



Independent Audit, 2011-2013

Report to the Legislature

Vermont Energy Efficiency Utility

Submitted to the Public Service Board

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Introduction

In April 2015, the Vermont Public Service Board (the Board) selected the Evergreen Economics team¹ (Evergreen) to serve as the Independent Auditor of the 2011-2013 reported energy and capacity savings and cost-effectiveness of programs delivered by the Vermont Energy Efficiency Utilities (EEUs) pursuant to 30 V.S.A. § 209(f)(12). The EEUs reviewed in this audit include Efficiency Vermont (EVT) and the City of Burlington Electric Department (BED), which deliver electricity and thermal-energy-and-process-fuel energy efficiency services to residential and business customers throughout the state of Vermont. Vermont Energy Investment Corporation (VEIC) operates as Efficiency Vermont under an Order of Appointment issued by the Board on 12/20/10. Oversight of the EEU programs is assigned to the Board by Vermont law. The Department of Public Service (Department) is a separate state agency that serves as the state's energy office and as the public advocate in proceedings before the Board. The programs reviewed in this report include all energy efficiency initiatives instituted by the EEUs during the latest three-year evaluation cycle consisting of January 1, 2011 through December 31, 2013. This document serves as the Report to the Legislature.

Audit Objectives

The Board identified five main objectives for the Independent Auditor to review. Evergreen Economics conducted a review of:

1. The cost-effectiveness of the EEUs, including EVT's and BED's programs;
2. The reported energy and capacity savings achieved by EVT and BED;
3. The Efficiency Vermont Technical Reference User Manual (TRM) and the process for managing and updating it;
4. The database and other information compiled by VEIC that is used to develop and track savings claims and project costs;
5. The procedures and method used in the Department's savings claim verification process.

The remainder of this document outlines the methodology used by Evergreen to complete these objectives, in addition to all relevant savings and cost figures where necessary.

Overview of EEU Programs

In Vermont, the two EEUs (EVT and BED) provide a variety of energy efficiency program offerings that save residential and non-residential Vermonters money and energy in their homes and businesses. From 2011 through 2013, EVT and BED implemented energy efficiency initiatives that can be grouped into three residential and two non-residential energy efficiency program categories, including:

¹ The Evergreen Economics team consists of staff from Evergreen Economics and Michaels Energy.

Residential Sector

- Residential New Construction
- Efficient Products
- Existing Homes

Commercial & Industrial Sector

- Business New Construction
- Business Existing Facilities

Between 2011 and 2013, EVT and BED spent over \$117 million on these energy efficiency initiatives. These initiatives resulted in nearly 323,825 MWh of energy savings, 62.3 MW of winter demand reduction, 43.8 MW of summer demand reduction, and over 276,186 MMBtu's in other fuel energy savings by Vermont residents and businesses.

Table 1: Annual Results, Total EEU Portfolio

Year	kWh	Summer kW	Winter kW	MMBtu	Incentive Costs	Admin Costs	Total Program Costs
2011	110,261,077	15,155	20,416	66,401	\$22,934,804	\$19,379,324	\$42,314,128
2012	118,190,667	16,566	23,851	79,578	\$19,982,247	\$17,581,919	\$37,564,166
2013	95,372,904	12,056	18,008	130,207	\$16,637,386	\$20,567,707	\$37,205,093
Total	323,824,648	43,776	62,276	276,186	\$59,554,437	\$57,528,950	\$117,083,387

Methodology and Process Review

As part of this audit, Evergreen was tasked with reviewing the data tracking, evaluation and Technical Advisory Group (TAG) processes currently in place and with providing actionable recommendations for improvement. Our review of these program and evaluation processes included an assessment of the following:

- TAG process for updating the TRM;
- Data management and reporting by the EEUs; and
- The Department's savings verification process.

For our review of the TAG process, data management procedures and savings verification processes, we conducted a series of interviews with staff at the Department, EVT, BED and West Hill Energy and Computing, Inc. (West Hill). West Hill is currently the independent evaluator contracted by the Department to review and verify annual project savings for EVT and BED. We also reviewed the 2013 EVT Verification report submitted to the Department by West Hill and TAG documentation provided by VEIC.

Overall, the TAG process is highly regarded by parties involved and seems to work well. Our review of TAG documentation indicates a thorough tracking system is in place to monitor the status of proposed updates, action items for TAG members and records of TAG decisions. While EVT drives the TRM update process, the existing checks and balances built into the process could be enhanced by greater involvement of Department staff. For example, greater involvement could occur when TRM revisions are explored or through occasional comprehensive review of TRM assumptions by a third party that reports to the Department.

