Update on the 2020 DRWG Work Plan Initiatives

April 2020

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Purpose

- The following slides provide an update on the priority DRWG 2020 work plan initiatives, including:
  - Baseline methodology
  - In-day adjustment methodology
  - Registering virtual hourly demand response (HDR) resources
- The purpose of this presentation is to update stakeholders on how the work is progressing in absence of an April webinar, which has been cancelled as a result of the additional demands facing stakeholders during COVID-19

Re-Cap: Timelines of 2020 Work Plan Initiatives

April

Baseline and IDAF: report back on jurisdictional scan and high-level options

Virtual Registration: report back on option development

June

Baseline and IDAF / Virtual Registration:

Present feasible options and recommend-ations for stakeholder feedback

Aug

Baseline and IDAF / Virtual Registration:

Present final recommend-ations

Sept

Baseline and IDAF / Virtual Registration:

Market rule and manual redlines (as required)

Content covered in this update

UPDATE ON BASELINE AND IN-DAY ADJUSTMENT FACTOR (IDAF) INITIATIVES

Baseline and IDAF Initiatives

- The objectives of these initiatives are to:
  - Determine whether the in-day adjustment methodology, as part of the baseline determination, should be revised to better reflect consumption patterns for non-weather sensitive loads (Phase 1)
  - Explore the need for different baseline methodologies for different load types, including options for such methodologies (Phase 2)
- These initiatives were developed in response to:
  - Stakeholder feedback on the challenges associated with the impact of the IDAF on non-weather sensitive loads that curtail in advance to prepare for an event (refer to Appendix for additional details); and,
  - Stakeholder feedback regarding the need for different baselines methodologies to better reflect different load types as are commonly available in other jurisdictions

Baseline and IDAF Initiatives

- A scan of baseline methodologies used in other electricity markets has been conducted to inform this work and to inform what may be possible in Ontario to address stakeholder concerns. This includes:
  - What in-day adjustment methods are employed? Are there opt-out provisions? What tests and audits are performed to assess accuracy of a baseline?
  - What is the timing of the adjustment window as part of the in-day adjustment methods in other markets and how does this align with the timing of activation?
- The "jurisdictional scan" will be used to inform the IESO's draft recommendations, which will be shared for stakeholder feedback in June

JURISDICTIONAL SCAN - BASELINE METHODOLOGIES

Jurisdictional Scan Outline

- The jurisdictional scan includes:
  - A re-cap of the purpose of a baseline
  - An overview of industry best practices for DR performance measurement
  - A review of baseline methodologies available in PJM, MISO, NYISO, ERCOT and ISO-NE
    - With a focus on the methodologies used to assess the performance of DR resources that participate in similar ways to those in Ontario
    - Includes review of the in-day adjustment methods as part of the baseline methodologies
  - Summary of key learnings

Purpose of a Baseline

- The baseline is an approximation of a resource's consumption profile that is used to estimate what the resource would have been consuming had a DR activation not taken place
- Deriving an accurate baseline is challenging due to the inherent volatility of a customer's load
  - Load variance can occur due to planned or unplanned daily business activities, business cycles, weather, seasonal product demand, etc.
- An effective baseline should neither reward nor penalize participants for normal load variance and, in doing so, should help ensure observed curtailments and associated settlements are reflective of the actual demand reduction value provided to the grid

Industry Measures and Best Practices

- The North American Energy Standards Board (NAESB) was tasked with developing Business Practice Standards for DR M&V as part of FERC Order 745
  - The purpose of FERC Order 745 was to enable increased DR participation in wholesale energy markets
- Goals of the M&V standards:
  - Transparency – requirements should be accessible and understandable
  - Accountability – promote accurate performance measurement in dispatch, operations, and market settlement
  - Consistency – methods should be applicable across all wholesale markets
- 5 broad Performance Evaluation Methodologies were developed by NAESB
  - The type of baseline methodology used to measure DR resource performance is largely dependent on the type of service the resource is providing

