Base Auction

Rationale

5.1 Forward period

5.1.1 The three-year forward period is long enough to achieve the benefits of a forward auction, namely the orderly entry, and exit of capacity assets. At the same time, while supply and demand conditions are less certain three years forward, they can still be forecast with reasonable accuracy. Many capacity markets have adopted similar forward periods, including PJM, and ISO-NE which have three year forward periods, and the UK, and Ireland which have four year forward periods. The three-year forward period has received unanimous support from the Capacity Market Technical Design Working Industry Group.[1]

As noted above, forward auctions support orderly entry and exit decisions by establishing market expectations well in advance of capacity commitment delivery. A capacity committed asset will be able to complete its interconnection and have additional time to complete construction prior to the start of the delivery period, allowing for competition between new and existing capacity assets.[2] Similarly, a capacity committed asset can signal to the market its intention to retire well in advance, or choose to reduce its obligation volumes in response to a reduction in forecasted load.

Some larger capacity assets may require longer than three years of lead time to come online and therefore there may be a preference for a longer forward period. These longer-term capacity assets may need to make significant investments before entering and potentially clearing the capacity market. While these capacity assets accept some additional risk by making investments prior to clearing a capacity auction, they are not excluded from the market. The capacity market's price signal allows these capacity assets to make investment decisions based on market fundamentals. While a longer forward period might benefit the subset of long lead-time capacity assets, these benefits may be offset by the costs of increased forecast error.

The three-year forward auction approach has certain drawbacks. In its report to Alberta's Market Surveillance Administrator, Potomac Economics drew a different conclusion about the most appropriate forward period and recommended a prompt auction, conducted only weeks or months before the start of the obligation period.[3] Potomac observed that forward auctions lead to greater uncertainty in load, and supply availability relative to prompt auctions. While this view is acknowledged, it's important to allow new capacity assets to establish a capacity commitment and obtain some revenue certainty prior to the start of their construction period and equipment deliver period – the time when capital expenditures increase dramatically for new assets. We also acknowledge Potomac's observations that forward auctions may be less beneficial for capacity

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1 See Capacity Market Technical Design Working Industry Group Recommendation, SAM 2.0, and https://www.aeso.ca/assets/Uploads/Capacity-Forward-Period-DAS.pdf

2 The AESO connection process shows that the target timeline between the initiation and the approval of energization of a connection project is 96 weeks. After the connection period, extra time and activities are also required before a project can begin commercial operation.

3 See Section III.2. of Potomac Economics, "Report on Best Practices in Wholesale Electricity Market Design," November 2017, Prepared for the Alberta MSA, Available: https://albertamsa.ca/uploads/pdf/Archive/00000-2017/2017%2011%2029%20Report%20to%20Alberta%20MSA%20Final.pdf

assets with longer construction lead times.[4] As discussed above, it is believed that such capacity assets may still be able to participate in forward auctions, and may benefit from the reduced price volatility of the three year forward period relative to auctions that are settled more immediately prior to the obligation period.

The three-year forward period strikes a balance between allowing enough lead time for capacity assets to complete construction after clearing the capacity market and managing uncertainty about future demand, and supply conditions. While a longer forward period would enable larger capacity assets more flexibility before making significant financial commitments, and a shorter forward period would reduce market uncertainty, a three-year forward period provides an appropriate balance of the aforementioned considerations.

5.1.2 Due to the short period between market design completion and the commencement of the capacity market, a transition period is being established in order to allow the AESO to procure capacity for obligation periods of 2021/22, 2022/23 and 2023/24. During this transition period few rebalancing auctions will be held. This is discussed in greater detail in Section 6.

5.2 Auction timeline and procedures

5.2.1 The forward capacity auction will involve a series of activities that begin approximately eight months before the capacity auction. This amount of time is required for the AESO to release auction parameters, including the reliability requirement for the obligation period, complete the prequalification and qualification process for new and existing assets and to allow firms to dispute some auction items. This period of time should also allow firms to establish their auction participation strategy and to obtain internal approvals for participation.

5.3 Obligation period

5.3.1 The 1-year obligation period proposed establishes a fair and competitive market for capacity assets. A one-year timeframe allows the capacity market to promptly reflect current supply and demand conditions, responding to trends and changes as necessary. A longer obligation period may be more prone to inefficiencies due to forecast errors, it may reduce the incentive for capacity suppliers to innovate and reduce costs and may result in the AESO purchasing capacity that becomes inefficient relative to new technology prior to the end of the longer term obligation period. A longer obligation period also may result in inefficient retirement, mothball, and upgrade decisions. In CMD 1 the AESO acknowledged that a potential downside of a shorter obligation period is that it could fail to provide enough certainty to attract investment in new capacity assets. Further assessment of whether various obligation periods of various durations and term structures for an obligation period longer than one year would impact investment differently, and the pros and cons of different design alternatives that may allow up to a 7-year price lock-in has been conducted. The AESO relied upon an investment banker with knowledge of power industry financial matters and the Brattle Group's modeling expertise and its experience with other capacity markets for its assessment.

