UPDATE ON IMPROVED UTILIZATION OF DR

Demand Response Working Group

September 12, 2017

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Purpose

- To provide a status update on the HDR utilization changes proposed at the last DRWG meeting and discuss next steps

HDR Utilization Changes Delayed

- At the July 18 DRWG meeting, the IESO informed members that it would present proposed Market Rule amendments reflecting the proposed changes to increase utilization of HDR resources at the next Technical Panel meeting
- The IESO subsequently discovered data issues within the historical analysis supporting the proposed changes
  - Decided against proceeding with proposed Market Rule amendments at the August 15 Technical Panel meeting due to a material change in results
- HDR resources will continue to be utilized through a four-hour activation until a revised proposal is implemented

IESO Commitment to Increasing Utilization

- The IESO thanks DRWG members for their contribution to discussions over the last few months to evolve the HDR resource
- Continue to be committed to increasing utilization of HDR resources, though a Summer 2019 target implementation date is more realistic
  - Allows more time to develop a more enduring utilization changes
- Value of previous discussions is not lost
  - Feedback from working group members will continue to influence design decisions and provide a starting point for new discussions

Current and Previously Proposed Protocols

Current HDR Activation Protocol

Maintained for 2017 DR Auction

1. Standby Notice:
4-hour schedule required for a standby by 7am

2. Activation:
4-hour schedule required for an activation ~2.5hrs prior

3. Duration:
DR activated for 4 hour blocks only

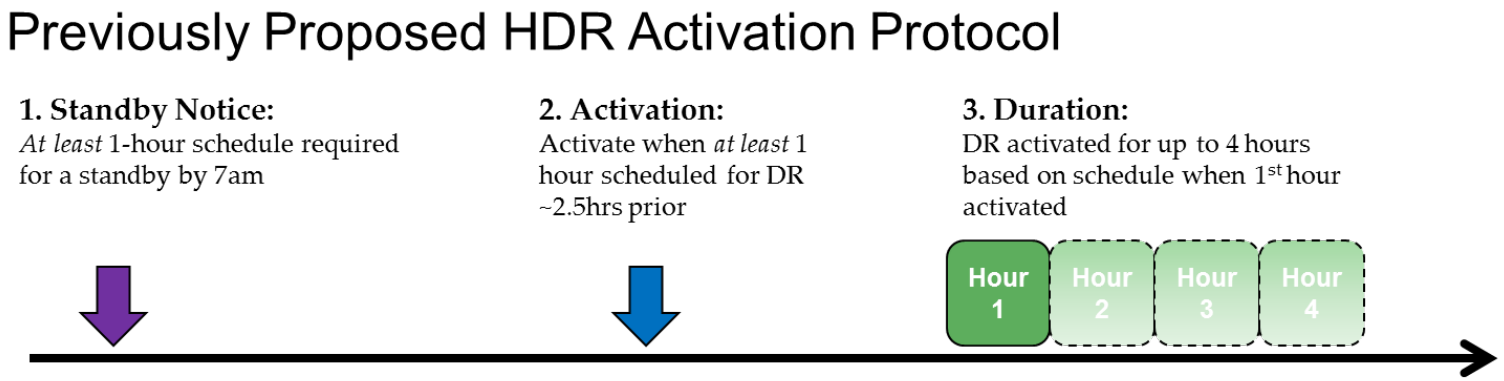
Previously Proposed HDR Activation Protocol "Option 6"

