

FINAL REPORT

Innovative Energy Efficiency: Increasing Weatherization in Massachusetts Small Businesses

Prepared for:

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Executive Summary

In 2018, the Massachusetts Department of Energy Resources (DOER) introduced the Innovate Energy Efficiency Grant Program whose purpose was to seek demonstration projects for the deployment of emerging energy efficiency technologies and the delivery of innovative energy efficiency programs. The total budget for this grant program was \$5,000,000 and CET was awarded \$699,995 to partially fund a pilot for *Increasing Weatherization in Massachusetts Small Businesses* (Pilot). The Pilot addressed PON Topic 2, Innovative Energy Efficiency Program Delivery with the goal to test and refine program design and delivery models that when brought to scale will greatly increase, and make more comprehensive, cost-effective annual and lifetime energy savings in the small business sector. Despite comprising 97% of commercial and industrial (C&I) customers in Massachusetts and 40% of the energy consumption, small businesses are underserved in the Mass Save program.¹

The Pilot tested new approaches and program design elements to increase participation of small businesses in Mass Save, and to increase uptake of weatherization and other efficiency measures. The need to better serve small businesses has long been on the radar of program administrators and the 2022-2024 Mass Save Plan, with its emphasis on weatherization, electrification, and equity is further impetus for reaching this market segment. Serving small businesses will not only improve equity metrics but they are ideal targets for weatherization and electrification measures.

CET collaborated with utility partners, Columbia Gas, Berkshire Gas, and Eversource, as well as weatherization partners, Energia and Rogers Insulation, to develop program guidelines. The guidelines were developed between September 1, 2019 and March 31, 2020, and the Pilot was implemented between April 1, 2020 and December 31, 2021. In January 2021, Liberty Utilities engaged CET to serve their business customers and joined the efforts of the Pilot.

Full-scale implementation of the Pilot was temporarily disrupted with the onset of COVID-19 restrictions in early 2020. Constraints resulted in many small businesses closing, reducing operations, or deferring building improvements, and limited CET's ability to conduct in-person field audits. In response, CET initially pursued remote site visits while building a pipeline for future in-person visits, focusing on business sectors that were still operational or reopening. CET worked with utility partners to develop guidelines for remote audits, which were performed using a combination of live phone calls, videos, photographs, and historical knowledge and references.

Based on a program of rigorous data collection and reporting, data has been recorded, compiled, and analyzed for each small business project to analyze what motivates customers to move forward, as well as those factors that inhibit projects, and provide recommendations for program design innovations that will increase weatherization in small businesses and potential future innovations. The key takeaways from the Pilot are summarized below.

The most successful selling points for customers include cost and understanding energy usage.

- No-cost assessments and enhanced incentives were attractive to small business customers with limited operating expenses.
- Many customers viewed energy efficiency solely from an electricity perspective, and often just lighting.
- Educating customers on energy usage of natural gas systems, including weatherization and hot water systems, improved uptake.

¹ MA Energy Efficiency Advisory Council (2017). Memo: Small Business Market and Opportunities. Available at ma-eeac.org.

The primary reasons small business owners decline to participate in energy efficiency programs include time and misconceptions.

A collaborative partnership like the one between CET and the weatherization contractor is a successful strategy for identifying customers.

The viability of commercial work for small weatherization contractors is an important element for the success of a weatherization program.

Use of a modeling tool with built-in pricing and on-site recommendations provide transparency for the customer and efficiencies for the weatherization contractor.

Project or property complexity was the primary factor limiting on-site contracting.

- Customers are too busy given the many roles they hold within their business or hold general skepticism or misconceptions around incentives and the Mass Save program.
- Customers conflate electric audits with gas audits, thinking they have already completed an energy audit. This underscores the importance of performing comprehensive gas and electric audits and/or sharing leads with partnering electric vendors.
- Weatherization contractors recommended and/or recruited other trusted contractors who enhanced referral feeds and reduced installation backlogs.
- The partnership resulted in an increased number of leads and offered small business customers a seamless customer service experience.
- Through mutual sharing of leads, CET was able to introduce other energy saving, non-weatherization measures to customers who scheduled with weatherization contractors directly.
- The longer the terms of payment for incentives, the more difficulty weatherization contractors have in securing capital for staffing and materials.
- Shortening payment terms reduced capital constraints, improving the viability of commercial work for small weatherization installers.
- CET's role as facilitator also saved weatherization contractors time by connecting all stakeholders, leading the sales process, and managing the project.
- Customers appreciated seeing a cost/savings breakdown by measure, allowing for a greater understanding of what was being proposed to them.
- Insight into the savings behind each measure made it easier to assess the building envelope comprehensively, which allowed calculation of different scenarios to maximize energy savings or in some cases preserve project viability by removing outlier expensive components.
- Weatherization contractors observed that the tool created efficiencies and/or positively impacted their work, citing increase in approved incentives, improved collaboration with utilities, and increased number of projects.
- Factors limiting the ability to complete on-site contracting were primarily due to the complexity of the project or property and corresponding cost, or physical roadblocks.
- In cases where on-site contracts could not be executed, customer engagement was enhanced by signing recommendation summaries at the time of the site visit.