[4] Potomac also observed that a single year of capacity revenues is a small portion of the revenue requirement of a new resource. While this is of course true, this is a feature of capacity markets generally, and has no bearing on the choice of forward period.

Investment banker summary

The investment banker completed a study of the financing arrangements that have been completed for generating assets built in PJM and the ISO-NE under their longer term capacity structures.

The key findings of their report include:

(a) *Project financing but with costs:* The longer obligation period in the ISO-NE has provided for project financing for three facilities. Even with the longer obligation period the risk characteristics of these projects has been rated high (below investment grade) and as such the financing costs have been high. Some of these projects have had multiple tiers of financing that resulted in later recovery of cash for equity investors, increasing the return expectation for the equity investors. The debt financiers have not been typical US or Canadian lenders, with offshore banks and non-banking lenders providing debt financing. Further, the recent low interest rate environment may have driven much of the financing for these projects. The investment banker points out that this environment may be changing and the durability of these lenders may be "open to question".

(b) *Incumbents still dominate:* Many of the asset builds in ISO-NE that have qualified for the longer term obligation period have been completed by incumbents to the power sector that finance projects from their balance sheets such as: Dynegy, Exelon, NRG and PSEG

(c) *PJM – relying on the energy market for financing:* Very few new capacity assets have qualified for the three year obligation period in PJM and have instead relied on bilateral hedges, often up to five years in length to support their financing

(d) The investment banker's considerations for a longer obligation period in Alberta include:

i. *Increased regulatory environment risk:* the merchant power's sector risk in Alberta is likely higher in today's environment than in previous years with a recent change in the provincial government and the new policies that result from different long term environmental goals of this administration than the previous administration.

ii. *Deteriorating incumbent balance sheets:* while the energy only market saw the development of a significant amount of merchant generation, much of that was balance sheet financed and supported by the contractedness provided by the PPA legislation. The benefits of that contractedness have largely disappeared and it's not expected the incumbents would be in a position to complete the same level of investment in the future as was completed in the past.

AESO's assessment of a 1-year obligation period

Over the last 18 months the AESO has completed much analysis regarding the 1-year obligation period. The following table provides a summary of the advantages and disadvantages of a 1-year obligation period for all types of capacity assets.

Advantages	Disadvantages
Does not discriminate between capacity asset types. All capacity assets receive the same treatment, reducing the efficiency losses and costs due to early retirement of existing capacity assets.	Uncertainty regarding whether a 1-year obligation period will attract sufficient new supply. The AESO recognizes a longer obligation period - reduces regulatory risk for new entrants; and - may provide financing alternatives that are not available with a one year term

Reduces the risk of over-procurement of capacity due to changing demand forecasts. Historical load forecasts have consistently overestimated load growth. Shorter procurement terms reduce the risk of purchasing more capacity than required.	
Has been successful in other markets **PJM has attracted many thousands of MWs of new entrant capacity with 1-year obligation periods.**	
Provide better liquidity in the capacity market – all capacity assets are required to participate in each forward auction	
Provides better price fidelity for capacity - better represents marginal value and cost of capacity through time and provides valuable market information at more frequent intervals	

Brattle Group's Analysis

The Brattle Group suggested a number of potential market design alternatives to the one year term. The table below summarizes their thoughts as well as possible advantages and disadvantages of each alternative.

Approach	Description	Advantages	Disadvantages
Have a longer term option when one year term does not attract needed investment	Seek to secure needed capacity through a one year term; if that is not successful allow all capacity assets to compete for a longer obligation period. The auction would clear at the price cap and shorter duration obligation period offers (i.e. 2 years) would clear prior to longer duration obligation period offers (i.e. 7 years)	- Resource neutral - Helps protect against reliability risk - May reduce market distortions created by longer multi-year commitments - Incents supply to offer at the shortest acceptable fixed price duration	- May provide an incentive for suppliers to hold out for longer term capacity commitments - The long term average capacity market price is higher than one year, no lock-in approach, overall variability of capacity prices is greater and the number of auctions that settle at the price cap is greater
Three-year term with auctions	Run a three year auction every three	- Some additional price certainty for	- Based on the investment banker's research, this term isn't

every three years	years. The AESO would obtain all the capacity it needs for the next three years once every three years.	sellers	materially different from a one year term and would provide little benefit in capacity cost or project financability - AESO runs risk of mismatch in needs vs. procurement quantity in many years and potential for additional costs to load - Risk of large simultaneous retirement and new capacity asset entry every 3 years
Laddered procurements	Procure capacity needs through a variety of terms; purchase 20% of capacity in 1 year, 2 year, 3 year, 5 year and 7 year terms.	- May be attractive to some market participants - Provides significant pricing information on a number of different terms	- Untested – not used in other jurisdictions - No concrete theory on the most appropriate share of short and long term contracts - May limit competition between new and existing capacity assets - Potential for over-procurement - Segments the market into smaller, less competitive slices, increasing need for monitoring and oversight

While the multi-year price lock-in would offer investors some revenue certainty in the face of a changing Alberta electricity environment by transferring risks to consumers, the analysis provided by the investment banker does not suggest that price lock-in of up to 7 years would necessarily increase investors' the ability to finance. The various design alternatives for multi-year price lock-in of up to 7 years analyzed by the Brattle Group would result in either higher price volatility or reduced market liquidity (due to a smaller residual market or a more segmented market). Jointly these two analyses indicate that the benefits of multi-year price lock-in of up to 7 years are too limited to offset the impact of market distortion caused by the multi-year lock-in design alternatives. Therefore, the AESO proposes that the obligation period be set at one year.

