought out.
- The AESO releases some of the previously procured volume and receives the re-balancing auction clearing price multiplied by its released volume.
- The new capacity asset receives the rebalancing auction clearing price multiplied by its volume cleared in the rebalancing auction.

- Capacity market settlements for all capacity committed assets that did not buy out in the rebalancing auction are unaffected.

**Figure 6 – *Auction price setting for scenario 5***




## 6.5 Anticipated transmission constraints

6.5.1 Individual and simultaneous import limits from adjacent areas will be updated to reflect the most up-to-date information as of the commencement of a rebalancing auction.

(a) if intertie transmission constraints prevent delivery of all impacted incremental supply offers, incremental supply offers behind the constraint will be rationed in the manner described in Section 5, *Base Auctions*;

(b) if intertie transmission constraints prevent delivery of commitments from the prior auction(s), those capacity commitments cleared in the prior auction(s) will be rationed in the manner described in Section 5, *Base Auctions*; and

(c) an external asset with a capacity commitment that is no longer able to deliver its capacity commitment due to a reduction in intra-provincial transmission capability will not be subject to reduced capacity payments but will have its cleared volumes reduced to reflect the updated transmission capabilities.

6.5.2 Intra-Alberta transmission constraints will be updated to reflect the most up-to-date information as of the commencement of the rebalancing auction.

(a) if intra-Alberta transmission constraints prevent delivery of all impacted incremental supply offers, incremental supply offers behind the constraint will be rationed in the manner described in Section 5, *Base Auctions*;

(b) if intra-Alberta transmission constraints prevent delivery of commitments from the prior auction(s), those capacity commitments cleared in the prior auctions will be rationed in the manner described in Section 5, *Base Auctions*; and

(c) a capacity committed asset that is no longer able to deliver its capacity commitments due to a reduction in intra-Alberta transmission capability will not be subject to reduced capacity payments but will have its cleared volumes reduced to reflect the updated transmission capabilities. The reduction in intra-Alberta transmission capacity does not refer to issues occurring in other jurisdictions or related to distribution system limitations.

# 7 Capacity Market Monitoring and Mitigation

*This section addresses the mechanisms that the AESO is proposing to monitor and mitigate the exercise of market power*

## 7.1 Mitigation of supply-side market power

7.1.1 The AESO's supply-side market power mitigation regime will include a must-offer requirement, a market power screen to identify firms that have the potential to profitably withhold capacity, a default offer price cap to restrict economic withholding by firms that fail the market power screen, and asset-specific offer price caps for mitigated qualified capacity assets with demonstrated net avoidable cost above the default offer price cap.

### *Must-offer requirement*

7.1.2 A firm must offer the full UCAP from all qualified capacity assets into a capacity auction, as described in Section 5, *Base Auction* and Section 6, *Rebalancing Auctions*, subject to the delisting process described in Section 2, *Supply Participation*.

### *Market power screen*

7.1.3 Before every base auction the AESO will:

(a) calculate and assign a UCAP for all prequalified capacity assets, as described in Section 3, *Calculation of Unforced Capacity Ratings*;

(b) conduct an *ex ante* market power screen to identify firms that have the potential to profitably exercise market power; and

(c) notify each firm that has failed the market power screen individually, before the commencement of the base auction.

7.1.4 The market power screen will not be applied to rebalancing auctions.

7.1.5 The market power screen will identify firms that have the ability to profitably increase the clearing price of an auction by 10% or more by withholding existing capacity from a base auction. The AESO will apply the market power screen using the following steps:

1. Calculate the average amount of UCAP of existing capacity assets that would need to be withheld from the market so that the auction clearing price would rise by 10% at a segment of the demand curve above the inflection point and at a segment of the demand curve below the inflection point around the inflection point; and

2. Calculate the portfolio size of existing capacity assets, measured in UCAP, that would be profitable from the 10% increase in auction clearing price by withholding the UCAP amount calculated in step 1. A firm that has a capacity offer control over a portfolio of existing capacity assets, measured in UCAP, equal to or greater than the size identified in step 2 above will fail the market power screen and will be subject to market power mitigation.

### *Default offer price cap*

7.1.6 A firm that fails the market power screen will be required to offer all of its UCAP from existing capacity assets in the firm's portfolio at or below the default offer price cap of 80% of net-CONE in the base auction.

In the situation where the price cap is set at a gross-CONE multiple in accordance with subsection 4.4.2(c), the default offer price cap will be 80% of the ratio between the multiple of gross-CONE and the multiple of net-CONE specified in subsection 4.4.2(c), multiplied by gross-CONE.

For clarity, the default offer price cap will apply to the offers of an existing capacity asset located inside Alberta, including demand response assets, as well as the offers from existing external assets under the offer control of firms who fail the market power screen.

### *Asset-specific offer mitigation*

7.1.7 A firm that fails the market power screen may request an asset-specific offer price cap for a qualified capacity asset with net avoidable costs higher than the default offer price cap.

7.1.8 Firms that fail the market power screen and request an asset-specific offer price cap must submit to the AESO, for review and approval, a cost submission justifying the requested asset-specific offer price cap.

7.1.9 A firm that submits a cost submission for an asset-specific offer price cap must indicate if the cost submission is based upon whether the qualified capacity asset would: (i) temporarily delist; or (ii) continue participation in the capacity market or the energy and ancillary service markets.

7.1.10 The cost submission will demonstrate the asset's net avoidable costs, based on the following formula (see subsection 7.1.13 below for an itemized list):

Net avoidable cost = avoidable cost – energy and ancillary services offset

Where "avoidable cost" means those described in subsection 7.1.12.

Where "energy and ancillary services offset" means the expected energy revenues less the variable costs required to be incurred to generate those revenues.

7.1.11 Additional details regarding the appropriate escalation rates that may be applied to calculate the avoidable costs measured in the dollar of the delivery year will be developed by the AESO and subject to further consultation.

7.1.12 The guiding principles that the AESO follows in interpreting "avoidable cost" include:

(a) Avoidable costs must be the costs that would not be incurred if the capacity asset is delisted for a year. Costs that would be deferred but would still occur in a subsequent year are not considered as avoidable.

(b) Avoidable costs must be those that are expected to be incurred only during the obligation period when the capacity asset is delisted.

(c) All avoidable costs must adhere to the principle of cost reduction, not reallocation, transferring or re-monetization of the costs.

7.1.13 The AESO may, in its assessment of the net avoidable costs, consider the following items where applicable.

(a) Avoidable fixed costs:

i. ***Avoidable labour expenses.*** Avoidable labour expenses related directly to operations and maintenance of the capacity asset. The categories of avoidable labour expenses may include:

o on-site based labour engaged in operations and maintenance activities;

- off-site based labour engaged in on-site operations and maintenance activities directly related to the capacity asset; and
- off-site based labour engaged in off-site operations and maintenance activities directly related to the capacity asset site.

ii. ***Avoidable administrative expenses.*** The categories of avoidable administrative expenses may include:

- those incurred for employee expenses, with the exception of employee expenses included in labour expenses related directly to operations and maintenance;
- environmental fees;
- safety and operator training;
- office supplies;
- communications; and
- annual asset testing, inspection and analysis.

iii. ***Avoidable fuel availability expenses.*** Avoidable fuel availability expenses are operating expenses related directly to fuel availability and delivery for the capacity asset that are not normally included for recovery in energy and ancillary services market offers. The categories of avoidable fuel availability expenses may include:

- those incurred for fuel transportation;
- costs of natural gas storage;
- costs of gas balancing agreements;
- costs of gas park and loan services; and
- variable mining costs.

iv. ***Avoidable maintenance expenses.*** Avoidable maintenance expenses are maintenance expenses related directly to the capacity asset, with the exception of those included in labour expenses related directly to operations and maintenance. The categories of avoidable maintenance expenses may include:

- those incurred for chemicals and materials consumed during maintenance of the capacity asset; and
- rented maintenance equipment used to maintain the capacity asset.

v. ***Avoidable fixed operating expenses.*** The categories of avoidable fixed operating expenses may include those incurred for:

- water treatment chemicals and lubricants;
- water, gas and station service;
- water rental;
- coal or gas royalties; and
- waste water treatment.

vi. ***Avoidable taxes, fees and insurance.*** The categories of avoidable taxes, fees and insurance may include those incurred for:

- insurance, permits and licensing fees,
- site security and utilities for maintaining security at the site; and

- property taxes.

vii. ***Avoidable carrying charges.*** Avoidable carrying charges may include short-term carrying charges for maintaining reasonable levels of inventories of fuel and spare parts that result from short-term operational unit decisions as measured by industry best-practice standards.

viii. ***Avoidable asset-specific corporate level expenses.*** Corporate-level expenses are those expenses directly linked to providing tangible services required for the operation or maintenance of the capacity asset to the extent that temporary or permanent delisting of the capacity asset results in a cost reduction rather than a reallocation. The categories of avoidable asset-specific corporate level expenses may include those incurred for:

- legal services; and
- regulatory and environmental compliance.

