

EEB Evaluation Committee Response to CL&P Response to Contractor Recommendations – Impact Evaluation of the Retrocommissioning, Operation & Maintenance, and Business Sustainability Challenge Programs

Only CL&P filed a response to the program recommendations Michaels Energy made in this report; therefore the EEB Evaluation Committee can only respond to those comments. UI intensions cannot be ascertained.

Conclusions and Recommendations – RCx Program

Program Findings¹

Overall, the RCx program was found to be successful in identifying projects. Based on the files reviewed, the projects included measures that covered a wide range of technologies and the types of measures identified indicate that the investigation completed was of a high level of rigor. Identified measures, and the associated savings, were clearly identified based on site-specific conditions.

The savings calculations for the completed measures were also found to be in-depth and robust. Additionally, the methodology was found to be consistent and reasonable. However, input parameters were often estimated, rather than measured. Most of the projects evaluated used an assumed motor, chiller, or other equipment load factor to calculate savings. The assumed load factor was often greater than the actual load factor when determined based on the collected data.

The measure calculations also often neglected to account for interactions with other completed measures. For example, savings were claimed for several of the school projects both for scheduling the HVAC equipment and the chiller plant. For both measures, the cooling load in the baseline condition was assumed to be the existing conditions. The savings should have been calculated sequentially, with the scheduling for the HVAC units reducing the cooling load on the plant, then the turning off of the plant eliminating the remaining energy usage.

Many of the changes in the evaluation analysis were not due to calculation errors or oversimplification, but instead due to measures not being implemented as intended. For example, several of the school projects had significant savings levels claimed for the implementation of reductions in operation for equipment during the summer months. However, due to system limitations, the systems needed to be manually changed to a “summer” mode. This was not occurring, resulting in the savings not being realized.

The documentation level for the RCx projects was sufficient, however, often did not clearly indicate what changes were made to the systems. Many of the RCx measures include the replacement or repair of failed equipment. These can include replacing failed sensors that are reading incorrectly or fixing dampers that may be failed open. In the case of a failed temperature sensor, the description should include a description of how the sensor failed and the result on the system, such as: “The temperature sensor for the building was out of calibration and was reading 5° F low, resulting in the

¹ Although not written in this report, Michaels Engineering remarked that the Companies’ RCx program was one of the best they had seen.

system changing over from heating to cooling mode incorrectly. This required and excessive reheating, which will be reduced.” This will facilitate both the implementation and evaluation of the recommended changes.

Program Data²

The total project list was provided through a data extract of the CL&P project tracking system for the RCx program. The tracking system included information at both the project and measure level. It included the project number, name, contact information and address, program, and completion date at the project level. The measure level descriptions included the project number and name, measure status, measure description, and measure savings, and dates for status updates. The tracking system included all of the necessary information for project sampling as well as customer contact information.

The project documentation for the RCx program was collected as a combination of electronic files and hard copy files. All of the RCx projects had electronic files supplied with a few of the projects having additional documentation scanned from the hard copy files at the CL&P office by Michael's personnel. The electronic copies included multiple separate versions of the report and savings analyses files. Typically at least one version of the report and the analysis was included in the project documentation and details the final three steps of the four-step approach the RCx program uses, starting with the survey and ending with implementation. The implementation files included the final calculations and as well as a complete copy of the O&M manual that was submitted to the customer.

Complete calculation files were included for all projects covered in the evaluation; however for eight of the 21 projects evaluated, the savings in the tracking system did not match the savings in the final version of the calculations in the project folders. For the largest electric saving project in the program, which accounted for over 30% of the claimed electrical energy savings for the years covered in the evaluation, no calculation files from the implementation portion of the project were supplied. The calculations were done by three different vendors with at least one project for each vendor not having calculations that matched the claimed savings. There were no major differences between vendors.

At the project level, the documentation supplied did include a description of the findings from the audit, the measure intent, the design intent, and a list of hardware to complete the measure. These descriptions gave an explanation of the project; however their detail was not sufficient to fully describe the operation of the systems, especially for the case prior to completion of the project. For example, the project description may say that an air handling unit is being rescheduled; however, the hours of operation prior to being rescheduled are often not given.