5.4 Supply participation and offer format

5.4.1 Allowing 7 offer blocks is expected to be sufficient for firms to represent the cost structure of many different capacity asset types and configurations. This approach is also consistent with the number of offer blocks in other jurisdictions. A minimum block size of one MW allows for participation by nearly all assets. Capacity assets under this threshold can participate by aggregation. This size is also consistent with the energy market minimum resource size.

Through the 7 offer blocks, firms will be able to indicate whether blocks are flexible or inflexible. The AESO requires information on block flexibility for market clearing. Firms are allowed to identify an offer block as an inflexible block. This option enables firms to prevent capacity assets that are under development from partial clearing and possibly requiring the firm to resize the asset. This option also allows firms to ensure that assets with a minimum stable generation level are able to ensure a minimum level of cleared capacity volume and the stable revenue associated therewith. After a firm offers an inflexible block for an asset, all the higher priced offers for that asset have to be flexible. This requirement is put in place in order to reduce computational complexity in the auction clearing algorithm. Finally, the offer of each asset formed with price-quantity pairs is required to be monotonically increasing to ensure the auction algorithm to be solved efficiently.

5.5 Out-of-market capacity payments

5.5.1 Assets that are the subject of a Renewable Electricity Support Agreement (RESA) under the first three rounds of the REP auction will be ineligible to participate in the capacity market. Compensation for the capacity value of these capacity assets is provided by the form of payment contained in the RESA. The capacity volumes for these assets will be accounted for in the target procurement volume identified in the demand curve. Subtracting this capacity value from the target capacity volume avoids over procurement of capacity and reduces costs to load. Initially, any potential distortionary impact to the capacity market is expected to be minimal, given the expected magnitude of capacity value for the REP rounds one to three assets. If future RESA transactions are structured in a comparable manner, they too would be ineligible to participate in capacity market auctions.

On a more general basis, there could be other forms of out-of-market payments made by the government to capacity market-eligible capacity assets. The AESO expects that the value associated with the capacity payments and the rights to sell capacity from qualified capacity assets will form part of the negotiation between parties.

With consideration to the future evolution of the capacity market, the AESO will establish a process to determine whether any alternative adjustments or incremental approaches should be implemented to incorporate future REP or similar programs.

5.6 Single-round uniform price auction

5.6.1 The AESO is proposing to use a sealed-bid, single-round, uniform pricing auction for both the base and rebalancing capacity auctions. This is the most common auction format among existing capacity markets and is used in PJM, MISO and NYISO. It has a number of benefits relative to the other potential auction format: the descending-clock design used in New England and the UK's capacity markets. The sealed-bid, single-round design minimizes the opportunity for gaming, and encourages participants to offer at cost, a particularly important consideration given Alberta's small size and relatively concentrated market. The sealed-bid auction is also simpler to administer. Overall, a sealed-bid, single-round, uniform pricing auction should help facilitate a fair, efficient, and openly competitive capacity market in Alberta.

The sealed bid, single round auction

Sealed-bid, single-round auctions minimize the opportunity for gaming by limiting market participants' access to information about competitors' bids. Sealed bids ensure that market participants cannot directly observe their competitors' offers. The single-round format allows auction participants to submit offers in only one clearing round. Unlike the descending clock auction format, the single round format does not provide further auction rounds that allow participants to revise their offers after seeing the result of previous rounds. While participants have some insight into how their competitors will offer based on the outcome of previous auctions and their knowledge of market conditions, this information may not be comprehensive. Without information about competitors' offers, market participants are incentivized to offer at cost. This

also allows the market to provide accurate price signals to suppliers entering or exiting the market. These considerations are particularly relevant given Alberta's relatively small electricity market.

The descending clock auction, an alternate approach

During a descending clock auction the auctioneer starts each round by issuing a price and asking firms to state the quantities they wish to sell at this price. If the quantity offered exceeds the target quantity to be procured, the auctioneer issues a lower price, and again asks firms the quantities they want to offer at the new price (hence, descending clock). This process continues until the quantity offered matches the quantity to be procured or until excess supply is negligible.

