# PROPOSED UPDATES TO THE DR AUCTION CLEARING MECHANISM

Demand Response Working Group

Meeting #1

March 29, 2016

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# Objective

- To present IESO proposals and invite stakeholder feedback on enhancing the DR Auction clearing mechanism

- The DR Auction clearing mechanism is a procurement tool open to enhancement and development
  - Updates to improve the mechanism can come from learnings from prior Auctions, best practices, feedback from stakeholders, etc.

# Proposals

- The IESO proposes to modify the DR Auction clearing mechanism with the following modifications:
  1. Update to the zonal pricing mechanism
  2. Update to the optimization engine

# Update to the Zonal Pricing Mechanism

# Auction Pricing

- The DR Auction selects offers to supply DR capacity, subject to Ontario-wide and zonal constraints, and establishes prices:
  - for all of Ontario, and
  - for any zone(s) where physical limits impose restrictions on the quantity of DR that can be provided from that zone

- Accurate zonal pricing is important because it provides a signal to market participants of DR conditions within a zone

# DR Auction Offer Structure

- DR Auction offers contain:
  - Price and MW Quantity
  - Zone
  - Physical or Virtual
    - Determines if offer is subject to virtual limit in addition to total limit
  - Full or Partial
    - Indicates the divisibility of the offer quantity

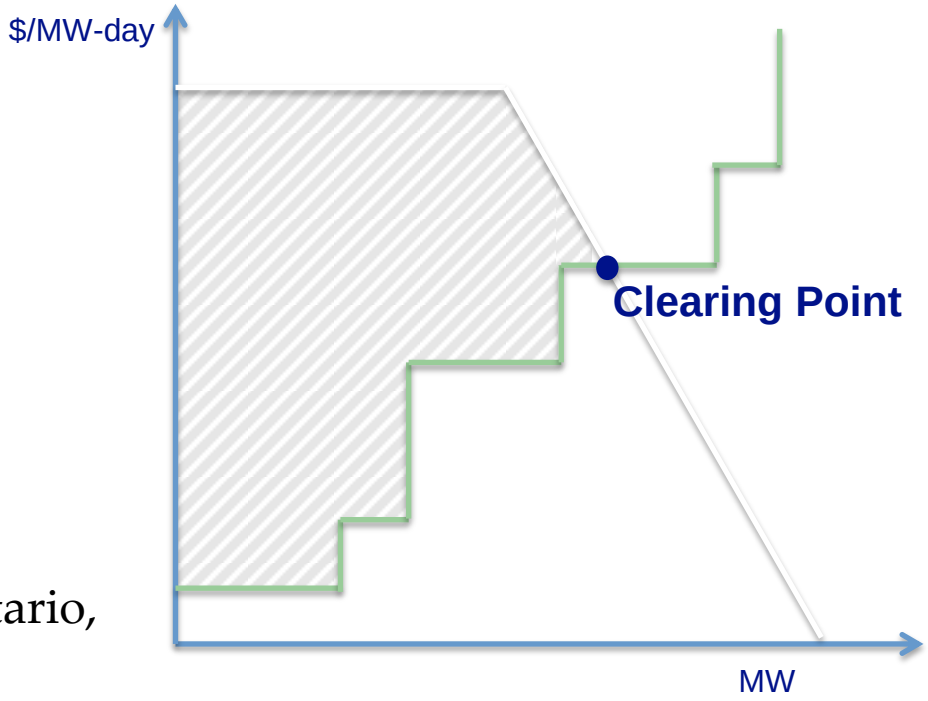
- Offers are then evaluated by the DR Auction engine, selecting offers based on optimization

# Auction Engine

- Objective: To maximize the area under the demand curve minus supplier costs for cleared offers

- Input:
  - Offers from DRAP's
  - Demand Curve elements
  - Zonal Constraints

- Output:
  - Capacity Obligations for each successful DRAP
  - Auction Clearing Price – for Ontario, and any constrained zones



# Current Zonal Pricing Mechanism

- A zone will clear at a lower price than the rest of the province, if quantity of DR selected in a zone is equal to the Zonal DR Capacity Limit
  - This limits the total amount of DR capacity that can be accommodated in each zone based on transmission availability studies