1. Standby Notice:
At least 1-hour schedule required for a standby by 7am

2. Activation:
Activate when *at least* 1 hour scheduled for DR ~2.5hrs prior

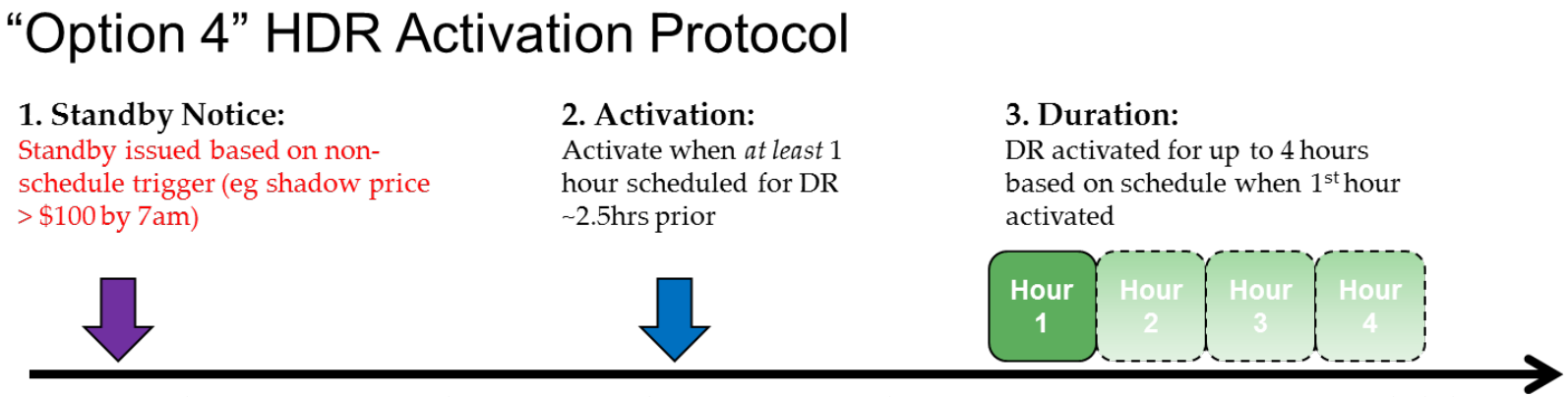
3. Duration:
DR activated for up to 4 hours based on schedule when 1st hour activated

Revised Results of "Option 6"



- Reducing the scheduling requirement from a fixed four hour block to up-to-four hours does evolve the HDR resource to provide greater flexibility to the system
- However, based on *revised* historical price analysis, using the proposed activation criteria, there would have been no increase in DR utilization from May 2016 to July 2017
  - Analysis assumed hourly DR was bid at $1999.99
  - While proposal does increase resource scheduling flexibility, it will likely not meet criteria of increasing utilization and warrants revisiting with the DRWG

Revised Results of "Option 4"



- Based on *revised* historical price analysis, "Option 4" would have triggered one local DR activation (one zone only) between May 2016 to July 2017
  - Assumed hourly DR was bid at $1999.99 and standby trigger was set at $100 (equal to the bid price threshold)
  - Issuing a standby notice based on a price trigger instead of a schedule trigger potentially further increases utilization of HDR because of the lower threshold to meet
  - Compared to "Option 6", this option does increase utilization but only marginally. The IESO wants to discuss additional options with the DRWG to further increase utilization

Revisiting the Criteria for Improvements

1. Must support efficient dispatch and evolve the effectiveness of the DR resource
2. Is likely to increase the number of Hourly DR Activations to demonstrate DR value when economic
3. Balances stakeholder needs
4. Can be implemented for the next DR Auction in December ~~2017~~ 2018

- Do stakeholders have any suggested edits to the criteria for improvements?

Historical Price Observations

- The following slides present historical observations of HDR/DR3 pricing nodes at the pre-dispatch minus 3 hours timeframe at specified price ranges to show the frequency of high priced hours
  - The 3 largest virtual MW zones: Toronto, Southwest and East, were selected for the analysis, making up 57% of all virtual capacity for Summer 2017
  - The pre-dispatch minus 3 hours timeframe is the current activation timeframe of hourly DR resources
  - Only hours during the respective availability windows were included

