



To: Energy Efficiency Board

From: Kim Oswald, on Behalf of the EEB Evaluation Committee

Date: December 12, 2011

RE: Evaluation Committee Status Report – for November Meeting

STUDY SUMMARY

Study	Selection Date	Contract Date ¹	P.O. Date	Final Report Filed	Notes
CL&P HERS Pilot – Impact, Process and Persistence	10/28/2010	01/10/2011			Initial billing analysis complete; 2 nd Survey to begin soon. Need to get Company contact information
UI HERS Pilot – Market Acceptance	01/13/2011	06/13/2011			Initial survey complete; analysis underway; Focus groups complete; analysis forthcoming
Res New Construction Baseline	02/03/2011	CL&P 03/09/2011 UI 08/12/2011			All site visits complete, analysis underway. Report expected early February.
ECB Impact and Process	04/16/2010	05/12/2010		08/15/2011	Presentation in November. Project complete.
RCx/O&M/BSC Impact	12/21/2010	CL&P 03/09/2011 UI 03/30/2011			Summer fieldwork for RCx complete, O&M and BSC on-site and customer research nearly complete. Winter fieldwork beginning
EISA Focus Groups	08/17/2011	09/22/2011		Draft 10/10/2011	Complete. Filed November 28
EISA Market Impacts	07/01/2011	12/08/2011			Draft Workplan Complete
Residential Measure Life and Persistence	07/01/2011	12/08/2011			Workplan development underway
Residential Lighting Saturation	07/01/2011	12/08/2011			Workplan draft complete
Efficiency Opportunities in Multi-family	07/01/2011	12/08/2011			
Ground Source Heat Pump	07/01/2011	12/08/2011			Workplan in Development
Early Replacement of Gas Water Heater with On-Demand Units	07/01/2011	12/08/2011			

¹ Contract delays result from multiple issues including contractor review of newly instituted Terms & Conditions from both Companies in Spring of 2011, general inertia by both Contractors and Companies, and Company inaction

Study	Selection Date	Contract Date ¹	P.O. Date	Final Report Filed	Notes
Early Replacement of Electric Resistance Water Heater with HPWH	07/01/2011	12/08/2011			
Assessment of PSD	08/19/2011	12/08/2011			Workplan Complete. Waiting for Contract
Free Rider/Spillover in C&I Programs	08/19/2011	12/09/2011			Workplan Complete. Waiting for Contract
Remaining Opportunities in C&I Lighting	08/19/2011	12/09/2011			Workplan in Development
SBEA Impact	07/31/2011	Pending			Workplan in Development - waiting program measure information

DPUC COMPLIANCE ISSUES - COMPLETE

In Docket 10-10-03, the Departments made several evaluation-related orders.

- Develop data collection needs with ISE by 3/15. Complete.
- Develop written protocols for evaluation. Complete
- Provide a study using billing analysis and reconcile to engineering-based study.

CURRENT RESIDENTIAL STUDIES – NOT IN RESEARCH AREAS

RESIDENTIAL BEHAVIORAL PILOT PROGRAM (HERs)

CL&P PROJECT, CONTINUED FROM 2010 \$252,700
 UI, STARTING IN 2011 \$ 78,030

Both of these studies suffered significant contracting and/or program initiation delays that require the studies to continue beyond their original completion dates.

CL&P

For this study, the goals are to determine:

- Savings that accrue to customers over the course of the pilot
- What actions customers take to achieve those savings
- Types of messages and ways of communicating those messages that are most likely to result in significant savings
- Whether customers continue social marketing after they are no longer reminded to do so
- Extent customers maintain program-induced savings after mailing cease

Data collection has been very challenging for this study. At this point, however, the system for transfer of data between NMR and CL&P is working flawlessly. The initial participant identification data were provided in late February and billing data at the end of March and again at the end of June. After reporting little progress in accessing data from OPower, agreements were signed and initial data provided on August 12. Some data were found to be missing, but have now been provided. The initial impact results for the Spring and Summer

quarters are completed and the report is due November 11. Persistence Assessment began in October with initial analysis in January 2012 and completion at least 6 months later.