(b) ***Expected payment adjustment costs.*** Expected payment adjustment costs will be based on quantitative risk assessment practices generally used by the industry to estimate risk.

(c) ***Estimated variable operating costs.*** Estimated variable operating costs include, but are not limited to, heat-rate and variable operating and maintenance expenses for use in the AESO's determination of energy and ancillary service market offset. For assets without an observable market price for fuel, fuel-cost estimates may be required. The AESO will estimate the energy and ancillary services offset using the same methodology that the AESO would use to estimate the energy and ancillary services offset for net-CONE calculation, as described in Section 4, *Calculation of Demand Curve Parameters*.

7.1.14 A firm that submits a cost submission for an asset-specific offer price cap request must ensure that the information provided in the cost submission is the same information it uses to make its internal decisions by its senior management or the board of directors. The firm must have a corporate officer attest to the validity of the documentation used to support the asset-specific offer price cap request and confirm the completeness and accuracy of the cost data.

7.1.15 The AESO will review the cost submission and may seek clarification from the firm that provides the cost submission in the review process. The AESO will exclude cost items if the costs are inappropriately included, or inaccurately calculated or recorded.

7.1.16 The AESO will approve the asset-specific price cap request if the cost items are higher than the default offer price cap and will provide an asset-specific price cap. The AESO will not approve the asset-specific offer price cap request if the cost items are lower than the default offer price cap and the asset will be subject to the default offer price cap.

7.1.17 If the firm disputes the AESO's determination with respect to the asset-specific offer price cap, the dispute may be settled through the dispute resolution process discussed in Section 5, *Base Auction*.

## 7.2 Mitigation of firms with net-short capacity positions

7.2.1 The minimum offer price for all firms will be a price floor of $0/kW-year. No mechanisms for mitigating net-short (or buyer-side) market power will be implemented at the commencement of the Alberta capacity market. This approach may be reviewed at a future date.

## 7.3 Reporting of auction statistics and market competitiveness

***Statistic report following a capacity auction***

7.3.1 As soon as reasonably practicable following a capacity auction (likely within 1 week of the capacity auction), the AESO intends to publish on its website, concurrent with the notification of auction results, auction statistics reports including:

(a) clearing price ($/kW-yr);

(b) total cleared capacity (MW);

(c) cleared capacity differentiating between existing and new assets as well as technology type; and

(d) a list of assets with a capacity market obligation after the second rebalancing auction, including asset name, resource type, new/existing/uprates, and awarded MWs.

***Assessment following a capacity auction***

7.3.2 Following a capacity auction, the AESO may publish on its website an assessment of the following items:

(a) auction competitiveness;

(b) the consistency of market results with market conditions;

(c) whether to pursue potential changes to the market design for future auctions; and

(d) whether there are aspects of the market design that should be more thoroughly investigated in triennial reviews.

***Independent performance reviews***

7.3.3 The AESO may periodically commission an independent party to review market performance.

# 8 Supply Obligations and Performance Assessments

*This section addresses the obligations of legal owners of capacity assets and how capacity asset performance will be assessed prior to and during an obligation period.*

## 8.1 Assessment prior to commencement of obligation period

8.1.1 Prior to the commencement of an obligation period, the AESO will monitor capacity committed assets and assess whether:

(a) in the case of a new capacity committed asset, the critical path and other major milestones set out in the detailed project development and implementation plan for the new capacity committed asset are being or have been met (as per Section 2, *Supply Participation*), such that the new capacity asset will achieve commercial operation in time to meet its capacity commitment; and

(b) in the case of an existing capacity committed asset, the asset's UCAP has deteriorated relative to the asset's capacity commitment for that obligation period.

### *Obligation of new capacity asset during prequalification*

8.1.2 As per Section 2, *Supply Participation,* the capacity market participant must provide the AESO with a detailed project development and implementation plan during the prequalification stage of each base auction or rebalancing auction. The project development and implementation plan must include sufficient detail to demonstrate that each of the major milestones for the new capacity asset will be met, such that the new capacity asset will achieve commercial operation prior to the commencement of the applicable obligation period.

8.1.3 The AESO will use the project development and implementation plan above to:

(a) validate whether the development of the new capacity asset is proceeding as per the project development and implementation plan;

(b) assess whether the new capacity asset will, in the opinion of the AESO, acting reasonably, achieve commercial operation prior to the commencement of the applicable obligation period; and

(c) establish credit requirements for the new capacity asset as per subsection 2.1.15 of Section 2, *Supply Participation.*

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

8.1.4 As per Section 2, *Supply Participation*, prior to commercial operation of a new capacity asset the capacity market participant must demonstrate that each of the major milestones, especially those on the critical path, set out in the project development and implementation plan for the asset have been met. The review of the critical path and major milestones will be completed during each prequalification process for each auction prior to the asset's commercial operation date. To complete this assessment the capacity market participant will be required to provide an updated development and implementation plan to the AESO for review.

8.1.5 A new capacity supplier that cannot demonstrate that it has fulfilled the development milestone requirements will be deemed to have failed to deliver on the new capacity asset and will be required to buy out its capacity commitment for that new capacity asset in one of the rebalancing auctions, subject to subsections 8.1.6 and 8.1.7.

8.1.6 For a new source asset, a capacity supplier must buy out its capacity commitment in the first rebalancing auction if that new capacity asset is more than 8 months delayed, vis a vis a major milestone, in its project schedule.

8.1.7 For a new source asset, a capacity supplier must buy out its capacity commitment in the second rebalancing auction if its new capacity asset is more than 5 months delayed, vis a vis a major milestone, in its project schedule.

8.1.8 For a new demand response asset, if the asset has a UCAP that is less than 75% of the asset's obligation during the second rebalancing auction prequalification stage, a capacity supplier must buy out its obligation volume by the amount that the obligation volume exceeds the actual UCAP of the asset.

### *Updates to qualified UCAP ratings*

8.1.9 The AESO will recalculate the UCAP for a capacity committed asset in advance of each rebalancing auction to reflect any changes in the capacity committed asset's capabilities as described in Section 6, *Rebalancing Auctions*.

8.1.10 If the final UCAP of a capacity asset for the last rebalancing auction is less than its obligation volume, a capacity committed asset must submit a UCAP reduction bid as described in subsection 6.2.2(c) of Section 6, *Rebalancing Auctions*.

## 8.2 Assessment during obligation period

8.2.1 The AESO will assess the performance of a capacity committed asset on the basis of both availability and delivery volume during the obligation period. If the availability assessment period and delivery assessment period hours overlap, availability and delivery will be assessed separately and, if applicable, both types of payment adjustments will be applied for those same hours.

### *Unavailability payment adjustment*

8.2.2 The AESO will conduct availability assessments during the tightest supply cushion hours.

8.2.3 Based on availability assessments, the AESO will apply an unavailability payment adjustment to a capacity committed asset that is not available to satisfy its capacity commitment during an availability assessment period.

### *Availability assessment period*

8.2.4 A capacity supplier will be required to demonstrate that the actual availability of the capacity committed asset was at least, on average, equal to its obligation volume during the availability assessment period.

8.2.5 The AESO will assess the actual availability of a capacity committed asset by comparing each capacity committed asset's capacity commitment to its availability during the 250 tightest supply cushion hours over the course of the obligation period. The capacity committed asset's actual availability will be measured during each such hour in alignment with the AESO's UCAP calculation methodology as described in Section 3, *Calculation of Unforced Capacity* (i.e., based either on the amount of MWs offered to the energy and ancillary services markets (including any dispatched volumes), or on the amount of MWs generated during the availability assessment period).

8.2.6 To determine the availability assessment period, the AESO will perform a supply cushion analysis at the end of each obligation period to identify the 250 tightest supply cushion hours during such obligation period.

### *Availability assessment volume definition*

8.2.7 The availability assessment volume of a capacity committed asset will be defined as:

*Availability Assessment Volume (MW) = (Actual Availability Volume - Obligation Volume)*

Where:

*Actual Availability Volume = the average availability volume for the capacity committed asset during the 250 tightest supply cushion hours in such year, which average shall be based upon the following:*

(a) For an asset whose UCAP is based on a capacity factor, a sum of metered volume and dispatched contingency reserve volume (if spinning and supplemental reserve provided) or regulating raise range[1] (if regulating reserve provided).

(b) For an asset whose UCAP is based on an availability factor, the stated available capability volume. A capacity asset with an available capability value greater than zero but which is not ready to receive a dispatch will, for that period of time, be deemed unavailable for the purpose of an availability assessment.

(c) For a guaranteed load reduction asset, the stated available capability volume.

(d) For a firm consumption level asset, availability volume will be determined as the difference between the lookback baseline and the firm consumption level.