Historical Price Observations

- The purpose of this reporting is to show the historical range of pre-dispatch prices at the timeframe that is used to dispatch hourly DR resources
- Over the last three years, pre-dispatch-3 shadow prices at Toronto, Southwest and East zones have been greater than $1900/MWh in 3 hours over 2 days
- There have also been a number days where select zones had local constraints increasing PD-3 shadow prices
  - Niagara zone: 3 days
  - Ottawa zone: 1 day
  - Northeast zone: 4 days

Historical Price Observations

Winter 2016-17 to Summer 2017

		Pre-dispatch - 3 hours Shadow Price $/MWh				
Commitment Period	**Zone**	**$100-199**	**$200-299**	**$300-499**	**$500-1899**	**>$1900**
Summer 2017 (up to July 31)	Toronto	3	0	0	0	0
	Southwest	3	0	0	0	0
	East	3	0	0	0	0
Winter 2016-17	Toronto	5	0	1	0	0
	Southwest	5	0	1	0	0
	East	5	0	1	0	0

- On December 19th, PD-3 prices rose to ~$375/MWh for 1 hour

Historical Price Observations

Winter 2015-16 to Summer 2016

		Pre-dispatch - 3 hours Prices $/MWh				
Commitment Period	**Zone**	**$100-199**	**$200-299**	**$300-499**	**$500-1899**	**>$1900**
Summer 2016	Toronto	35	7	1	2	0
	Southwest	35	7	1	2	0
	East	34	8	1	2	0
Winter 2015-16	Toronto	0	0	0	0	0
	Southwest	0	0	0	0	0
	East	0	0	0	0	0

- Summer 2016 saw PD-3 prices rise above $200/MWh for multiple hours over August 4th and 11th

Historical Price Observations

Summer 2014 to Summer 2015

		Pre-dispatch - 3 hours Prices $/MWh				
Commitment Period	**Zone**	**$100-199**	**$200-299**	**$300-499**	**$500-1899**	**>$1900**
Summer 2015	Toronto	15	2	1	0	0
	Southwest	15	2	1	0	0
	East	11	2	1	0	0
Winter 2014-15	Toronto	29	9	7	2	3
	Southwest	29	9	7	2	3
	East	30	9	5	4	3
Summer 2014	Toronto	0	0	0	0	0
	Southwest	0	0	0	0	0
	East	0	0	0	0	0

- Summer 2015 saw PD-3 prices rise above $200/MWh for multiple hours on September 3rd
- Winter 2014-15 experienced a number of high-priced hours during the polar vortex including: Jan 13, 14, Feb 2, 16, 17, 19, 20, 23

