

# Alberta Capacity Market

## Comprehensive Market Design (CMD 1) Design Proposal Document

### Section 4: Forward Capacity Auction

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## 4 Forward Capacity Auction

To effectively allow for new entry, the AESO proposes to facilitate a forward-capacity auction. This section outlines the specific timeline, format and mechanics of this auction.

### 4.1 Auction Forward Period and Timeline

The AESO will conduct, and finalize results of the forward auction three years before the start of the obligation period. In the transition period when the market begins, the forward period will be less than three years to allow the market to take effect more rapidly. Procedures for these transitional auctions will take place on a compressed timeline. After the transition period is concluded, auction procedures will be conducted on a pre-determined schedule, allowing sufficient time for qualification, market monitoring actions, bidding, and auction clearing.

#### 4.1.1 Transition into the Three-year Forward Period

The implementation of the proposed three-year forward period will occur over several auctions, as shown in Table 1. This transition will begin with the first auction process commencing in November 2019 for delivery in 2021/22 with a compressed, approximately two-year forward period. Two additional transitional auctions will be held at approximately **six month** intervals. An auction will be held in **May of 2020** with an approximately two-and-a-half-year forward period. The **November 2020 auction**, for delivery year **2023/24**, will be the first auction conducted with the full three-year forward period, though auction procedures for this auction will still be conducted on a compressed timeline.

**Table 1**  
**Timeline of forward capacity auction**

| Auction Date | Obligation Period |
|--------------|-------------------|
| Nov 2019     | Nov-Oct 2021/22   |
| May 2020     | Nov-Oct 2022/23   |
| Nov 2020     | Nov-Oct 2023/24   |

#### 4.1.2 Auction Timeline Post Transition

Once the transition period is complete, a predetermined timeline for each step of the auction process will be used. Figure 1 shows the major process steps required for each forward auction.<sup>1</sup> Resource qualification and the determination of UCAP requirements (discussed in Section 2) will be conducted well in advance of the auction to provide sufficient time for the receipt and review of market participant data.

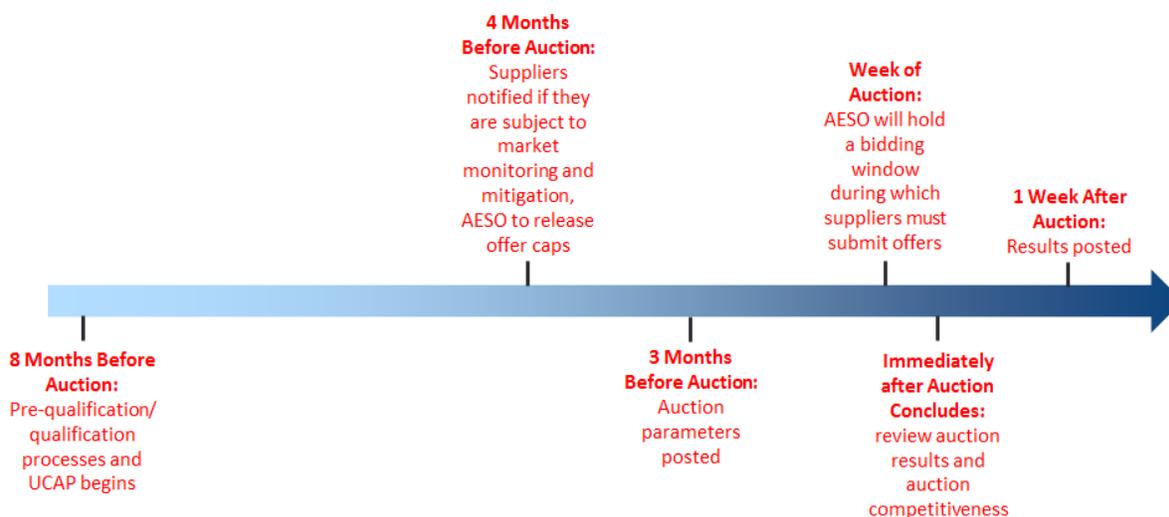
**The rules with respect to the auction will be finalized prior to the commencement of the first auction.**

Pivotal suppliers will be notified of market mitigation implications (described in Section 7 – *Capacity Auction Monitoring and Mitigation*), and receive notice of the auction parameters (described in Section 3 – *Calculation of Capacity Market Demand Parameters*) prior to offer submission. The offering window, during which market participants can submit offers to sell capacity, will be one week long. Auction clearing will be followed by a review of auction results and the posting of results **one** week after the auction.

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<sup>1</sup> These procedures will be elaborated on in future versions of the Consolidated Market Design and may include steps such as data submissions by market participants, review by AESO staff, etc.