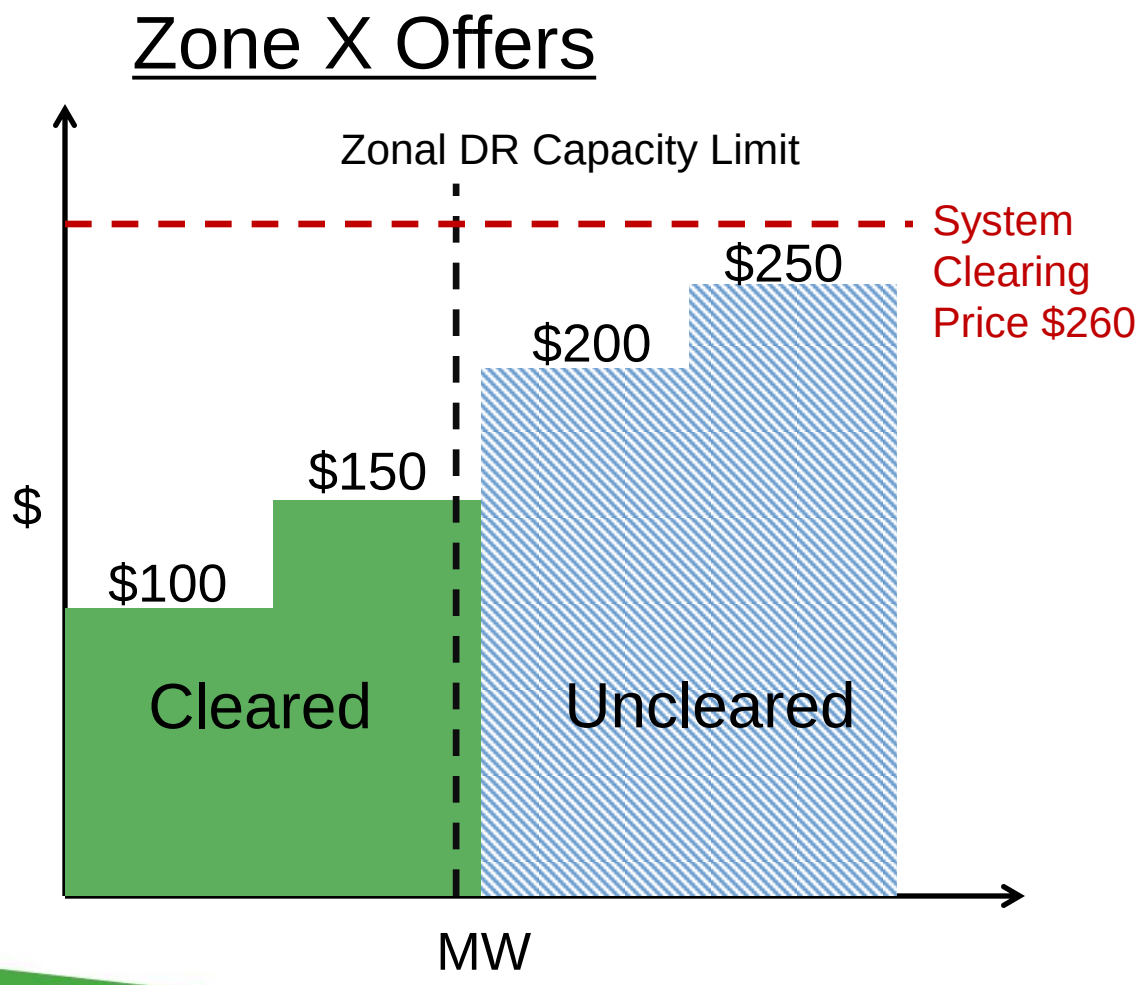
- However, if the zonal limit is not *exactly* reached, the zonal price will be equal to the Ontario system-wide clearing price
  - This is true even if there are "Full" offers that are less expensive than the system-wide clearing price but couldn't be accepted due to the zonal limit

# Proposal 1: Zonal Pricing

- A zonal price will be set at the lesser of the next higher economic offer price or Ontario-wide price when:
  1. An otherwise economic "Full" offer is not selected due to the zonal limit; OR
  2. The zone clears at exactly at the limit.

- This approach will send a better price signal about supply conditions within the zone when there is oversupply, relative to what can be accommodated
  - Setting the zonal price equal to the system-wide price sends the wrong signal about the availability and cost of DR in the zone
  - Local DR will not be signaled at a higher price when the value of DR in that zone is lower