EVT and BED each maintain a program tracking database that stores all relevant project data, and Evergreen was provided with a copy of both EVT's and BED's databases. Both databases are complete, but the EVT database is much more complex, with numerous linked tables. For both EEUs, Evergreen found that the savings values calculated using the two datasets did not match the evaluation report savings claims for some programs. We attribute this to the fact that the data provided came from live databases that are continually changing. Therefore, we recommend that the EEUs maintain a frozen copy of the tracking database provided to the evaluator and store this dataset in a predetermined location prior to the auditor's involvement so that both the auditor and evaluator have the opportunity to work from identical datasets as well as to expedite the audit process.

Evergreen reviewed the savings verification process for EVT and BED conducted annually by the independent evaluator for the Department. We learned during our interviews with the Department and EEU staff that there is an effort underway to investigate the cost-benefits and make subsequent recommendations regarding the coordination of the forward capacity market (FCM) evaluation and EEU project verification for EVT, to allow for more rigorous evaluation that includes additional opportunities for on-site verification. BED already uses this approach for its projects, and we believe EVT could benefit from coordinated evaluation timelines and a more rigorous verification approach that includes additional on-site verification visits.

TRM Review

One of the key components of the energy efficiency implementation and evaluation processes in Vermont is the Efficiency Vermont Technical Reference User Manual (TRM). The TRM contains a substantial list of measures with methods on how to calculate energy savings for each measure. The TRM lists most of the assumptions used to determine savings, in addition to the algorithms and other auxiliary information such as incremental cost, free ridership rates and operation and maintenance (O&M) savings.

Deemed savings values are well documented, reasonable and consistent with industry practices found in other jurisdictions. A majority of the measures in the TRM are algorithm based, which is a generally more accurate savings calculation methodology than strictly deemed values. Algorithms allow for specific customer inputs, which improve savings estimation accuracy by tailoring the values to match more closely with specific customer conditions.

Validation of Reported Energy Savings and Costs

Evergreen was also tasked with reviewing and validating the energy savings (kWh), demand reduction (kW), and cost values reported in all evaluation reports filed by EVT and BED for program years 2011, 2012 and 2013. Evergreen verified the savings amounts reported by the independent evaluator for each program year by reviewing an extract of each EEU's program participant database and replicating the savings amounts listed.

Given that adjustments were made to the program tracking databases continuously over time, our savings replication effort was completed to within an acceptable margin of error (i.e., within 1-2 percent of savings reported in the original annual report) for most programs; however, the data provided for BED's Efficient Products program deviated from this trend with calculated energy savings only amounting to 88 percent of claimed savings.

Consequently, our calculation of total residential sector energy savings was 10 percent lower than BED's reported claims, and the calculated savings of the combined portfolio of BED programs was off by 5 percent. For future audits, we recommend that both EVT and BED save the same version of each program tracking database provided to the independent evaluator in addition to the most current database so as to ensure that all evaluation and audit activities are using identical data, as well as to expedite the audit process. The results of the replication activity are discussed in more detail in the Management Letter.

Additionally, we reviewed the evaluation reports and associated site reports for program years 2011-2013. We found project documentation to be adequate; however, there were several areas that should be addressed in more detail in future evaluations.

Cost-Effectiveness Analysis

The Evergreen analysis found that the EEU program portfolio was cost-effective between 2011 and 2013 using the Program Administrator Cost Test (PACT), Total Resource Cost Test (TRC) and Societal Cost Test (SCT). Additionally, efficiency initiatives reported by sector and EEU in Table 2 were also found to be cost-effective with benefit-cost ratios exceeding 1.00 in all cases.

Table 2: Cost-Effectiveness Model Summary, Total EEU Portfolio

	Program Administrator Cost Test (PACT)	Total Resource Cost Test (TRC)	Societal Cost Test (SCT)
Total EEU Portfolio	3.05	2.66	3.51

Recommendations

There are several overarching findings from the audit of the 2011-2013 EEU program activities. While we have a number of recommendations on how the evaluation process can be improved, it is important to discuss these within the overall context of the work that has

been completed by the Vermont EEUs and the independent evaluator. Specifically, all recommendations should be considered within the context of these overall findings:

- Evaluation reports reviewed were of high quality and conformed to the standard practices of the evaluation industry.
- The TAG process is highly regarded by parties involved and seems to work well. Our review of TAG documentation indicates a thorough tracking system is in place to monitor the status of proposed updates, action items for TAG members and records of TAG decisions.
- Savings estimates are accurate. The savings databases examined for EVT and BED yielded energy savings totals to within a few percentage points of the reported savings noted in the evaluation reports filed by the EEUs. Furthermore, savings estimates are consistent with TRM guidelines.

