Cataloguing Available End-Use and Efficiency Measure Load Data

prepared by KEMA for the Northwest Power and Conservation Council and Northeast Efficiency Partnerships
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This study was commissioned jointly by sponsors of two regional organizations, in response to a widespread interest in updating end-use load data. It represents a first step – "Phase 1" – toward a goal shared by the east and northwest (the Regions) of developing a coherent method of warehousing, distributing, and updating end-use and efficiency measure load data for the regions to eventually have a full array of data for all end-uses and efficiency measures.

One of the final products for this study is a spreadsheet "catalog" identifying recently completed existing end-use and load shape data studies that may be useful to the Regions.

In addition, the report summarizes results of the various activities in the study. It contains:
- Overview of the approach to identifying usable end use load datasets and the results of the data collection effort (Chapter 3)
- Summary of needs of users of end-use load shape data by ee planners, capacity market operators, and air quality analysts (Chapter 4)
- Metrics for determining usability of end-use load datasets and review of issues related to transferring data between regions (Chapter 5)
- Synopses of studies that were classified as "usable" and review of gaps in available data (Chapter 6)
- A high level prioritization scheme for load shape improvements for each region (Chapter 7)
- Road map for coordinating future end-use data efforts (Chapter 8)
- Recommendations for near-, mid- and long-term load shape improvement efforts (Chapter 9)

Findings:
- 37 of 110 studies that were identified and examined in the study are "potentially useful;" 9 studies are ongoing. Most "meet planning requirements and are usable in compilation studies" by other program administrators. That said, some challenges to transferring data exist, including significant differences in the data priorities among program administrators, and difficulties assessing how transferable the data is for populations not directly represented by the research efforts. The sources of the potentially useful studies are:
    - 6 from Northwest
    - 18 from Northeast
    - 5 from Mid Atlantic
    - 10 from California
- The following "high level" data gaps in the East were identified:
    - 7 of 13 residential end use groups have no coverage at all by studies in this region
    - 10 of 22 C&I groups have no coverage at all by studies in this region
- One important caveat KEMA notes is that findings and recommendations were provided at a high level from a region-wide perspective. Due to limitations that were not possible to capture in this study, including diverse data needs among all program

administrators, and specific program administrators may have different priorities for data collection from what was identified.

Near Term Recommendations (12 months)
- Base short term plans on goal of meeting immediate needs of capacity markets
- Take steps to support a large coordinated multiregional effort to collect end-use data that is broadly usable and transferable
- Coordinate with metering studies currently in progress
- Implement new metering studies targeted at specific end-use analysis groups
- Pilot the transfer of end use data from one region to another
- Develop a multi-regional or national detailed protocol for metering study data collection to facilitate leveraging of data from existing studies

Mid Term Recommendations (1-3 years)
- Implement multi-region end-use repository
- Plan for other study types (non-metering studies)
- Assess feasibility of disaggregating end use information from Advanced Metering/Smart meter (AMI) whole premise data

Long Term Recommendations (>3 years)
- Continue to maintain and update the catalog of end use data

Recommendations for End-Use and Measure Shape Improvement Strategies for the East

Table 1: End-Use and Measure Shape Improvement Strategies (East Residential)

(*Option 1*: Regional Meta-study, *Option 2*: Trans-Regional Meta-study, *Option 3*: DOE2/Modeling, *Option 4*: New Metering, *Option 5*: Do Nothing)

Residential Analysis Groups	Near Term Action	Description
Tier 1 Importance		
Lighting - Interior	Option 1	There have been a number of high quality lighting studies completed in the Eastern Region. In particular, the region is recommended to utilize the SPWG Lighting Coincidence Factor Study.
HVAC - Cooling	Option 1/4	Compile results from the UI and CL&P 2005 Coincidence Factor Study (B), NGrid Residential Room AC Impact Study (B), and NSTAR/NGrid/UI/CL&P CAC Regional Evaluation (B) and conduct new metering.
HVAC - Heating	Option 1/4	Compile results from MACT Ductless heat pump study and conduct new metering.
Plug Load (Electronics)	Option 2/4	Utilize LBNL/Ecos CA Residential Plug Load Study and SCE/PG&E Residential End Use Load Research study. Otherwise, conduct new metering.
Tier 2 Importance		