- The lookback baseline will be based on the average of metered volumes for each hour (corresponding to the tight supply cushion hour) in the days prior to the day with a tight supply cushion hour as specified below.
- If a tight supply cushion hour falls on a non-holiday weekday, the lookback baseline is calculated on the 15 most recent non-holiday weekdays prior to the day with a tight supply cushion hour. If a tight supply cushion hour falls on a weekend or a holiday, the lookback baseline is calculated on the 10 most recent weekend days or holidays prior to the day with a tight supply cushion hour.
- Any tight supply cushion hours and delivery assessment periods will be excluded from the lookback baseline.
- The lookback baseline will be limited to a maximum of 45 days. If there are fewer than the 15 non-holiday weekdays or 10 weekend/holiday days to create the lookback baseline the AESO may elect to utilize only the available suitable non-holiday weekdays, weekends or holidays within the previous 45 days to calculate a lookback baseline.

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

8.2.8 For a capacity committed asset with negative availability assessment volume throughout an obligation period, the AESO will calculate an unavailability payment adjustment rate as follows:

*Unavailability Payment Adjustment Rate ($/MWh) = 40% x 1.3 x* Obligation Price per MW */ 250 hours*

The total unavailability payment adjustment in dollars($) will then be calculated as:

*Unavailability Payment Adjustment Rate* multiplied by *Availability Assessment Volume* multiplied by *250*

For example, assume the capacity committed asset's Obligation Price is $100,000/MW. *Actual Availability Volume* is 95 MW and *Obligation Volume* is 105 MW. The resulting unavailability payment adjustment would be:

*(0.4 x 1.3 x $100,000/MW-year) / 250 hours = $208/MWh for each availability assessment hour and the total payment adjustment would be $208/MWh x (95 – 105) MW x 250 hours = -$520,000.*

[1] I.e., the volume in the regulating reserve range that has not been dispatched.

This amount will be reduced from the capacity payments to the capacity supplier as per Section 9, *Settlement and Financial Security Requirements*.

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

8.2.9 A capacity committed asset that has a positive availability assessment volume will be eligible to receive an over-availability payment adjustment. Over-availability payment adjustments will be wholly funded from the unavailability payment adjustments retained from capacity committed assets with negative availability assessment volumes.

8.2.10 For a capacity committed asset with a positive availability assessment volume throughout an obligation period, the AESO will apply the over-availability payment adjustment rate to each MWh of average over-availability during the 250 tightest supply cushion hours, calculated as follows:

*Over-availability Payment Adjustment Rate ($/MWh) = Total Unavailability Payment Adjustments Collected in an Obligation Period ($) / Total Over-availability Volume (MWh)*

8.2.11 Over- availability payment adjustments will be capped in the manner described under the heading "Maximum amounts for over-availability and over- delivery payment adjustments", below.

8.2.12 In the event that there are residual funds remaining after all unavailability payment adjustments and over-availability payment adjustments for an obligation period have been applied, or in the event that there are no capacity committed assets that are eligible to receive over-availability payment adjustments for an obligation period, such residual funds will be applied by the AESO against the costs incurred by the AESO to procure capacity from capacity suppliers.

### *Delivery payment adjustment*

8.2.13 The AESO will assess a capacity committed asset's delivery relative to its capacity commitment during EEA events for the full duration of the delivery assessment period.

8.2.14 The AESO will calculate a capacity committed asset's delivery volume to determine the volume of the asset's capacity that will be subject to either over-delivery or under-delivery payment adjustments.

### *Delivery assessment period*

8.2.15 A capacity supplier will not be given any notification prior to the commencement of a delivery assessment period declared by the AESO.

8.2.16 Delivery will be assessed for each settlement interval within a delivery period assessment. Assessment calculations will be completed for each hour or portion of an hour during which a delivery assessment period occurs.

### *Delivery volume definition*

8.2.17 Delivery volume is the volume of a capacity committed asset's actual delivery minus its expected delivery during a delivery assessment period.

8.2.18 A capacity committed asset's delivery volume will be defined as:

*Delivery Volume (MWh) = Actual Delivery - (Obligation Value * Balancing Ratio)*

8.2.19 For a capacity factor or availability factor capacity asset, actual delivery for any hour will be measured in MWh as the sum of the metered volumes and the dispatched contingency reserve volume for either the spinning and supplemental reserve provided or the regulating raise range.

8.2.20 For a guaranteed load reduction asset, actual delivery for any hour will be measured in MWh as the difference between delivery baseline and the measured consumption of electricity during the delivery event. This difference should be equal to or greater than the obligation volume adjusted for the balancing ratio. For each delivery assessment period, the delivery baseline shall be calculated as follows:

*Delivery Baseline = Standard Day Baseline * In-Day Adjustment Factor*

where:

(a) The standard day baseline is the most recent average hourly load consumption for each corresponding hour to the delivery event hour in the prior days to the delivery assessment period as specified below. If a delivery assessment period falls on a non-holiday weekday, the standard day baseline is calculated on the 10 most recent non-holiday weekdays prior to the delivery event day. If a delivery assessment period falls on a weekend or a holiday, the standard day baseline is calculated on the five most recent weekend days or holidays prior to the delivery event day.

(b) The in-day adjustment factor is calculated as A ÷ B, where:

A = average actual consumption during the adjustment window hours on the delivery assessment period; and

B = average actual consumption during the adjustment window hours on the most recent ten non-holiday weekdays or five weekend holiday days prior to a delivery assessment period.

The adjustment window is the three hour window occurring one hour before a delivery event.

The in-day adjustment factor will be limited to scaling the standard baseline by +/-20%, i.e. the factor can only be as low as 0.8 and as high as 1.2.

(c) The standard day baseline will exclude days:

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

(d) In the event the baseline calculation is required to exclude days, the calculation will only go back to a maximum of 35 days. If there are fewer than the 10 non-holiday weekdays or five weekend/holiday days to create the standard day baseline the AESO may elect to utilize only the available suitable non-holiday weekdays, weekends or holidays within the previous 35 days to calculate a standard baseline.

(e) Load volumes that are committed in the operating reserves market or are armed for LSSi will have those commitments deducted from the metered volume of the asset during a delivery assessment period. For example, a load with a delivery baseline of 80 MW and a capacity obligation could consume at 80 MW during a delivery assessment period and not be assessed a payment adjustment in the event it had a capacity obligation of 20 MW and was armed for 20 MW of LSSi.

(f) On the first day of a forced outage, a demand response asset's demand reduction shall equal the difference between the delivery baseline of the asset and the metered consumption of the guaranteed load reduction asset.

(g) A demand response asset shall be assessed a zero demand reduction on any day of a forced outage other than the first day; on any day of a scheduled outage, in any interval in which there is insufficient data to calculate the delivery baseline, and in any interval in which the capacity market participant fails to comply with the demand response asset metering and communication requirements.

(h) A capacity market participant shall not take any action to create or maintain a standard day baseline that exceeds the typical electricity consumption levels expected in the normal course of business.

8.2.21 For a firm consumption level asset, consumption measured during a delivery event 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 obligation volume adjusted for the balancing ratio. Metered load volumes not reduced due to operating reserves or LSSi arming will be deducted from the metered volume of the asset. A firm consumption level asset shall be assessed a zero demand response reduction on the day of a scheduled outage.

8.2.22 The legal owner of a long lead time asset with a capacity commitment, in order to be assessed as having delivered on its capacity commitment during a delivery period, must be providing energy in response to a dispatch during a delivery assessment period. The AESO may direct a long lead time asset to start before a shortfall event when there is sufficient time. A long lead time asset that is directed to start will be considered compliant for a delivery event if the asset enters a start time within 10 minutes of receiving the directive and if the asset is online and providing energy equal to or greater than the asset's obligation volume during the delivery event.

8.2.23 A capacity asset with an available capability greater than zero but not ready to receive a dispatch will, for that period of time, be deemed to be non-delivering for the purpose of a delivery assessment.

8.2.24 An external capacity asset's delivery will be assessed using:

(a) the energy schedule of the asset during a delivery assessment period up to the asset's capacity commitment, or

(b) when the Available Transmission Capability (ATC) is fully utilized and the asset was not dispatched due to the ATC being utilized by lower priced energy market merit order offers, delivery will be measured using the asset's offer in the energy market merit order. When this is applicable, the external asset must offer equal to or greater than the asset's obligation volume using its "price taker" asset at the next restatement opportunity period. For clarity the asset must restate at the next T-2 restatement window or earlier if restatements are allowed inside of T-2, so that energy will flow during the third hour of the delivery assessment period or sooner. The asset will be considered compliant if the asset has price taker offers equal to or greater than the asset's capacity committed volume.

If the ATC level is constrained to less than the full firm interconnection volume, the external asset offer may be prorated to less than its capacity commitment. If the reduction in the offer is a result of an AESO related transmission constraint or outage, the external asset will be exempt from delivery assessment for its prorated volume of the AESO related constraint or outage. Delivery assessment will not be waived for constraints or outages related to transmission outages or constraints external to the AESO.

