

# RESIDENTIAL DR BASELINE

Demand Response Working Group  
Meeting #4

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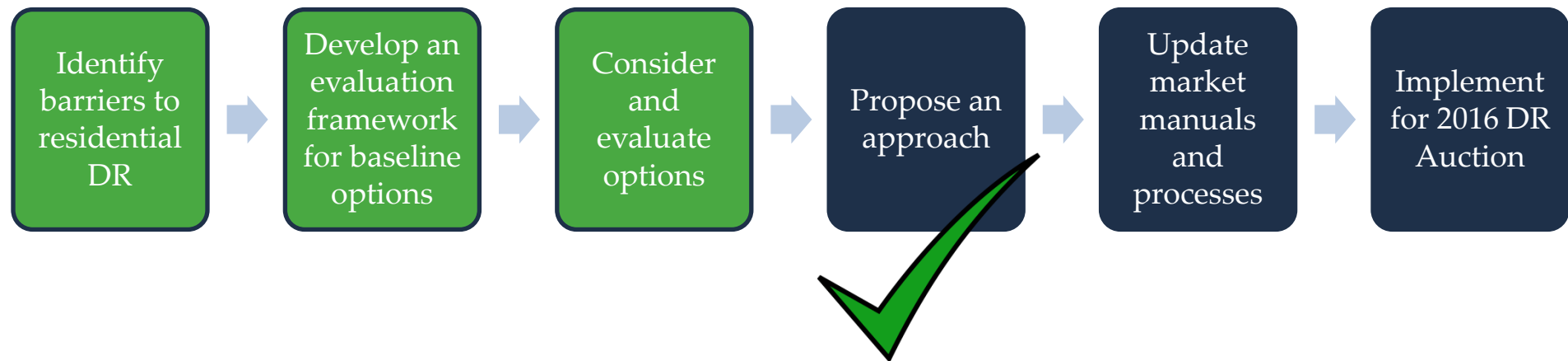
September 30, 2016

# Objective of a Residential DR Baseline

- To reduce unnecessary barriers for residential load to participate in demand response
- To measure with reasonable accuracy the delivery of demand response
- To balance administrative requirements of the design with the need to maintain auditability

# This year's goal

- Implement an alternative baseline methodology to include residential DR participation for the 2016 Demand Response Auction



# Stakeholder Feedback

- Distinct characteristics of residential customers must be considered (weather sensitivity, meter data, small contributors, dynamic populations)
- The standard historical baseline is an inaccurate reflection of consumption from residential load; an alternative is required
- Contributor enrollment, registration and access to meter data must be relatively simple
- IESO should investigate address operational matters (e.g. reports, minimum aggregation)

# Evaluation of Baseline Methodologies

- The IESO considered accuracy, robustness, feasibility and best practices for each methodology
  - Historical X of Y with in-day adjustment, statistical sampling, like-day matching, regression modeling, randomized control trials, custom baselines
  - A “firm service level” methodology, where a resource drops to a pre-determined consumption level, was not considered
    - This approach does not necessarily deliver demand response as the resource may already be consuming at or below its pre-determined service level.

# Options Considered

- Historical baseline with design changes (i.e. change to high X of Y and/or adjustment)
  - easy to understand and widely used for DR
  - significant data burden for dynamic population
  - accuracy for residential DR is still an issue, even with design changes
- Statistical sampling
  - accuracy for residential DR is acceptable
  - used when interval meter data not available for the entire population, but Ontario has smart meter data

# Options Considered

- Like-day matching
  - easy to understand, some other jurisdictions are using this option
  - accuracy for residential DR is still an issue and new tools would be required
- Regression modelling
  - accuracy for residential DR is acceptable
  - complex to understand, not widely used, brand new tools would be required

# Options Considered

- Custom baseline
  - accuracy for residential DR depends on the proposed approach
  - costly and burdensome to administer multiple different baselines
- Randomized control trials (RCT)
  - sufficient accuracy for residential load has been proven, and other jurisdictions are using or exploring this option
  - new tools are required for IESO implementation