Installer-led assessments informed pricing updates in the modeling tool and improved field documentation and protocol.

With successful strategies, there is room to add remediation costs and still pass the BCR.

The ability to conduct infiltration testing is limited by the type of buildings small businesses tend to occupy.

Providing a facilitator, such as CET, between the weatherization contractor, customer, and utility greatly increases the success rate of weatherization projects.

- Utilizing a standard process between weatherization contractors and CET allowed a consistent, efficient approach to assessments, and pre-set parameters resulted in higher confidence in project approval.
- Installation contractors pre-trained on the weatherization modeling tool resulted in more conversions of leads to contracts by fast-tracking the initial step of the process.
- After calculating a baseline benefit cost ratio (BCR) using the state-wide screening tool, CET iteratively added roadblocks using building science principles to make strategic choices about weatherization elements and rescreened until the project failed the BCR (versus strictly relying on vendors to create weatherization packages).
- Existing challenges continue to prevent projects from moving forward, including increased focus by utilities on lowering the \$/therm cost and permitting requirements not covered by utilities (i.e., construction affidavits by an architect).
- Small businesses tend to occupy older buildings which are often the best candidates for weatherization and benefit from blower door tests to help identify areas of infiltration to tailor the weatherization strategy.
- However, the nature of older buildings tends to complicate or constrain the ability to conduct air infiltration testing due to size of structure or configuration of the structure and environmental or health and safety roadblocks.
- Weatherization contractors indicated that it is difficult to get projects completed using the Customer Directed Option.
- Weatherization contractors tend to be small businesses themselves and are not experienced with weatherization incentives in the commercial program. They lack the time (or resources) to shepherd an application to approval.
- A facilitator, such as CET, connects the customer, installation contractor, and utility, translates technical specifications into a BCR rating, monitors and controls the project progress and deliverables, identifies and mitigates risks, roadblocks, or challenges, identifies opportunities to shorten the contracting period, verifies project completion, and facilitates co-pays.
- A facilitator also plays the role as the primary point of contact for the customer, providing full-service, turnkey support to reach their weatherization goals, and since the facilitator is not an installer, there is no added complication or conflict of interest with regards to selling a product or service. CET also ensured comprehensiveness by addressing additional measures beyond weatherization, as appropriate.

The recommendations for program design innovations to increase weatherization in small businesses are listed below and are based on the outcomes of the Pilot and feedback received from weatherization contractors. The proposed actions may be new, additive, or simple enhancements to existing PA programs, and all serve the goal of streamlining and strengthening program design to effectively engage small business customers and help utilities scale to meet aggressive energy savings and equity goals.

