DECEMBER 02, 2015

# Clearing the ISO-NE Forward Capacity Auction (FCA)

*Functions of the FCA's Descending Clock Auction and Market Clearing Engine*

Ron Coutu

STRATEGIC MARKET ADVISOR

# Presentation Objectives

- Describe the inputs, process, and outcomes of the Descending Clock Auction (DCA).
- Describe how the results of the DCA are used in the FCA's Market Clearing Engine (MCE).
- Describe the objective and purpose of the MCE.

# The DCA and MCE Together Clear the Annual FCA

- The DCA is a offer/bid collection device.
  - It is an open auction format, with sealed offers/bids within a series of 'rounds.'
  - When the DCA has collected enough offers/bids to ensure a market-clearing solution is possible, additional collection is stopped.
- The MCE is the optimization software that determines all final Capacity Supply Obligation (CSO) awards.
  - Based on the collected set of offers/bids from the DCA, consistent with the Tariff rules.
  - We will explain how and why the MCE is used in this presentation.

# DESCENDING CLOCK AUCTION

*Mechanics*

# Inputs to the DCA

- Prior to participating in the Forward Capacity Auction (FCA), bids/offers from all resource owners must be qualified.
  - The ISO ensures the MWs associated with each resource can be expected to be deliverable at the claimed levels during the relevant Capacity Commitment Period.
- For some resources, the qualification process includes a bid/offer review by the Internal Market Monitor (IMM).
  - For example, the IMM reviews New Supply Offers and De-list bids.
- Information about qualified resources is filed with FERC *prior to* each FCA (early November timeframe).

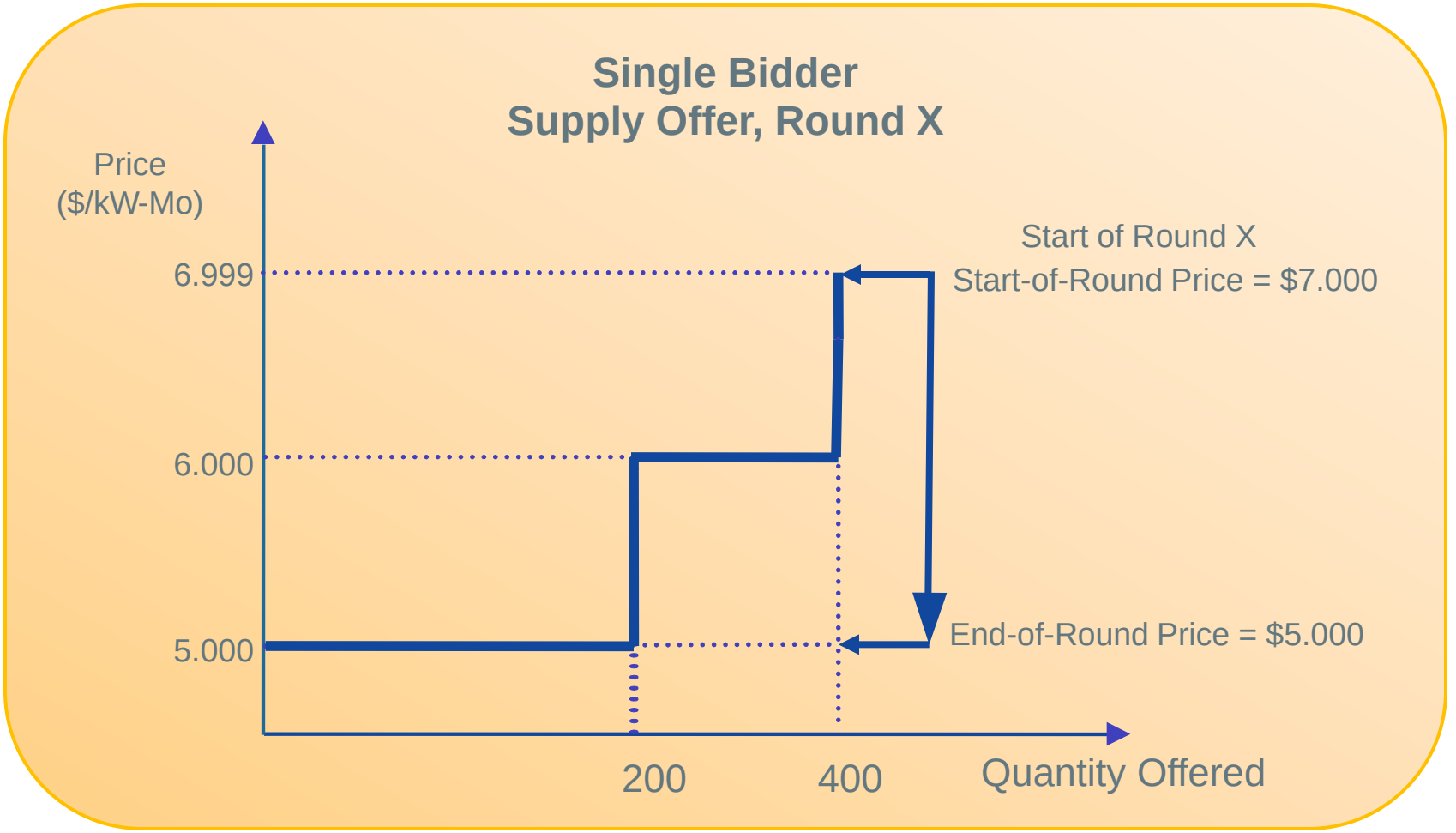
# Resources' Participation within the DCA