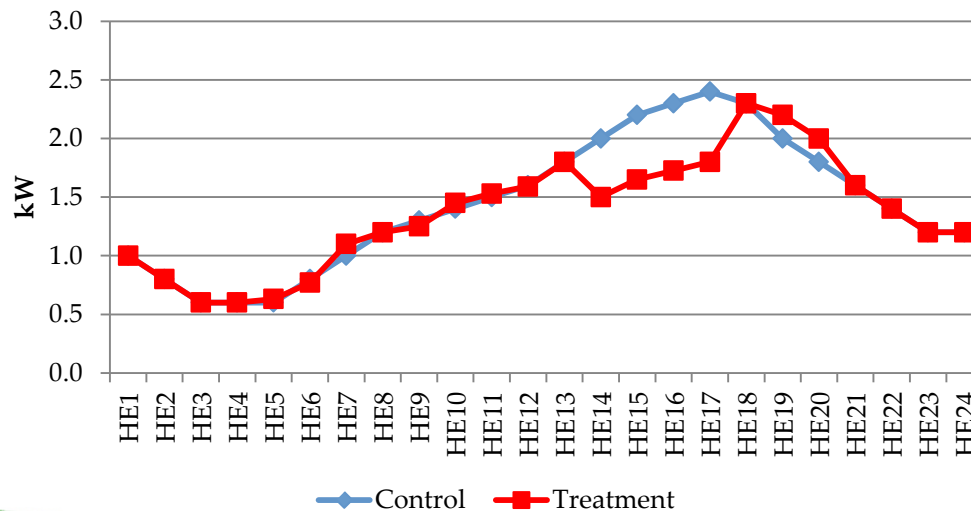


## Recommendation – RCT Baseline

- Delivers the required accuracy for M&V purposes
- Implementation for summer 2017 commitment period is feasible
- Can scale to larger volumes of residential DR participation
- Consistent with the methodologies used in other IESO programs and markets

# How Randomized Control Trials Work

- Two groups are established within a resource:
  - A “treatment” group which receives the DR standby and activation notices
  - A randomized “control” group which receives no notification and serves as a proxy for baseline consumption
- RCT evaluates the average consumption difference between the two groups to determine the amount of DR delivered



# RCT – Design Considerations and Impacts

- Determining the Control Group size
- Adjusting the Control Group consumption based on event day information
- Application of Settlement Charges
- Impacts to existing DR Auction processes
  - Pre-Auction and Auction activities
  - Registration
  - Contributor Management
  - Settlements

# Determining Control Group Size

- The size of the control group is key to the accuracy of the control group load as a reflection of what the treatment group would have done in the absence of an event
- **Stakeholder input** on the best methodology to determine the control group size is requested

# Measuring Performance using RCT

- In order to determine how much DR has been delivered, RCT must compare the behaviour of the control and treatment groups
- To evaluate how much DR was delivered, we propose to compare the average control group load to the average treatment group load on the event day, with a same-day adjustment