1. **Modeling Tool with Embedded Pricing.** *Adopt a modeling tool that includes pricing to provide customer transparency, streamline decision making, and shorten the contracting timeline.* Customers appreciated seeing a cost/savings breakdown by measure, allowing for a greater understanding of what was being proposed to them, and weatherization contractors observed efficiencies with increased project approvals leading to an increased number of completed projects.
2. **Project Delivery Services.** *Leverage the project delivery services of the Small B vendor as a facilitator (e.g., CET) between the utility, customer, and weatherization contractor to translate technical requirements, demystify incentives, streamline execution, and verify project completion.* This role was critical in 1) providing the customer with one point of contact and providing full-service, turnkey support to reach weatherization goals; 2) helping the small business installation contractor complete projects successfully in a timely manner; 3) helping utilities meet energy savings goals; and 4) introducing other energy saving, non-weatherization measures to customers who scheduled with weatherization contractors directly.
3. **Customer Outreach Collaboration.** *Partner with weatherization contractors to collaborate on marketing, outreach, and acquisition efforts.* This strategy would “level up” existing PA marketing efforts by partnering with “boots on the ground” contractors who have direct engagement with small business customers. The contracting community is an untapped resource that can help utilities bring their program to scale to meet aggressive energy savings goals. Involving contractors at the beginning of customer outreach, including leveraging them during early on-site assessments, has proven to be a successful strategy for increasing referrals, customer leads, and contracted projects.
4. **Contractor Training.** *Train weatherization contractors on using assessment or modeling tool(s) and conducting weatherization assessments, including how to use building science to make strategic choices about adding or subtracting weatherization elements and potential remediation strategies to successfully meet BCR thresholds (vs. standard weatherization packages).* This strategy resulted in a quicker conversion of leads to contracts by fast-tracking the initial step of the process. By leveraging the weatherization contractor community, utilities may also be able to bring their incentive programs to scale more quickly to meet energy savings goals.
5. **Auditor Skills.** *Teams who have both residential experience (Building Performance Institute [BPI]) and Certified Energy Manager (CEM) certifications can navigate both weatherization and the complex mix of other commercial energy efficiency measures to achieve comprehensiveness.* To maximize weatherization of commercial buildings, especially small businesses, CET recommends audit teams with this combination of skills and experience. CET has CEMs and engineers with decades of combined experience in the C&I space, but do not have BPI certification. We also have auditors that have moved up from the Mass Save residential programs who have extensive weatherization experience and BPI certifications. While CEM training touches on weatherization, it is a relatively minor aspect of the certification and the skills of our auditors that have come out of the residential program have proven most valuable, especially in the project component scenario building to tweak scopes so they pass, or to incorporate roadblock remediation costs. CETs staff are collaborative in nature and leverage our whole team to the benefit of the customer and our utility partners.

6. **Decoupled Cost Model.** *Separate the cost of small business vendor services from actual project costs, especially for “micro” businesses.* The annual savings from a customer who only uses a few thousand therms per year is so modest that the traditional model of an all-in-one cost for these projects presented to the utilities is prohibitive to projects passing BCR or for them to be financially compelling for these smaller business customers. The long-term benefits are clear, and this adjustment to program design would increase access to this critical measure, and in the building types that are also most likely to be easily electrified among commercial rate payers.

I Introduction

In 2018, the Massachusetts Department of Energy Resources (DOER) introduced the Innovate Energy Efficiency Grant Program whose purpose was to seek demonstration projects for the deployment of emerging energy efficiency technologies and the delivery of innovative energy efficiency programs. The total budget for this grant program was \$5,000,000 and CET was awarded \$699,995 to partially fund the *Increasing Weatherization in Massachusetts Small Businesses* pilot (Pilot). The Pilot addressed PON Topic 2, Innovative Energy Efficiency Program Delivery with the goal to test and refine program design and delivery models that when brought to scale will greatly increase, and make more comprehensive, cost-effective annual and lifetime energy savings in the small business sector. Despite comprising 97% of commercial and industrial (C&I) customers in Massachusetts and 40% of the energy consumption, small businesses are underserved in the Mass Save program.²

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This report summarizes the Pilot planning, training, implementation, measurement, and verification activities, and presents program results, including but not limited to, customer engagement strategies, energy cost savings, energy usage reductions, and cost to implement. Based on a program of rigorous data collection and reporting, data has been recorded, compiled, and analyzed for each small business project between April 2020 and December 2021. This report also documents and analyzes factors that motivate customers to move forward, as well as those factors that inhibit projects, and includes recommendations for program design innovations that will increase weatherization in small businesses and potential future innovations.

2 Pilot Implementation Overview

CET collaborated with utility partners, Columbia Gas, Berkshire Gas, and Eversource, as well as weatherization contractor partners, Energia and Rogers Insulation, to develop program guidelines. The guidelines were developed between September 1, 2019 and March 31, 2020, and the Pilot was implemented between April 1, 2020 and December 31, 2021. In January 2021, Liberty Utilities engaged CET to serve their business customers and joined the efforts of the Pilot.