**Figure 1**  
**Auction Timeline After Transition Period is Concluded**



The obligation term will be one year for all resources. The annual obligation period will run from November 1 of each calendar year through October 31 of the following calendar year.

## 4.2 Supply Participation and Offer Format

Each resource must specify in its offer a number of characteristics that will be required in the clearing process. Examples of such characteristics include the following:

- The number of blocks in, up to a maximum number of seven blocks per offer.
- Whether a block is divisible or indivisible; Divisible blocks can be cleared mid-block at the required MW, whereas indivisible blocks can only clear at their total offered capacity volume.
- The price (in \$/kW-year) for each block.
- The quantity (UCAP MW) pairing for each block.
- Offers will have a minimum at \$0/kW-year and a maximum of the price cap established for the demand curve **with exceptions for resources buying out of previous capacity obligations in rebalancing auctions (see Section 5)**.
- For offer quantities, the proposed minimum block size is **1 MW**.

All qualified capacity resources must offer their entire qualified UCAP in each base auction.

## 4.3 Out-of-Market Capacity Payments

**No adjustments will be made to capacity market offers from qualified resources for the purposes of correcting for out-of-market payments.** Capacity market offers may be mitigated as per Section 7.

## 4.4 Single-Round Uniform Price Auction

A sealed-bid, single-round, uniform pricing auction will be utilized for forward and rebalancing capacity auctions. A single capacity price will be established for all supply which clears the market.

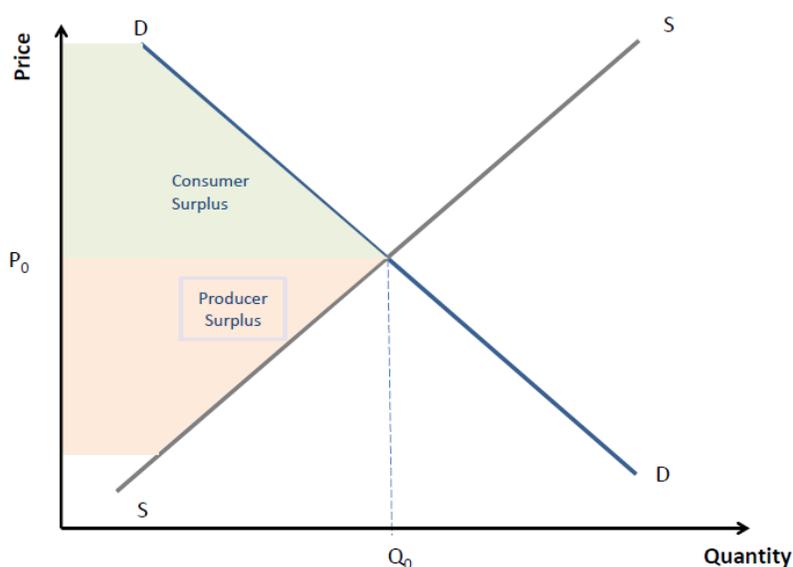
## 4.5 Auction Clearing and Price-Setting

The AESO expects that the supply curves created in the capacity auction will not be smooth, but will be built up by a number of independent supply offers resulting in a supply curve with a number of discrete

steps. This will create scenarios where the market cannot clear at the intersection of the supply and demand curves, possibly due to the demand curve intersecting the supply curve between offer blocks, the marginal offer being inflexible or possibly due to the supply curve being below the demand curve. This section describes the principles that will be used to clear the capacity market.