# Example 1 - Current



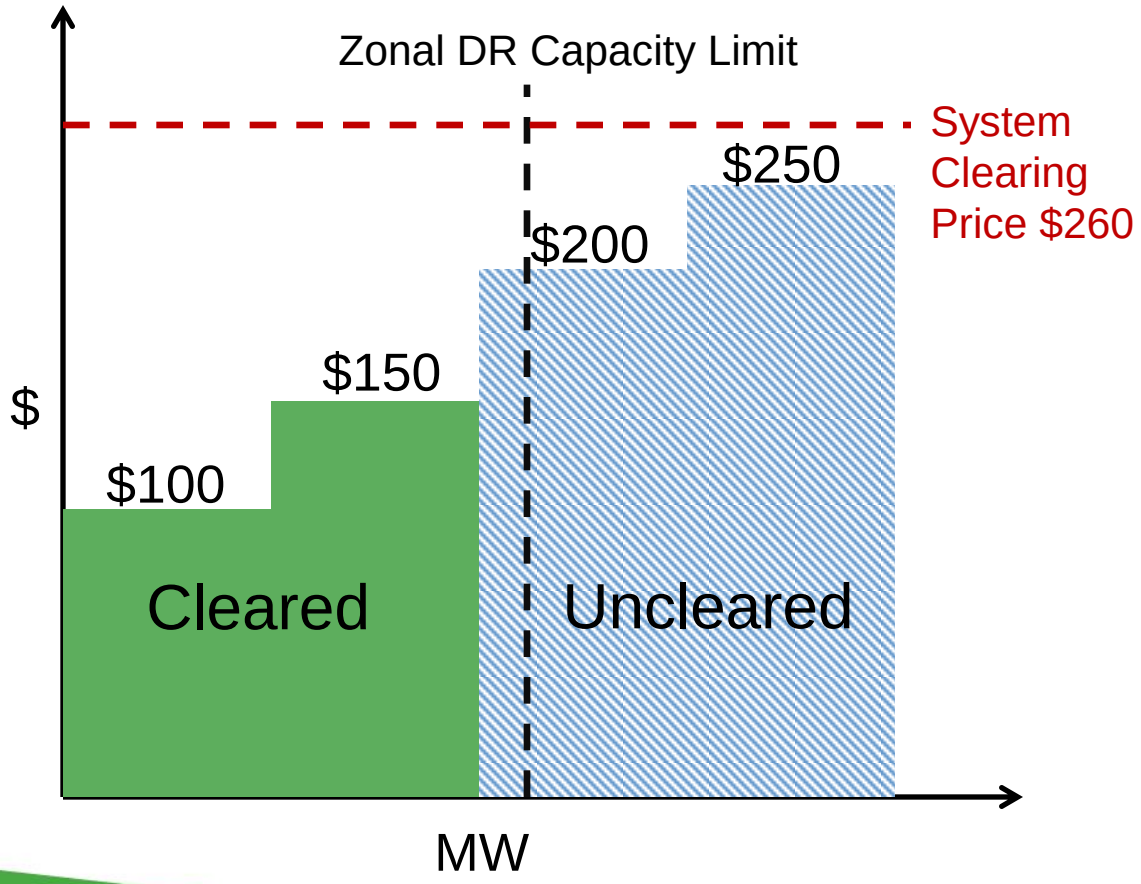

Assumptions:

- $150 offer is “Partial”

Under the current zonal clearing rules, Zone X will clear at $150, since the Zonal DR Capacity Limit was exactly reached.

# Example 2 - Current

## Zone Y Offers



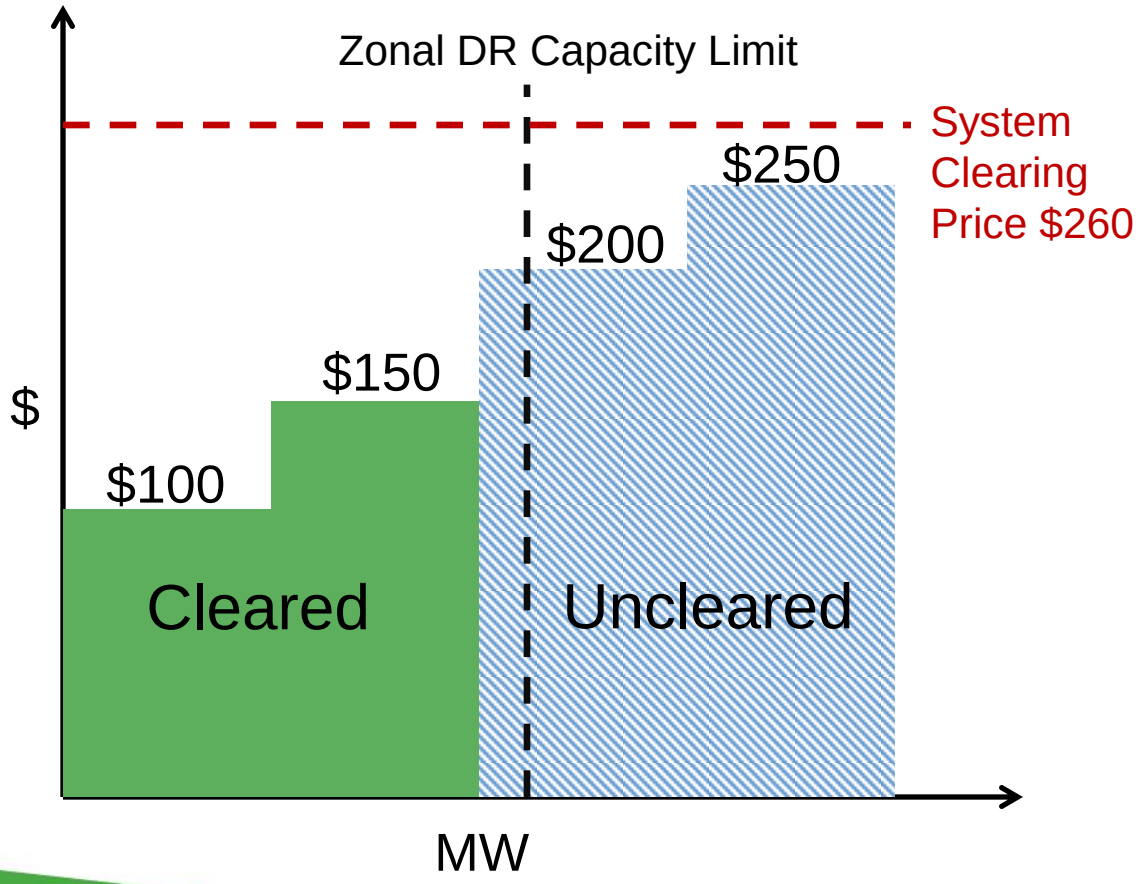

Assumptions:

