Supplemental Project Notice

SPACE CONDITIONING DISCOVERY, ENERGY DISAGGREGATION FOR ELECTRIFICATION PLANNING AND ANALYSIS

Electrification planning and analysis

PROJECT HIGHLIGHTS

- Detect homes/buildings with and without electric space heating/cooling using automated real-time analytics.
- Characterize baseline space heating/cooling footprint, energy profiles, and coincident system peak impacts.
- Develop space heating/cooling energy profiles (8760) for each AMI customer and aggregations by pre-defined criteria.
- Project insights beneficial for applications such as determining space conditioning energy baseline, electrification potential, electrification targeting, selection of demand flexible technology such as variable speed heat pumps, and customer and system impacts.

Background, Objectives, and New Learnings

Electrification is a key pathway to meet regional decarbonization targets while providing customer and grid benefits. However, a key gap in enabling streamlined electrification is the lack of utility data models and tools that aid planning and analyses.

This project seeks to address this gap by providing new learning regarding time-differentiated end-use energy profiles disaggregated from premise-level usage (AMI) data for decision support and assistance in utility planning and prioritization of electrification deployments. The current project focus is space conditioning (space heating and cooling) disaggregation for single-family residential and small commercial customers served by a utility. Subsequent phases are envisioned involving other large end-uses such as EVs, water heating, cooking, etc.

Key project objectives include:

- Develop a method for discovering electric and non-electric space conditioning in single-family residential homes and small commercial buildings (< 15,000 kWh/year).
- Develop end-use energy consumption and energy profiles (8760S) for each premise.
- Characterize electric usage footprint and electrification potential for individual and aggregated premise types.

Benefits

The energy profiles and other data-driven insights from this project can bring about potential benefits through their usefulness in:

- Determining electrification potential and the best-fit technology to meet strategic objectives (flexible demand, location, feeder loading, customer cost, other).
- Forecasting end-use energy consumption and profiles for short-term and long-term planning, rate analysis, and regulatory filings.
- Analyzing ‘what-if’ scenarios for computing distribution impacts such as at various levels of space heating/cooling electrification adoption, during winter/summer weather extremes, etc.

Project Approach and Summary

Kick-off Meeting: EPRI plans to conduct an in-person or virtual kick-off meeting, a key goal of which will be to ensure all parties are made aware of the scope of the data required and the logistics of the data transfer processes that enable EPRI to govern and manage the data responsibly.

Data Assessment and Transfer: EPRI plans to coordinate with the utility collaborator team to assess the scope/availability of residential single-family and/or small commercial buildings (<15,000 kWh/year) AMI data. Up to a total of 35,000 customers' AMI data for 24 historical months and zip code data is required. Metadata such as load saturation survey information, aggregation identifiers, and end-use metered data, if available, will be collected for model calibration, result validation, and energy profile presentation. Utility collaborators are expected to transfer anonymized data (without personally identifiable information) to EPRI.

Model Calibration and Validation (Space Conditioning Energy Disaggregation): EPRI plans to calibrate the model with usage data (AMI) along with metadata/ information. If space heating/cooling end-use metered data is not available, the calibrated model estimated results will be compared with climate zone-specific field/pilot project data available to EPRI from prior studies.

Space Heating, Cooling Disaggregation Energy Profiles: EPRI plans to generate model results including aggregate and resolute end-use energy profiles, such as aggregate profiles for homes with and without electric strip heat. The resolute analysis is expected to include space heating and cooling consumption (kWh) by day, month, and season for each home. The energy profiles are presented by time domain distinctions such as average weekday, average weekend, user-selected (system peak) day(s), and average season (summer, winter, shoulder). Data results are formatted in Excel files.

Data Results Tool: EPRI plans to develop a standalone tool (such as Excel macro-enabled, pivot table, etc.) that can be stored locally on the project members' computers to query, aggregate, sort/filter, and plot disaggregated energy profiles.

Deliverables

- Utility-specific report – The EPRI team will summarize and present the results and insights derived from the study (PPT format).
- Utility-specific data result files – Multiple data result files with each resolute space heating/cooling energy profiles.
- Data Results Tool – An Excel tool to query, aggregate, sort, and plot end-use energy profiles.

Price of Project

Option A: $80,000 per project member. Includes results for space heating/cooling discovery and energy disaggregation.

Option B: $100,000 per project member. Includes Option A results plus space heating/cooling energy forecasting.

Option C: $125,000 per project member. Includes Option B results plus analyses for two "what-if" scenarios.

This project qualifies for Self-Directed Funding (SDF). Funding can be distributed across two calendar years.

Project Status and Schedule

The project will commence after two member agreements have been completed. The project is planned to be completed within 12 months of data receipt from both members.

Who Should Join

Utilities seeking strategic heat pump electrification deployments and use cases to maximize system and customer benefits.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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