The descending clock's "multiple-round" structure reveals information on supply offers after each round of bids (such as how many MW exited the auction), providing opportunities for some supply capacity assets to take advantage and coordinate offers or use market power to sway the auction results. Given the size and concentration of the Alberta market, this feature of the descending clock auction format introduces additional opportunities for gaming which could potentially offset the benefits from increased price discovery that this format might provide. In addition, the descending clock format favors incumbents relative to new entrants. Under the descending-clock auction, established participants are better able to take advantage of the information revealed during the auction itself due to their better familiarity with the system. Given Alberta's unique characteristics of relatively small size and the concentration of incumbents, the AESO's view is that a sealed-bid, single-round auction is more appropriate.

Uniform pricing

Uniform pricing provides a single clearing price for every supply bid that clears the auction. This feature incentivizes market participants to submit cost-based offers to ensure they are cleared in the auction and make at least enough revenue to cover their net going forward costs. Uniform pricing is also fair in the sense that capacity assets supplying the same product receive the same price. In contrast, auctions with non-uniform pricing introduce incentives to offer above cost. For example, pay-as-bid auctions encourage low-cost capacity assets to offer above cost in order to capture a higher price for greater revenues.

5.6.2 Sealed-bid, single-round and uniform pricing auctions are also simple and straightforward to implement. The operator builds the supply curve based on all of the bids received in the single round, the demand curve implements any constraints such as locational or import transmission constraints, and then clears the market at a single price by maximizing social surplus between the two curves. By contrast, the descending clock auction is more challenging to implement: (1) it requires additional parameters like step size (the reduction in volume between rounds), price band width, and infrastructure to enable communication between the ISO and market participants during the auction; (2) it creates challenges for the handling of scarce import capability, and (3) is intended for a single buyer auction which would introduce challenges during the rebalancing auction where market participants will be able to submit bids to buy out of their obligations.[5]

The sealed-bid, single-round uniform pricing auction format supports a fair, efficient, and competitive capacity market by reducing gaming opportunities, limiting the possibility of tacit collusion, leveling the playing field between incumbent and new market participants, providing clear and accurate price signals, and incentivizing cost-based supply offers.

5.6.3 The AESO is mandated to plan for an unconstrained transmission system. With unconstrained transmission system planning, capacity market price is not used to signal transmission builds and only signals the demand and supply balance of capacity assets. In the event transmission

[5] See ISO-NE discussion, https://www.iso-ne.com/static-assets/documents/2016/07/20160711-dca-v-sealed-bid.pdf.

constraints are expected to cause capacity deliverability issues, the capacity price will be is set at the level absent of transmission constraints to reflect the demand and supply balance of capacity assets. In this situation, capacity assets may be required that are priced above the unconstrained price. If this was to occur, the capacity assets whose capacity volumes are selected to meet the total capacity requirement would be paid an uplift payment in addition to the market clearing price. The uplift payment is equal to the difference between the offer price and the unconstrained clearing price.

5.7 Auction clearing and price-setting

5.7.1 The social surplus-maximizing clearing algorithm is the most commonly used clearing algorithm across all existing capacity markets, with the exception of the UK.[6] Maximizing social surplus will result in the most efficient long-term price signals which should provide the most efficient resource mix and lowest societal costs over time. This approach is also consistent with the clearing approach used in the current AESO energy market.

Use of a different clearing algorithm may not have the same outcomes. For example, in the UK, if the inflexible block is marginal, it is only cleared if it is beneficial to the customers. Figures 1 and 2 illustrate examples where this clearing algorithm does not maximize social surplus. Under the UK clearing algorithm, the auction clears at P_1 and Q_1 in Figures 1 and 2 as shown in the graphs below on the left.[7] In these situations the clearing algorithm would have the AESO purchasing less capacity than its target purchase level. While this procurement level would still be above the level which would cause reliability concerns over time the AESO is concerned that it may systematically purchase less capacity than its target purchase levels and set auction price levels lower than what would be established under a maximization of social surplus approach.

For example, in Figure 1 if the market had cleared at P_2 and Q_2, social surplus would be larger. In the graph on the right of Figure 1, the green triangle is larger than the red triangle, and thus there is additional social surplus by clearing at P_2 and Q_2; social surplus being the difference between the two triangles. In the graph on the right of Figure 1, the green triangle indicates the additional social surplus by clearing P_2 and Q_2. In the graph on the left of both Figures 1 and 2, if Area A is bigger than the net social surplus gain, a net loss in consumer surplus may occur in the auction. Maximizing net consumer surplus instead of maximizing social surplus would clear the market at P_1 and Q_1 instead of P_2 and Q_2.

[6] In the UK, if the lump offer is marginal, it is only cleared if doing so economically benefits customers. May result in lower short-run customer prices in some cases, but less efficient resource selection will increase prices over the long term.