- All offers are “Full”

Under the current zonal clearing rules, Zone Y will clear at $260, despite having offers to supply DR that are cheaper than the System Clearing Price due to the Zonal DR Capacity Limit.

# Example 2 - Proposed

## Zone Y Offers




Assumptions:

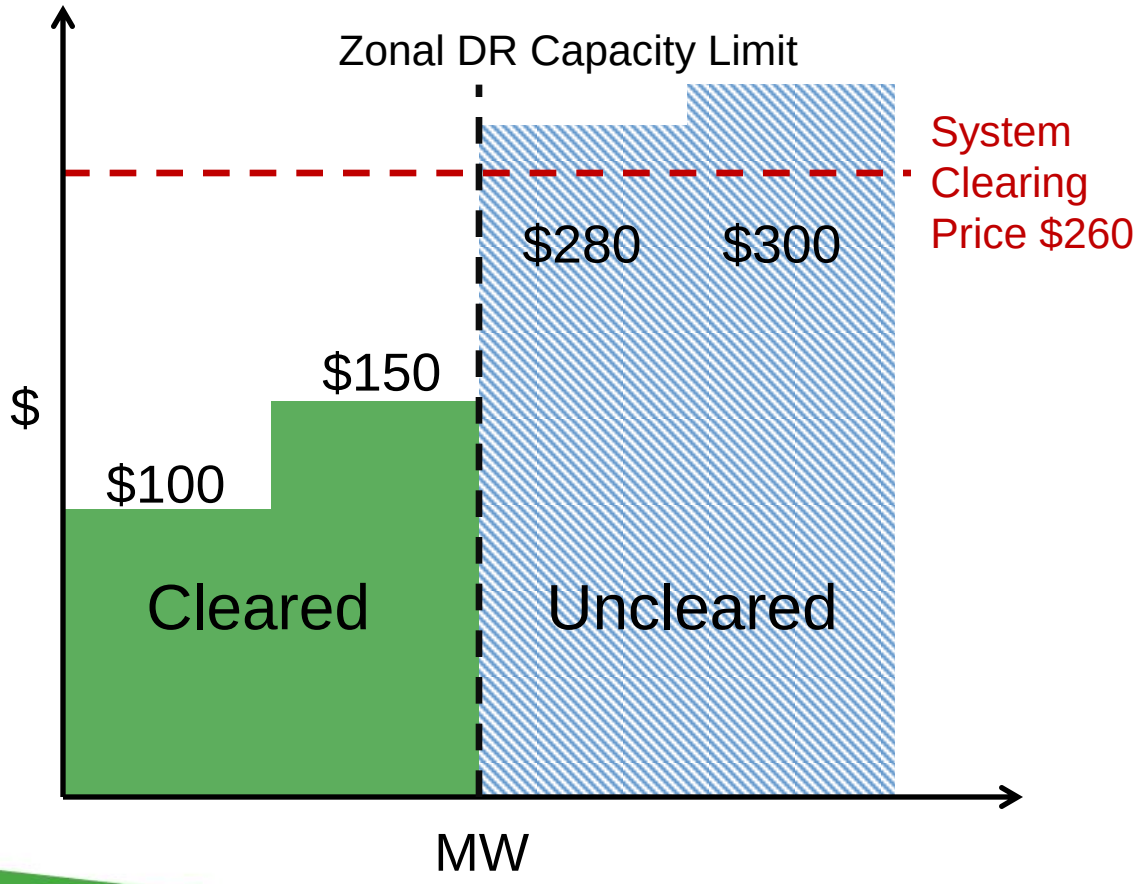
- All offers are “Full”

Under the proposed zonal clearing rules, Zone Y will clear at $200 because the next offer would have been selected but for the Zonal DR Capacity Limit.

This will create a zonal price for Zone Y that is more reflective of supply and demand conditions.