UNITED ILLUMINATING

The original expectation was for a single evaluation of both UI and CL&P's programs. However, UI decided to pursue a different model for their Pilot. UI's main evaluation goals are to determine:

- What messages and message delivery vehicles, alone and in combination, are most effective in producing energy efficiency actions among participants? Ease of access and use of the web interface;
- Changes in knowledge, attitudes, and reported actions among program participants. Barriers to taking additional (more substantial) energy efficiency behaviors? The extent to which participation in the Pilot induces participation in other CEEF programs
- Participant satisfaction with the overall program and specific aspects of the program
- Frequency and reasons for program drop-outs, including passive dropouts

NMR provided the work plan for this less complex study on January 12 and UI approved going forward with it on January 13th. After receipt of a Purchase order late in March, a kick-off meeting was held on April 6th. However, after receipt of the P.O., UI provided new Terms and a Professional Services Agreement that delayed development of a firm Contract.

The countersigned contract was provided on June 13 – the new evaluation start date. The late start required some change in focus since participating customers are no longer new to the program. Instead of completing a baseline efficiency profile, an initial participant survey examined customer perceptions of the usefulness of the Home Energy Reports, customer-reported actions taken as a result of suggestions in the reports and customer suggestions.

Survey analysis is complete. Focus group is complete; they were held December 6 and 7th. Results of the focus groups are currently being analyzed and a memo regarding conclusions from the activity will be provided prior to the end of the year.

While the study was originally expected to be completed before the end of 2011, initial contract delays brought several important, customer-oriented tasks into the holiday season resulting in an expected completion date of March of 2012.

RESIDENTIAL NEW CONSTRUCTION BASELINE \$209,800

The Residential New Construction Baseline project is being completed in cooperation with an effort begun in Massachusetts. While there are many common tasks across the various groups, each entity is able to select those activities important to their states. CT is focusing on an assessment of the extent to which:

- New residential construction meets current building codes;
- Customers seek out opportunities to select efficient systems; and
- Whether builders are making those opportunities available.

MA selected a team made up of KEMA and NMR to conduct this study and the EEB Evaluation Committee concurred with this recommendation. The CT Scope of Work was developed and accepted on February 3rd. Since CT was able to establish our study parameters more quickly than other states involved, Connecticut was set to begin prior to other the states. However while UI had first requested that this study be moved up to be complete in time for the 2011 filing, UI's contracts were not complete until August 12. Therefore, NMR has just recently started scheduling and conducting site visits to houses in the UI service area. We will be able to capture some results no matter when on-sites are completed; however, air conditioning

testing can only be done when temperatures are at least in the mid-60's with some additional exceptions where higher minimum temperatures are required.

Inspection and measurement at non-program, newly-constructed homes are now complete. NMR is now analyzing the data to determine a reasonable baseline for new construction in Connecticut. The draft report is expected prior to the end of November.

CURRENT COMMERCIAL/INDUSTRIAL STUDIES – NOT IN RESEARCH AREAS

ENERGY CONSCIOUS BLUEPRINT IMPACT AND PROCESS STUDY \$645,000

Global Energy Partners, LLC (with their subcontractor, Lime Energy) was chosen to complete the study the ECB study. In order to quantify the benefits of efficient measures installed in C&I facilities through the ECB program. The program benefits include avoided capacity costs resulting from reduced electric demand during peak hours and avoided energy costs resulting from energy savings during seasonal and on/off-peak periods. In addition to the impact study, changes in the program and in the market made plain the need for a process evaluation that will examine customer benefits realized, comprehensiveness and depth of installations made with and beyond program incentives and effects of individual measures on program performance.

An initial draft of the summer temperature-sensitive measures was supplied as scheduled in December. A Draft Final report was provided on May 20 and was sent to the Companies and the EEB C&I Technical Consultant on the 21st. However, a miscommunication between CL&P and GEP resulted in some important data not reaching GEP. For that reason, additional analysis was required and for which CL&P added \$7,500 to the GEP budget. The EEB Executive Secretary filed the final ECB report on August 15. Final presentation was held November 8. The project is now COMPLETE.