² EEB Evaluation notes that the Michaels Engineering report did not provide a section that explicitly listed recommendations concerning data collection and sufficiency. However the report includes discussion of the data-related findings. As these assessments are required under PA 11-80 and in Docket No. 10-10-03, the discussion is included in this response. However, because this discussion was not included as a recommendations section, and the Companies are only required to respond to recommendations, it is not surprising that CL&P did not provide a response. EEB Evaluation strongly recommends that CL&P should not be penalized for the resulting lack of response.

This is extremely important in a program like RCx as the measures are not simple replacement of equipment and the energy savings are based on product specification. The savings are instead attributed to changing sequencing, set points, schedules, repairing damaged, worn, or out of calibration equipment including but not limited to sensors and dampers. The assessment of the baseline operating conditions is difficult to assess at the time of evaluation and thus the baseline operating condition is modeled based on the project description and customer interview.

Conclusion 1: Several of the school projects had significant savings levels claimed for the implementation of reductions in operation for equipment during the summer months. However, due to system limitations, the systems needed to be manually changed to a “summer” mode. This was not consistently occurring. Therefore, we suggest using extreme caution when claiming savings for schedule or other changes that require a manual change in order for the savings to be realized.

Recommendation 1: The Companies should employ conservative assumptions when claiming savings for projects that require a manual change to set or maintain efficient operation. Our assessment demonstrates that those changes are frequently undone.

CL&P Response: In addition to incorporating the results of this evaluation into program design and reporting, which will ensure that adjusted gross savings reconcile to the evaluated savings. CL&P reviews savings assumptions for all projects and will continue to do so in the future. The assumptions used in the Connecticut Program Savings Document reflect lower persistence for these types of measures.

EEB Evaluation Response:

The EEB Evaluation Committee agrees with CL&P that it should incorporate the evaluation results into adjusted gross savings. In addition, EEB Evaluation recommends the companies use lower persistence values as recommended in the evaluation results to adjust persistence assumptions in the PSD going forward. EEB Evaluation believes the implication remains that higher persistence value assumptions (and associated savings) might be realized if, in the future, large projects incorporate an enhanced reminder / training element.

Conclusion 2: Many of the RCx measures include the replacement or repair of failed equipment. These can include replacing failed sensors that are reading incorrectly or fixing dampers that may be failed open. In the case of a failed temperature sensor, the description should include a description of how the sensor failed and the result on the system, such as: “The temperature sensor for the building was out of calibration and was reading 5 °F low, resulting in the system changing over from heating to cooling mode incorrectly. This required and excessive reheating, which will be reduced.”

In addition, for operation changes the schedule or conditions before and after should be given, rather than saying the schedule was reduced by one hour or one inch of pressure drop was eliminated.

Recommendation 2: The Companies should require that the operational conditions before and after an operational change or repair of failed equipment are fully documented, rather than only including a description of the change.

CL&P Response: CL&P currently seeks pre and post data for all measures.

EEB Evaluation Response:

The EEB Evaluation Committee recognizes that CL&P seeks pre and post data. However, that goal was found not to have been achieved. As recommended in this study, the Companies should require vendors to provide full and accurate assessments of the pre- and post-implementation operational conditions. Failure to do so makes it impossible for the gross savings to be calculated accurately.

Conclusion 3: Most of the projects evaluated used an assumed motor, chiller, or other equipment load factor to calculate savings. The assumed load factor was often greater than the actual load factor when determined based on the collected data. Therefore, we recommend that, when possible, load factors be based on collected data.

Recommendation 3: Load factors for motor, chiller, and other equipment should be based on collected data such as instantaneous measurements, short term metering, or BAS/EMS trended data.

CL&P Response: Retrocommissioning load factor estimates rely on instantaneous and short-term metering. In the absence of this data, shorter term data collection is used.

EEB Evaluation Response:

As long as the load factor data is collected as described [for each project](#), the EEB Evaluation agrees with CL&P's response.

Conclusion 4: Savings were claimed for several of the school projects at both the chiller and HVAC equipment. In addition the HVAC cooling loads were not consistent with the chiller cooling loads. Therefore, we recommend that, savings be calculated including all building systems that interact with the energy efficiency measure to ensure the interactive affects are accounted for correctly and that the savings associated with each measure affecting the building system be calculated sequentially.

Recommendation 4: The Companies should calculate measure savings sequentially. For example, the baseline operation and energy consumption for the second measure should be calculated as incremental to the effects of completion of the first measure. Pre and post demand and energy consumption should be shown for each measure to ease the review process.

CL&P Response: CL&P makes every attempt to ensure that savings are calculated correctly, and interactively, as a matter of policy.