- The DCA proceeds in a sequence of priced 'rounds.'
- New Resources – Can exit the auction during DCA rounds with prices between Starting Price and Offer Floor Price.
  - Offer Floor Price: Either Offer Review Trigger Price (ORTP) calculated for resource type or offer floor price from IMM.
- Existing Resources – Can exit the auction during DCA rounds with delist bids priced between the Dynamic De-list Bid Threshold (currently $5.50/kw-mo) and $0.
  - Except Static, Permanent, Export, and other pre-auction de-list bids are entered into the auction at their approved price.
- These rules are *inputs* into the DCA.
  - They are what restrict participation of bids/offers during the DCA.

# Descending Clock Auction

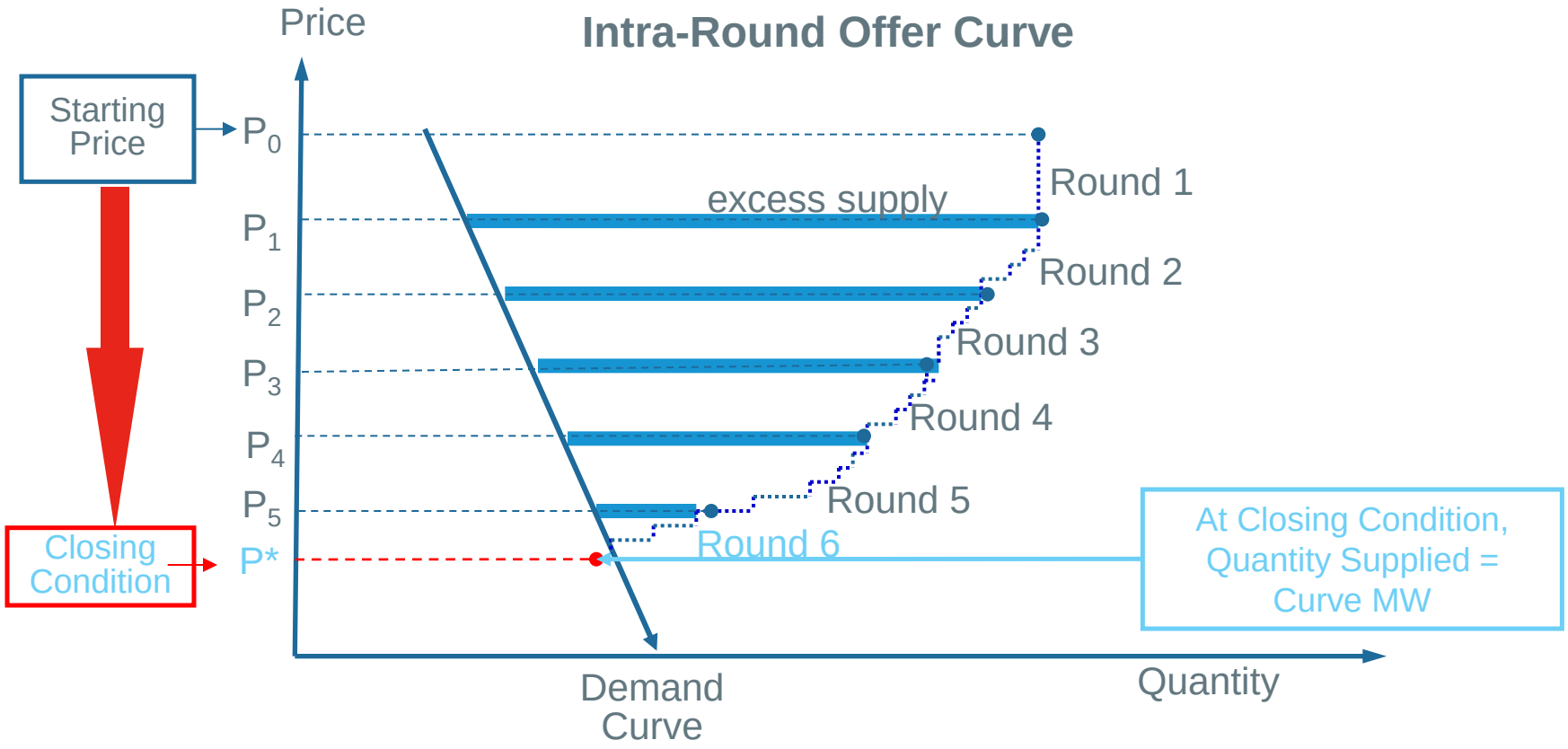
- DCA is conducted in discrete rounds. Each round, Auctioneer announces:
  - Start of round price (higher price);
  - End of round price (lower price); and
  - Excess supply at the end of prior round.
- Round size determined by ISO and Auctioneer, and varies from FCA to FCA.
  - Larger rounds are used when there is a low bid-cover ratio before DCA starts. This reduces a participant's ability to gauge whether its bid might set price.
- New Resource owners submit the MW capacity they are willing to supply at prices within current round limits (up to 5 price/quantity pairs); an Existing Resource continues in each round as a 'price taker' until the round with its de-list bid price is reached, or the auction closes.
- Auctioneer determines excess supply at end of round price.
- If no excess supply, descending clock auction stops.
- Between rounds, ISO performs resource reliability reviews (as necessary).