IMPACT EVALUATION OF THE RETRO-COMMISSIONING/O&M SERVICES PROGRAM – BSC INITIAL ASSESSMENT \$375,000

Michaels Energy has been retained to conduct this impact evaluation. The study will provide savings data in order to quantify the savings benefits of efficient measures and processes developed in commercial and industrial (C&I) facilities through the RCx/O&M Services (O&M) programs. The benefits include avoided capacity and energy costs resulting from energy savings during seasonal and on/off-peak periods. In addition, because operations adjustments may not be maintained, persistence is a particular concern for this study. Beyond the impacts of the current program, it is hoped that this study can inform the evolution of the program through the Business Sustainability Challenge.

For the Business Sustainability Challenge, this project will examine the impacts made and the needs that corporations have to develop a culture of efficiency improvements. The study will use interview approaches to determine the extent to which participants have established attributes and practices that provide for culture change and long-run savings. The extent to which participating companies have established savings metrics and completed benchmark analysis is an important component of the study

There have been several project delays. Contracting issues led to a late start to the project, delaying winter seasonal data collection until 2011-2012. Data issues also resulted in some delays, although these delays were anticipated to varying extents. For CL&P in particular, program data are maintained in paper files. So the Contractor came to CT and scanned the individual files for analysis. Additional project files for several CL&P sites could not be located. Because of the lost files, Michaels has had to alter the sample plan to assure statistically valid results. The new sample plan was delivered July 5. To date, UI has submitted available data for most projects in their O&M program. UI's RCx data are complete.

After the initial delays, Michaels has completed field work for all RCx sites through the summer season. Additional metering will be required for the upcoming winter season and will continue throughout the winter.

The UI O&M Services sites are being metered, CL&P sites are awaiting additional data from CL&P files.

Business Sustainability Challenge interviews are being conducted. Michaels expects that they will need to interview several individuals in each firm.

RESEARCH AREA STUDIES

Descriptions of projects initiated and anticipated under each Research Area are provided below. Please note that, until Scopes of Work are complete, study costs cannot be established. Therefore cost figures are only supplied when known.

RESIDENTIAL RETROFIT AND RETAIL PRODUCTS/RESIDENTIAL NEW CONSTRUCTION AND EMERGING MEASURES RESEARCH AREAS

These two residential research areas have been combined for convenience because a single lead contractor was selected for both areas. The NMR Team (NMR Group, KEMA, Cadmus Group and Tetra Tech for Res Retrofit and NMR Group, KEMA, Cadmus Group and Dorothy Conant for Res New Construction) will share task and project responsibilities as suit the situations.

EFFECTS OF EISA LIGHTING REQUIREMENTS ON RESIDENTIAL PROGRAMS

Most of this study will be completed under the Residential Research Area Groups and thus the study is included here. However since contracts were not yet complete and time of the essence, this study was initiated prior to contracts for the full Residential Research area.

PART 1: EISA FOCUS GROUPS \$46,110

The first step in the overall EISA Lighting project is to conduct a series of focus groups that examine customer opinions in depth. In addition to providing substantial information on its own, the focus groups task also provides the starting point for broader, but less in-depth survey approaches.

The focus groups concentrate on determining the answers to these major foci:

- How do customers expect to react to the differences in bulb availability under EISA?
- To what extent does more knowledge and exposure to newer technologies change the options customers expect to take?
- What other programming opportunities exist to help customers make more efficient lighting choices?

A draft report has been released with an expected final report at the end of October. The direct result of the Focus Groups is a set of recommendations for methods PAs might employ and program changes for the PAs to consider.

The overall study will examine current saturation of efficient lighting, likely programmatic impacts of the new requirements, and remaining program opportunities for residential consumer lighting after EISA efficiency standards are initiated.

Contracting for the Res Retrofit research area was completed December 8th. This area includes three additional studies to start this year:

- RESIDENTIAL MEASURE LIFE AND PERSISTENCE

This study is intended to examine measure life (time until failure) and persistence (time still in service) for measures installed in (1) HES and (2) HES Income-Eligible. The most recent study on this topic was undertaken in 2007. Beyond the age of the existing information, the need for this study was made evident with the completion of the 2010 Low Income study. That study found evidence that existing estimates developed for HES poorly matched what was found in limited income homes.

The Contractor is finalizing the Scope of Work for this project and developing data requirements for completion of the study.

- A new HES IMPACT AND PROCESS EVALUATION STUDY
- HES-IE IMPACT AND PROCESS EVALUATION STUDY

Data gathering for these two studies will be combined with that of the measure life and persistence study discussed above to the extent it makes sense to do so.