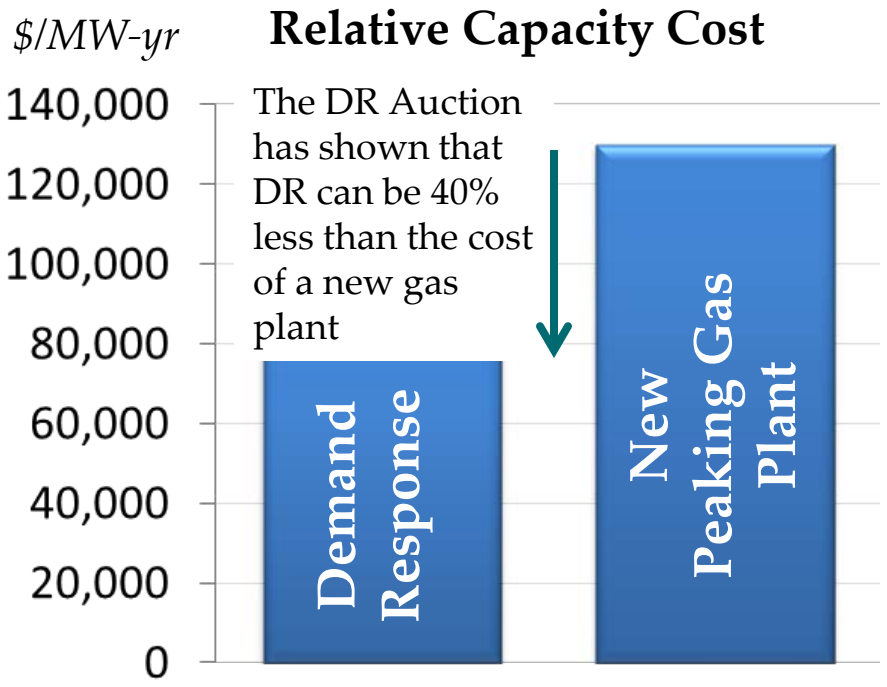
The Economics of DR

- Most consumers place great value on the electricity they consume and will only not consume when electricity prices are extremely high
  - Most HDR resources are bid near the maximum market clearing price, indicating they are only willing to reduce consumption when prices approach the price ceiling of $2000/MWh
- By contrast, most generators are willing to provide power at prices less than $50/MWh
- **Based on economics, it does not make sense to use DR to displace large volumes of energy, however, it does make sense to ensure DR can be utilized during times of system stress**

The System Value of DR

- While DR is only economic to be used in a few hours when the system is under most stress, it still has significant value as a "capacity" resource

- DR is often significantly cheaper than building an equivalent peaking gas generator that would only operate for a relatively few hours a year



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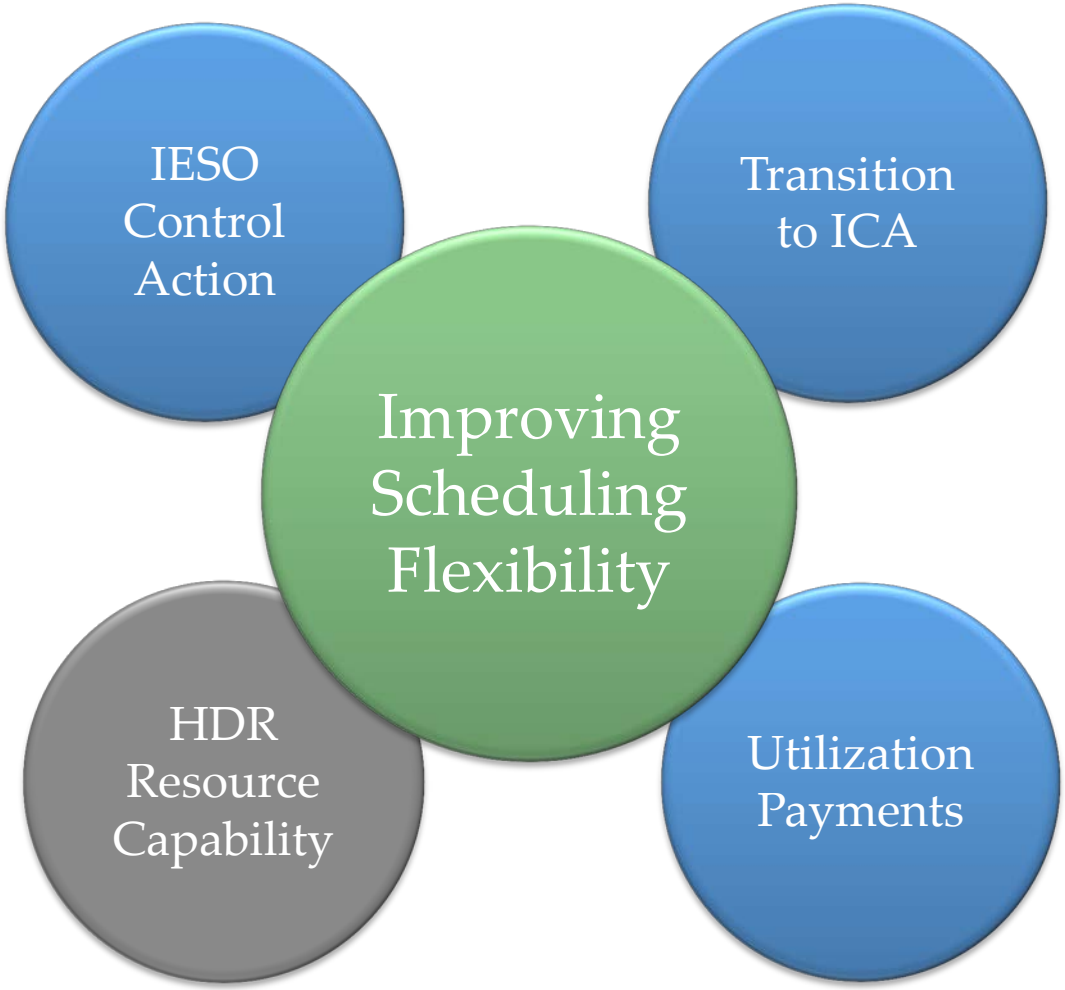
Considerations for Change