Regardless of obligation volume, external offers will not be given dispatch priority over non-capacity committed import offers. The AESO's current merit order dispatch will continue to apply.

### *Non-delivery payment adjustment*

8.2.25 The AESO will apply a non-delivery payment adjustment for a capacity committed asset with a negative delivery volume.

8.2.26 The AESO will set the non-delivery payment adjustment based on the obligation price per MW. The non-delivery payment adjustment will also be dependent upon the expected number of EEA hours for the obligation period as determined for the base auction.

8.2.27 The AESO will determine and communicate to capacity market participants the specific value of expected EEA hours in advance of each base auction using the AESO's reliability modelling. This value will remain constant for the applicable obligation period. If the expected EEA hours based on the AESO's reliability modelling at the inflection point of the demand curve is lower than 20, a floor of 20 hours will be used. See subsection 4.4.2(d) of Section 4, *Calculation of Demand Curve Parameters* for details regarding the inflection point of the demand curve.

8.2.28 The AESO will calculate the non-delivery payment adjustment rate using the following formula:

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

The non-delivery payment adjustment rate will then be multiplied by the delivery volume to determine the non-delivery payment adjustment for the delivery event for the capacity committed asset.

### *Over-delivery payment adjustment*

8.2.29 A capacity committed asset that has a positive delivery volume will be eligible to receive an over-delivery payment adjustment. Over- delivery payment adjustments will be wholly funded from the non- delivery payment adjustments received from capacity committed assets with negative delivery volumes.

8.2.30 The AESO will calculate over-delivery payment adjustments for each MWh of over-delivery during delivery assessment periods and will pay those capacity committed assets with positive delivery volumes at the $/MWh payment adjustment rate:

> *Over- delivery Payment Adjustment Rate ($/MWh) = Total Non-Delivery Payment Adjustments Collected $ / Total Positive Delivery Volume MWh*

8.2.31 Over- delivery payment adjustments will be capped in the manner described under the heading "Maximum amounts for over-availability and over- delivery payment adjustments", below.

8.2.32 In the event that there are residual funds remaining after all non-delivery payment adjustments and over-delivery payment adjustments for a delivery assessment period have been applied, or in the event that there are no capacity committed assets that are eligible to receive over-delivery payment adjustments for a delivery assessment period, such residual funds will be applied by the AESO against the costs incurred by the AESO to procure capacity from capacity suppliers.

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

8.2.33 The AESO will cap the combined payment adjustment exposure to unavailability and non-delivery payment adjustments for each capacity committed asset.

8.2.34 The monthly non-delivery payment adjustments for a capacity committed asset will be capped at 300% of the monthly capacity revenue based on the capacity committed asset's obligation price per MW. For clarity, the monthly cap does not apply to the availability payment adjustment assessments.

8.2.35 The cumulative annual unavailability and non-delivery payment adjustments for a capacity committed asset will be capped at 130% of the annual capacity revenue based on the capacity committed asset's obligation price per MW.

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

8.2.36 Maximum potential over-availability and over-delivery payment adjustments will be capped at a capacity committed asset's total annual obligation price per MW. For example, if a one MW asset receives $100,000 per year of capacity payment, the maximum cumulative over-availability and over-delivery payment adjustments will be capped at $100,000 for that obligation period, such that total revenue earned is $200,000.

8.2.37 If the cap described in subsection 8.2.36 is reached before the end of the obligation period, the capacity supplier will not be eligible for further over-delivery or over-availability payment adjustments for the remainder of the obligation period.

### *Unavailability and non-delivery payment adjustment exemptions*

8.2.38 A capacity committed asset that is constrained down due to limits on the Alberta internal transmission system will be exempt from unavailability payment adjustments on that volume of its obligation. The actual availability of a capacity committed asset that is constrained down due to limits on the Alberta internal transmission system will be measured as metered volume plus constrained down volume plus, if applicable, contingency reserve volume dispatched for regulating raise range. Similarly, a capacity committed asset that is constrained down due to limits on the Alberta internal transmission system will be exempt from non-delivery payment adjustments on that volume of its obligation.

8.2.39 Availability and delivery assessments will not be conducted during periods when events such as market suspension, limited markets operations, war, invasion, armed conflict, blockade, act of public enemy, riot, revolution, insurrection, act of terrorism, sabotage, act of vandalism, fire, lightning, explosion, earthquake and flood, are in effect or have occurred.

8.2.40 No other exemptions to the assessment of unavailability payment adjustments or non-delivery payment adjustments will be permitted. For clarity, if a capacity committed asset is not available or does not perform for the following reasons, no exemption to the assessment of an unavailability payment adjustment or a non-delivery payment adjustment will be granted:

(a) forced or planned derates;

(b) forced or planned outages;

(c) force majeure;

(d) on-site and/or distribution system constraints that are not a result of outages or other constraints on the transmission system; and/or

(e) transmission outages that result in the asset being electrically disconnected from the transmission system.

## 8.3 Ex ante asset substitution and volume reallocation

8.3.1 A capacity supplier will have the option of ex ante asset substitution, or volume reallocation, to avoid or decrease non-delivery payment adjustments associated with a failure to deliver on its obligation volume during a delivery assessment period. For clarity, asset substitution and volume reallocation does not apply to availability assessments.

8.3.2 Ex ante asset substitution and volume reallocation are risk mitigation approaches that will be available to the capacity supplier in addition to the option of participating in the rebalancing auctions to adjust or buy back such asset's obligation volume.

### *Ex ante asset substitution*

8.3.3 A capacity supplier may engage in asset substitution with a qualified but non-committed or partially committed capacity asset (substitute asset) commencing after the last rebalancing auction and until the start of the energy market settlement interval.

8.3.4 The obligation volume of the asset being substituted must be less than or equal to the uncommitted capacity from a substitute asset.

8.3.5 A capacity supplier must register all ex ante asset substitutions with the AESO specifying the:

(a) start date and time, and end date and time of the substitution. The start date and time must not be prior to the date and time upon which the substitution is registered with the AESO.

(b) obligation volume to be substituted. This volume must be less than or equal to the obligation volume of the substitute asset; and

(c) approval of the substitution by both counterparties. Approval is required before the begin date and time of the substitution.

Details in respect of the financial arrangements between the two counterparties will not be required for the asset substitution registration.

8.3.6 The AESO will allocate the payment adjustments associated with under-delivery and over-delivery of the substituted asset to the original obligation holder and not to the substituted asset owner.

8.3.7 The AESO will not transfer a capacity obligation during the substitution period to the substituted asset. However, the substituted asset will be utilized for purposes of delivery.

### *Ex post volume reallocation*

8.3.8 Following a delivery assessment period, a capacity supplier that delivered metered volumes greater than expected delivery under its obligation during a delivery assessment period may sell its excess positive delivery volume to another capacity supplier whose capacity committed asset did not deliver sufficiently to meet its entire obligation. Only capacity committed assets are eligible to participate in volume reallocation transactions.

8.3.9 A capacity supplier must indicate to the AESO if its capacity committed asset(s) can be considered for volume reallocation after the last rebalancing auction and before the start of the obligation period (i.e., November 1 of a corresponding year).

8.3.10 The AESO will allocate the payment adjustments associated with under-delivery and over-delivery of the substituted asset to the original obligation holder and not to the substituted capacity market participant. The capacity obligation during the substitution period will not be transferred to the substituted capacity asset.

8.3.11 If one or more delivery assessment periods takes place in a calendar month, the AESO will be required to notify the capacity market participant that have indicated its capacity committed asset(s) can be considered for volume reallocation, no later than five business days following the end of the calendar month, of delivery volume data results for each delivery assessment period in the previous calendar month.

8.3.12 The delivery volume data results will be required to contain the following information for each delivery assessment period in the previous calendar month and in respect of each capacity committed asset, using the most recent data:

(a) the capacity delivered in metered volumes (MWh) during the delivery assessment period;

(b) the balancing ratio;

(c) the initial positive delivery volume; and

(d) the initial negative delivery volume.

8.3.13 Following receipt of its delivery volume results a capacity supplier must submit a volume reallocation request to the AESO within six business days if it wishes to participate in volume reallocation.

8.3.14 A volume reallocation request must include, the:

(a) names of the volume reallocation transferee legal owner and the volume reallocation transferor legal owner(s);

(b) performance assessment period(s) to which the volume reallocation request relates. For certainty, ex-post volume reallocation must be for the same delivery hour or portion of that hour; and

(c) reallocated capacity volume. In the case of the transferee this is a positive number, and in the case of a transferor this is a negative number.

Details in respect of the financial transaction or the volume reallocation trade between a transferee and a transferor are not required in the volume reallocation request.

8.3.15 A capacity supplier that buys reallocated capacity will be considered to have met its obligation volume via a combination of any output of its own and output nominated from other legal owners of capacity committed assets through capacity volume reallocation (if sufficient amount of positive delivery volume was reallocated).

