M&V for Residential DR in Energy and Capacity Markets

Demand Response Subcommittee

April 23, 2014

Timeline

- Problem statement endorsed at April MIC
- Issue charge endorsement at May MIC
- Expected duration
  - Manual changes only: 6 months
  - Tariff changes: 9 months before FERC filing

Evolution of residential Demand Response

- Past
  - Direct load control (DLC)
  - Legacy DLC using radio controlled switches, one way communication, no AMI
  - All programs run by EDC
- Future
  - DLC (adaptive algorithm), thermostat controlled, behavioral programs
  - AMI
  - LSE and third party CSP participation
  - Dynamic management of customers that should be cycled

Measurement and verification (M&V) for residential DR today

- Interval metered
  - M&V based on actual meter data
  - Must pass CBL test (like non-residential DR)
- Non-interval metered
  - M&V based on load research study using historic data
    - Deemed savings report – available for all PJM members
    - Load research study submitted by CSP
  - Switch operability study
- Interval metered sample
  - M&V based on actual meter data from a sample of customers

Registration process

- Determine type of metering for resource
- Transition issues
- Registration process determined by type of metering, M&V

- **Direct-load control**: Refers to the technology, *not* the M&V method.
- **Non Interval Metered DLC:** Refers to M&V method
- **Enrolled Customers**: Customers who are part of the CSP DLC program, who the CSP has the right to cycle, regardless of whether these customers are registered with PJM.
- **Registered Customers**: Customers that the CSP has registered with PJM in eLRS.

Interval metered registration process

- PJM is indifferent to type of technology
- Load Management: Choose FSL or GLD
  - **Issue:** Reductions only count below PLC. Residential PLCs are sometimes class averages.
- Economic Energy: Qualify for CBL
  - Submit 60 days of aggregated meter data, RRMSE < 20%
- Meter Data Submission:
  - Aggregate data for all enrolled customers, scale to registered customers

Non-interval metered DLC registration process

- Type of technology is important – must be DLC
- Qualification: legacy, radio-controlled program
- Load management & Economic:
  - Choose non-interval metered DLC for capacity and energy
  - Determine per participant impact via deemed savings report or load research
  - Determine switch operability
  - Managed load:

    (per participant impact)X(switch operability)X(# customers)

Non-interval metered registration process 2

- Deemed savings
  - Per-participant impact chosen from matrices based on several variables
    - Cycling strategy (27%, 43%, 50%...)
    - AC size (connected load or seasonal usage)
    - WTHI – determined by PJM based on historic peak temperature.
    - Time of day – 15 minutes ending at 5pm

Non-interval metered registration process 3

- Load research
  - Must include per-participant impact by hour for HE13-HE20, range of local weather conditions, cycling level, program, zone
  - Adequate sample size for 90% confidence, 20% error
  - Sample is randomly selected and stratified appropriately
  - Study methodology is reasonable and unbiased
    - **Issue:** Inconsistent study methodology
  - Per-participant impact selected from matrix

Non-interval metered registration process 4

- Switch operability
  - Default value = 50%
  - Every 5 years
  - Sample selection (random, stratified, etc.)
  - Sample size – 90% confidence, 10% error
  - Study methodology

Non-interval metered settlement/compliance process

- Compliance – based on start and stop time of signal
- Energy settlement (load management & economic) – use actual hours and temperatures for per participant impact from matrix

Interval metered sample registration process

- Load management:
  - GLD or FSL
  - Switch operability study if necessary
  - M&V plan – sampling methodology, how meter data will be aggregated and scaled
- Economic:
  - Must qualify for CBL
- Compliance & Settlement:
  - Sampled real-time meter data is scaled to number of customers on registration, then same as interval metered

- Tariff and Manual references

- Tariff
  - Non-hourly metered customer pilot
  - Direct Load Control (DLC) – … DLC programs are qualified based on load research and customer subscription data. Providers may rely on the results of load research studies identified in the PJM Manuals to set the per-participant load reduction for DLC programs.
  - Compliance for Direct Load Control programs will consider only the transmission of the control signal.

- Manual 19 Appendix B
  - Load Management Providers with Direct Load Control programs which employ a radio signal may elect to utilize the base per-participant impacts contained in the “Deemed Savings Estimates for Legacy Air Conditioning and Water Heating Direct Load Control Programs in PJM Region” report.