Scope of the Jurisdictional Scan

- The scan reviews the methodologies that other jurisdictions use to assess the performance of DR resources with participation characteristics that most closely align with how C&I HDR resources participate in Ontario
  - This includes resources with a capacity obligation and "must offer" requirement in the energy market; or DR that chooses to participate as both a capacity (emergency) resource and an energy resource
  - Based on this scope, the scan focuses on the NAESB Baseline Type-I methodology which uses historical interval meter data to estimate a profile baseline
  - The scan covers Baseline Type-I methodologies in PJM, MISO, NYISO, ERCOT, and ISO-NE per stakeholder feedback

Elements of the Type-I Baseline

There are three main components to a Type-I Baseline:

1. Data Selection

- Establishes what data to include in baseline calculation
- Includes exclusion rules (i.e. defines a Suitable Business Day)
- E.g., 'High 15 of 20'

2. Estimation Method

- Method used to calculate the provisional baseline (i.e. baseline with no adjustments)
- E.g., Averaging, regression

3. Adjustment Method

- Method used to account for day-of consumption
- E.g., Weather-sensitive, additive, scalar, symmetric, capped (see next slide for definitions of these terms)

Adjustment Method - Key Terms

Weather-Sensitive Adjustment: determined by a relationship derived through a regression analysis that considers the DR load and historical hourly temperature data

Additive Adjustment: A fixed kW adjustment to the provisional baseline that is applied across all event time intervals

Scalar/Multiplicative Adjustment: A percentage multiplier adjustment to the provisional baseline that is applied across all event time intervals

Symmetric Adjustment: allows for adjustment upward and downward (asymmetric allows for only upward or downward)

Adjustment Cap: A limit to the magnitude of an adjustment to the provisional baseline; can be limited upward, downward, or both

Comparison of Type-I Baselines

	Description	Calculation Method	Baseline Adjustment	Adjustment Window	Applicability
PJM	'Highest 4 of 5' days over a 45-day look back	Hourly average of highest 4 event period use days	WSA or SAA	3 hours ending one hour prior to dispatch	Energy resources; default if also an emergency/capacity resource
MISO	'10-day rolling average' over a 45-day look back	Hourly average of the 10, but not less than 5, most recent eligible weekdays	WSA or SSA with a +/- 20% cap	3 hours ending 4 hours prior to dispatch	Energy resources; default if also registered as a capacity resource w/ "must offer" energy requirement
NYISO	'Highest 5 of 10' days over a 30-day look back	Hourly average of highest 5 event period use days	SSA with a +/- 20% cap	2 hours ending 2 hours prior event (aligns with activation notice window)	Energy resources; emergency resources settled for performance above and beyond energy performance

WSA = weather-sensitive adjustment SSA = symmetric scalar adjustment
SAA = symmetric additive adjustment

Comparison of Type-I Baselines (cont'd)

	Description	Calculation Method	Baseline Adjustment	Adjustment Window	Applicability
ERCOT	'Middle 8-of-10' over a 10-day look back/ forward	Average 24-hour energy use over 10 eligible days, eliminating days with the highest and lowest consumption	SSA with no cap	2 hours ending 3 hours prior to dispatch	Energy resources, emergency resources
ISO-NE	'10-day rolling average' over a 30-day look back	Average 24-hour energy use over last 10 eligible days	SSA with no cap	3 most recently completed 5-minute intervals prior to issuance of activation notice	Energy resources; default if also registered as a capacity resource w/ "must offer" energy requirement

- PJM, MISO, NYISO, and ISO-NE also have baseline calculations to capture weekend DR events, calculated the same as above, but with weekends/holidays as eligible days

WSA = weather-sensitive adjustment SSA = symmetric scalar adjustment
SAA = symmetric additive adjustment

Adjustment Method: Opt-In/Out Mechanism

	In-day adjustment method	Opt-in/Opt-Out Mechanism
PJM	WSA or SAA; 3 hours ending one hour prior to dispatch	Adjustment is default unless participants fail the relative root mean squared error (RRMSE) test at registration
MISO	WSA or SSA with a +/- 20% cap; 3 hours ending 4 hours prior to dispatch	Participants must bring forward documentation at the time of registration if they choose to opt for an adjusted baseline
NYISO	SSA with a +/- 20% cap; 2 hours ending 2 hours prior dispatch	Participants elect whether or not to have an adjustment at the time of registration
ERCOT	SSA with no cap; 2 hours ending 3 hours prior to dispatch (adjustment window can be moved to improve accuracy)	Applied at ERCOTs discretion if it improves the accuracy of the baseline calculation
ISO-NE	SSA with no cap; 3 most recently completed 5-minute intervals prior to issuance of start-up instruction	Applied universally to all DR assets*