# How Does a Descending Clock Auction Work?



# How Does a Descending Clock Auction Work?

***(continued)***



# *Example:* Descending Clock Auction

| | |
|---|---|
| ***Assumptions***: (Starting Price = $18) | |
| Existing Capability | 34,000 MW |
| Participating New Capacity | 4,000 MW |

| Round | Start of Round Price ($/kW-MO) | End of Round Price ($/kW-MO) | End-of-Round Resource Offers (MW) | Demand Curve MW at End-of-Round | Excess Capacity (MW) |
|---|---|---|---|---|---|
| 1 | $18.00 | $13.00 | 38,000 | 33,750 | 4,250 |
| 2 | $12.99 | $11.00 | 36,000 | 34,500 | 1,500 |
| 3 | $10.99 | $9.00 | 35,250 | 34,750 | 500 |
| 4 | $ 8.99 | $7.00 | 35,250 | 35,000 | 250 |
| 5 | $ 6.99 | $ 5.00 | 35,250 | 35,500 | -250 |

# Descending Clock Auction Observations

- It is a bid-collection process.
- It is a hybrid auction format ("on the clock") that is actually 'sealed bid within rounds.'
- It does not reveal the price levels at which competitors submit final-and-best bids/offers (i.e., 'drop out' of the DCA process).
  - This helps to limit potential (seller-side) market power.
- The DCA does not determine the clearing prices or Capacity Supply Obligation (CSO) awards for any resources.
  - That is performed by the MCE.

# THE FCA MARKET CLEARING ENGINE

*Purpose and Process*

# The FCA Market Clearing Engine (MCE)

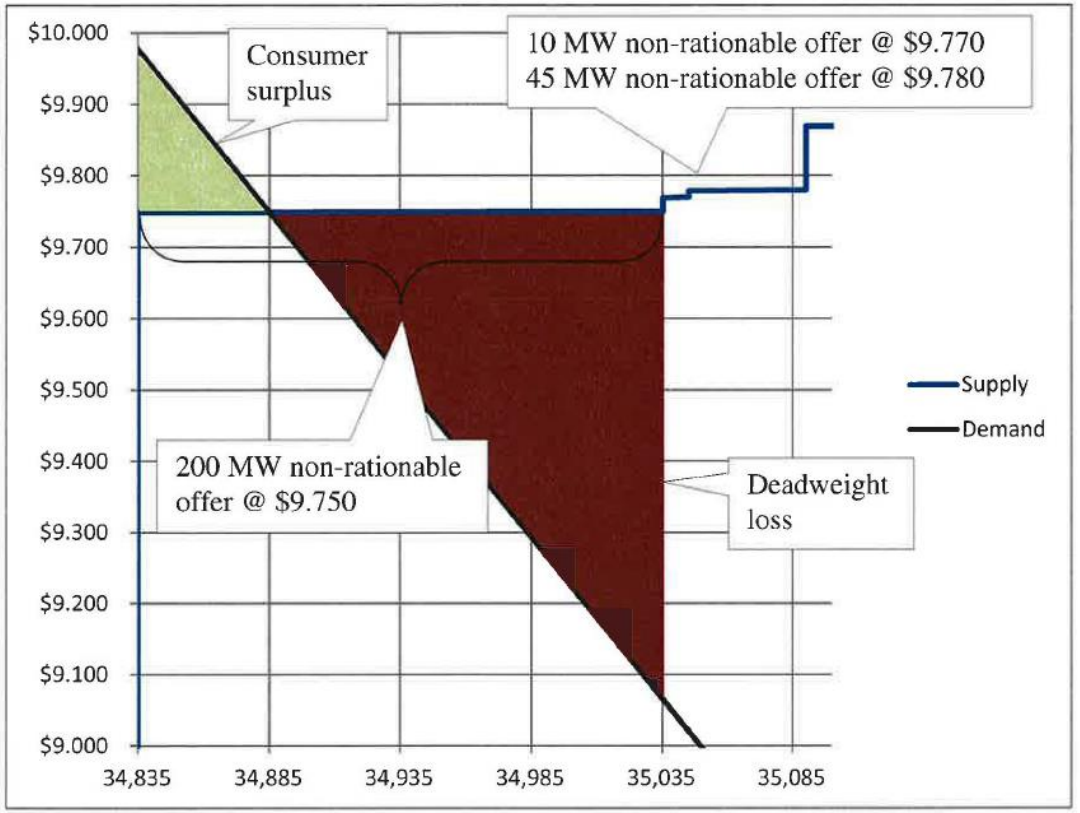
- The MCE is a complex software system the ISO uses to 'clear' the FCA.
  - The MCE takes, as inputs, the 'final and best' bid/offer prices of all potential capacity suppliers received (via the DCA).
- The MCE determines all CSO awards (in MWs) and final clearing prices.
  - Optimizes those bids/offers to best meet the demand.
- The MCE is effectively an auction-clearing system for a sealed-bid auction, since all bids/offers are complete and irrevocably submitted before it runs.
- The MCE is an optimization algorithm. It clears bids/offers using a social welfare objective function, consistent with the Tariff and many specific clearing rules (*next*).

