Alberta Capacity Market

Comprehensive Market Design (CMD 1)
Design Proposal Document

Section 1: Overview of the Alberta Capacity Market

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1 Overview of the Alberta Capacity Market

1.1 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 a 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.

1.2 Summary of Design Process

During the course of 2017, the AESO engaged both working groups and the broader stakeholder community at multiple stages to advance the technical elements of the capacity market design. Three iterations of a Straw Alberta Market proposal document (SAM 1.0, 2.0 and 3.0), which reflected the AESO's analysis and the recommendations of the working groups, were developed and posted for stakeholder comment.

To initiate the next stage in the advancement of the capacity market design, the AESO is posting its first draft of the proposed Comprehensive Market Design (CMD 1). CMD 1 sets out the framework of the technical design of the capacity market, as informed by SAM 3.0 recommendations, stakeholder feedback, third party expert advice and internal AESO analysis. Given certain legislative changes required to enable the development and implementation of the capacity market have not yet been enacted, CMD 1 is premised on the assumptions that the preliminary technical design work can continue to proceed and that the authority, roles and responsibilities of Alberta's electricity-related agencies will ultimately be specified in legislation. Such legislation could necessitate the modification of some market design elements discussed in this draft of the CMD.

Concurrently with CMD 1, the AESO is posting an accompanying rationale document, which contains the AESO's support and other considerations for positions taken in CMD 1. Both CMD 1 and the accompanying rationale document, while posted as separate documents that each contain a number of discrete sections, are intended to be read holistically, and together. In addition, as part of its design activities the AESO modelled the Comprehensive Market Design to simulate capacity and energy market conditions under forecast scenarios to review various potential market conditions and determine the revenue sufficiency of select generating assets under those conditions. This analysis is presented in the report titled *Summary of Integrated Capacity and Energy Revenue Modelling* accompanying the CMD 1 proposal and rationale documents.

It is expected that both the CMD proposal and the accompanying rationale document will evolve over the coming months. Feedback from working group members as well as the broader stakeholder community will be invited at various stages throughout the first and second quarters of 2018. The technical design of the capacity market is currently scheduled to be finalized by June 30, 2018 with the issuance of a final draft of the CMD.

1.3 CMD 1 Proposal

The CMD 1 proposal is colour coded in red and black text to focus discussions with the working groups over the coming months. **Red text** indicates design areas where further AESO analysis and/or stakeholder engagement is expected in order to advance refinement of the technical design proposal. **Black text** indicates design areas where minimal to no further changes to the proposed technical design

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

are expected at this time; however, areas of black text may still evolve based on ongoing stakeholder consultation and analysis. The CMD 1 proposal as a whole is expected to evolve based on ongoing AESO analysis and continued engagement with stakeholders.

1.4 Overview of Proposed Design

Category	High-level Design Choices
Supply Participation	• Resource-neutral participation of all resource types with demand response only participating on the supply side of the capacity market. Energy efficiency will not be eligible for the initial auction. Resources which do not have the ability to deliver through the entire delivery period will not be eligible. • Prequalification and qualification requirements will be resource specific, ensure feasibility of physical delivery, and reasonably accommodate different resource types. All existing generating assets greater than 5 MW maximum capacity will be prequalified for the capacity market auction. • UCAP determination will be unit specific for existing resources. • An availability factor based calculation will be utilized for thermal resources and large hydro. • A capacity factor based calculation will be utilized for all other resources excluding external resources (interties). • Unforced capacity (UCAP) for most resources will be determined by measuring the availability factor, capacity factor or intertie schedule during the 100 hours per year of smallest supply cushion for each of the previous five years. The UCAP for variable generators will use the same number of hours as will be used for thermal generation resources. • New units will utilize class averages utilizing the same methodology to determine class average UCAP as per above. New variable resources will use class average by geography. • External resources will use the minimum of firm transmission, the Alberta scheduling limit, or the observed historical scheduled energy flow during defined tight supply cushion hours.
Calculation of Capacity Market Demand Curve Parameters	• AESO will forecast demand based on gross Alberta load. • The target capacity volume will be set to meet the resource adequacy standard. • Forward-looking probabilistic resource adequacy modelling will be used to determine target capacity volume based on the resource adequacy standard. Target volume will be adjusted to account for self-supplied volumes, non-qualified import volumes, and ineligible resources (including successful Renewable Electricity Program (REP) Round 1 projects). Reference technology will be simple-cycle. The reference technology will be limited to a plant capacity of approximately 150 MW or less. • A comprehensive gross-CONE estimate will be completed by an independent consultant once every three to five years. • Energy and Ancillary Services (EAS) revenue offset for the reference technology will be determined via a forecast methodology. • Demand-curve parameters will be set to create a downward-sloping, convex demand curve with: - The price cap at the maximum of 1.75 x net-CONE or 0.5 x gross-CONE; - the minimum quantity will be set at a value of capacity commensurate with 800 MWh of Expected Unserved Energy (EUE) in one year; - Price at the target capacity level is 1.5 x net-CONE; - The inflection point is set at 0.875 x net-CONE; - The foot is 13 per cent above the target capacity volume and at a price of zero. • Prior to each auction a defined process to update gross-CONE and net-CONE for changing cost parameters and EAS revenue offset will be applied to recalculate net-CONE.
Forward Capacity Auction	• Three-year forward period. • One-year delivery period, running November-October. • No option for seasonal capacity commitments (annual obligations only). • REP resources will continue to be ineligible as long as payment mechanisms stay the same. No other adjustments for out-of-market payments will be made.