**Note in ISO-NE, the baseline calculation and in-day adjustment are conducted at the asset level (i.e. contributor level) rather than the resource level*

Summary of Key Learnings

- There are at least three jurisdictions that allow for an unadjusted baseline
  - NYISO offers one NAESB Type-I baseline with an adjustment that is most similar to Ontario: optional, symmetric scalar with a +/- 20% cap
    - Participants elect whether or not to have an adjustment at the time of registration
  - MISO offers one NAESB Type-I baseline and customers can choose between the unadjusted baseline, a weather-adjusted baseline, or a symmetric scalar adjustment with a +/- 20% cap (like Ontario)
    - In MISO, participants must bring forward documentation at the time of registration if they choose to opt for an adjusted baseline
  - PJM offers many NAESB Type-I baselines, including an option for no adjustment, but these options are only available if participants do not pass a relative root mean squared error (RRMSE) test at registration
    - The test determines whether the default baseline, which includes an additive symmetric adjustment, is appropriate
    - PJM is the only jurisdiction with a formal process for testing the accuracy of the standard baseline

Summary of Key Learnings (cont'd)

- It is common for the adjustment window to be aligned with the activation notice timeframe
  - In PJM, the notification timeline for activation is 30 minutes, with an adjustment window of 3 hours starting one hour prior to dispatch
  - In NYISO and ISO-NE, the adjustment window is aligned with the activation notice (2 hours in NYISO, service-dependent in ISO-NE)
- Where the standard baselines do not appropriately reflect a participant's load profile, PJM and MISO have an option for the participant to bring forward a Custom Baseline which must be approved by the ISO/RTO

Next Steps on IDAF Initiative

- The IESO will use the findings from the jurisdictional scan to inform draft recommendations for Phase 1 of the baseline methodology initiative
  - Current assessment is focused on an opt-out of the IDAF as well as the timing of the adjustment window
- Draft recommendations will be presented to stakeholders for feedback in June

UPDATE ON REGISTERING VIRTUAL HDR RESOURCES INITIATIVE

Overview of the Registering Virtual HDR Resources Initiative

- The objective of this initiative is to develop and assess options for allowing a DRMP to register virtual HDR contributors into separate aggregates within a zone
- These slides provide an update on the IESO's development of options under consideration

Option Development

- To align with Capacity Auction design, the primary option under development is to allow an aggregator to enroll two C&I virtual demand response resources per zone in the pre-auction period
  - Aggregator submits offers for each C&I virtual demand response resource in the auction
  - Aggregator can transfer obligations between the two resources in the forward period following the auction and prior to the obligation period
- Allowing more than two virtual aggregations per market participant per zone is not being considered due to concerns related to potential impact on tool computation

2020 DRWG Work Plan - Next Steps

- The IESO will present the draft recommendations with respect to the priority DRWG 2020 work plan initiatives in June
- The IESO welcomes questions and feedback from stakeholders on this update by email to engagement@ieso.ca
- Please provide feedback on the information contained in this update by May 22 to engagement@ieso.ca. Feedback provided by this date will be considered in the development of the draft recommendations

APPENDIX: BASELINE CALCULATIONS IN CURRENT DESIGN

Standard Baseline for C&I HDRs

- Uses an average of the highest **15** consumption values during the same hours as those of the Activation, in the last **20** Suitable Business Days prior to the Activation

Suitable Business Days

- Any business days where a C&I HDR resource:
  - Has placed at least one dem*and response energy bid* (as defined in Chapter 11 of Market Rules) for at least one hour within the availability window for the day; and,
  - Was not activated to provide demand response

- Calculation may go back to a maximum of 35 Business Days prior to establishing the 20 Suitable Business Days