Implementation activities included:

- Customer Outreach & Acquisition
- Field Audits, Contracting & Verification
- Experimental Protocol & Workflows
- Field Air Infiltration Measurements
- Reporting

Full-scale implementation of the Pilot was temporarily disrupted with the onset of COVID-19 restrictions in early 2020. Constraints resulted in many small businesses closing, reducing operations, or deferring building improvements, and limited CET's ability to conduct in-person field audits. In response, CET initially pursued remote site visits while building a pipeline for future in-person visits, focusing on business sectors that were still

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operational or reopening. CET worked with utility partners to develop guidelines for remote audits, which were performed using a combination of live phone calls, videos, photographs, and historical knowledge and references. After training CET staff on the Mass Save health and safety protocols and securing appropriate PPE, and in accordance with government guidance, CET returned to in-person audits in July 2021.

CET reported on program progress throughout the life of the Pilot, on both a monthly and quarterly basis. Reporting included narrative summaries, program expenditures (including utility and customer matches), key performance indicators, and a project pipeline report, including number of businesses contacted, projects completed, and energy and cost savings. This report is a compilation of the tasks and program metrics previously reported as supporting evidence for the proposed recommendations.

3 Customer Outreach & Acquisition

CET launched customer acquisition activities in April 2020 based on a customer acquisition strategy designed to generate leads and convert them into projects. The strategy included a combination of web-based, telephone, in-person, publication, and cross-selling methods. Lead sources were tracked and evaluated against key metrics to determine the impact of various outreach methods within different business types. **Over the course of the Pilot, 242 customers were engaged, resulting in 59 completed projects and 36 still in progress.**

- **Program Materials and Collateral.** CET created both promotional materials and customer package materials as a part of our customer acquisition strategy.
 - Physical rack card (Appendix A)
 - Virtual rack card, for distribution via email (Appendix B)
 - PowerPoint for promotional webinar
 - Blog post on weatherization benefits
 - Energy Efficiency Summary Report
 - Direct Installation Summary
- **Web Based.** CET used our Twitter, Facebook, Instagram, and LinkedIn platforms to share blogposts and host live webinars to promote the benefits of weatherization in small businesses and generate leads.

For example, CET hosted live webinars in 2020 and 2021 with a follow-on Q&A session titled “Commercial Weatherization Program and It’s Benefits”. The webinar material is presented as Appendix C and one of the webinars can be viewed at <https://vimeo.com/425328085>. Events were also promoted in local Chamber of Commerce newsletters sent out to residents via email.

- **In Person.** CET conducted several Main Street events (including Shrewsbury, Northampton, Scituate, and Norwell), which are specifically geared toward reaching small businesses. Our Energy Specialists (in some cases partnered with our weatherization contractors) spent anywhere from one day to one week going door-to-door, installing instant savings measures, talking with business owners about their utility’s energy efficiency program, and identifying energy efficiency opportunities. CET is part of a vast network of local organizations and regularly attends many events related to both waste and energy efficiency. Unfortunately, due to COVID-19, many of these events were cancelled or conducted virtually during the Pilot.

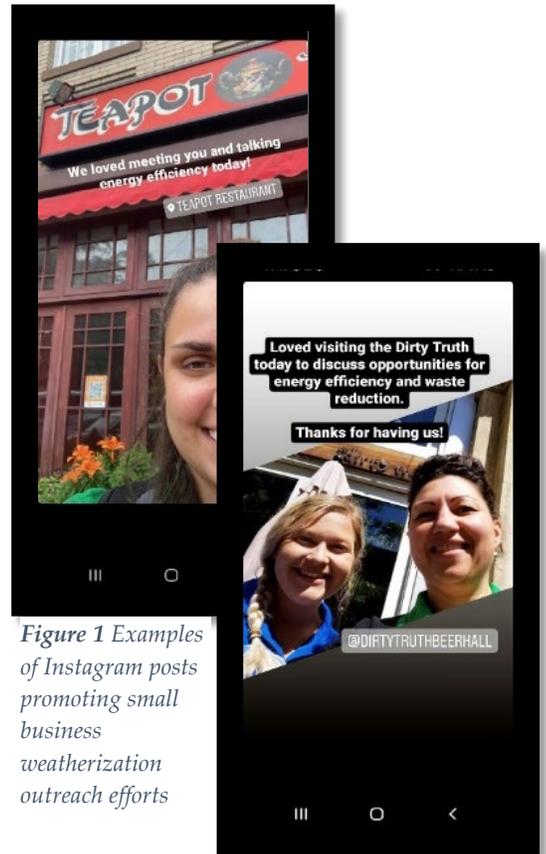


Figure 1 Examples of Instagram posts promoting small business weatherization outreach efforts