Category	High-level Design Choices
	• Uniform price, sealed bid, single round auction. • Alberta will clear as a single capacity region with one capacity price. • The capacity market auction clearing mechanism will maximize social surplus and minimize deadweight loss. • Import offers and any transmission-constrained offers exceeding transmission delivery limits will be rationed based on offered capacity price in supply curve, then by the offer maximizing social surplus, then by pro rata allocation. Cleared resources will receive market clearing price determined by highest price offer accepted.
Rebalancing Auctions	• Two rebalancing auctions will be held and completed at 18, and 3 months before the delivery period. • Suppliers may offer buy-out bids and incremental sell offers into the rebalancing auction. • The rebalancing auction may clear with a net purchase or sale from the AESO, consistent with an updated administrative demand curve. • Demand curve shape will stay the same in the rebalancing auction.
Physical Bilateral Transactions and Self Supply	• Physical bilateral capacity procurement of capacity is not permitted; however, a site may choose to 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 (includes industrial system designations (ISD and DAT). • Sites with onsite generation that cannot physically flow their gross volumes due to system connection limitations must self-supply. • Self-suppliers can be connected to either the transmission system or the distribution system. • The City of Medicine Hat will be treated as a self-supplied load within the capacity market. • 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 three years.
Monitoring and Mitigation	• A must-offer requirement will apply to all suppliers except for: - New resources which have not achieved commercial operation or cleared a previous auction. - Demand response and external resources which have not prequalified and cleared a previous auction. • Resources wishing to retire, mothball, or derate capacity will need to apply for a must-offer exemption prior to the auction. The request will be reviewed and approved if net going-forward costs are demonstrated to be above the capacity auction price cap or if the resource cannot clear the capacity auction at its net going-forward costs. • Sellers with a portfolio UCAP of 15 per cent or greater of target capacity volume will be subjected to a capacity market offer cap of 0.5 x net-CONE on all existing assets. Assets may be allowed to offer at higher prices subject to demonstrating higher net going-forward costs, and offering at cost up to the overall market cap. • There will be no minimum offer price requirements for capacity resource suppliers due to net-short capacity positions or out-of-market payments.
Supply Obligations and Performance Assessments	• Capacity resources will be required to deliver on obligations or face adjustments to payments. • Resources may be required to provide data necessary to calculate UCAP and assess performance. • New resources clearing the market will be required to meet development milestones tracked by the AESO. If failing to meet development milestones, new resources will be required to replace their capacity obligation through asset substitution arrangements or by buying back in the rebalancing auction up to the market price cap. • Within the obligation period there will be two assessments: - Availability Assessment: will be assessed annually relative to sold UCAP volume using actual energy production plus offered energy and ancillary services obligations. The assessment will be carried out over the 100 tightest hours of each delivery year. Failure to demonstrate dispatched or offered energy volume being equal to or greater than the obligation of the resource will result in a payment adjustment on a $/MW-yr basis at 40 per cent of the maximum of 1.3 multiplied by the actual capacity revenue of the supplier divided by 100, or 1.3 multiplied by the last