In-Day Adjustment Factor for C&I HDRs

- Captures changes in typical load consumption during the activation day
  - Capturing changes in HDR participant's baseline during the activation day helps to provide accurate performance calculations

In-Day Adjustment Factor for C&I HDRs

$$\text{In-Day Adjustment Factor (IDAF)} = A \div B$$

Where:

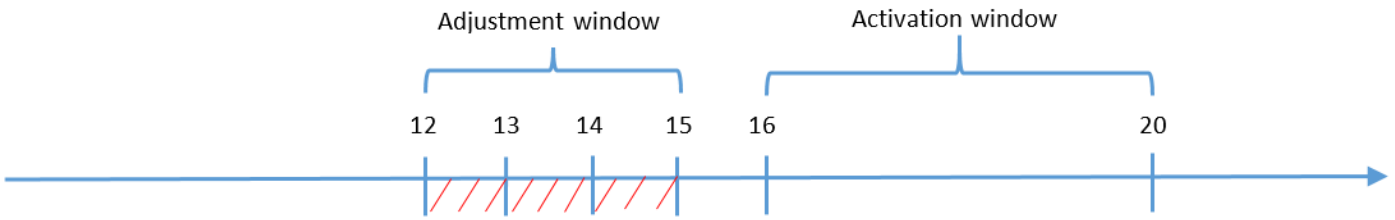
- "A" is the average actual consumption during the adjustment window* hours on the actual DR activation day
- "B" is the average actual consumption during the adjustment window* hours in the past highest fifteen (15) of twenty (20) suitable business days* prior to the DR activation day
- IDAF can only be as low as 0.8 and as high as 1.2

*defined on the next slide

In-Day Adjustment Factor for C&I HDRs

Adjustment Window

- Three (3) hour window occurring one (1) hour before a DR activation event



In-day Adjustment: Illustrative Impact

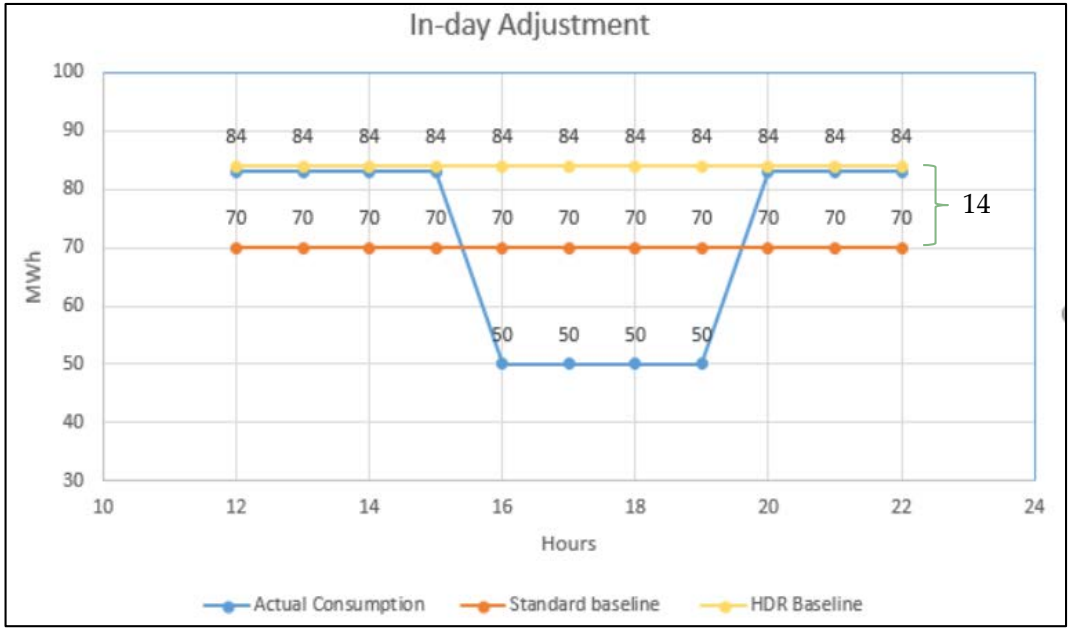
- HDR participants whose consumption is higher than typical consumption during activation day will have IDAF > 1
- Provides a process to adjust the baseline for weather dependent loads and thus may better reflect the amount of capacity provided by the resource