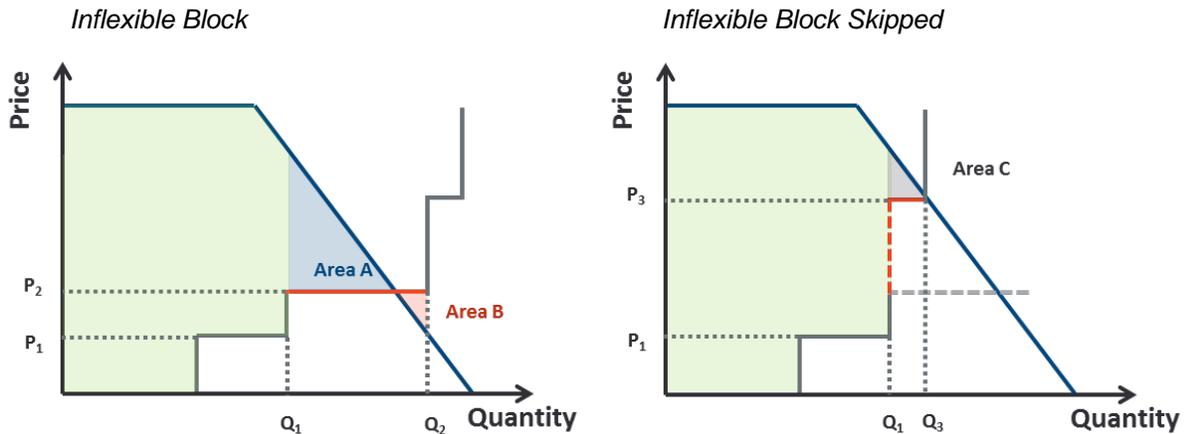
The capacity market auction clearing algorithm will seek to maximize social surplus and in so doing, minimize deadweight loss. Social surplus represents the total value, to buyers and sellers, of transacting in the market. It is represented by the area between the demand curve and the supply curve to the left of the cleared quantity (see **Figure 2**). Social surplus has two components: producer surplus and consumer surplus. Producer surplus represents the difference between total market revenues from the sale of the product, and the total marginal costs of production. Consumer surplus represents the difference between a buyer's (in this case, the AESO's) willingness to pay for a product and the price of the product, summed over all units sold. When the market clears at the intersection of the supply and demand curves, the social surplus is maximized.

**Figure 2: Consumer Surplus, Producer Surplus, and Social Surplus**



In circumstances where the capacity market cannot clear at the intersection of the supply and demand curves due to the marginal capacity offer being an inflexible block, the market will then clear the marginal resource provided it maximizes social surplus. **Figure 3** illustrates two scenarios: (1) on the left: a scenario where the entire inflexible block is cleared; and (2) on the right: a scenario where the inflexible block is skipped and the offer above the inflexible offer is cleared on the right. The social surplus resulting from clearing at  $P_1$  and  $Q_1$  is the same in both figures, depicted as the light green region. In the figure on the left, the additional social surplus from clearing the inflexible block (clearing at  $P_2$  and  $Q_2$ ) is indicated by the blue region (area A) minus the red region (area B). In the figure on the right the additional social surplus from skipping the inflexible block and clearing the offer above the inflexible block (clearing at  $P_3$  and  $Q_3$ ) is indicated by the grey region (area C). In these illustrations, we see that the additional social surplus from clearing the inflexible block at  $P_2$  and  $Q_2$  (area A minus area B) is larger than the additional surplus if the inflexible block was skipped, and the next block was cleared at  $P_3$  and  $Q_3$  (area C). Therefore, selecting the entire inflexible block creates the greatest additional social surplus and would be cleared (auction clears at  $P_2$  and  $Q_2$ ). The market-clearing engine used by the AESO to clear the capacity market will use the same approach. Maximizing social surplus is also the approach used by the AESO in the energy market.

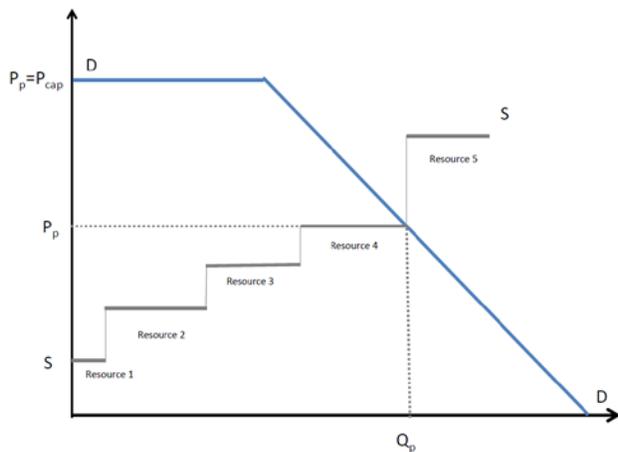
**Figure 3: Illustration – Maximizing Social Surplus**



*Price-Setting When the Entire Capacity Supply Curve or the Portion of the Capacity Supply Curve Cleared in the Auction Lies below the Demand Curve*

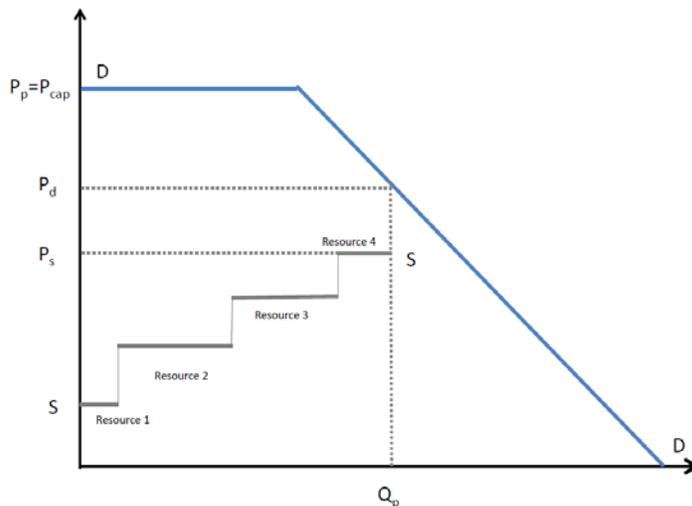
When clearing the auction to maximize social surplus, the auction clearing price is set at the intersection between the supply and the demand curves,  $P_p$  (**Figure 4**).