# Example 3 - Current

## Zone Z Offers



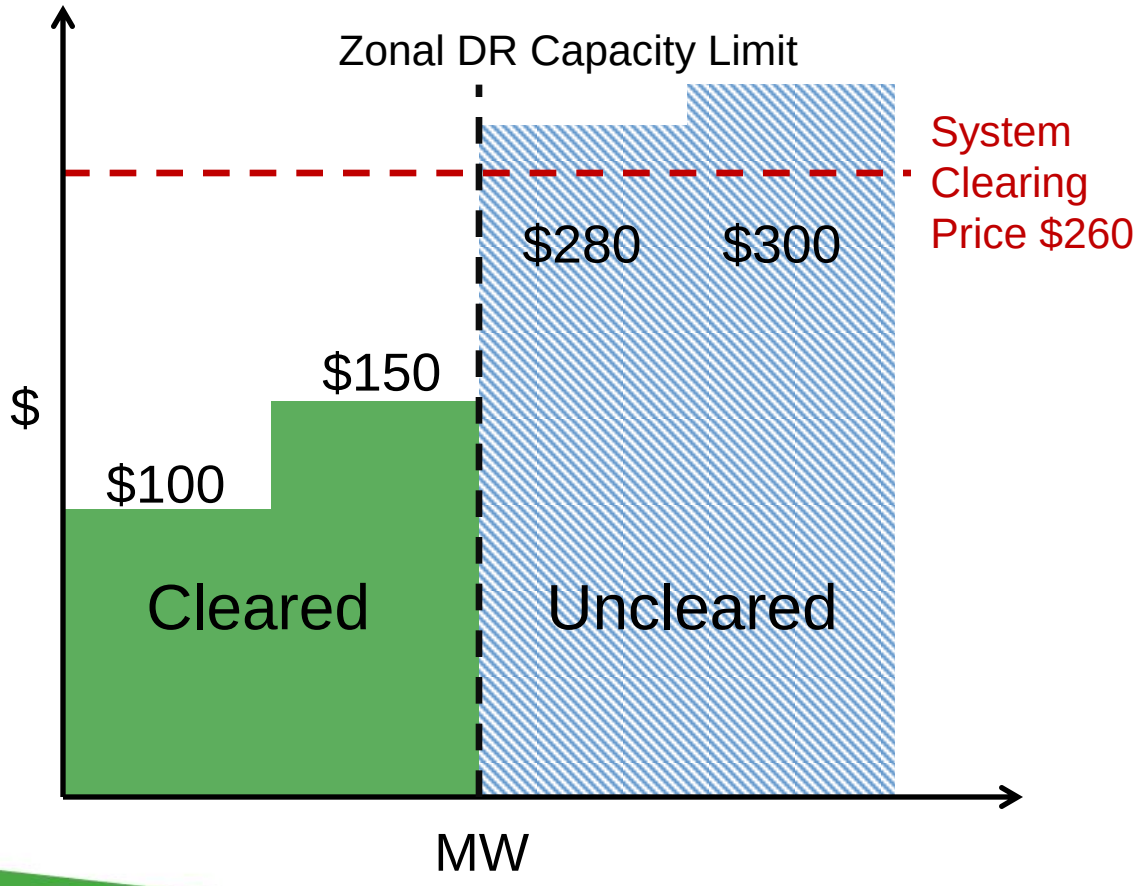

Assumptions:

- All offers are “Full”

Under the current zonal clearing rules, Zone Z will clear at $150, since the Zonal DR Capacity Limit was exactly reached.

# Example 3 - Proposed

## Zone Z Offers




Assumptions:

- All offers are “Full”

Under the proposed zonal clearing rules, Zone Z will clear at the System Clearing Price of $260 because the next offer would have not been selected.

# Proposal 1: Summary

- Setting a zonal price is intended to inform market participants of supply and demand conditions within a zone

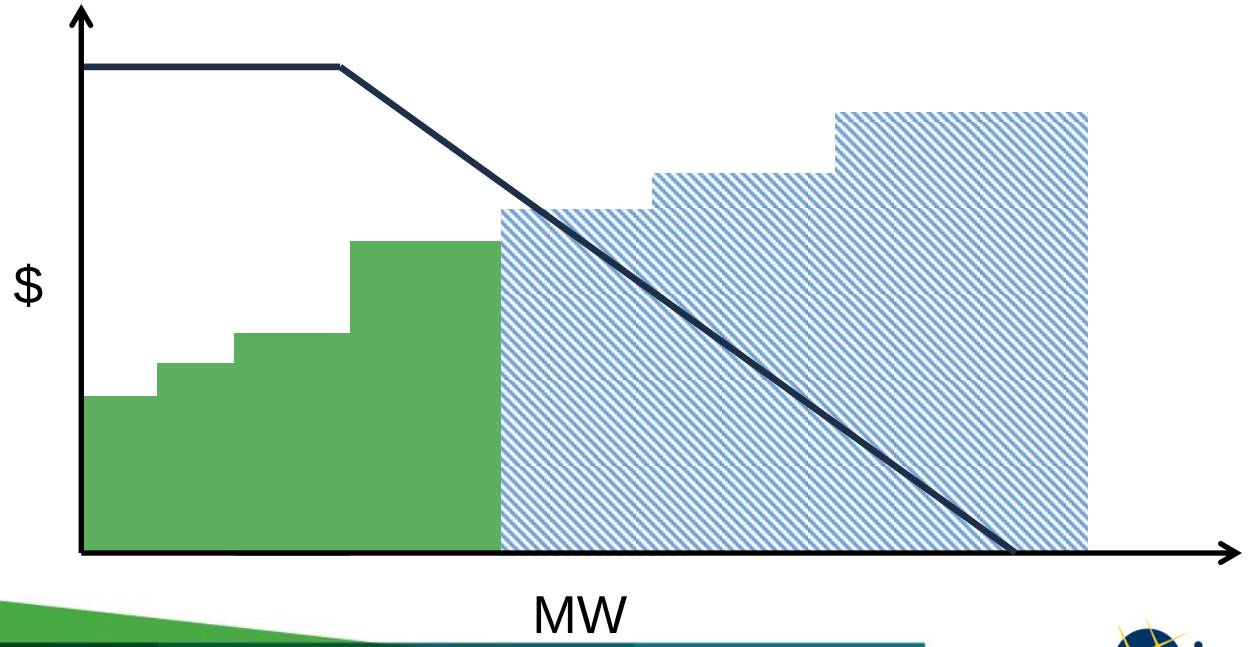
- Under this proposal, a zonal price would be set at the lesser of the next higher economic offer price in the zone or Ontario-wide price when:
  1. An otherwise economic "Full" offer is not selected due to the zonal limit; OR
  2. The zone clears at exactly at the limit.