- Are there additional considerations and factors that should be included when making utilization changes?
- *Note that not all considerations may impact design changes for the 2018 DR Auction*



Considerations for Changes

Scheduling Flexibility

- Improving HDR scheduling flexibility increases the opportunities for HDR to be utilized during times of system need
- Improving scheduling flexibility is possible through:
  1. Reducing activation duration from 4 hour blocks only
     - As discussed in previous DRWG sessions, allowing IESO to activate from one up-to four hours is an improvement to current practice
  2. Eliminating or modifying standby notice
     - Current standby notice is restrictive in gaining access to HDR capacity availability during the dispatch day
       - HDR must be scheduled for DR by 7am in pre-dispatch timeframe for it to be available to be activated for the rest of the day

Considerations for Changes

Scheduling Flexibility

- Improving scheduling flexibility is possible through:
  3. Reducing activation notice lead time of ~2.5 hours
     - Shorter activation notice times provide greater flexibility in meeting system conditions (eg dispatchable loads respond with 5 min notice, imports respond with 1 hour notice)
- The IESO is interested in hearing from DR participants how much notice is required to activate HDR resources?

Other Considerations

Utilization Payments

- The IESO will be discussing the merits of utilization payments with stakeholders at the upcoming DRWG
  - Navigant has been selected to produce the discussion paper, which will be posted publicly prior to the November DRWG meeting
- One of the areas of discussion with the DRWG would be the impact of utilization payments on DR utilization
  - Would a utilization payment reduce DR energy bid prices, and if so, by how much?

Other Considerations

Emergency Actions

- The IESO may initiate control actions in advance to and during an *Emergency Operating State*
  - Actions could include:
    - Curtailing export transactions
    - Revoke/recall outages
    - Run short of 30-minute operating reserve
  - Available control actions are documented in the Emergency Operating State Control Actions (EOSCA) list*
    - Constraining down dispatchable load resources and notifying/activating Capacity Based Demand Response are included
- How can HDR resources can be utilized during and/or help avoid emergency conditions?

**Market Manual 7.1, Appendix B*
http://www.ieso.ca/Sector%20Participants/Market%20Operations/-/media/ccdae55168cc4ae8a4b73894ba305ebe.ashx

Other Considerations

Transition to Incremental Capacity Auction

- The DR Auction was developed as a transitionary procurement mechanism used to select demand response capacity until an incremental capacity auction is in place
- Ensuring hourly DR can be used to meet reliability needs is key to a successful transition
  - There ***may*** be changes required to certain elements of HDR resources and DR capacity obligations
  - More instances of DR utilization will be required
  - As these modifications are identified in the high-level and detailed design processes, the IESO will work with stakeholders through the DRWG and ICA Stakeholder Engagement to implement required changes

Feedback and Next Steps

- The IESO remains committed to increasing utilization of HDR resources and will be targeting changes to be approved for the 2018 DR Auction

- The IESO is interested in hearing from stakeholders on:
  1. Should the criteria for improvements be modified?
  2. Suggestions to increase utilization of HDR resources
  3. How much notice time is required to activating HDR resources?
- Please provide feedback by **September 29th** to engagement@ieso.ca