- RESIDENTIAL LIGHTING SATURATION

Completion of this study is required and will be initiated as soon as possible. This study will examine the numbers and locations of common and specialty efficient lighting products with an aim to determine the extent to which substantial direct intervention in the market continues to be needed. NMR has provided a Scope of Work and will begin the study soon.

Currently, the studies that initiate in 2012 to 2013 include:

- Efficiency opportunities in multifamily
This market assessment and feasibility study will assess ways to reach and expand depth of multifamily efficiency options. The study will include site visits to assess common apartment configurations and efficient equipment saturation. The study will also examine barriers to implementation including landlord/tenant conflicts and payback requirements. This study was moved to the next study cohort in order to begin HES studies to support weatherization requirements.
- Examination of efficiency opportunities in Low Income,
- Studies identified as needed by an assessment of the PSD (occurring in 2011 in the Cross-Cutting Studies research area),
- VIP (Verification of Installation Procedures) study

The Res New Construction and Emerging Measures research area includes a fairly complicated set of studies. For 2011, the slate includes:

- GROUND SOURCE HEAT PUMP STUDY
CL&P estimates that they've helped install, or have in the pipeline, upwards of a 1,000 units; UI has a lesser number. This study will entail working with CEFIA to do an impact analysis for HVAC and water heating applications as well as carbon impact analyses. This study will be completed in cooperation with CEFIA. Currently, the Contractor is revising the Scope of Work.
- EARLY REPLACEMENT OF GAS WATER HEATER/ FEASIBILITY OF ON-DEMAND UNITS
This study will be a market assessment study to examine the feasibility and likely cost efficiency of encouraging early replacement of inefficient gas water heaters and especially the benefits and costs of replacing these units with on-demand water heaters. Little work has been completed to date.

- **EARLY REPLACEMENT OF ELECTRIC RESISTANCE WATER HEATER WITH HEAT PUMP WATER HEATERS**
Market and Potential Impact from an early replacement option for electric resistance water heat customers. Little work has been completed to date beyond examination of background documents.

The out years also include very complex studies, including:

- Baseline construction efficiencies for multi-family buildings (5 units and up),
- Studies of savings from ductless heat pumps, and
- Potential savings from approaches to reduce phantom loads in consumer electronics.

CROSS-CUTTING STUDIES RESEARCH AREA

The Cross Sector studies RFP did not result in reasonable proposals for the out-year studies. However, the 2011-initiating studies were well-designed by a team lead by Tetra Tech. Tetra Tech will complete the 2011 studies while a broader search continues for the longer-term studies. UI contracts are not yet completed and thus Tetra Tech has initiated only the small initial evaluation steps.

For 2011 the studies are:

- **ASSESSMENT OF THE 2012 PSD \$178,733**
The result of the study will be a proposed next edition of the PSD. Additionally, the study will recommend new or additional studies needed to support Connecticut-based inputs to the PSD. The draft Scope of Work is complete awaiting contract execution.
- **FREE RIDER & SPILLOVER (FR/SO) STUDY IN C&I PROGRAMS \$164,000**
This study had originally been proposed to start in 2012. However, Tetra Tech completed the last FR/SO study and did an excellent job. Contracting with them for this study allows for a consistent methodology to be employed. The SOW is now completed and is being formatted for UI's Purchase Order procedures.
- **REMAINING OPPORTUNITIES IN C&I LIGHTING**
This study is a market study to examine where remaining opportunities exist for efficient lighting. In addition to examining particular technologies, the study will examine the extent to which program barriers affect capture of these opportunities within individual customer types. As an initial stage in this work, the Contractor is developing a scope of work that will examine the C&I program databases over the last 5 years to see if there are patterns in what types of customers are being reached, frequency of participation and lighting implementation as a gateway for further action. CL&P is determining whether they are able to provide data to support this effort – because of the long time period to be examined, data will be needed from their legacy database, which may make data collection overly difficult. If so, this study might be done using only UI data.

For 2012 and beyond, additional studies will include:

- Free rider & spillover study for residential participant programs
- Data mining
This study may require more explanation. The EEB expects programs to encourage comprehensive retrofits, however, we have little information on exactly what is accepted by customers, what is not, why those differences occur and what we could do about the underlying problems that might be revealed. Data mining could allow us to “follow” participating customers to assess the characteristics of groups of customers relative to their program actions. This study might also assess persistence of

measures within a building, such as when occupants of premises move and are replaced by other occupants.