8.3.16 The AESO will not allocate an over-delivery capacity payment adjustment for the seller for any MW transferred to another capacity supplier through volume reallocation.

# 9 Settlement and Financial Security Requirements

*This section addresses the processes and mechanisms for settling the capacity market and financial security requirements for market participants.*

## 9.1 Capacity market statements

9.1.1 The AESO will issue monthly statements to the capacity market participant with settlements for the previous settlement period. These will be separate from the energy market statement and separate from the invoices for cost allocation settlement.

9.1.2 These statements will include:

(a) monthly capacity payment amount;

(b) delivery and/or availability payment adjustments incurred in the settlement period;

(c) outstanding payment adjustment balances;

(d) for the month following the end of the obligation period, the annual payment adjustment for availability;

(e) uplift payments; and

(f) the net capacity payment.

## 9.2 Settlements applicable to capacity assets

***Capacity payments***

9.2.1 The AESO will make capacity payments to the capacity market participant after the start of the obligation period. New capacity assets that have not reached commercial operation before the start of the settlement period will not be paid the monthly capacity payment in that settlement period. The monthly capacity payment for that settlement period will be held by the AESO until all penalties for the delivery year are assessed and thereafter will be applied towards the payment adjustment balance before any net payment owed to the capacity market participant is provided.

***Calculating capacity payments***

9.2.2 The capacity payment will be calculated by the AESO as follows:

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

Where, for the obligation period:

$O_b$ equals obligation volume of the capacity asset after the base auction;

$P_b$ equals the clearing price of the base auction;

$O_{r1}$ equals the obligation volume of the capacity asset after the first rebalancing auction;

$P_{r1}$ equals the clearing price of the first rebalancing auction;

$O_{r2}$ equals the obligation volume of the capacity asset after the second rebalancing auction; and

$P_{r2}$ equals the clearing price of the second rebalancing auction.

9.2.3 Any capacity asset volumes required to satisfy the capacity purchase volume determined through unconstrained market clearing that are priced above the market clearing price will receive uplift payments equal to the difference between their offer price and the market clearing price.

## 9.3 Calculating capacity payment adjustments

9.3.1 Payment adjustments for availability (unavailability and over-availability) and for delivery (non-delivery and over-delivery) will be determined in accordance with Section 8, *Supply Obligations and Performance Assessments*. The AESO will not assess capacity payment adjustments against the energy market or ancillary services market. The AESO will apply payment adjustments up to 100 per cent of the capacity market payment for each asset on any one settlement period, the remainder of which will be carried forward to the subsequent settlement period and will continue until the balance of the payment adjustment is paid.

### *Obligation price per MW*

9.3.2 To determine the delivery payment adjustment rate and the availability payment adjustment rate the obligation price per MW for each asset must be calculated.

9.3.3 The asset obligation price per MW will be calculated by the AESO as follows:

Asset obligation price per MW equals the annual capacity payment (capacity payment multiplied by 12) divided by the total capacity obligation, both of which are determined after all auctions for the obligation period have been completed.

### *Payment adjustment for availability*

9.3.4 The AESO will:

(a) calculate the availability payment adjustment in accordance with Section 8, *Supply Obligations and Performance Assessments*; and

(b) apply the availability payment adjustment to the payment adjustment balance.

9.3.5 In the event that there are residual funds remaining after all unavailability payment adjustments and over-availability payment adjustments for an obligation period have been applied, or in the event that there are no capacity committed assets that are eligible to receive over-availability payment adjustments for an obligation period, such residual funds will be applied by the AESO against the costs incurred by the AESO to procure capacity from capacity suppliers.

### *Payment adjustment for delivery*

9.3.6 The AESO will:

(a) for every delivery event that occurred, conduct a delivery assessment of that event in accordance with Section 8, *Supply Obligations and Performance Assessments*; and,

(b) calculate the delivery payment adjustment for the same settlement period for which the non-delivery event occurred; and

(c) apply the delivery payment adjustment to the payment adjustment balance.

9.3.7 In the event that there are residual funds remaining after all non-delivery payment adjustments and over-delivery payment adjustments for an settlement period have been applied, or in the event that there are no capacity committed assets that are eligible to receive over-delivery payment adjustments for an obligation period, such residual funds will be applied by the AESO against the costs incurred by the AESO to procure capacity from capacity suppliers.

## 9.4 Capacity cost allocation settlements

9.4.1 Capacity costs will be allocated to consumers (load) through a tariff mechanism.

9.4.2 The AESO will:

(a) calculate the capacity cost allocation using a formula that has not yet been determined (additional details will be developed by the AESO and subject to further consultation);

(b) calculate the capacity cost allocation as soon as reasonably practicable after each capacity market settlement period; and

(c) issue statements based on the capacity cost allocation settlement results.

## 9.5 Net settlement instructions (NSI)

9.5.1 Net settlement instructions will not be facilitated within the capacity market.

## 9.6 Financial security requirements for capacity assets

9.6.1 ISO rule section 103.3(2)(1) regarding financial security requirements will apply to the capacity market participant.

9.6.2 The AESO will establish the following additional financial security requirements applicable to the capacity market participant:

(a) no security requirement during the obligation period provided that, for the following obligation period, the asset maintains an obligation and is eligible for a capacity payment; and

(b) if the asset does not have an obligation in the following obligation period then the AESO may request security against the estimated outstanding payment adjustment balance owing.

## 9.7 Measurement, verification and tracking of capacity assets

9.7.1 The AESO will:

(a) verify the capabilities and performance of all capacity assets throughout the obligation period against their obligation volume; and

(b) develop platform(s) to track capacity supply data to support several functions in the capacity market. The capacity market participant can use the platform to track their qualification status, UCAP ratings, and auction results including the capacity obligation volumes and associated prices for each obligation period.

9.7.2 The capacity market participant must:

(a) provide data required by the AESO which is sufficient to measure the performance and availability of the capacity asset; and

(b) for each of its assets, have the ability to measure production or consumption on a sub-hourly basis and provide that data to the AESO via SCADA.

# 10 Roadmap for Changes in the Energy and Ancillary Services Markets

*This section addresses how the energy and ancillary services markets will evolve with the introduction of the capacity market, including requirements to facilitate the delivery of the capacity, to monitor and mitigate market power, to integrate the anticipated generation fleet, and to improve market efficiency.*

## 10.1 Overview of the EAS markets

10.1.1 To facilitate the implementation of the capacity market, certain aspects of the energy and ancillary services (EAS) markets will be evolved and new requirements will be adopted for energy market mitigation. However, the majority of the current aspects of the energy and ancillary services markets will continue including, without limitation:

(a) dispatch using the information in the energy market merit order to dispatch blocks required to serve demand levels;

(b) dispatch of the ancillary services market as a separate market;

(c) unit self-commitment by pool participants;

(d) single-part bid for submission of priced offers; and

(e) the pricing methodology in the energy market, including the system marginal price set at marginal block, and the pool price set as an average of 60 system marginal prices.

Subsections 10.2 – 10.6 below outline the obligations for each customer group.

## 10.2 Obligations in the EAS markets for a generating unit, aggregated generating facility and energy storage facility

### *Volume obligations*

10.2.1 A generating unit, aggregated generating facility or energy storage facility that has a maximum capability of 5 MW or greater, regardless of whether or not it has a capacity commitment, must offer its maximum capability volume into the energy or ancillary services markets. Its available capability may be reduced from its maximum capability due to an acceptable operating reason (AOR). It must offer, and be available for dispatch, up to its available capability volume.

10.2.2 A generating unit, aggregated generating facility or energy storage facility that has a capacity commitment, and has a maximum capability of less than 5 MW is not required to offer but has the option to offer into the energy market if its available capability is 1 MW or greater.

10.2.3 A generating unit, aggregated generating facility or energy storage facility, regardless of whether or not it has a capacity commitment, has the option to offer into the ancillary services market and accepted ancillary services offers will continue to be netted off obligation volumes in the energy market.

10.2.4 The existing Section 306.7 of the ISO rules, *Mothball Outage Reporting*, will be withdrawn and replaced with the temporary delisting provisions applicable to both the capacity and energy markets. A generating unit, aggregated generating facility or energy storage facility that has a maximum capability of 5 MW or greater, regardless of whether or not it has a capacity commitment, has a must-offer requirement unless it delists.

### *Pricing obligations*

10.2.5 A generating unit, aggregated generating facility or energy storage facility must price its offer between the offer cap ($999.99) and offer floor ($0) in the energy market.

10.2.6 A generating unit, aggregated generating facility or energy storage facility must self-commit in accordance with the existing ISO rules, and offers may reflect the use of seven price quantity pairs.

10.2.7 A generating unit, aggregated generating facility or energy storage facility must submit:

a) offer control data with offers; and

b) the specific amount of offer-control held by each firm in cases where multiple firms control a specific offer block.