# Same-Day Adjustment

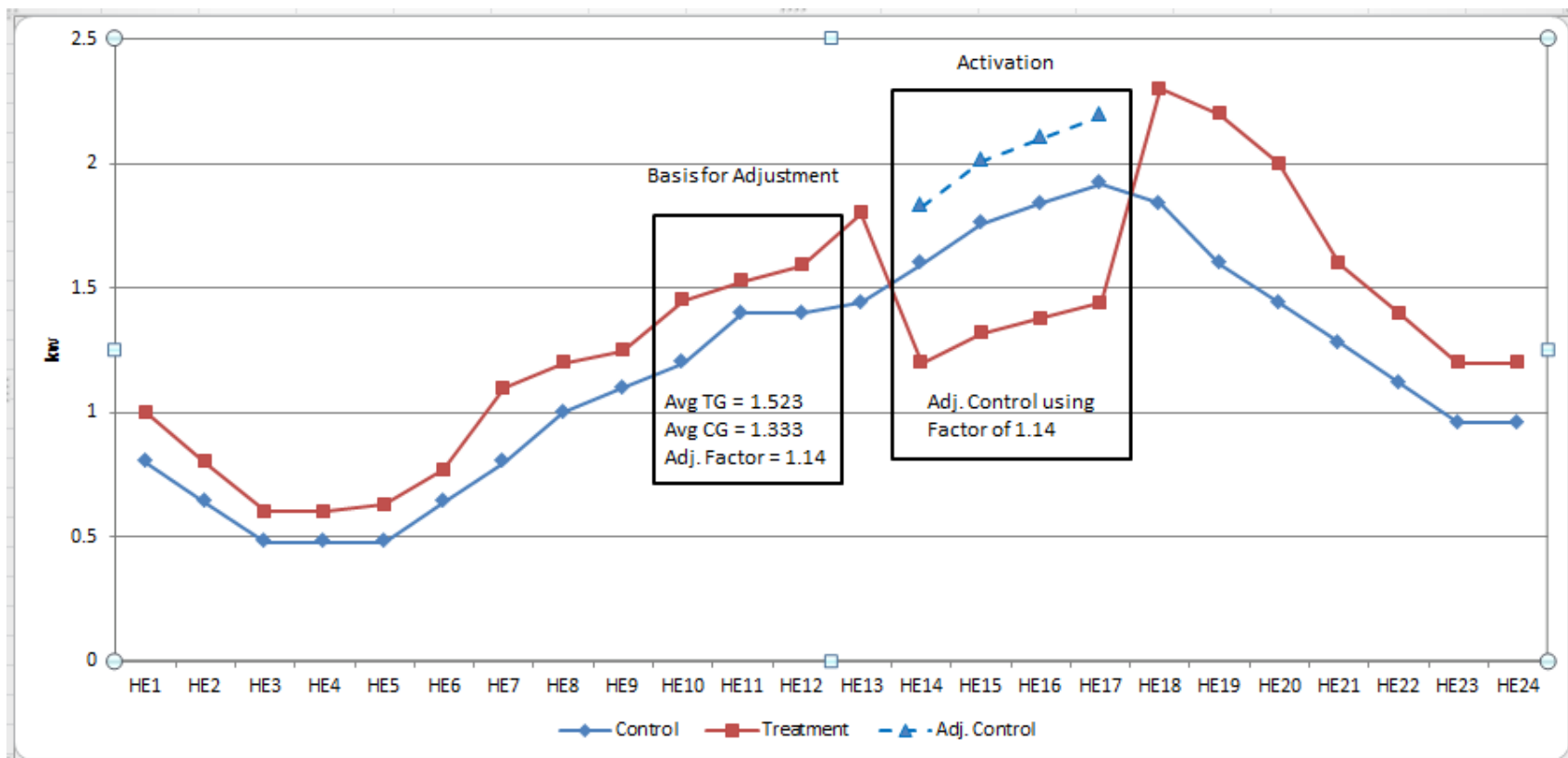
- Ideally, prior to activation, the control group's average load would perfectly align with the treatment group's average load, but there may be times where this is not the case
- A same-day adjustment will be applied to the control group load to equalize the control and treatment groups based on their respective loads in the 3 hours starting 4 hours before activation

$$\text{Adjustment Ratio} = \frac{\text{3 hour avg Treatment Group Load, 1 hour prior to dispatch}}{\text{3 hour avg Control Group load, 1 hour prior to dispatch}}$$

HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18
	Adjustment window				Activation Period				

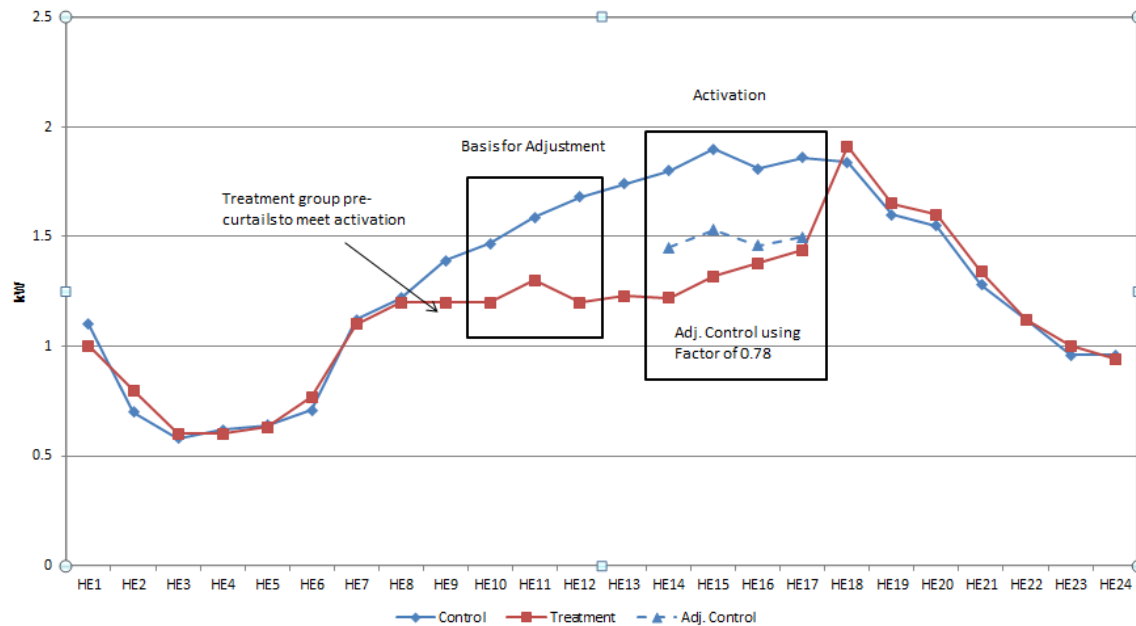
- The adjusted control group load = control group load X Adj. Ratio