Figure 1: *Illustration – Maximizing Customer Benefits: Clearing at the Block Below the Inflexible block*

Inflexible block Does Not Clear (Area A > Area B)

Potential Addition Social Surplus

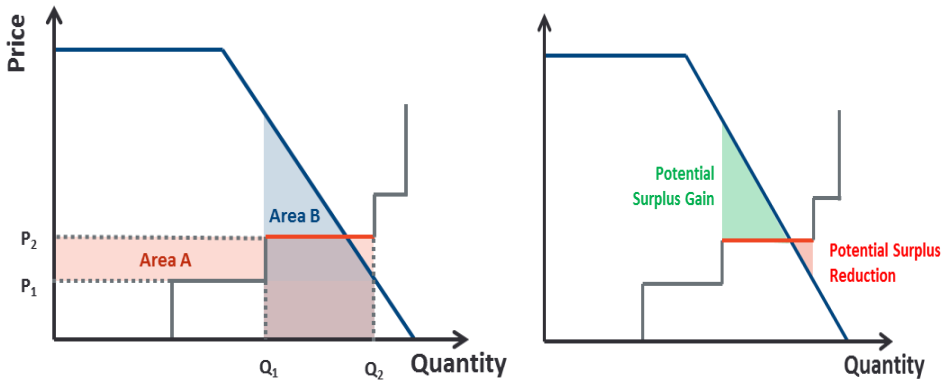
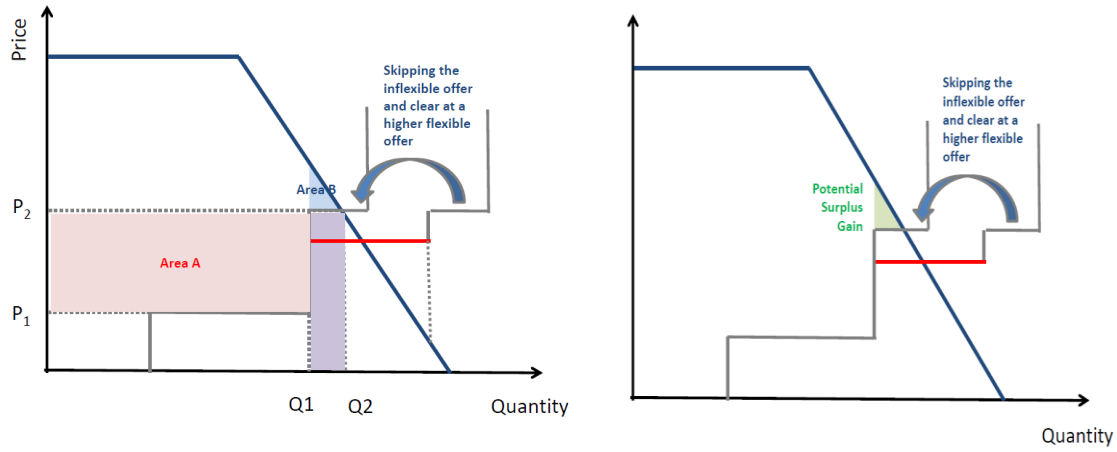


Figure 2: *Illustration – Maximizing Customer Benefits: Clearing at the Flexible Block above the Inflexible Block*

The Flexible Block above the Inflexible Block Does Not Clear (Area A > Area B)

Potential Addition Social Surplus



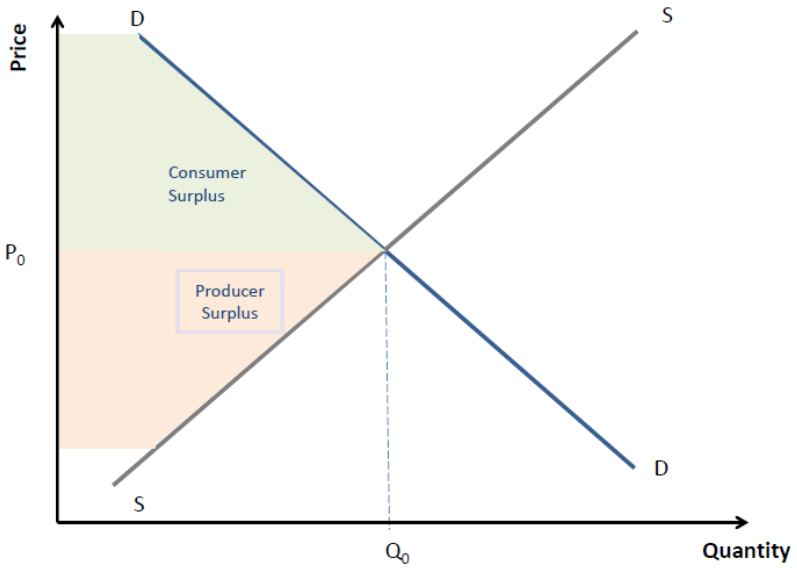
By clearing at P_1, and Q_1 consumer surplus is maximized, but this reduces the effectiveness of the price signal by creating no market incentive for new capacity assets that could offer between P_1 and P_2. Instead, when social surplus is maximized in the clearing algorithm (auction clears at P_2 and Q_2), a more accurate price signal is provided compared to a clearing algorithm that maximizes consumer surplus only. Maximizing social surplus would attract new capacity assets to enter the market at price levels between P_1 and P_2, providing more capacity at a lower price.

5.7.2 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 further describes the principles that will be used to clear the capacity market.