10.2.8 A generating unit, aggregated generating facility or energy storage facility must submit asset-specific data used in the calculation of asset-specific reference prices, including asset-specific technological parameters, variable operations and maintenance costs, and carbon costs, which will be subject to verification or audit.

### *Dispatch obligations*

10.2.9 A generating unit, aggregated generating facility or energy storage facility, regardless of whether or not it has a capacity commitment, must self-commit to be ready to meet dispatch requirements in the energy or ancillary services markets in accordance with existing ISO rules, subject to the subsection 10.2.10 below.

10.2.10 A generating unit, aggregated generating facility or energy storage facility, regardless of whether or not it has a capacity commitment, must submit a ramp table (or a ramp curve) that reflects the ramp rate at different MW levels of the asset.

10.2.11 The AESO must dispatch the energy and ancillary services markets using the respective energy and ancillary services merit orders, independent of any capacity obligations.

10.2.12 The allowable dispatch variance (ADV) for a wind or solar aggregated generating facility will continue to take into account real power capability (see ADV definition that is to become effective on September 1, 2018).

### *Outage scheduling obligation*

10.2.13 A generating unit, aggregated generating facility or energy storage facility with a maximum capability of 5 MW or greater, regardless of whether it has a capacity commitment or not, must submit outage information in accordance with Section 306.5 of the ISO rules, *Generation Outage Reporting, and Coordination*.

10.2.14 The AESO will not provide approval of outage scheduling. However, the AESO may cancel an outage as required in accordance with the existing ISO rules.

## 10.3 Obligations in the EAS markets for a load or aggregated load asset

### *Volume obligations*

10.3.1 A load or an aggregated load asset that has a capacity commitment of 5 MW or more must actively participate in the energy market by submitting an offer for its obligation volume into the energy or ancillary services markets. A load or an aggregated load asset that does not have a capacity commitment may continue to bid into the energy market.

10.3.2 A load or an aggregated load asset that has a capacity commitment of less than 5 MW is not required to actively participate in the energy market by submitting an offer, but it has the option to participate if its capacity commitment is 1 MW or greater.

10.3.3 A load or an aggregated load asset that does not have a capacity commitment will continue to have the option to submit an offer of at least 1 MW into the energy and ancillary services markets, or may continue to act as a price responsive load or demand response asset.

10.3.4 A load or an aggregated load asset that offers into the ancillary services market and has accepted ancillary services offers will continue to have these volumes netted off its energy market volume.

10.3.5 The existing Section 306.7 of the ISO rules, *Mothball Outage Reporting*, will be withdrawn and replaced with the delisting provisions applicable to both the capacity and energy markets. A load or aggregated load that has a capacity commitment of 5 MW or greater has a must-offer requirement unless it delists. A load or aggregated load that has not cleared in a capacity auction will not have a must offer requirement.

10.3.6 A load or aggregated load with a capacity commitment is eligible to provide ancillary services products, including load shed service for imports (LSSi).

### *Pricing obligations*

10.3.7 A load or an aggregated load asset with a capacity commitment must price its energy market volumes between the offer cap ($999.99) and offer floor ($0) for the energy market.

10.3.8 A load or an aggregated load asset with a capacity commitment will receive seven price quantity pairs similar to a generating unit or aggregated generating facility providing offers into the energy market.

10.3.9 A load or an aggregated load asset that has a capacity commitment may submit an offer into the energy market in one of two forms (i.e., dispatched “down to” a volume or dispatched “down by” a volume), but must identify which form they subscribe to.

(a) A load asset that is dispatched “down to” is also known as a firm consumption level asset and must be offered into the market as a MW level that the firm consumption level asset, if dispatched, will not consume above. A firm consumption level asset must have real time telemetry in place so the AESO system controller will be able to calculate how much load will be reduced when the firm consumption level asset is dispatched

(b) A load asset that is dispatched “down by” is also known as a guaranteed load reduction asset and must be offered into the market as the amount of MW that the guaranteed load reduction asset will, at minimum, reduce by.

10.3.10 A load or aggregated load must submit:

(a) offer control data with offers; and

(b) the specific amount of offer control held by each firm in cases where multiple firms control a specific offer block.

### *Dispatch obligations for a load with a capacity commitment*

10.3.11 A load or aggregated load with a capacity commitment that has submitted prices and volumes into the energy or ancillary services markets is consuming energy until it becomes in-merit and is subsequently dispatched to reduce its consumption.

10.3.12 A load or aggregated load asset with a capacity commitment must self-commit to be ready to meet dispatch requirements similar to existing dispatch requirements for a generating source asset (i.e., a load asset must specify a ramp rate and reduce its consumption within 10 minutes of a dispatch), subject to the requirement to submit a ramp table (or a ramp curve) that reflects the ramp rate at different MW levels of the asset.

10.3.13 After a load or aggregated load with a capacity commitment is dispatched, some or all of the load or aggregated load may not be available to receive a new dispatch to increase consumption levels for a length of time. If this is the case, the load must restate its available capability and have an acceptable operational reason (AOR) for restating its energy. When the load or aggregated load is again capable of coming back up, a restatement indicating its capability must be made and the load may come back up after it is dispatched.

10.3.14 A load or aggregated load with a capacity commitment must restate price and volume quantities to accurately reflect its capability whenever required, similar to the obligations requiring a generator to maintain accurate energy offers.

10.3.15 A load or aggregated load with a capacity commitment, in the event of equal prices anywhere in the merit order including at $999.99, will be dispatched last in the group bids and offers. For example, energy offers will be dispatched and exports bids would be dispatched at $999.99 before a load or aggregated load with a capacity commitment is dispatched.

10.3.16 A load or aggregated load with a capacity commitment does not receive additional payments in the energy market for reducing load. However, the load or aggregated load avoids the energy costs by not consuming energy and receives capacity payments.

### *Outage scheduling obligations*

10.3.17 A load or aggregated load with a capacity commitment must submit outage information, similar to the requirements in Section 306.5 of the ISO rules, *Generation Outage Reporting and Coordination*.

10.3.18 A load or aggregated load that does not have a capacity commitment must continue to comply with Section 306.3 of the ISO rules, *Load Planned Outage Reporting*.

10.3.19 The AESO will not provide approval of outage scheduling. However, the AESO may cancel an outage as required in accordance with the existing ISO rules.

10.3.20 Section 202.2 of the ISO rules, *Short-Term Adequacy and Supply Shortfall*, will be amended to contemplate a load or aggregated load with a capacity commitment.

## 10.4 Obligations in the EAS markets for an import asset

### *Volume obligations*

10.4.1 An import asset with a capacity commitment must offer its obligation volume into the energy or ancillary services markets for all hours, unless it delists. This is different than the existing requirements for an import asset where the must-offer obligation only applies to hours when delivery is submitted.

10.4.2 An import asset that does not have a capacity commitment will continue to have no obligation to offer its volumes into the energy or ancillary services markets.

10.4.3 An import asset has the option to offer into the ancillary services market, regardless of whether it has a capacity commitment. Accepted ancillary services offers will continue to be netted off obligation volumes in the energy market.

### *Pricing obligations*

10.4.4 An import asset will have the option to request and receive a priced asset with seven price-quantity pairs per interconnection to be used to offer into the energy market.

10.4.5 An import asset may request a priced asset in addition to a current price-taker asset:

(a) An import asset that chooses to be a price taker for some or all of its volume must use its price-taker asset for offers.

(b) An import asset that chooses to price its offers must use the priced asset and price its offer between the offer cap ($999.99) and above the offer floor ($0) in the energy market.

10.4.6 For scheduling purposes, an import price taker asset is treated differently than an import priced asset. The import priced asset will submit or adjust a scheduled interchange transaction that reflects its real-time dispatch (dispatched only when in-merit).

10.4.7 An import asset must submit:

(a) offer-control data with offers; and

(b) the specific amount of offer-control held by each firm in cases where multiple firms control a specific offer block.

***Dispatch obligations***

10.4.8 An import asset offer will continue to have a defined schedule and ramp period, as required currently.

10.4.9 A priced import asset must self-commit to be ready to meet dispatch requirements.

10.4.10 The AESO must dispatch an import asset from the merit order on a minute-by-minute basis during the hour, up to the available transfer capability of the respective intertie paths. Import assets will be dispatched when in-merit from lowest to highest price until the available transfer capability limit is reached. Balancing authorities can schedule on 15 minute intervals. The scheduling timeline for interties is considered to be within the dispatch tolerance rules, as described below.

10.4.11 The AESO must dispatch imports based on the respective energy market merit orders, independent of any capacity obligations (an import asset with a capacity commitment will not have priority dispatch). If available transfer capability is available and the import asset with a capacity commitment is in merit, it is dispatched. If available transfer capability is not available for all in merit offers, offers are dispatched in order and a volume may not be dispatched.

10.4.12 A priced import asset must ensure balancing authorities and transmission providers along the transmission path into Alberta will approve interchange transactions for schedule changes during the hour (i.e., having an e-tag request denied for scheduling practice reasons is not an acceptable operational reason (AOR)).