HDR Baseline = Standard Baseline x IDAF

Example:
- Standard Baseline = 70 MWh
- IDAF = 1.2

HDR Baseline = 70 MWh x 1.2 = 84 MWh

Curtailment compared to **Standard baseline** = 20 MWh
Curtailment compared to **HDR baseline** = 34 MWh



In-day Adjustment: Illustrative Impact

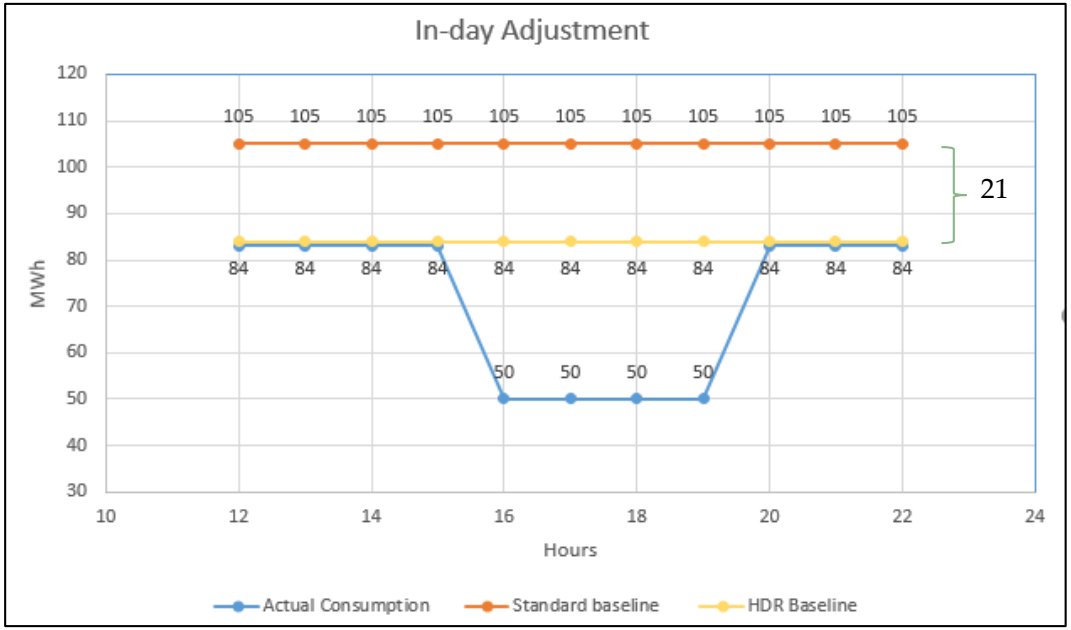
- HDR participants whose consumption is lower than typical consumption during activation day will have IDAF < 1

HDR Baseline = Standard Baseline x IDAF

Example:
- Standard Baseline = 105 MWh
- IDAF = 0.8

HDR Baseline = 105 MWh x 0.8 = 84 MWh

Curtailment compared to **Standard baseline** = 55 MWh
Curtailment compared to **HDR baseline** = 34 MWh



Stakeholder Feedback: In-day Adjustment Impact

- The IDAF can limit the participants operational flexibility on test / activation day as customers can be penalized (through a lower baseline) for curtailing load in advance of the event even though these load reductions may occur outside of the availability window when the resource has no capacity obligation and be sustained for the entire activation
  - Resources may "test" the capabilities of their contributors prior to an activation for the purposes of improving reliability during the event
  - A contributor may undergo scheduled maintenance during the in-day adjustment hours on the day of an activation
  - A manufacturing plant may respond to a DR notice by cancelling a shift that is scheduled to start well ahead of the activation. If the adjustment window includes part of the cancelled shift, the plant's baseline can be significantly reduced

Stakeholder Feedback: In-day Adjustment Impact

- The IDAF should be optional to allow ample time for industrial (non-weather sensitive) loads to perform shut-down processes. The baseline adjustment window should never overlap with a ramp window as the resources is penalized when they ramp down in advance.