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

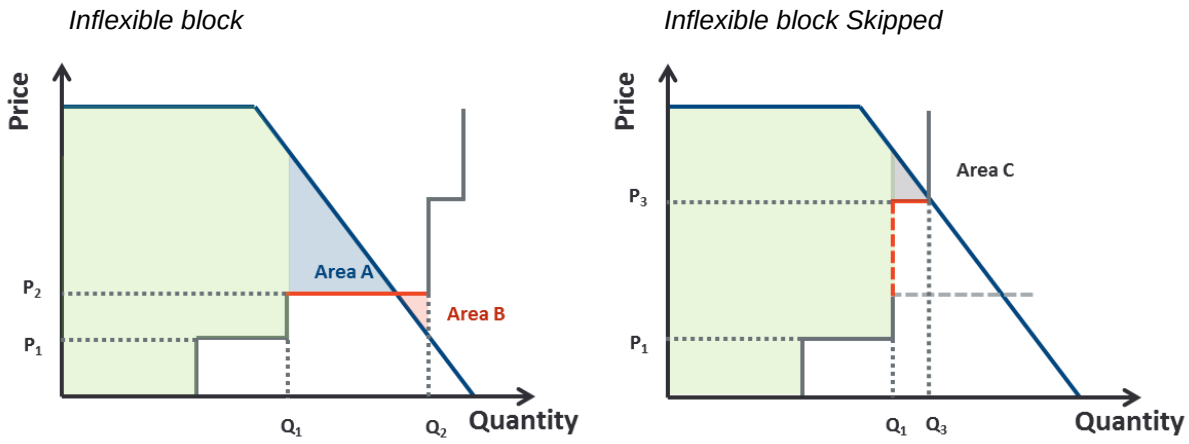


In circumstances where the capacity market cannot clear at the intersection of the supply and demand curves due to the marginal capacity offer being an inflexible block, the market will then clear the capacity offer that maximizes social surplus.

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 block is cleared. 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, in this scenario, selecting the entire inflexible block creates the greatest additional social surplus and the inflexible block would be cleared (auction clears at P_2 and Q_2). Staying at P_1 and Q_2 would result in smaller social surplus. The market-clearing engine used by the AESO to clear the capacity market will choose the higher quantity and price that maximize the social surplus. Maximizing social surplus is also the approach used by the AESO in the energy market.

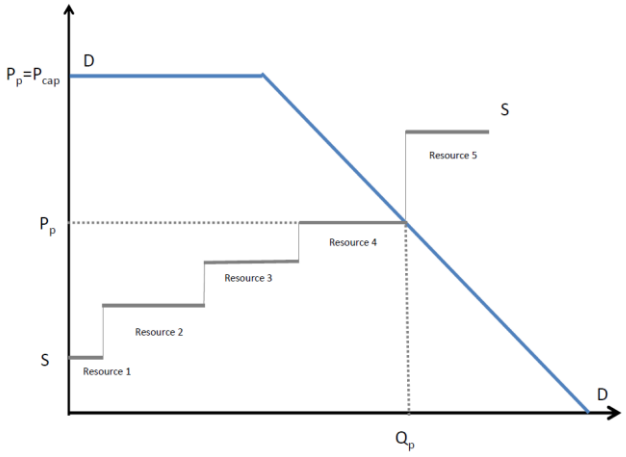
Figure 3 – *Illustration: Maximizing Social Surplus*



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*



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*

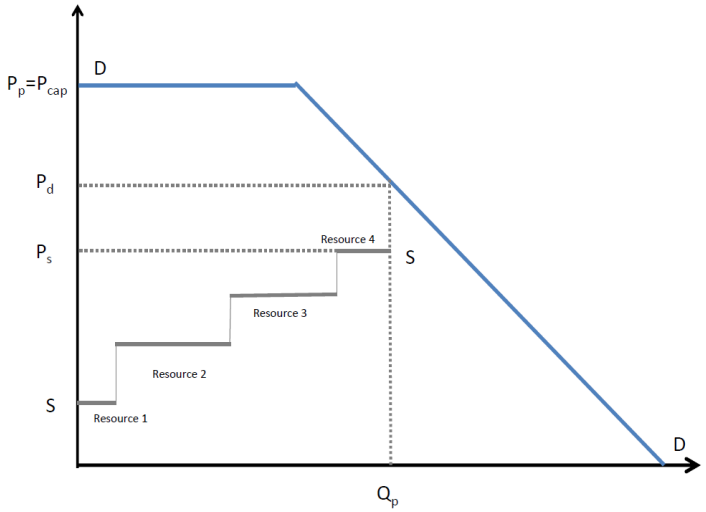
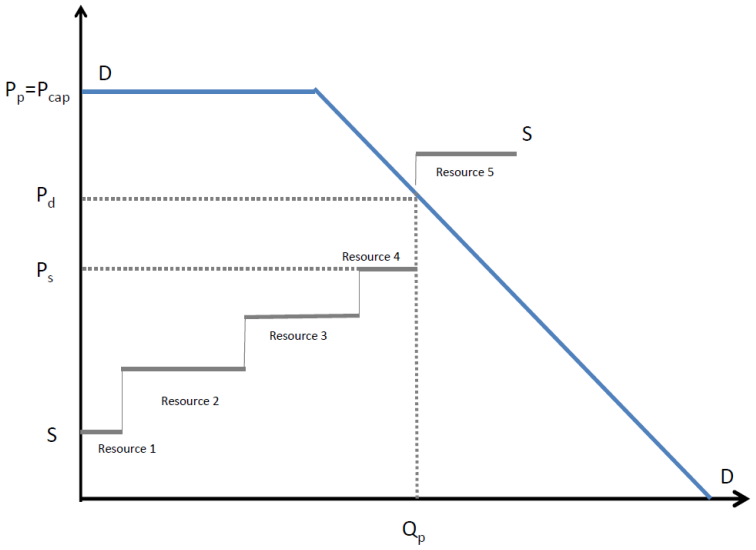