10.4.13 When dispatched up or down, the interchange transaction ramp should start as soon as practical after the dispatch is received. E-tag(s) must be submitted or adjusted, and approved for the dispatched volume. It is understood that it may take a participant some time to procure transmission and e-tag the transaction and some jurisdictions will only change interchange schedules on 15 minute intervals. When an import asset is dispatched the interchange transaction ramp must start no later than 35 minutes after the asset is dispatched.

10.4.14 A priced import asset block may set system marginal price when dispatched.

10.4.15 An import asset will be paid based on the scheduled energy in the interchange transaction (e-tag) during the settlement interval.

## 10.5 Obligations in the EAS markets for an export asset

***Volume obligations***

10.5.1 An export asset will continue to have no obligation to bid its energy volume into the energy market. However, the export asset must submit a bid in order to deliver energy.

***Pricing obligations***

10.5.2 An export asset will have the option to request and receive a priced asset with seven price-quantity pairs per interconnection to be used to bid into the energy market.

10.5.3 An export asset may request a priced asset in addition to a current price taker asset:

(a) An export asset that chooses to be a price taker for some or all of its volume must use its price taker asset for bids.

(b) An export asset that chooses to price its bids must use the priced asset and price its bid less than $999.99.

10.5.4 For scheduling purposes, a price-taker export asset is treated differently than a priced export asset. For example, the energy component of a scheduled interchange transaction is treated as a dispatch for a price-taker asset whereas a priced asset will be dispatched when it is in-merit.

### *Dispatch obligations*

10.5.5 An export asset will continue to have a defined schedule and ramp period.

10.5.6 A priced export asset must self-commit to be ready to meet dispatch requirements.

10.5.7 The AESO will dispatch an export asset from the merit order on a minute-by-minute basis during the hour, up to the available transfer capability of the respective intertie paths. An export asset will be dispatched when in-merit from highest to lowest price until the available transfer capability limit is reached if its block is at or below the marginal block dispatched. The scheduling timeline for interties is considered to be within the dispatch tolerance rules, as described below in subsection 10.5.10.

10.5.8 The AESO will dispatch exports based on the respective energy market merit orders.

10.5.9 A priced export asset must ensure balancing authorities and transmission providers along the transmission path into Alberta will approve interchange transactions for schedule changes during the hour (i.e., having an e-tag request denied for scheduling practice reasons is not an acceptable operational reason (AOR)).

10.5.10 When dispatched, the interchange transaction ramp should start as soon as practical after the dispatch is received. E-tag(s) must be submitted and approved for the dispatched volume. It is understood that it may take some time for a participant to procure transmission and e-tag the transaction and some jurisdictions will only change interchange schedules on 15 minute intervals. When an export asset is dispatched, the interchange transaction ramp must start no later than 35 minutes after the asset is dispatched.

10.5.11 An export priced asset block may set system marginal price when dispatched.

10.5.12 An export asset will pay based on the scheduled energy in the interchange transaction (e-tag) in the settlement interval.

## 10.6 Obligations in the EAS markets for a long lead time asset

The existing requirements for a long lead time asset are anticipated to remain the same with additional delivery obligations for a long-lead-time asset with a capacity commitment.

### *Volume obligations*

10.6.1 A long lead time asset must offer its available capability volume into the energy market if such volume is over 5 MW.

10.6.2 A long lead time asset must self-commit. A generation asset that has a start-up time of greater than 1 hour is considered a long lead time asset when it is offline.

10.6.3 A long lead time asset participating in the energy market must enter a start time at least 2 hours before the start of the settlement interval.

10.6.4 A long lead time asset must notify the AESO before synchronizing to the Alberta interconnected electric system.

10.6.5 The long lead time asset must have an energy offer in the energy merit order to receive a dispatch.

10.6.6 The existing Section 306.7 of the ISO rules, *Mothball Outage Reporting*, will be withdrawn and replaced with the temporary delisting provisions applicable to both the capacity and energy markets. A generation asset that has a capacity commitment of 5 MW or greater has a must-offer requirement unless it delists.

### *Pricing obligations*

10.6.7 A long lead time asset must price its offer between the offer cap ($999.99) and offer floor ($0) in the energy market.

10.6.8 A long lead time asset must self-commit in accordance with the existing ISO rules and offers must reflect the use of seven price quantity pairs.

10.6.9 A long lead time asset must submit:

a) offer control data with offers; and

b) the specific amount of offer-control held by each firm in cases where multiple firms control a specific offer block.

10.6.10 A long lead time asset must submit asset-specific data used in the calculation of asset-specific reference prices, including asset-specific technological parameters, variable operations and maintenance costs, and carbon costs, which will be subject to verification or audit.

### *Dispatch obligations*

10.6.11 A long lead time asset, regardless of whether it has a capacity commitment or not, must self-commit to be ready to meet dispatch requirements in accordance with existing ISO rules, subject to subsection 10.6.12 below.

10.6.12 A long lead time asset with a maximum capability of 5 MW or greater, regardless of whether or not it has a capacity commitment, must submit a ramp table (or a ramp curve) that reflects the ramp rate at different MW levels of the asset.

10.6.13 The AESO will dispatch the energy and ancillary services markets using the respective energy and ancillary services merit orders, independent of any capacity obligations.

10.6.14 The AESO will issue a dispatch to a long lead time asset if the long lead time asset is online and in-merit.

10.6.15 The AESO may issue a directive to a long lead time asset to come online during supply shortfall if the long lead time asset is not online, in accordance with the supply shortfall procedures outlined in Section 202.2 of the ISO rules, *Short-Term Adequacy and Supply Shortfall*. The AESO will only direct a long lead time asset to come online if the AESO expects to be short of regulating reserves (i.e., Energy Emergency Alert 2).

10.6.16 A long lead time asset, when directed to bring the long lead time asset online, may either:

(a) refuse the directive and elect to receive a dispatch in the energy market (in which case the AESO will also cancel the directive); or

(b) accept the directive to be directed to minimum stable generation (MSG) and directed above MSG if required as per ISO supply shortfall procedures, to maintain operating reserves.

10.6.17 When the AESO directs a long lead time asset online, the long lead time asset is entitled to be paid in accordance with the following:

(a) If the long lead time asset refused the directive and elected to receive a dispatch in the energy market, the energy revenue based on pool price (excluding start-up costs); or

(b) If the long lead time asset complied with the directive, the long lead time asset's start-up costs (excluding energy revenue).

### *Outage scheduling obligations*

10.6.18 A long lead time asset with a maximum capability of 5 MW or greater, regardless of whether it has a capacity commitment or not, must submit outage information in accordance with Section 306.5 of the ISO rules, *Generation Outage Reporting, and Coordination*.

10.6.19 The AESO will not provide approval of outage scheduling. However, the AESO may cancel an outage as required in accordance with the existing ISO rules.

## 10.7 Monitoring and mitigation of market power in the energy market

10.7.1 *Ex ante* energy market mitigation will be developed to supplement the existing *ex post* monitoring and mitigation.

10.7.2 An *ex ante* market power mitigation test is a three-part test of offer volumes and prices, applied separately in each delivery hour:

(a) ***Market power screen.*** Determines if a firm has structural market power (net of obligations).

(b) ***No-look scarcity test.*** If the market is sufficiently tight in a delivery hour, there will be no market power mitigation in that delivery hour irrespective of generator concentration or offer prices.

(c) ***Asset-specific reference price***. Calculates the maximum price level that a generator would be expected to offer energy at if it had no market power based on the asset-specific short-run marginal costs adjusted through the use a market-wide marginal cost multiplier to account for cycling and start-up costs, or a scarcity multiplier to account for scarcity market conditions.

10.7.3 An offer price fails the market power mitigation test if the following three conditions are satisfied:

(a) a specific firm has market power (net of obligations);

(b) the energy market is not sufficiently tight (i.e., the no-look level does not occur); and

(c) an offer price is above the relevant asset-specific reference price.

If an offer price fails the market power mitigation test, it will automatically be restated to the relevant asset-specific reference price. An offer that passes the market power mitigation test will not be price mitigated. All delivered energy will continue to be paid pool price regardless of whether a specific offer or bid is mitigated.

10.7.4 The AESO may provide reports on *ex ante* market power mitigation. Further details will be developed by the AESO and will be subject to further consultation.

### *Monitoring – market power screen*

10.7.5 The AESO will implement a market power screen for each firm after T-2, as close to the delivery hour as reasonably practicable, using the available or forecast data outlined in subsection 10.7.8.

10.7.6 The market power screen will use the residual supplier index metric, which is a firm-specific measure of structural market power. Implementation of the market power screen will require all firms to submit offer control information at the time it submits its offers (rather than the current requirement of up to 30 days later).

10.7.7 A firm may submit to the AESO a value of physical and financial supply obligations to be deducted from the firm's portfolio in the calculation of its residual supplier index. The submitted value may be subject to ex post audit by the AESO.