- Codes and Standards

To explore the feasibility of developing and promoting higher standards for various products including furnaces, television set top boxes, hot tubs, pool heaters, and electronics products – and be credited with the resulting savings.

SMALL C&I RESEARCH AREA

Proposals for the Small C&I research area were provided on June 11. A team lead by KEMA was selected to complete the studies. Contracting for this research area is taking an extraordinarily long time. While complete proposal and selection documents were provided on July 31, UI contracts are not yet complete.

ONLY ONE 2011 STUDY IS ANTICIPATED TO START IN 2011 – AN IMPACT EVALUATION OF SBEA

A Small Business program impact evaluation was completed in 2009. In many program areas, it provided good impact values and collected large amounts of information on lighting and lighting controls. However, additional information on impacts from air-conditioning and refrigeration measures need to be collected as those areas were largely missed in the random sampling process.

Over the 2012 -2014 time period, studies are expected to include:

- New construction baseline
- Measure persistence
- SBEA Opportunities and measure life study
- Market for financing options
- Case study development to support target markets
- Full market segmentation assessment
- Assess opportunities for a BSC approach to small businesses

LARGE C&I RESEARCH AREA

The Large C&I RFQ was released on October 18th. Proposals were received on November 15th. We received 3 responsive proposals and additional that did not meet minimum expectations.

Starting in 2012 and 2013, studies are expected to include:

- ISE IMPACT EVALUATION – Subject to ISE timing
- Process Evaluation of Business Sustainability Challenge
- Impact and Process of Energy Opportunities
- Opportunities and Barrier in Municipal, Government, Schools and Hospitals
- Assessment of Commercial Real Estate
- State Buildings – Metric Development, Comprehensive Projects
- Performance Contracting in Municipal, Government, Schools and Hospitals
- Opportunities to Bundle Measures in C&I HVAC

REGIONAL EM&V FORUM – 2010-2011

LOAD SHAPE ESTIMATION: C&I LIGHTING – CONTINUED FROM 2010

This project involves the creation of a spreadsheet tool that can be used by members of the Regional EM&V Forum to calculate and quantify the hourly savings of efficient lighting measures installed at Commercial and Industrial facilities. The tool will generate 8760 commercial/industrial lighting load shapes (largely from secondary sources). KEMA was selected to complete the study. Assembling the available data is nearly complete, and the spreadsheet tool design is being coordinated with the Unitary HVAC study. This project is proceeding at a slower pace than originally anticipated, but it is now at a point where the majority of the data has been collected, and KEMA can estimate the schedule for the next steps with more certainty. KEMA has completed almost 75% of the on-sites needed for the study. KEMA intends to complete up to 66 more projects, of which 10 are already in the pipeline. Draft results were provided on April 25. The final report was provided July 15th.

Moving towards 2012, NEEP is in the process of selecting the next group of measures to be completed. When determined, a competitive bid will be required. One loadshape effort taking place is the Loadshape Data Collection Protocol project, which will provide guidelines and protocols for the electronic file format and information/data to collect in conjunction with metering data.

LOAD SHAPE ESTIMATION: C&I UNITARY HVAC – CONTINUED FROM 2010

The objective of the study is the development of Unitary HVAC load factor data for every hour of the calendar year. The annual load shape data is adaptable to different program participant populations located within the service territories of Forum members; load shape data is weather-normalized in order to provide for the calculation of aggregate load shapes that reflect the weather conditions of different Program Administrator customer populations.

KEMA has collected and analyzed the data from its metering effort, and it has completed its modeling tasks. It also developed the spreadsheet tool which was tested by a small subset of the subcommittee (beta testers) late last year. Subcommittee review of the draft spreadsheet tool and report outline concluded on March 15. The HVAC Loadshape tool is expected to be available later this month. The Final Report was provided June 13 and can be found:

http://neep.org/uploads/EMV%20Forum/EMV%20Products/NEEP_HVAC_Load_Shape_Report_Final_June_10.pdf

Variable speed drives will be the next technology examined. A draft RFP for this work has been developed. Additional loadshape studies are under consideration. The short list includes Residential lighting (CFLs or CFLs and LEDs); Commercial LEDs; Commercial Refrigeration; and Data Centers.