Figure 6 – *The Supply Curve of Selected Capacity Assets Lies Below the Demand Curve*

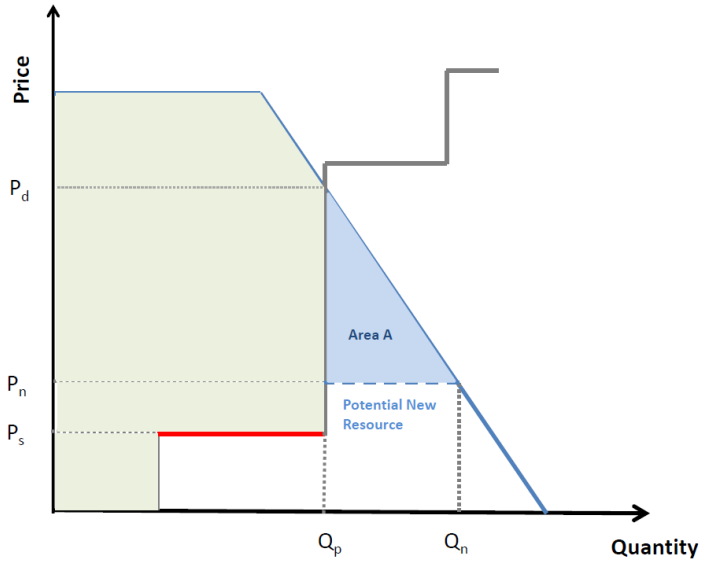


5.7.3 The AESO proposes to set the capacity market clearing price at the demand curve when the entire supply curve is below the demand curve, or when the entire procurement volume is below the demand curve. Setting the clearing price at the demand curve enables the price to reflect the market's value of additional capacity. Although it does not lead to the lowest procurement cost in one particular auction, it does provide price signals to support the efficient entry of additional, lower-cost capacity assets over time. When the clearing price is set at the demand curve, (P_d) in Figure 3, it provides a strong price signal for new or additional capacity assets to enter the market during the next auction. In the example below, the new or additional

capacity asset enters at P_n (indicated by the teal line in Figure 3), leading to additional social surplus (denoted by Area A) in the long run.

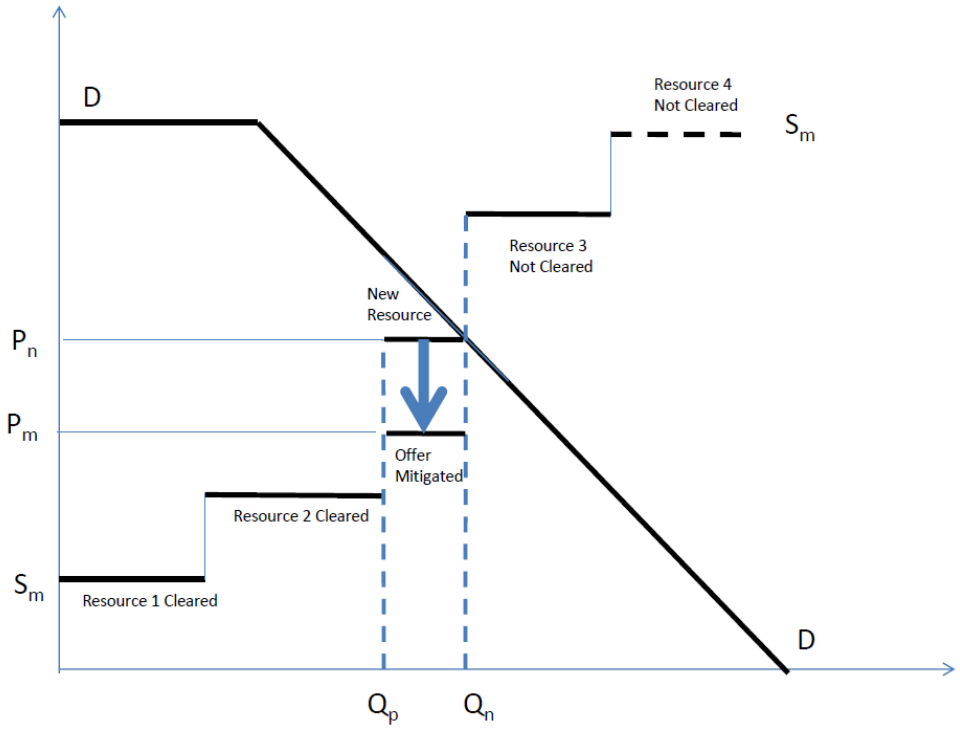
If the clearing price was set at P_s instead of at the demand curve (P_d), this would result in a lower price but would not provide the price signal the new or additional capacity asset may need to enter the market. Over the long term this could lead to inefficient outcomes and reliability issues due to under procurement.