- This would send a better signal to market participants of the availability and cost of DR in an oversupplied zone relative to the rest of the province
  - Lesson learned from first DR Auction

# Update to the Optimization Engine

# Current Optimization Mechanism

- Currently the DR Auction clearing mechanism selects DR capacity by optimizing participant offers, while constrained by the demand curve and zonal limitations
- By relaxing the demand curve constraint, a more optimal selection of resources may be possible

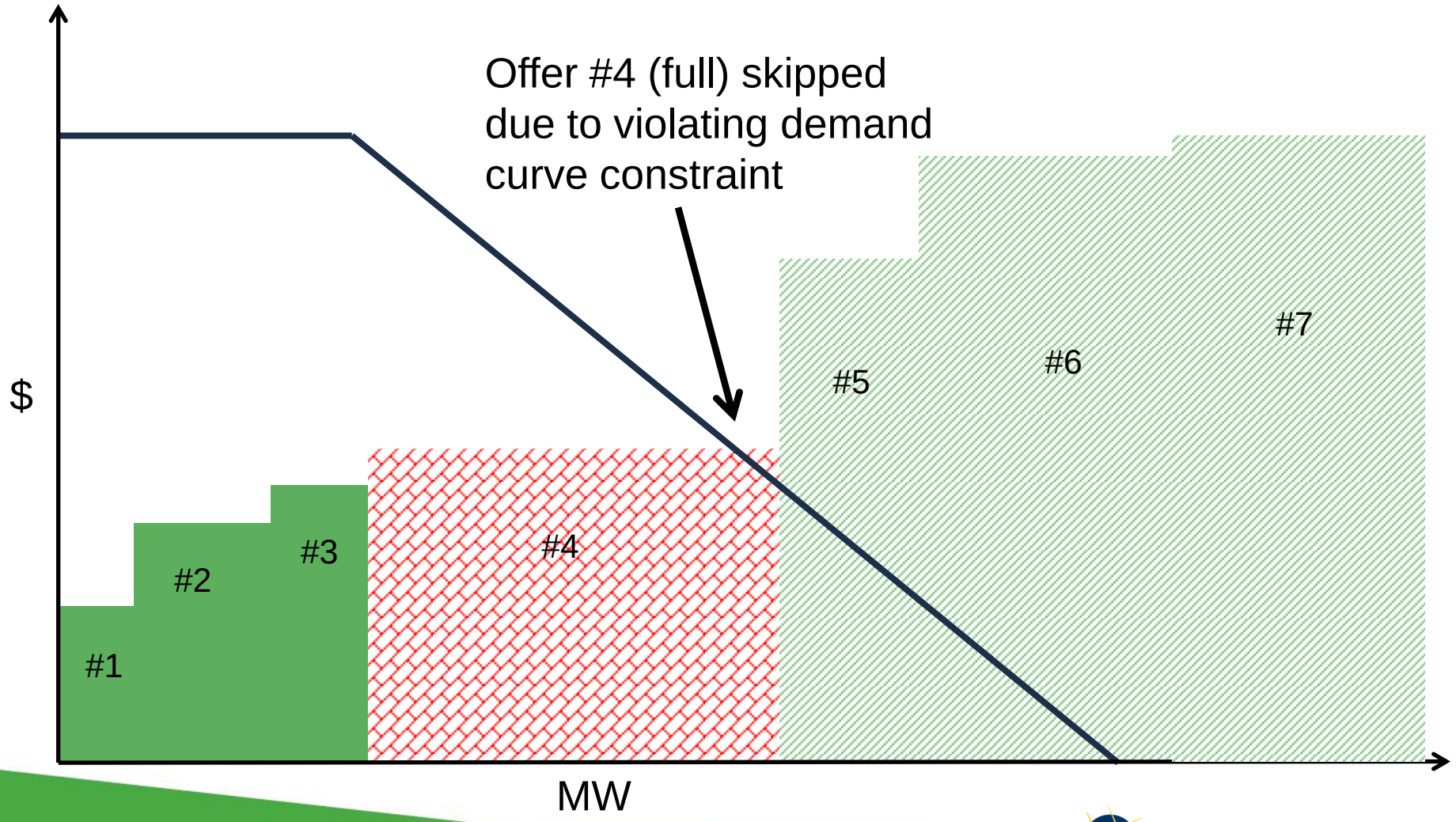


# Proposal 2: Optimization

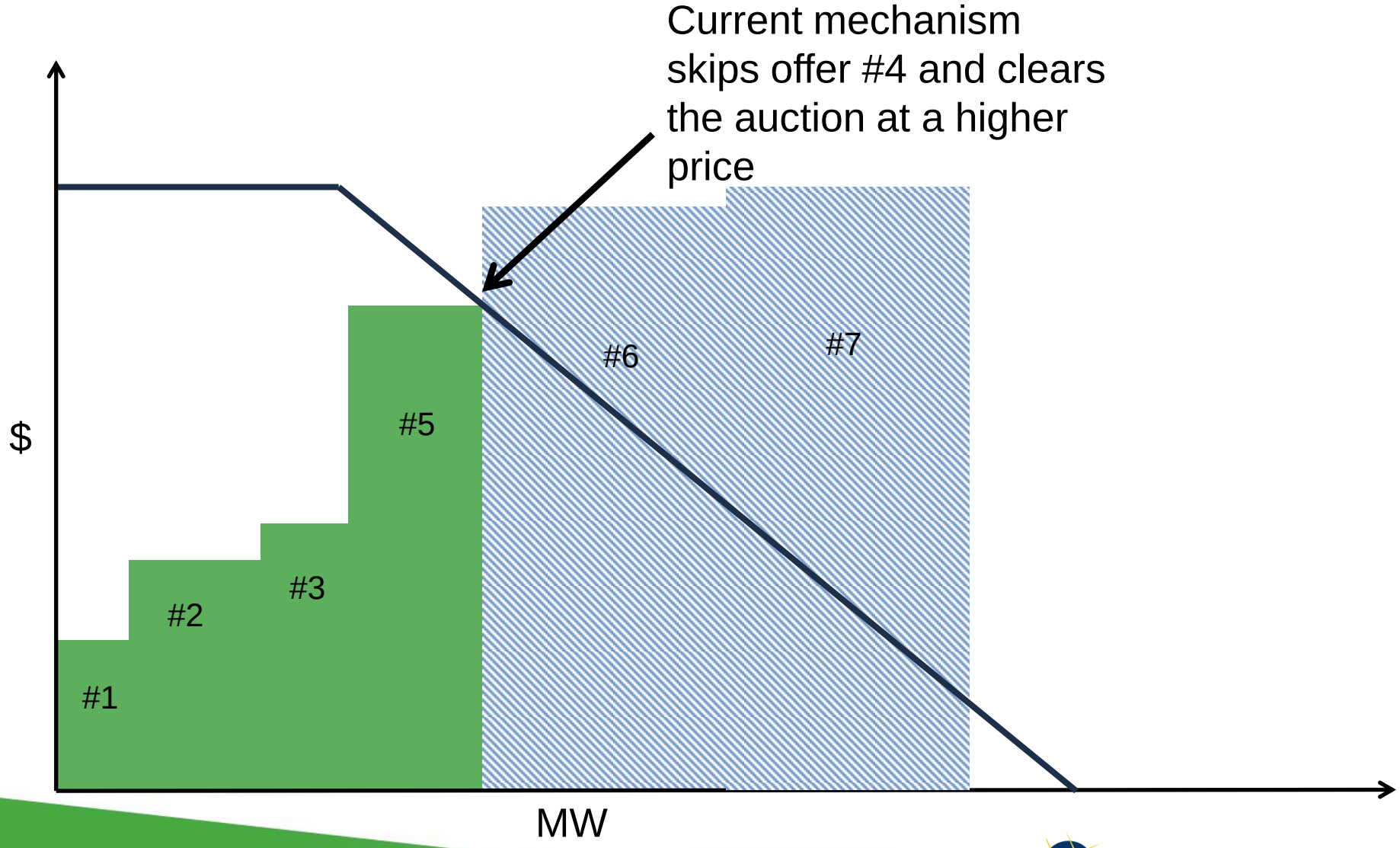
- The IESO proposes to clear a "full" offer that crosses the demand curve ONLY IF accepting that offer improves the objective function
  - Proposal favours accepting a low-cost full offer with "overhang" rather than selecting next offer at higher price that fits within the demand curve constraint
  - Offer would only be accepted if its surplus gain exceeds its surplus reduction

