

Discussion Brief 3.0: Demand Curve Review

Overview

The existing method for deriving the demand curve was established in 2015 to support the competitive acquisition of demand response via the Demand Response Auction (DRA). Since that time, the purpose of the auction has evolved from a mechanism that primarily supports the growth of demand response as a capacity resource in Ontario, to procuring incremental capacity from a broader set of resource types to help meet short-term reliability needs.

While the evolving purpose and design of the auction is the primary driver of the demand curve review, Ontario is also entering a period of constrained supply, meaning appropriate market signals will play an important role in ensuring sufficient capacity is procured to meet emerging adequacy needs. Neighbouring jurisdictions are also facing supply constraints, compounded by decarbonization efforts.

The 2022 demand curve review will serve as more of an adjustment ahead of the 2023 Capacity Auction to ensure that the capacity auction curve reflects current economic conditions, and is well-positioned to ensure the auction mechanism continues to successfully contribute to meeting identified Resource Adequacy needs. More substantive updates to the demand curve will be considered for future reviews.

The Downward-Sloping Demand Curve

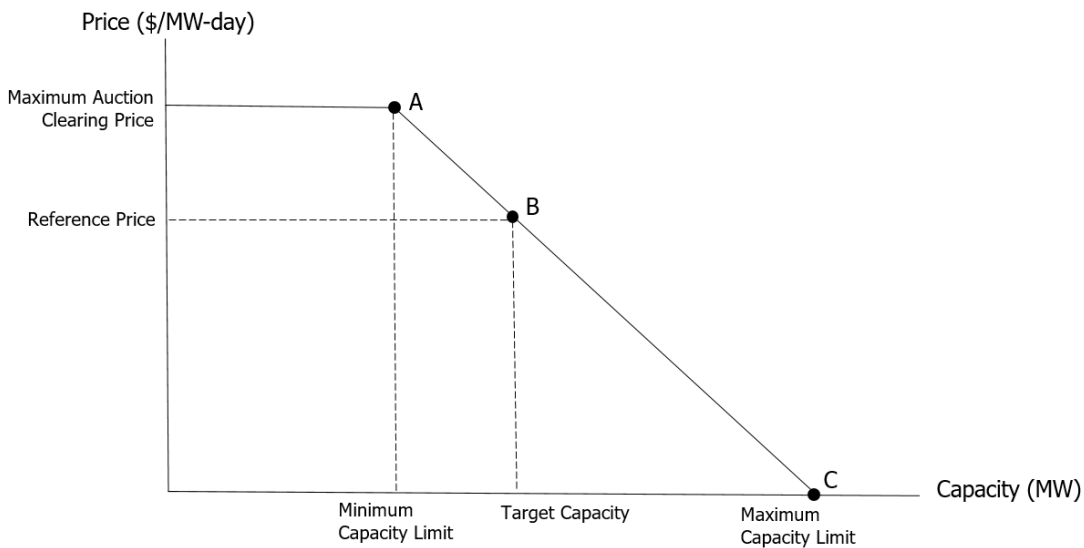
The capacity auction demand curve represents the IESO's willingness to buy capacity by defining the prices that we will pay for varying levels of reliability along a curve. The shape of the curve impacts the quantity (X-axis) and price (Y-axis) of capacity that clears each auction, meaning it also impacts the total cost to ratepayers of acquiring auction capacity, the likelihood of the IESO procuring the targeted amount of capacity, and the attractiveness of the auction to potential participants.

As shown in Figure 1, there are two price parameters and three quantity parameters that establish the shape of Ontario's capacity auction demand curve. The curve is established by joining Point A, Point B, and Point C. The price parameters are the **reference price** and **maximum auction clearing price (MACP)**. The quantity parameters are the **minimum capacity limit** (also called the maximum capacity at MACP), **target capacity**, and the **maximum capacity limit**.

The **reference price** reflects the estimated average annual capacity payment a new reference resource would need to receive over its expected lifecycle to be economic, often referred to as net cost of new entry (Net CONE). Theoretically, the reference price represents the marginal cost of

supply that auction clearing prices should converge to in the long-run. The reference price is currently set at \$413/MW-business day ICAP.