# Why is Market Clearing Engine Needed?

- The DCA cannot manage various aspects of awarding a CSO that are stipulated in the Tariff, such as evaluating non-rationable offers.

Example:
Ninth FCA Evaluation of lumpy (indivisible, or non-rationable) offers.

Source: February 27, 2015 FERC Auction Results filing, Testimony of R. Ethier (Docket #ER15-1139)

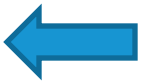


# Why is a Market Clearing Engine Needed?
***(continued)***

- The MCE is also needed to award CSOs in a manner that properly address other special rules in the Tariff, including:
  - Real-time Emergency Generation procurement limit;
  - Tie-breaking rules when there is equal offer prices in different zones;
  - Accounting for resources retained for reliability; and
  - Wheeled export bids.
- The MCE is an optimization algorithm. It takes as given:
  - Bid/Offer prices and quantities (MW) from all resources;
  - The auction zone configuration;
  - The system demand curve; and
  - Any import zone requirements, and export zone/export interface limits.

# *Example:* Descending Clock Auction - MCE

| Round | Start of Round Price ($/kW-MO) | End of Round Price ($/kW-MO) | End-of-Round Resource Offers (MW) | Demand Curve MW at End-of-Round | Excess Capacity (MW) |
|---|---|---|---|---|---|
| 1 | $18.00 | $13.00 | 38,000 | 33,750 | 4,250 |
| 2 | $12.99 | $11.00 | 36,000 | 34,500 | 1,500 |
| 3 | $10.99 | $9.00 | 35,250 | 34,750 | 500 |
| 4 | $ 8.99 | $7.00 | 35,250 | 35,000 | 250 |
| 5 | $ 6.99 | $ 5.00 | 35,250 | 35,500 | -250 |
| MCE result | | $ 5.80 | 35,100 | | 0 |



- In the above example, the MCE has collected Bids/Offers from $18 to $5.00. *The MCE uses that data to clear the market*. In this example, the cleared auction shows a price of $5.80 and a quantity of 35,100.
- As shown previously (slide 14), lumpy offers/bids may not allow quantities to clear exactly on the demand curve, as in this example.

# Market Clearing Engine Observations

- Clearing prices do not come from the CSO award optimization directly; they are determined by applying the tariff-specified pricing rules to the final CSO award set.
- MCE is needed regardless if bids/offers are submitted via the DCA or as sealed bids/offers.
  - The MCE is a sealed-bid clearing engine. It utilizes the output of the DCA when performing the optimization of bids/offers to award a CSO.
- The MCE optimization software and algorithms are professionally audited by qualified outside (subject-matter) algorithm experts.

# Summary

- The Forward Capacity Auction ("FCA") is cleared using two sequential processes:
  1. Collect 'final and best' resource bids/offers via the DCA.
  2. Run the MCE, which uses an optimization algorithm to determine CSO awards.
- The DCA is a bid/offer collection device. It is a hybrid auction format ("on the clock") that is 'sealed bid within rounds.'
- The MCE is needed to clear the market consistent with the Tariff-specified CSO award rules, regardless of how bids/offers are collected.