EEB Evaluation Response:

The EEB Evaluation Committee agrees that CL&P works hard to ensure appropriate savings calculation and commends that commitment. However, results from this study indicate that for some school projects, that commitment did not always result in reliable and consistent savings measurement during the program year of the evaluation. CL&P may need to increase their efforts (considering changes to policies, procedures,

modeling, tools, or staff training) to address the noted inconsistencies if updates have not been implemented since the 2010 program year.

Conclusions and Recommendations – O&M Services Program

Program Findings

Overall, the O&M program tended to focus on more specific areas, with compressed air leaks and PC projects comprising the vast majority of the projects and the savings.

The savings calculations were found to be simple and more general than the RCx analyses. However, in general, the analyses were reasonable and accurate, with two notable exceptions.

First, the Wattage for the controlled computers in the PC projects was found to be overestimated. This change resulted in all of the PC projects having savings levels reduced.

Second, one of the compressed air projects comprised of 46% of the evaluated O&M program savings and 25% of the entire O&M program savings. Several significant errors were found in the analysis which resulted in a 54% realization rate for the project. This was not representative of the remaining compressed air projects. Aside from this project, the compressed air projects were adjusted upwards by 4% during the evaluation.

While reviewing the compressed air projects, and investigating the persistence of leak repairs, it became apparent that many of the companies were not using the provided leak detectors on a regular basis. This was primarily driven by either a lack of knowledge on the use of the leak detector or the lack of a responsible person tasked to complete the leak audits. The two companies that were performing leak tests had either made it part of the maintenance program or it was driven by a single employee at the site outside of his normal responsibilities. It was clear that sites that did actively search out and repair leaks had much lower leakage rates than companies who were not actively repairing leaks.

Conclusion 5: One of the compressed air projects comprised of 46% of the evaluated O&M program savings and 25% of the entire O&M program savings. Several significant errors were found in the analysis which resulted in a 54% realization rate for the project which was not representative of the remaining compressed air projects.

Recommendation 5: The Companies should afford greater scrutiny to the large projects that make up a significant portion of the program portfolio. This can be done by additional levels of review to allow additional people to review the project or increased metering requirements by collecting both pre and post data.

CL&P Response: CL&P has implemented tighter processes and now requires metering for these types of projects, working closely with participants to ensure that pre and post data is used in savings calculations.

EEB Evaluation Response:

Assuming the CL&P response means collection and reporting of pre and post metering data are now required as a qualification criteria for large projects, the EEB fully supports CL&P's response.

Conclusion 6: Many of the PC projects were penalized due to the PC wattage being significantly lower than the assumed wattages.

Recommendation 6: Equipment energy specifications should be double-checked, especially for projects where equipment wattages are applied over a large number of installations.

CL&P Response: CL&P uses pre-metering, short term and instantaneous metering, and post-metering to test savings assumptions.

EEB Evaluation Response:

EEB Evaluation agrees that CL&P's approach should produce robust results for most projects but urges that for projects where measurements will be applied to multiple installations, additional care may be required, including updating of assumptions on wattages, operating hours, and other important elements of savings computations.

Conclusion 7: While reviewing the compressed air projects and investigating the persistence of leak repairs it became apparent that many of the companies [customers] were not using the provided leak detector on a regular basis. The two companies that were performing leak tests had either made it part of the maintenance program or was driven by a site engineer. The latter has now left the company and leak testing is no longer a focus of the maintenance team.

Recommendation 7: The customers should be required to make leak detection a regularly occurring part of the facility maintenance.

CL&P Response: As a sponsor of the Compressed Air Challenge®, CL&P has worked to promote and propagate best practices in compressed air system management, including the establishment of leak detection programs.

EEB Evaluation Response:

Recognizing that customer requirements to continue leak detection cannot be enforced, EEB Evaluation agrees with CL&P's approach of increasing education and promoting best practices.

Conclusion 8: The compressed air sites that were investigated for the persistence of leaks it was clear that sites that actively searched out and repaired leaks had lower leakage rates than companies who were not actively repairing leaks. Some of the limiting factors appeared to be the lack of leak detection in maintenance plans and the lack of understanding on how to use the leak detector.

Recommendation 8: Reinstating the distribution of leak detectors under the O&M Services program should be investigated, along with periodic education or training.

CL&P Response: CL&P currently conducts training sessions on leak detection and will investigate increased distribution of leak detectors as part of that effort.