10.7.8 The residual supplier index for a market participant in delivery hour t is set out in the following expression:

$$RSI_{it} = \frac{Total\ Alberta\ Supply_t + Total\ Alberta\ Import\ Capability_t - (Supply_{it} + Imports_{it} - Obligation_{it})}{Total\ Alberta\ Demand_t + Total\ Alberta\ Exports_t}$$

where:

| Term | Definition |
|---|---|
| $\mathrm{Supply}_{\mathrm{it}}$ | The supply available from generating asset i in delivery hour t, including the full capability of units as measured by AC that may be offered in the energy or ancillary services markets and long lead time assets that have not been synchronized to the system. |
| $\mathrm{Total\ Alberta\ Supply}_{\mathrm{t}}$ | The supply available from all generating assets located in Alberta in delivery hour t. Specifically, $$\mathrm{Total\ Alberta\ Supply}_{\mathrm{t}} = \sum_{j=1}^{n} Supply_{jt}$$ Where the variable j indexes the n generating assets located in Alberta. |
| $\mathrm{Total\ Alberta\ Import\ Capability}_{\mathrm{t}}$ | The total available transfer capability into Alberta in delivery hour t. |
| $\mathrm{Imports}_{\mathrm{it}}$ | The imports offered by firm i in delivery hour t. This value will not exceed $ImportATC_t$ for any firm in delivery hour t. |
| $\mathrm{Obligation}_{\mathrm{it}}$ | The physical supply and financial obligations of firm i in delivery hour t that was submitted to the AESO. |
| $\mathrm{Total\ Alberta\ Demand}_{\mathrm{t}}$ | The demand for electricity within Alberta in delivery hour t. |
| $\mathrm{Total\ Alberta\ Exports}_{\mathrm{t}}$ | The total volume of exports scheduled in delivery hour t. |

10.7.9 A firm is identified by the market power screen as having market power in delivery hour t if its residual supplier index is less than 1.0.

### *Monitoring – no-look scarcity test*

10.7.10 If the supply cushion for a given delivery hour is forecast by the AESO to be less than 250 MW after T-2, electricity will be deemed to be sufficiently scarce such that no further testing of market power by the AESO will be conducted. There will be no mitigation of any offers or bids in the associated delivery hour (i.e., settlement hour at T).

10.7.11 The AESO will create a new report to inform the market of the supply cushion level and whether the no-look scarcity test will be implemented for a delivery hour. The AESO intends to use the same data to create this new report that it uses to produce its *Supply Adequacy Report*, with adjustments to serve the purpose of the no-look test.

### *Mitigation – asset-specific reference price and multiplier*

10.7.12 The asset-specific reference price for asset j in delivery hour t will reflect its operating costs, including carbon costs and cycling, as defined by the following formula:

$$RP_{jt} = \mathrm{M} * \left(HR_j * FP_{jt} + VOM_j + Carbon\ Cost_t * Asset\ Specific\ Carbon\ Efficiency\ Factor_j\right)$$

where:

| Term | Definition |
|---|---|
| $\mathrm{M}$ | The price multiplier. |
| $HR_j$ | The heat rate of asset j. |

| Term | Definition |
|---|---|
| $FP_{jt}$ | The fuel price relevant to asset j in delivery hour t. |
| $VOM_j$ | The variable operating and maintenance cost of asset j. |
| $Carbon\ Cost_t$ | The carbon cost in Alberta that is set as a matter of public policy for a delivery hour t measured in dollars per tCO2e, e.g., $30 per tCO2e. |
| $Asset\ Specific\ Carbon\ Efficiency\ Factor_j$ | The asset's rate of carbon emissions associated with energy production net of its Output Based Allocation (OBA) and is measured in tCO2e per MWh, using data consistent with that collected under the *Carbon Competitiveness Incentive Regulation*. |

10.7.13 The AESO will use the following fuel prices when determining the asset-specific reference price:

(a) For a natural gas-fired asset, the natural gas price used in the fuel price is the daily Alberta natural gas price for the day in $/gigajoule.

(b) For a coal-fired asset, the coal price submitted to the AESO that has been pre-approved.

10.7.14 For other assets, including an import asset or a non-thermal, energy-limited asset, the asset-specific reference price will be set based on a formula that captures the concept of opportunity cost.

10.7.15 For an import asset, the asset-specific reference price is defined by the following formula:

$$RP_{jt} = MidC(on\,peak) + \min\{100,\ M * MidC(on\,peak)\}$$

where $\mathrm{MidC}\ (\mathrm{on\ peak})$ is the day-ahead, on-peak price in the Mid-Columbia market (for delivery on the same day as the energy market in Alberta) and M is the price multiplier.

10.7.16 For a non-thermal, energy-limited asset, there will be no offer price mitigation (in effect, the asset-specific reference price will be the energy market offer price cap of $999.99) provided that offers for the predetermined products in predetermined quantities from these assets were made into the ancillary services market, independent of whether they have cleared or not. If such ancillary services offers are not made, then the relevant asset j in delivery hour t will be assigned an asset-specific reference price defined by the following formula:

$$RP_{jt} = M * (30Ravg)$$

where $30\mathrm{Ravg}$ is the 30-day Rolling Average Pool Price that was most recently published by the AESO at the time mitigation occurs; and M is the price multiplier

10.7.17 The asset-specific reference price will be calculated by applying a price multiplier as follows:

a) When the supply cushion is over 1000 MW, the asset-specific short-run marginal costs will be adjusted through the use a market-wide marginal cost multiplier of 3x in order to account for overall operating costs including cycling and start-up costs.

b) When the market is scarce, as measured by a supply cushion of 1000 MW or less, a scarcity multiplier will be used, adjusting the market wide marginal cost multiplier of 3x reflecting operating costs to a multiplier of 6x reflecting scarcity conditions.

10.7.18 An asset may submit to the AESO an exception request for the asset-specific reference price and, in doing so, must submit its actual short-run marginal cost. If such an exception request is approved by the AESO, the asset-specific reference price would be set at the approved level.

10.7.19 The minimum asset-specific reference price for any offer will be $25/MWh.

10.7.20 If a firm is identified in the market power screen but the offer for its asset for a given delivery hour is below the asset-specific reference price, the offer will be unaffected.

10.7.21 Market power screen and mitigation apply to both capacity and non-capacity resources on a firm-wide offer control basis.

***Mitigation – ex post monitoring and mitigation***

10.7.22 *Ex post* monitoring and mitigation is expected to continue by the AESO and the MSA.

## 10.8 Roadmap reforms in the EAS markets

10.8.1 The following design changes are included in the market roadmap (i.e., not included as part of the capacity market implementation) and will be reviewed and implemented as part of the ongoing evaluation of the market and day to day operations.

10.8.2 Design changes in relation to energy market pricing may include the following:

(a) raising the offer cap above $999.99;

(b) negative pricing and a move away from the administrative clearing of the supply surplus events; and

(c) shortage pricing and a move away from the administrative management of supply shortfall events.

10.8.3 Design changes in relation to dispatch and flexibility requirements may include the following:

(a) dispatch certainty through tightened dispatch tolerance, ramp by block, and delay times (delay times in moving towards a dispatch would be capped at some maximum less than 10 minutes);

(b) introduction of a ramp product; and

(c) shorter settlement (i.e., 15 minute settlement) for a transmission-connected asset, with the exception of retail loads, where hourly settlement will be applied.

## 10.9 Out-of-Scope Reforms in the EAS Markets

10.9.1 The following design changes will not be included as part of the capacity market implementation or market roadmap, although they may be considered by the AESO as part of a separate evaluation at another time should the need arise. The reason for this categorization is outlined in the rationale document though a brief explanation as summarized here.

(a) ***Locational marginal pricing***: given the current policy in relation to unconstrained transmission and recent system build-out, pricing on transmission grid is not required at this time.

(b) ***Security-constrained unit commitment***:  centralized unit commitment will be evaluated in the future if identified by reliability issues caused by increasing supply surplus events or as part of an integrated solution like time ahead market. A self-commitment model maintains the risk with generators and sends incentive for flexible resources.

(c) ***Security Constrained Economic Dispatch (SCED)***: SCED is currently out of scope as a comprehensive dispatch methodology, although some elements of the methodology will be used to enhance the dispatch tool and are already reflected in current pricing methodologies.

(d) ***Intertie dynamic scheduling.***

(e) ***Co-optimization of energy, and ancillary services***: the efficiency gain in relation to moving from the current separate markets to co-optimized markets was small.

(f) ***Day-ahead Market (DAM)*****:** the value of a DAM is heightened if concerns about market power are not mitigated or if the market values moving to a security-constrained unit commitment model in order to manage reliability risk. As a separate design element, the DAM effectively acts as a financial trading model, which most participants can manage independently outside of the market. The proposed market power mitigation approach encourages forward trading for large companies.