C&I LIGHTING: MEASURE PERSISTENCE OF SAVINGS – COMPLETED

The purpose of the project is to develop up-to-date impact parameters that describe lighting measure persistence, i.e. in place and operating over multiple (5+) years based on field and survey samples. The project will also develop equipment life estimates from secondary sources (manufacturer reports). The value of this project to sponsors is that commercial lighting is the largest source of savings for most EE providers in the region. Multi-year persistence lends itself to regional study because the research is difficult, expensive, and measures are consistent across locations.

KEMA developed the sample design for this project, based on data collected from EM&V Forum members in New England and New York. The results of this project deliver measure life estimates developed from models informed by primary data collected from programs that have been in existence and measures that have been installed for many years. The Final Report was provided on June 29th and can be found at: <http://neep.org/uploads/EMV%20Forum/EMV%20Products/NEEP%20CI%20Persistence%20Report-FINAL.pdf>

COMMON EM&V METHODS AND SAVINGS ASSUMPTIONS – EMERGING TECHNOLOGIES

For 2011, development of common methods to evaluate and savings assumptions for PSD usage focuses on emerging technologies and the programs offering them. The project focus on developing common EM&V methods for emerging technologies and program designs (whole building single family and multifamily programs and programs addressing commercial lighting design). The initial list of technologies to examine includes: commercial lighting design programs, solid state lighting/LEDs (fixtures & screw-ins for residential and commercial); and Advanced/smart power strips.

ERS was selected to complete this study that focused on examination of secondary data to identifying gaps and developing deemed savings methods. The interim report was submitted in October. The final report is now available at <http://neep.org/uploads/NEEPResources/id814/NEEP EMV Emerging Tech Research Report Final-Rev12-8-11.pdf>

REGIONAL ENERGY EFFICIENCY DATABASE

The overall purpose of this study is to address growing interest in consistent reporting of electric and natural gas energy-efficiency program savings, costs and emission impacts across states in the region to help inform multiple energy and environmental policies, including:

- Climate change goals and air quality emission reductions, and associated planning;
- State procurement policies, energy-efficiency savings and associated economic goals; and
- Regional energy planning and forecasting purposes.

Development of a database design is the follow on research to the reporting tool project above. Peregrine Energy Group, the project contractor, is continuing its work to develop the Regional EE Database (REED), in consultation with Forum staff and the project subcommittee. Peregrine has finalized the data collection savings modules (consistent with the reporting templates in the Common Statewide EE Guidelines adopted last year by the Steering Committee) and is currently developing the expenditures, emissions, and job impacts modules. The database should be completed by early 2012, with states populating the database with 2011 efficiency program results as results become available throughout 2012.

INCREMENTAL COST STUDY - CONTINUED

The objective of this Project is to develop incremental cost assumptions for a variety of efficiency measures. Navigant is the contractor selected for this project. The Incremental Cost Study is now complete, and the final report is posted to the Forum's Products and Guidelines webpage. This study determined the cost of material/equipment for baseline and efficient measures, the cost of baseline labor and, where appropriate, incremental costs of labor. The final report provides incremental cost results and describes the methods Navigant Consulting, the project contractor, employed to investigate and update incremental costs for a number of common energy efficiency measures.

The Incremental Cost project subcommittee is refining options for follow-on Incremental Cost research. It is considering options that can use the remainder of the 2011 Incremental Cost Study budget allocation and possibly 2011 Add-On Research funds, as well as options that may be included in the 2012 Forum agenda. The subcommittee has expressed support for sole sourcing this work to Navigant Consulting due to the cost and other advantages of leveraging Navigant's experience with the Incremental Cost Study. The Forum is currently considering additional measures to be included in this continuation.

The high priority measures were identified as the following:

- Large commercial HVAC (chillers)
- Variable Frequency Drives (VFD)

- Energy Management Systems (EMS)
- On Demand WH (condensing)
- Boiler Controls (gas)
- C&I refrigeration compressors

REGIONAL EM&V FORUM – 2012

The 2012 Forum workplan for 2012 will be complete prior to the end of the year..