Domestic Hot Water	Option 1/2	Utilize data from the UI Water Heater Controller Study, NYLE Heat Pump Water Heater Evaluation Study and leverage data from other regions such as the Mid-Atlantic (e.g. BGE Residential Water Heater Evaluation studies).
Lighting - Exterior	Option 1/2	Compile data from the SPWG Lighting Coincidence Factor and NU/CL&P CFL Markdown Impact study, and consider bringing in data from other regions (e.g. DEER) since the end use analysis group has a "high" transferability rating.
Appliances - Laundry	Option 2/4	Consider leveraging publicly data from other regions, such as DEER, or conduct new metering studies.
Appliances - Refrigerators	Option 1/2	Compile data from the Efficiency Maine Low Income Appliance Impact Study and consider leveraging data from other regions, such as DEER, or BC Hydro Power Smart Res End Use Study (IP).
Tier 3 Importance		
HVAC - Fan Energy	Option 4	Since no data was found, and end use group transferability is low, new metering is recommended.
Pool Pump	Option 5	Leverage BC Hydro Power Smart Res End-Use Study (IP) should it become available.
HVAC - Other	Option 3/4	Since no data was found, DOE modeling or new metering is recommended.
HVAC-Ventilation Only	Option 4/5	Since no studies were found, new metering is recommended, or no action, as the measure is considered low importance.
Appliances - Kitchen	Option 2/4	Due to high transferability, first consider leveraging data from other regions, such as simply utilizing DEER load shapes, or conduct new metering studies.

Table 2: End-Use and Measure Shape Improvement Strategies (East Non-Residential)

(*Option 1*: Regional Meta-study, *Option 2*: Trans-Regional Meta-study, *Option 3*: DOE2/Modeling, *Option 4*: New Metering, *Option 5*: Do Nothing)

Non-Residential Analysis Groups	Near Term Action	Description
Tier 1 Importance		
Lighting - Interior	Option 1/2	There have been a number of high quality lighting studies completed in the Eastern Region. In particular, the region is recommended to utilize the SPWG Lighting Coincidence Factor Study.
HVAC - Cooling	Option 1/4	Compile results of UI/CL&P 2005 Coincidence Factor Study, NGrid Small C&I Unitary HVAC Pilot Impact Study, NSTAR BSCS Non-Lighting M&V Impact Study and NSTAR CS Impact Study and conduct new metering.

Lighting - Exterior	Option 1/2/4	Compile results of UI/CL&P 2005 Lighting Coincidence Factor Study, NSTAR BSCS Impact Study and NSTAR CS Custom Impact Study and perhaps conduct some new metering.
HVAC - Fan Energy	Option 1/4	Compile UI/CL&P 2005 Coincidence Factor Study and conduct new metering
Plug Load (Electronics)	Option 4	No studies were found related to non-residential plug load. New metering is recommended.
HVAC - Heating	Option 1/4	Compile UI/CL&P 2005 Coincidence Factor Study and conduct new metering
Motors - Drives	Option 1/2/4	Compile data from UI/CL&P 2005 Coincidence Factor Study, CL&P Municipal Impact Study, NSTAR BSCS Non-Lighting M&V Impact Study, NSTAR C&I Retrofit Impact Study and conduct new metering.
Refrigeration	Option 1/4	Compile results from a number of studies that are available, including NSTAR BSCS Impact Studies, NSTAR SBS Impact Study, NSTAR CS Impact Study, NSTAR C&I Impact Study and NGrid SBS Customer Impact.
Tier 2 Importance		
Industrial - Process	Option 1/2/4	Compile data from NSTAR BSCS Non-Lighting Impact Study, NSTAR BSCS Impact Study, NSTAR C&I Retrofit Study and NSTAR C&I New Construction Retrofit Study.
Data Center Cooling	Option 4	No studies were found related to data center cooling. New metering is recommended.
HVAC - Other	Option 1/4	Compile results of NSTAR BSCS Non-Lighting M&V Impact Study, NSTAR C&I Retrofit Impact Study, and NGrid Custom HVAC Impact Study, and conduct new metering.
HVAC-Ventilation (Only)	Option 4	Since no studies were found, DOE modeling or new metering is recommended.
HVAC-Reheat	Option 4	Since no studies were found, DOE modeling or new metering is recommended.
Water Heating	Option 3/4	Since no non-residential water heating studies were found, DOE modeling or new metering is recommended.
Pump	Option 3/4	No studies found. DOE modeling or new metering recommended.
Compressed Air	Option 1/2/4	Compile results of NSTAR studies: BSCS Non-Lighting M&V Impact Study, CS Impact Study, C&I Retrofit Study, C&I New Construction Retrofit Impact Study, and conduct new metering.
Data Center Equipment	Option 4	No studies found. New metering recommended.
Tier 3 Importance		

Agricultural - Pumping	Option 5	
Appliances - Laundry	Option 5	
Food Service Equipment	Option 5	Due to minimal contributions to efficiency program savings, no action is recommended at this time.
Agricultural - Process	Option 5	
Clean Room	Option 5	