One unique opportunity CET arranged was with the City of Cambridge, Department of Public Works. The City was rolling out food waste collection for composting to small businesses; our contract with MassDEP to administer the RecyclingWorks program allowed us to provide free signage and training to participating businesses. CET suggested engaging the city’s energy manager and Eversource to maximize the interaction with small businesses to address both waste and energy while on site. **CET trained over 40 businesses on composting, installed 2,323 therms and 7,036 kWh in direct installation (DI) measures while on site, identified 9 weatherization and other custom gas projects, and connected 8 business owners with AE COM, the typical small business vendor for Cambridge, to handle all the identified electric opportunities.** This event was held in November 2021 and CET is now working to scope and complete the weatherization and other custom gas projects identified over this 3-day effort.

Table 1 Main Street Outreach Events

	Shrewsbury Main Streets	Norwell-Scituate Main Streets	Northampton Main Streets
Businesses Visited	84	43	36
% Visited Converted to Opportunities	38%	17%	69%
Total Therms Saved (to date)¹	6,675	2,456	3,350
Avg Therms Per Business	209	256	93

¹Many projects are still in progress.

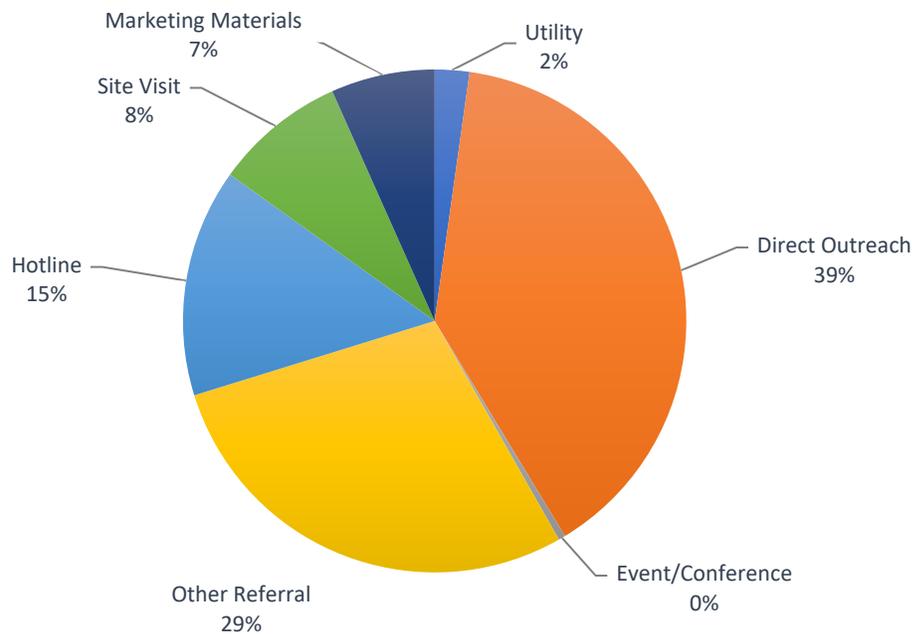
- **Contractor Generated Sales.** CET’s weatherization partners also generated leads that were converted to projects throughout the Pilot. CET shared Pilot customer acquisition materials with contractors to distribute and met monthly with partner contractors to review project pipelines and customer acquisition progress. **Out of 27 contractor-generated leads, 14 resulted in completed projects, translating to an average capture rate of 50%.** Further discussion on the value of contractor generated sales is presented in Section 5.
- **Cross-Selling.** CET leveraged existing relationships and various resources to build a customer pipeline, such as:
 - Existing relationships through previous energy efficiency and waste work.
 - Connections with energy efficiency vendors to receive leads.
 - Existing relationships with contractors and other vendors to serve additional businesses.
- **Business Development.** As utilities across the state sought additional gas savings, several expressed interest in learning more about the Pilot. CET presented the methodology and benefits of the Pilot at both the EEAC Equity Working Group meeting and the MA Small Business Committee. As a result, CET commenced discussions with two additional utilities, Liberty and Unitil, on serving their territories. CET started supporting Liberty customers in early 2021, initially adding 15 energy efficiency projects to the pipeline. This expanded CET’s work in the eastern half of the state, allowing us to test our model with a new group of contractors in a new market. Discussions with Unitil are ongoing.
- **Telephone.** Our customer acquisition team called customers to discuss program benefits and screen businesses for eligibility, then followed up with virtual rack cards. As part of CET’s company-wide initiative to support

underserved populations, CET focused on these communities during outreach and added a translation phone line to accommodate non-English speaking callers.