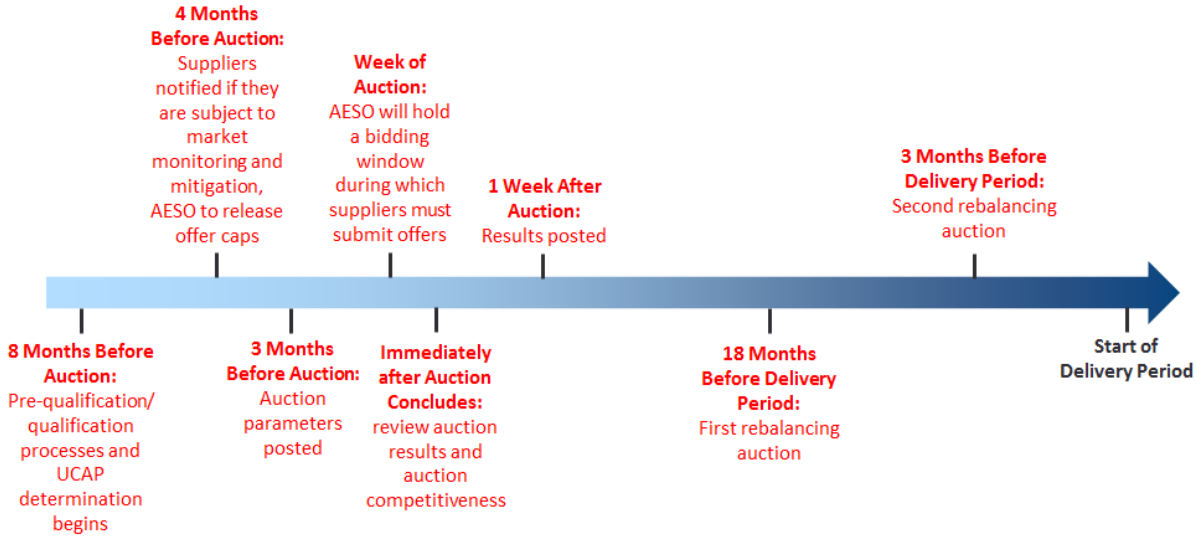
Category	High-level Design Choices
	rebalancing auction clearing price divided by 100. - Performance assessment: provider will be assessed relative to sold UCAP volume adjusted by a balancing ratio (energy and reserves produced by committed resources during a performance assessment period/total capacity purchased) using actual energy production, level of consumption and/or provision of reserves during all energy emergency alert event (EEA) levels. Payment adjustment will be calculated on a $/MWh basis at 60 per cent of the maximum of 1.3 multiplied by the actual capacity revenue of the supplier divided by an expectation of EEA hours at the demand curve cap, or 1.3 multiplied by the last rebalancing auction clearing price divided by an expectation of EEA hours at the demand curve cap. • During performance assessment conditions, over-performing resources with an existing capacity obligation will be eligible for over-performance payment adjustments. Resources without a capacity obligation will not receive any performance payments. Performance payment adjustments will be funded on a revenue neutral basis. • Inability to deliver due to derates, forced or planned outage conditions or force majeure will not exempt a resource from performance or availability requirements. Inability to deliver due to intra-Alberta transmission constraints will provide an exemption from performance and availability requirements. • Total combined payment adjustment assessments will not exceed the greater of 1.3 multiplied by the actual capacity revenue of the supplier, or 1.3 multiplied by the last rebalancing auction clearing price as applied to the seller's volume. Payment adjustments in one month will not exceed 300 per cent of any one month's revenue of the supplier. • The management of payment adjustment risk through asset substitution will be allowed on an *ex ante* basis up until the start of the energy market settlement interval.
Settlements and Credit Requirements	• Payments will not be made to providers prior to the start of the delivery period. • Consistent with the energy market, capacity market statements will be issued monthly. • 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. • Costs of procuring capacity will be allocated to customers according to the approved capacity cost allocation methodology. • No net settlement instructions (NSI) for capacity will be enabled. • Resources looking to buy back in rebalancing auctions, as well as new capacity resources, will need to demonstrate sufficient credit. • 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.
Confirming Changes in the Energy and Ancillary Services Markets	**Status quo continues** • Current self-commitment rules will continue. • Current must-offer requirement will continue to apply to all generation resources – capacity or non-capacity (AC must be offered). • Non-committed load resources (demand response and price-responsive load) may offer or may continue to self-dispatch. • All generation participants (capacity-committed and otherwise) must submit information related to asset outages for the market, and AESO information based on current rules (no outage approval). • All offers can be between price cap and floor, unless mitigated as per below. • The current market structure for ancillary services will remain the same (subject to security constrained economic dispatch (SCED) evaluation as per below). • *Ex post* monitoring and mitigation of the market will continue. **Roadmap** • Over time, the AESO and stakeholders will implement a roadmap of reforms to enhance energy and ancillary services markets to meet growing system flexibility needs, and enable new technologies to