Figure 1. Downward-Sloping Demand Curve



The

MACP represents the highest price at which the auction can clear and determines the height of the demand curve. It is a key investment signal during periods of scarce capacity. The MACP is currently set administratively at 1.25 x the reference price.

The **target capacity** defines the desired amount of capacity IESO is seeking to secure through a given auction in a given season. Currently, target capacity is set based on an identified incremental reliability requirement, once rate regulated and contracted resources have been accounted for and all other procurement mechanisms have been executed. The portion of incremental needs expected to be satisfied through the capacity auction is communicated in the Annual Acquisition Report (AAR).

The **minimum capacity limit** represents the minimum quantity of capacity that the IESO must procure in an auction in order not to have to take additional reliability actions. The IESO has a high willingness-to-pay for all capacity up to the minimum acceptable quantity, meaning all cleared capacity up to the minimum limit will receive the MACP. For quantities above the minimum capacity limit, the IESO's willingness-to-pay decreases, per the downward-sloping curve.

Currently, the minimum capacity limit is set as a function of the target capacity and the Reference Price multiplier, as follows:

$$\text{Minimum Capacity Limit} = \frac{\text{Reference Price} * \text{Target Capacity}}{\text{MACP}}$$

Where, MACP = Reference Price Multiplier * Reference Price

$$\text{So, the Minimum Capacity Limit} = \frac{\text{Target Capacity}}{\text{Reference Price Multiplier}}$$

The reference price multiplier is currently set as 1.25x the reference price, resulting in a minimum capacity limit of 80% of the target capacity. If the multiplier were increased to 1.5x or 2x the reference price, the minimum capacity limit would be 66% and 50% of the target capacity, respectively.

The **maximum capacity limit** is the highest quantity of capacity that can clear an auction. It also determines the width of the demand curve, and is defined by the point at which the clearing price is zero. Because the target capacity is determined probabilistically, the maximum capacity limit allows the downward-sloping demand curve to extend beyond the target capacity, providing flexibility to secure more than the target capacity when economic.

Similar to the minimum capacity limit, the maximum capacity limit is currently a function of the target capacity and reference price multiplier. It is established by extending the straight line that joins the minimum capacity limit and target capacity straight down to the X-axis. The current reference price multiplier of 1.25x the reference price results in a maximum capacity limit equal to 180% of target capacity. If the multiplier were to increase to 1.5x or 2x the reference price, the maximum capacity limit would be % and % of the target capacity, respectively.

Scope

Updates to the demand curve for the 2023 Capacity Auction will focus on adjustments to the reference price and maximum auction clearing price. These enhancements will ensure the curve appropriately reflects current economic conditions such that the auction continues to clear reliable, low-cost incremental capacity, which helps meet Ontario's emerging Resource Adequacy needs.

Engagement on future auction enhancements will consider a more fulsome review that includes potential updates to the reference technology. This approach will ensure that any substantive changes to how the demand curve parameters are set are considered comprehensively, including allowing for sufficient stakeholder input and internal IESO assessment to ensure alignment across procurement mechanisms and IESO planning processes.

The IESO's Pathway's to Decarbonization report is due to the Ministry of Energy in Q4 2022, and is expected to inform government policy on the role of natural gas resources in Ontario's future electricity system. This policy clarity, along with execution of the medium- and long-term procurements, will inform future demand curve updates, including a review of the reference technology.

Objectives

The objective of the demand curve review is to update the price parameters such that the capacity auction remains a cost-effective, reliable, and robust procurement mechanism within the Resource Adequacy Framework.