CET segmented and identified customers from utility partner territories based on several key factors. The screening process included questions on building construction, fuel type, building age, insulation history, roadblocks or factors that may prevent service, and past participation in Mass Save programs. CET also collaborated with contractor partners to identify target building types, measures, and procedures for scoping work in these building types. It was decided to target wood framed buildings, as this is the most straight forward construction type, leading to less complicated insulation projects. CET has found that business type can often serve as a proxy for building type, as there are certain businesses that tend to occupy converted wood frame homes. As a result, CET primarily targeted small businesses such as law offices, realty offices, contractors, day care facilities, and nonprofit offices, and utilized information on usage and rate code, provided by our utility partners, when prioritizing customers for outreach. See the Project Workflow document (Appendix D) for details.

CET amended our acquisition strategy in early 2021 based on customer usage, targeting customers with higher annual usage after Eversource capped weatherization savings at 20% of the customer’s annual usage. This allowed our outreach team to dedicate time to projects that will pass the utilities’ screening tests.

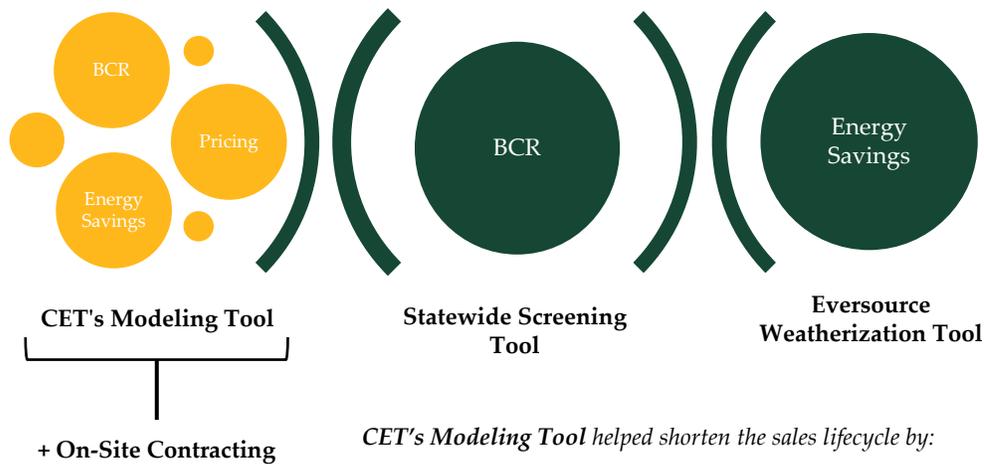
Figure 2 Small Business Outreach Results



4 Field Audits, Contracting & Verification

4.1 Field Assessments

CET’s field audit process included site visits at businesses that were pre-screened to have the greatest potential for energy savings, cost effectiveness, and project conversion. Field audits were completed using up to three screening tools. CET’s field assessment process included site visits at businesses that were pre-screened to have the greatest potential for energy savings, cost effectiveness, and project conversion. Field assessments were completed using up to three screening tools.



CET's Modeling Tool helped shorten the sales lifecycle by:

- *Bundling contractor pricing with energy savings to calculate real time BCR for customer review. The Statewide tool required pricing to be created separately and then manually entered to calculate BCR.*
- *Offering built-in incentive agreements and vendor contracts to facilitate on-site signatures.*

1. **CET Modeling Tool.** An energy savings modeling tool created by CET was used to calculate energy savings, incentive levels, and project costs to provide the small business owner the information to be able to make efficient and informed decision on next steps, as well as the ability to sign the contract on-site. Integrating all elements into one tool shortened the sales lifecycle. For example, this eliminated the need to seek contractor pricing.
2. **Statewide Screening Tool.** The statewide tool calculates the BCR used by the utilities to determine if the project is cost effective and eligible for incentives. The tool does not include contractor pricing; installation costs must be assessed outside of the tool and entered to calculate the BCR. This tool was a requirement for all projects to be considered for utility incentives.
3. **Eversource Weatherization Tool.** The weatherization tool calculates specific energy savings based on the building's existing conditions. Like the Statewide Screening Tool, weatherization contractor pricing is assessed outside of the tool and entered to calculate the BCR. This screening tool was only a requirement for projects within Eversource's territory to be considered for incentives.

An evaluation of the three tools, as well as a summary of modifications to CET's tool in response to the Pilot, is presented in Section 5.