Category	High-level Design Choices
	compete. Further evaluation is required to specify timing for implementation of market changes. Dates and classification of changes (prior to first auction delivery (2021) or beyond) will be included in the next draft of the CMD. **Additional rule changes for capacity market delivery** • Offer control information must be submitted. • Mothball rule adjusted to shorter one-year period (or eliminated for non-capacity resources). • Minor changes to the supply adequacy or supply shortfall rules to include demand-capacity resources, and self-supplied demand. • Capacity-committed load resources must offer similar to generation assets, and follow dispatch. Capacity-committed load resources can offer to be last-directed assets at price cap or part of EEA1 directives (subject to evaluation of tools and rules. Capacity-committed load resources that are "down-to" must offer at the cap (part of directives)). • Intertie assets, imports and exports will be provided the option to submit offers in price quantity pairs upon request of a new asset, in which case they will be dispatched during the settlement period, and may set SMP. • Capacity-committed imports must offer the capacity-committed volumes into the energy market. • Capacity-committed load resources must follow a similar rule for outage information (no outage approval). • The energy market will adopt an *ex ante* market power mitigation based on an hourly residual supplier index (RSI) structural screen will be set at RSI of 0.9. • An hourly conduct test will be evaluated against a bid threshold at 3x marginal costs measured at variable cost. All resource offers from a supplier that fails the conduct test will be mitigated to the 3x marginal cost threshold by fuel type. - The bid threshold will be calculated at 3 x marginal cost defined as heat rate x fuel price + variable O&M + carbon cost. - For non-thermal resources, market participants will have the ability to submit opportunity cost for approval. - Calculation of marginal cost will likely be subject to a regulatory approval process. • Offer cap will be kept at $999.99. **Rule changes for price fidelity/flexibility** • Dispatch will continue on a minute-by-minute basis from a merit order created by hourly submissions. An alternative SCED model will be evaluated against other options like a ramp product. The SCED model runs an algorithm, period ahead, constrained by balancing supply with demand and expected need for ramp. The forward SCED would run in advance sufficient to support a self-commitment decision. The SCED will run during the hour to also support five minute dispatch optimizing for these constraints. • Some incremental energy market rule changes will be required to ensure efficient dispatch and price signals related to system ramp, including rules related to dispatch tolerance, ramp by block, and rules related to supply surplus. • Fifteen minute settlement will be applied for pool assets, except hourly settlement will be applied for retail loads. • Real-time or co-optimized ancillary services market for purchases of energy and ancillary services may be introduced (part of SCED evaluation). **Out-of-Scope Components for Energy and Ancillary Services Market Reforms** • These items may be reconsidered if proposed market rules are insufficient to address market evolution; however, they would be taken out of scope of current market roadmap discussions. - Increasing offer-cap above $999.99

Category	High-level Design Choices
	- Negative pricing - Shortage pricing (operating reserve demand curve-type pricing) - Locational marginal pricing (LMP) - Intertie dynamic scheduling - Security constrained unit commitment (SCUC) may be reconsidered due to high supply surplus events or issues of market power mitigation - Day-ahead market (DAM)

1.5 Auction Timeline

Figure 1
Steady State Timeline for Capacity Auction



In the transition to the capacity market, auctions will be conducted on a compressed forward period starting with a November 2019 auction for delivery in 2021/2022. Auctions will be held approximately every six months until the full three-year forward period is achieved with an auction in November 2020 for delivery year 2023/2024. During this transition period, rebalancing auctions will be held less frequently than under the standard auction timeline. See Sections 4 and 5 for additional detail.