# Example: RCT with adjusted Control Group



# Pre-curtailment

- If the treatment group pre-curtails its load earlier in the day due to an expected DR activation, this will be reflected in the adjustment factor





# Meter Data Requirements

- The IESO will accept meter data on an hourly granularity from residential smart meters
- On an event basis, Participant provides aggregated hourly meter data for all hours of the event day, separately for the control group and the treatment group
- The IESO continues to advance efforts to facilitate access to data from the Smart Metering data repository, but recognizes its limitations at this time
  - Access to this data likely will require direct partnership between participants and LDCs in order to provide the necessary meter data

# Future Considerations

- For December 2016 DR auction, only single family homes allowed (no multi-unit residential and/or sub-metered homes)
- The IESO may consider stratification of resources in the future (e.g. small, medium, large) to improve control group fidelity to treatment group
- The impact of net metered customers will not be considered in our processes at this time

# Impact to Existing DR Auction Requirements

1. Pre-Auction and Auction
2. Registration
3. Contributor management
4. Energy Market Participation
5. Settlement

# 1. Pre-Auction/Auction Requirements

The RDR resource will participate as an Hourly DR resource:

- Participant registers as DR Auction Participant
- Qualifies capacity quantity for each zone, provides a load reduction plan
  - Load reduction plan must indicate where DR is provided by residential load
- Pays a deposit based on qualified capacity prior to the auction
- Offer into auction represents DR capacity during availability window of commitment period

## 2. Registration

### Prior to Energy Market Participation:

- Registration of the resource is required
- 1MW minimum aggregated DR capacity per zone
- Residential resources must be registered separately from resources with C&I contributors
  - Must be registered as an Hourly DR resource
  - Separate residential resource registration allows for the application of appropriate baseline for each resource type

# 3. Contributor Management

Prior to the start of each month by a specified deadline, the Participant provides:

- Total number of contributors and average DR capacity per contributor (e.g. 8000 contributors, 2 MW)
- A detailed list of all contributors
  - List will identify the new control group for that month, which must be determined randomly using an approved tool
  - contributor address & premise/universal device ID, LDC name and acct #, effective start and end date
- Participant must retain contributor consent and participation agreements for audit purposes
  - Consent agreements must also grant permission to share meter data

## 4. Energy Market Participation

- Energy market bids are based on available DR capacity for that hour
  - Bids based on capacity from treatment group
  - Participant must communicate with contributors in the treatment group when standby and activation notice received from the IESO

## 5. Settlement payments and charges

### Payments:

- Availability payment is the same as for C&I resources, and is paid on a monthly basis

### Non-Performance Charges:

- Residential DR will be subject to availability, administration and capacity charges;
  - no dispatch charge, since 5-minute data is unavailable and compliance at that granularity is less relevant for residential DR
- The availability charge is applied if DR bids are not submitted in the energy market in hours of availability, same as for C&I resources
- Unique administration and capacity charges for RDR outlined on next slides



# Settlement - Administration Charge

- Contributor information for the next month must be received prior to the start of that month by a specified deadline
- Aggregated control group and treatment group meter data for each event must be submitted meet current timing requirements
  - 6 business days prior to the end of the month following the month in which the event occurred
  - Same opportunity to correct erroneous data
- An administration charge equal to the availability payment for the month will apply if these timelines are not met

# Settlement - Capacity Charge

- The capacity charge will be applied if, for the event:  
$$\text{Avg (Adjusted Control Group Load - Treatment Group Load)} < 80\% \times \text{Avg (Total Bid Quantity - Scheduled Quantity)}$$
- Capacity Charge is equal to the availability payment for the month
- Total capacity charge for the month is capped at the amount of the monthly availability payment
- Non-compliance is also flagged to the IESO's compliance department for possible investigation

## Next Steps

- IESO will continue to work with stakeholders to refine the design elements for post-Auction activities necessary for residential DR
- At the next DRWG, the IESO will provide information on:
  - Responses to stakeholder feedback
  - Revised Market Manual content
  - Timelines for implementation of Market Manual changes

# Feedback

- The IESO is seeking feedback on this proposal, including:
  - The methodology used to determine the control group size
- Please provide written feedback by October 14.
- To provide feedback, contact [engagement@ieso.ca](mailto:engagement@ieso.ca)