- This approach is a best practice that has been adopted in other capacity auction mechanisms, such as PJM and ISO-NE

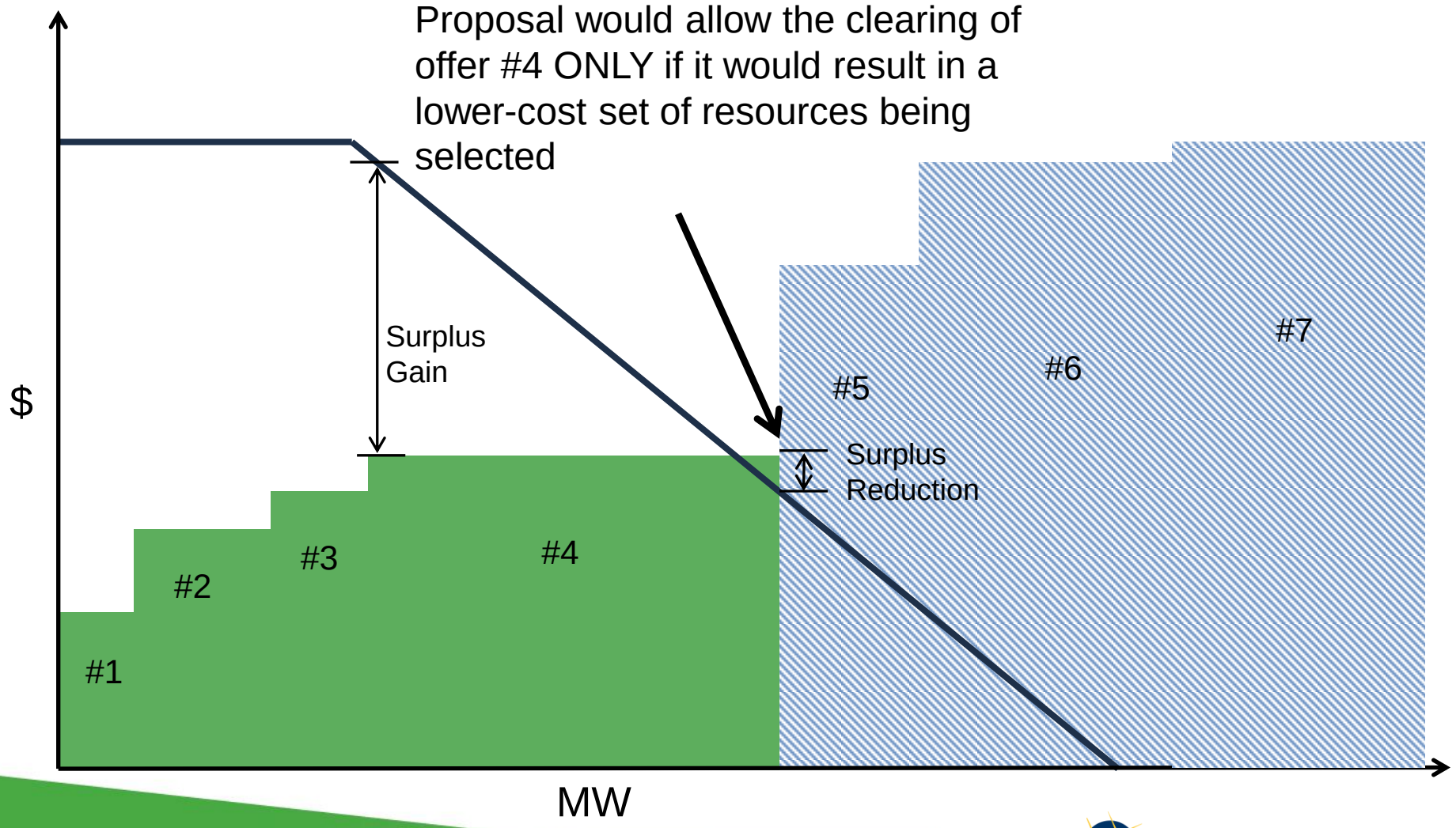
# Example


Offer #4 (full) skipped due to violating demand curve constraint
$
#1
#2
#3
#4
#5
#6
#7
MW

# Example


Current mechanism skips offer #4 and clears the auction at a higher price
$
MW
#1
#2
#3
#5
#6
#7

# Example


Proposal would allow the clearing of offer #4 ONLY if it would result in a lower-cost set of resources being selected
$
MW
Surplus Gain
Surplus Reduction
#1
#2
#3
#4
#5
#6
#7

# Proposal 2: Summary

- Implementing the "overhang" proposal allows for a more optimal clearing result in cases where "Full" offers that improve the objective function are rejected because of the demand curve constraints

- This approach is a best practice that has been adopted in other capacity auction mechanisms, such as PJM and ISO-NE

- The result is a more optimal and more intuitive pricing outcome