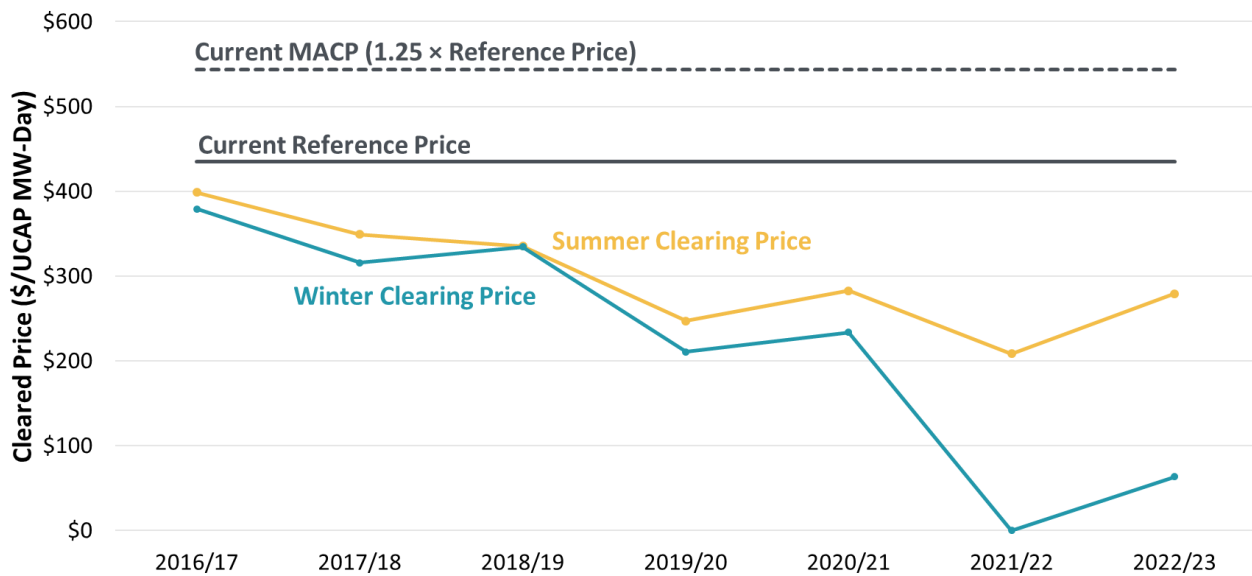
Enhancements to the curve for the 2023 Capacity Auction will aim to ensure the auction continues to:

1. Procure sufficient capacity to meet incremental resource adequacy needs
2. Provide a stable and appropriate investment signal to market participants
3. Drive competition and ratepayer value

Brattle Analysis

Brattle has provided initial analysis that leverages price parameter recommendations provided as part of the 2019 Demand Curve Review, updated for the 2022 context. The reference price and MACP set demand curve parameters as outlined in Figure 1, but do not set clearing prices. Clearing prices are set by competitive forces, and have historically been below the reference price and MACP in Ontario as shown in Figure 2.

Figure 2. Ontario Capacity Auction - Historic Clearing Prices



Reference Price Update

Using the 2019 reference price recommendation of \$542/MW-day ICAP, Brattle updated the recommendation to account for inflation and the planned auction enhancement which will qualify and clear resources on an Unforced Capacity (UCAP basis).

For inflation, Brattle used the Bank of Canada CPI data for historic monthly inflation (2019 to 2021) and the inflation forecast from the Bank of Canada Monetary Policy Report for a projection of 2022 inflation, resulting in the following reference price increase:

- Inflation adjustment: $\$542 \times 1.127^* = \$611/\text{MW-day ICAP in 2023\$}$

For the ICAP to UCAP conversion, Brattle assumed a de-rate based on the Equivalent Forced Outage Rate (EFORd) of a gas CT reference technology of 5.13% to align with the Annual Planning Outlook, resulting in the following reference price increase:

- ICAP to UCAP adjustment: $\$611/(1-5.13\%) = \mathbf{\$644/\text{MW-day UCAP in 2023\$}}$

Maximum Auction Clearing Price Update

Two options for updating the MACP above the current 1.25 x reference price were provided by Brattle. These options were an MACP of 1.5 x the reference price and an MACP of 2 x the reference price.