**Figure 4: Auction Cleaning Price Determination**

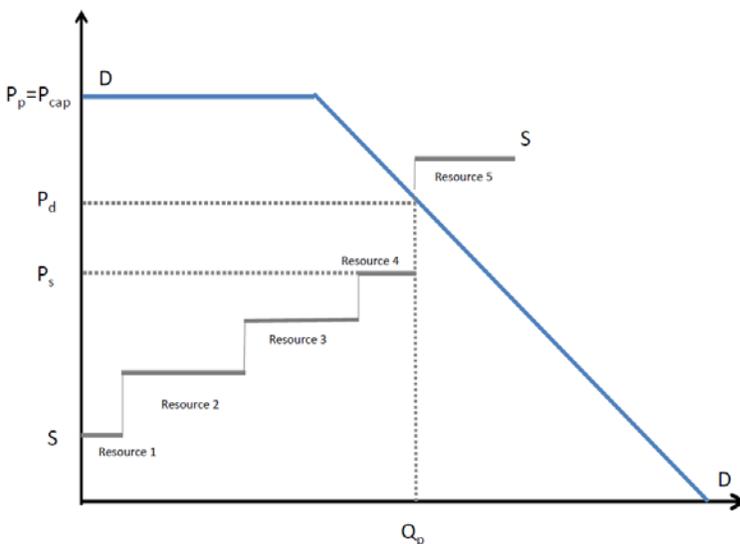


However, it is possible that the entire capacity supply curve or the portion of the capacity supply curve cleared in the auction lies below the demand curve as shown in **Figure 5** and **Figure 6** respectively. In **Figure 5** and **Figure 6**, if the procurement volume is  $Q_p$ , the price value is not unique as the cost of the capacity at quantity  $Q_p$  (represented by the supply curve  $SS$  at  $P_s$ ) and willingness to pay at quantity  $Q_p$  (represented by the demand curve  $DD$  at  $P_d$ ) are not equal. In these situations, the AESO will set the capacity auction clearing price at the intersection between the vertical line drawn from the procured quantity  $Q_p$  and the demand curve, i.e., the  $P_d$  in the charts.

**Figure 5: The Entire Supply Curve Lies Below the Demand Curve**



**Figure 6: The Supply Curve of Selected Resources Lies Below the Demand Curve**



#### 4.6 Addressing Intertie Transmission Constraints

Alberta has limits on the amount of capacity that can participate through interties. Section 2.3 discusses how capacity values are determined for qualified external resources utilizing interties. Ahead of the auctions, the AESO will determine expected joint scheduling limits across interties. Should a constraint be identified which prevents the simultaneous delivery of external capacity resources across multiple interties, external resources will not have their individual UCAP ratings reduced, but rather will be cleared in the auction using the following method:

1. From lowest to highest capacity offer price.
2. For multiple resources at the constraint volume level, resources that maximize the social surplus in the auction will be cleared first. This will provide priority to offers that are divisible.
3. If there is still more capacity resource available than can be delivered after steps 1 and 2, the resources will be cleared via a prorata allocation of remaining expected transmission capability.
4. Volumes remaining after the transmission constraint level has been reached will be skipped over in remaining market clearing steps. All cleared resources will receive the overall market clearing price.

## 4.7 Addressing Internal Transmission Constraints

Prior to the auctions, 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 delivery period.

Clearing of qualified capacity resources that are located behind an identified transmission constraint will be done based on qualified resource UCAP levels up until the level of the constraint. Resources will be cleared as follows:

1. From lowest to highest-capacity offer price.
2. For multiple resources at the constraint volume level, resources that maximize the social surplus in the auction will be cleared first. This will provide priority to offers that are divisible.
3. If there is still more capacity resource available than can be delivered after steps 1 and 2, the resources will be cleared via a pro rata allocation of remaining expected transmission capability.
4. Volumes remaining after the transmission constraint level has been reached will be skipped over in remaining market clearing steps. All cleared resources will receive the overall market clearing price