EEB Evaluation Response:

EEB Evaluation agrees that CL&P's approach is appropriate and encourages CL&P to investigate leak detector distribution in the near term.

Conclusions and Recommendations – Business Sustainability Challenge

Program Findings

The BSC participants did have staff dedicated to sustainability, however, only approximately half of the companies had an “official” group. The other companies incorporated sustainability into existing meetings or included sustainability as an “unofficial” duty for a staff member.

The companies did use their utility bills as a metric to gauge sustainability; however, few of the companies had progressed beyond reviewing utility bills to developing *meaningful* metrics, such as kWh per part produced or per square foot of area. Several specifically mentioned difficulties in developing or determining meaningful metrics for their facility as a barrier. This process is complex in nature and will be unique to each customer. By working with customers on a one-on-one basis, companies will be more likely to be able to determine what metrics will be meaningful for them. Specifically, two customers indicated a desire to develop metrics regarding trash and recycling volumes. Both indicated that they did not know how to proceed with this task.

Several customers indicated a frustration with the lack of meetings after the completion of the course.

Conclusion 9: While all but one of the companies did have staff allocated towards sustainability, only approximately half of the companies had an “official” group. The other companies incorporated sustainability into existing meetings or included sustainability as an “unofficial” duty for a staff member.

Recommendation 9: The Companies should work with customers to develop a staffing plan to ensure sustainability groups or green teams are “official” positions.

CL&P Response: As described in the 2013-2015 Plan, CL&P is working to align the Business Sustainability Challenge with other programs, including the Clean Energy Communities program and PRIME.

EEB Evaluation Response:

CL&P’s response does not seem to address the recommendation on official sustainability positions. Development of a single sustainability approach across the two companies is appropriate to meeting identified customer needs, but the companies may wish to review the programs with which it elects to align (see weak performance results for PRIME in Energy & Resource Solutions, 2007).

Conclusions 10: Few of the companies had progressed beyond reviewing utility bills to developing meaningful metrics. Several specifically mentioned difficulties in developing meaningful metrics. This process is complex in nature and will be unique to each customer. By working with customers on a one-on-one basis, companies will be more likely to be able to determine what metrics will be meaningful for them.

Recommendation 10: Work with customers on a one-on-one basis to develop meaningful metrics.

CL&P Response: As detailed in the 2013-2015 Plan, Tracks A and B of the Business Sustainability Challenge have been rolled together into three levels of engagement, which focus on one-to-one interaction and multi-year commitments resulting in sustainability plans and goals.

EEB Evaluation Response:

Michaels found that customers most appreciated the ‘cohort’ program approach using multi-year commitments. To the extent the new program will accomplish those goals to engage its customers, it will meet the study recommendations.

Conclusion 11: Two customers indicated a desire to develop metrics regarding trash and recycling volumes. Both indicated that they did not know how to proceed with this task. Therefore, we are recommending that trash and recycling metrics be expanded in the program.

Recommendation 11: While participants are very interested in the broad range of sustainability issues, the program appears to focus on electricity use only in developing savings metrics. To better serve these participants, the Companies should Increase focus on non-utility metrics, such as recycling volumes, trash volumes, and water usage.

CL&P Response: CL&P will continue to pursue non-utility savings whenever possible. In particular, the PRIME lean manufacturing program contained in the 2013-2015 Plan offers significant non-utility and sustainability benefits to participants.

EEB Evaluation Response:

CL&P should actively pursue and market attainment of non-energy savings as well as utility energy savings in order to maximize utility savings, as broad sustainability initiatives are the focus of customers’ interest. Non-utility benefits are used elsewhere to leverage interest in utility programs and better appeal to customer segments. These benefits are incorporated into program tracking, dashboards, and customer program impact materials.

Conclusion 12: Several customers indicated a frustration with the lack of meetings after the completion of the course.

Recommendation 12: The Companies should hold periodic meetings open to all BSC participants, to review successes, challenges, and tools.

CL&P Response: In 2011 and 2012, the Connecticut Energy Efficiency Fund sponsored multiple Sustainability Breakfast Forums for Connecticut businesses, providing an open environment for dialogue about energy efficiency and sustainability. Additionally, networking groups for participants and prospects to share best practices, challenges, and ideas have been added as a fundamental part of the program in the 2013-2015 Plan.

EEB Evaluation Response:

EEB Evaluation agrees that the Fund’s forums will contribute to meeting customer needs.