EMI CONSULTING

2020 HVAC Controls Calibration Study

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RESEARCH PLAN



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1. RESEARCH OVERVIEW

This research plan presents an overview of the methods and processes by which the EMI Consulting team will gather data and estimate savings from commercial and industrial (C&I) HVAC controls measures delivered through Consumers Energy's and DTE's Energy Waste Reduction portfolios to inform updates to the deemed savings values included in the Michigan Energy Measures Database (MEMD). This study is important to the success of the programs as HVAC Controls measures constitute a substantial portion of recent and planned program savings.

This research will begin in July 2020 and will be completed by the end of December 2020.

1.1 MEMD Overview

The MEMD was developed by Morgan Marketing Partners (MMP) as the basis for the initial energy efficiency potential estimates in the Energy Optimization (EO) Plan, the predecessor to the EWR Plans. Michigan's EWR Program administrators now use the MEMD for the development and update of their EWR program plans as well as for the calculations of the gross energy and demand savings achieved in each program year for included measures. Among other things, the MEMD specifies the per-unit energy (kWh, MCF) and demand (kW) impact estimates of each measure in the database. The per-unit impacts of MEMD measures are stipulated, or "deemed" until there is consensus among parties that a revision to the MEMD is warranted.[1]

The purpose of this study is to develop updated savings and demand estimates for C&I HVAC Controls measures for the State of Michigan to validate and/or calibrate the MEMD to more accurately reflect local operating conditions. This study focuses on savings from C&I HVAC controls, as these measure contribute substantial savings to Consumers Energy and DTE's portfolios and current estimates in the MEMD lack Michigan-specific information. For example, HVAC controls measures constituted roughly 20% of DTE's 2018 gas savings and 25% of Consumers Energy's 2020 gas plan, but due to estimates that lack Michigan operation conditions, the uncertainty in these estimated savings is high.

1.3 Past Calibration Research Activities

Two previous calibration studies have looked at some element of HVAC controls. Navigant (now Guidehouse) conducted a C&I Programmable Thermostat Billing Analysis study in 2014 and 2015 and EMI Consulting conducted a Building Energy Management System Market Study in 2015 through 2017. The Building Energy Management System Market Study analyzed the technology and then market potential, but did not include any primary collection of Michigan-specific operating conditions for HVAC controls in general or EMS systems in particular.

[1] "*Parties*" refers to the collective membership of either the Program Design and Implementation Collaborative or the Evaluation Collaborative, under the auspices of the Michigan Public Service Commission.

1.4 2020 Research Objectives and Summary of Methods

The overall objectives of the 2020 HVAC Controls Calibration Research will be to estimate energy (kWh and MCF/therm) savings and peak demand (kW) reductions for key HVAC controls measures in Consumers Energy and DTE's EWR portfolios.

Specific research questions for this project include:

- What are appropriate deemed kWh, therm, and kW savings values for key HVAC control measures?
- [If there is sufficient variation and sample size across weather zones] How do the savings vary across Michigan weather zones?
- [If there is sufficient variation and sample size across building types] How do savings vary across building types?

For this 2020 research, the EMI Consulting team will conduct billing analysis of both electric and gas consumption for Consumers Energy and DTE program participants who have installed key HVAC controls measures.

The research team will use the program tracking data to identify participants who have installed HVAC control measures and participation dates, and request advanced metering infrastructure (AMI) electric and gas meter data for participants and any potential comparison group customers. A more detailed discussion of research activities is discussed in the next section.

MEMD Measures Affected

The research team will be using the first phase of the research to identify key HVAC control measures based on combined program volume and the availability of advanced metering infrastructure (AMI) data.

2. RESEARCH PHASES AND TASKS

This section outlines the proposed tasks and activities for this project. The 2020 HVAC Controls Calibration Research will consist of the following tasks:

- Research Planning
- Billing Analysis
- Reporting

Specific details of each phase are described below.

Task 1 - Research Planning

The objective of the Research Planning task is to identify the key HVAC Controls measures to include in the billing analysis and selection of methods. The outcome of this task is an internal analysis plan and data requests to Consumers Energy and DTE. We plan to share the analysis plan with Consumers Energy and DTE to ensure the research is effectively meeting the needs of the utilities, but not conduct a formal review process. This document will be updated as new research objectives or research questions are established.

As part of preparing the data requests, we will meet with the data teams at Consumers Energy and DTE to ensure the data requests are clear and meet internal guidelines. The research team has already received program data from Consumers Energy due to reoccurring data transfers from previous work.

The deliverables for Research Planning phase will include:

- Program data request to DTE (timeframe - August 2020)
- Meter data requests to DTE and Consumers Energy: (timeframe - August 2020)

Figure 3-1 at the end of this document provides a visual depiction of this timeline along with all other research activities.

Task 2 - Billing Analysis

The research team plans to conduct billing analyses of electric and gas meter data to estimate savings and demand reduction from key HVAC controls measures. The exact methods taken to conduct these billing analyses will depend on the methods determined as part of the research planning in Phase 1. The general process of a billing analysis involves the following steps:

- Identifying participants and the timing of participation,
- Cleaning meter reading data and aligning time stamps,
- Identifying comparison groups accounts (as appropriate),
- Estimating reduced energy consumption due to HVAC controls,
- Normalizing the results for typical weather, and
- Estimating uncertainty in results.

Outcomes of this task will be savings estimations and peak demand reductions due to key HVAC controls measures, which may be stratified by weather zone and building type based on available data and sample sizes. These results will summarized in a report in Task 3 of the research.

Task 3 - Reporting

Outcomes of this task will be energy savings (kWh and therm) and demand reductions (kW) estimates, a presentation of results, and draft and final reports.

The deliverables of this task will include:

- Presentation of results: December 2020
- Draft report: December 2020
- Final report: March 2021

Figure 3-1, located at the end of this document, provides a visual depiction of this timeline along with all other research activities.

3. SCHEDULE

This research will begin in June 2020 and end by December 2020.
Figure **3-1** shows the overall schedule for this research and detailed due dates for key deliverables for this research. It is important to note that all deadlines are contingent on receiving Consumers Energy data files by the requested date, as well as receiving feedback on data collection instruments from Consumers Energy within two weeks of delivery.

Figure 3-1: Research Schedule