Based on the updated reference price of \$644/MW-day UCAP, these updates would result in the following MACP values:

- 1.5 x Reference Price = **\$966/MW-day UCAP in 2023\$**
- 2 x Reference Price = **\$1288/MW-day UCAP in 2023\$**

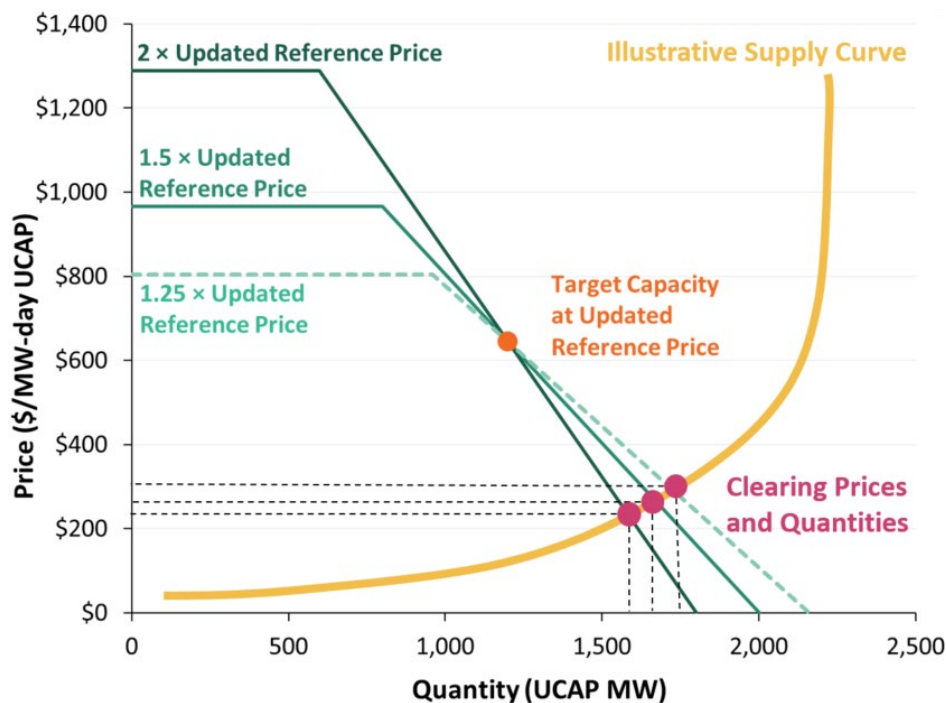
The table below outlines how the two MACP values compare to auction price caps in other jurisdictions. The current reference price and MACP is not likely to attract imports if other markets also experience tight supply. The updated reference price and 2 × multiplier would result in an MACP substantially higher than all other jurisdictions (except MISO), and a 1.5 x multiplier would still be slightly higher.

	Net CONE <i>(\$/MW-day UCAP)</i>	Price Cap <i>(% of Net CONE)</i>	Price Cap <i>(\$/MW-day UCAP)</i>
PJM	\$499	150%	\$749
NYISO	\$472	202%	\$954
ISO-NE	\$439	173%	\$762
MISO (Prior Annual)*	\$430 (CONE)	100%	\$430
MISO (New Four-Season)*	\$430 (CONE)	400%	\$1,719
IESO Current	\$435	125%	\$544
IESO Updated (MACP = 1.5 x Reference Price)	\$644	150%	\$965
IESO Updated (MACP = 2 x Reference Price)	\$644	200%	\$1,287

Demand Curve Comparison

In terms of the potential impact of updates to the demand curve on auction clearing prices and quantities, Figure 3 shows a flatter demand curve (i.e., current curve with updated reference price) will procure more capacity at a higher price than a steeper demand curve. The extent to which differences in demand curve slopes impact market clearing is also a function of the supply curve shape. The supply curve in Figure 3 is illustrative only to show how auction clearing prices and quantities can change depending on the shape of the demand curve. shown here for illustrative purposes only.

Figure 3. Capacity Auction Demand Curve Comparison



Stakeholder Feedback Requested

- Please provide any feedback related to the approach presented for updating the reference price
- Are there additional considerations the IESO should be aware of when assessing the MACP?
- Do the updated price parameters support the review objectives to procure sufficient capacity to meet incremental resource adequacy needs, provide a stable and appropriate investment signal to market participants, and drive competition and ratepayer value?
- Besides assessing the appropriateness of the reference technology, what other demand curve design considerations should IESO incorporate into future demand curve reviews?

Next Steps

IESO will continue with internal assessment of the Brattle price update analysis. The Brattle analysis, along with stakeholder feedback following the October Technical Session into formal recommendations to be presented at the November engagement session. The recommended updates are planned to be implemented for the 2023 Capacity Auction (summer 2024, winter 2024/2025 obligations).