Figure 3: ***The Supply Curve of Selected Capacity Assets Lies Below the Demand Curve***



Setting the market price at the demand curve also prevents a situation where the entry of a new capacity asset in one auction can cause the market clearing price to collapse in the following auction (when it is the marginal unit, and there is no change in market supply and demand). This feature helps to ensure the overall market structure is attractive for new investment. Figure 4 illustrates a scenario assuming a new capacity asset enters the market and sets the clearing price at P_n in its first capacity auction and as it transistions to being an existing capacity asset in subsequent auctions it reduces its offer price to P_m due to lower going forward cost and, potentially market power mitigation. As illustrated in Figure 4, if the supply and demand remain the same, and the capacity asset offers at price P_m in future auctions after recovering some of its fixed costs in earlier auctions, the market price would drop from P_n to P_m if the market price is set by the the marginal offer instead of the demand curve, even though there is no change in market supply and demand. This would discourage future capacity assets from entering into the market if they can offer at a price between $P_{n,}$ and P_m. However, when the price is set at the demand curve, the market price in the subsequent auction would stay at P_n; correctly reflecting the fact that there is no change in market supply and demand and providing accurate price signals to other capacity assets.

Figure 4: ***Illustration – Price Set by Demand Curve Avoids New Entry Causing Price to Collapse***



Setting the capacity price at the demand curve would allow the market price to be at the price cap if the capacity market is not able to clear when there is insufficient capacity supply to meet the minimum procurement volume.

5.9 Addressing intertie transmission constraints

5.9.1 Section 2.2.8 discusses how capacity volumes are determined for individual external capacity assets. Alberta has limits on the amount of capacity that can be delivered through interties. Joint intertie scheduling limits will be determined and made available as part of the overall auction process. There may be auctions in which there are more qualified external capacity assets than there is available import capacity when joint scheduling limits across multiple interties are considered. For example, transmission delivery constraints may be observed on the Alberta–BC Intertie and Montana–Alberta Tie-line. The constraints will be a result of the combined flow limit on those two interties. The unforced capacity (UCAP) volumes of the external capacity assets will not be reduced to reflect the level of the joint scheduling constraint because this may result in an inefficient outcome where the higher cost capacity assets are cleared prior to fully utilizing the lower cost capacity assets.

Clearing lower-priced capacity assets first, results in a more efficient outcome and lower costs for consumers. Considering overall social surplus in situations where offers are priced the same also results in more efficient outcomes.

5.10 Addressing internal transmission constraints

5.10.1 Alberta's transmission system is designed to support unconstrained operations under system-normal conditions. It should be noted, however, that transmission development timelines can

often extend beyond three years when considering regulatory approval and construction timelines. Development cycles of five to seven years are not uncommon. While constraints are not anticipated, any potential transmission constraints will need to be accounted for when clearing the capacity market so that the AESO does not procure volume that cannot be delivered. This would fail to provide value to customers and would not meet reliability requirements.

While not expected to occur, if there are anticipated transmission constraints in the Alberta interconnected system that could affect capacity market offers from qualified participants, the AESO will identify the location and implication of any transmission constraints so that participants have full information upon which to base their offers.

5.10.2 UCAP volumes of available capacity assets behind a transmission constraint will not be adjusted to reflect the limit of the transmission constraint. Doing so could result in the capacity market clearing some volume of the higher-priced capacity asset prior to clearing all of the lower cost capacity asset. Clearing a lower-priced capacity asset first results in a more efficient outcome and lowers costs for consumers. Capacity assets compete for capacity sales based on their price structure. This competition promotes a fair and efficient market that treats all capacity assets equally provided they meet the eligibility criteria. Considering overall social surplus in situations where offers are priced the same also results in more efficient outcomes.

Capacity auction assessment against capacity market design criteria

Adopting a sealed-bid, single-round auction with a three-year forward period and a 1-year obligation period for all participants promotes a capacity market that is fair, efficient and openly competitive, employs a market-based mechanism that incents competition in a transparent fashion and should result in a well-defined product and an effective and efficient capacity price signal. The one-year term for the capacity commitment is as short as possible and satisfies the design principle that investment risk should continue to be borne by investors.

The auction design considers Alberta's unique approach to import and transmission constraint management by creating single price for capacity regardless of location. This is a simple and straightforward initial implementation. While other capacity market implementations differ, the selected design is one that best fits the unique needs of Alberta.