Our review of the evaluation reports, savings estimates, and program processes identified several areas where improvements can be made. Related recommendations are summarized below.

- **The EEUs should maintain a frozen copy of the program tracking database/s provided to the evaluator that is consistent with annual reported savings values for future audits.** Evergreen was able to verify energy savings to within an acceptable margin of error for most programs; however, deviations from the reported savings numbers were found. For future audits, we recommend that both EVT and BED save the same version of each program tracking database provided to the evaluator and make it readily available for the independent audit prior to the audit process beginning. This will ensure that all evaluation and audit activities are using identical data, and that the process is more fluid. By providing both sets of data, the auditor will be able to determine where significant changes in savings occurred, and this will inform the TRM and measure review process.
- **EVT should continue to pursue efforts to investigate coordinating the FCM evaluation with the annual project verification.** The resulting evaluation would have the potential to be more rigorous while continuing to meet ISO New England evaluation requirements. Should this prove to not be feasible, EVT and the evaluator should consider beginning the evaluation earlier in the calendar year with a preliminary sample of projects. As general sector and end-use trends are unlikely to change significantly, this earlier start will allow the evaluator a longer timeframe in which to conduct a more rigorous analysis.
- **The evaluation of EVT's energy efficiency initiatives should begin earlier in the year.** An earlier start will allow the evaluator to complete a more rigorous analysis, by affording them more time to conduct additional site visits and complete more in-depth engineering analyses. It is appropriate for the evaluator to draw a preliminary sample of projects from the first part of the year, which allows for some on-sites to be

completed by the end of the year. The on-site sample can then be supplemented at the beginning of the following year to incorporate projects completed in the latter part of the prior year.

- **EVT should explore whether more project-specific data can be incorporated into its savings calculations.** This will produce more accurate savings estimates and lessen reliance on TRM assumptions, which should only be used where this information is not readily available. For two of the three years reviewed, the EVT evaluation report highlighted that parameters or assumptions from the TRM were being applied to applications or equipment for which they were not originally intended. This is an ongoing issue that needs to be addressed.
- **For all new TRM measures, EVT should allow sufficient time for TAG members to thoroughly review proposals for updates to the TRM.** Allowing more time for review will mean that TAG members are better prepared to discuss updates and can arrive at conclusions that all parties feel confident about.
- **The Board should reconsider the advisability of relying on an EEU functionally driving the TRM process.** The process seems to be working well, but there is a potential structural conflict of interest in having the program implementer also managing the TRM and the update process. One solution would be to hire an independent third party to conduct periodic in-depth reviews of the TRM.
- **The level of detail included in the individual site reports should be expanded.** While we found the site reports provided to adequately describe the general evaluation approach, changes made to the analysis, and the resulting impact on the savings estimates, we encourage the level of detail to be expanded even more. In many cases, the specifics of the evaluation process or findings are unclear. Specifically, on-site findings from the FCM evaluation and information from customer interviews (such as operating hours of the individual areas from energy data loggers, or self-reported hours of operation) were not included in the report text.
- **Future reports should adopt a more consistent structure.** While the most critical information was always included in each report, the inconsistency across programs and projects sometimes made the location and interpretation of the information more difficult. It is possible that this inconsistency is due in part to the many individuals and companies that completed individual project evaluations. Verification reports should clearly label which projects are custom and which are prescriptive; this would help facilitate the audit process.
- **The evaluator should put in a good faith effort to determine the project savings, even if the documentation level is poor or non-existent.** In our review, we found a number of evaluated projects that had energy savings reduced due to lack of documentation. Although the Evergreen team does applaud the evaluator's stance on requiring sufficient documentation, the evaluator should take the additional steps necessary to determine the correct savings estimates whenever possible. If, due to



customer non-response or other factors, no independent estimate of the savings can be developed, we agree that an approach whereby savings estimates are reduced is appropriate as a last resort.