4.2 Incentives & Project Estimates

CET collaborated with weatherization partners to set standardized pricing for weatherization measures and then worked with utility partners to agree on the set incentive level. Project utility partners agreed that during the initial phase of the Pilot, small business weatherization incentives would be set at 70% of the project cost. After initial implementation and additional project data was received, utility partners could agree to increase incentive levels for underserved small business segments (e.g., non-profits). Not long after the initial 70% level was agreed to, COVID hit and once customer interactions were re-started, most utilities were offering 100% for most measures. In cases where a lower incentive was offered, fewer jobs went to completion.

CET also collaborated with weatherization partners to track and document roadblocks for weatherization, including knob and tube wiring, mold and moisture issues, ventilation issues, structural concerns, access issues, and vermiculite. During each job, CET documented the type, extent, and cost of remediation for any roadblocks identified. We also calculated the effect of remediation costs on project savings and BCR calculations. CET convened with utility partners during the Pilot to evaluate data and determine which roadblock removals they would consider for incentives. Roadblock remediation challenges are presented in Section 5.

4.3 Contract Offer

The contract offer followed existing utility protocols with partner utilities to minimize any disruption to current payment systems. CET integrated existing incentive agreements into our system and sales process. Through each process, the customer signed a contract with the weatherization contractor, and the incentive agreement with the utility before work was initiated. The customer committed to paying the pre-determined percentage of project costs on the payment schedule defined in the contracts.

CET included the following materials in customer offer packages:

1. Summary of potential energy savings, approved incentives, project costs, and direct installations.
2. Summary of weatherization measures and benefits.
3. Full audit report covering additional measures, if applicable.
4. Program instructions and next steps.

4.4 Project Completion & Verification

CET developed protocols with weatherization contractor and utility partners for determining successful job completion. Upon job completion, CET scheduled a post-inspection to verify all measures were installed and met quality standards. Once successful project completion was determined, CET requested a check to be issued directly to the weatherization contractor.

CET conducted a post-install verification visit on 100% of the projects completed under the Pilot to verify that measures were installed. This far exceeded our goal of 25%. Partly driven by existing contractual requirements with Berkshire Gas and Eversource (EGMA), CET adopted a 100% post-installation verification rate across all Pilot projects for consistency and best practice.

The steps in the post-installation verification process included:

1. Visual inspection of weatherization work as compared to the customer's scope of work.
2. Follow-up communication with contractor to discuss results and revisit, as warranted.
3. Customer survey sent by email. Out of 59 weatherization projects completed, nine (9) small businesses completed the customer survey (15% response rate). The results are presented in Appendix E.

Field Assessments included:

- ✓ Interview with business owner to confirm building characteristics and operation
- ✓ Insulation material identification and area and level measurements
- ✓ Identification and documentation of roadblocks
- ✓ Recommendations for appropriate levels of insulation
- ✓ Identification of significant leaks for potential air sealing
- ✓ Air sealing estimate
- ✓ Installation of DI measures
- ✓ Review of offer package with estimated energy savings, costs, and incentive levels for business owner signature
- ✓ Discussion of next steps and leave-behind material

LESSONS LEARNED: FIELD AUDITS, CONTRACTING, & VERIFICATION

Providing a facilitator, such as CET, between the contractor, customer and utility greatly increases the success rate of weatherization projects.

- Contractors indicated that it is difficult to get projects completed using the Customer Directed Option. The facilitator connects the customer, contractor, and utility, monitors, and controls the project progress and deliverables, identifies and mitigates risks, roadblocks, or challenges, and verifies project completion.
- Small business contractors are typically inexperienced with weatherization incentives, or as small business owners themselves, having the time (or resources) to shepherd an application to approval. The facilitator translates technical specifications into a BCR rating, identifies opportunities to shorten the contracting period, and facilitates co-pays.
- A facilitator also plays the role as the primary point of contact for the customer, providing full-service, turnkey support to reach their weatherization goals, and depending on their business model, such as CETs, can help the customer identify and meet energy savings goals beyond weatherization. And since the facilitator is not an installer or contractor, there is no added complication or conflict of interest with regards to selling a product or service.

The viability of commercial work for small weatherization contractors is an important element for the success of a weatherization program.

- The longer the terms of payment for incentives, the more difficulty weatherization contractors have in securing capital for staffing and materials.
- CET worked with utilities and our internal team to issue payment to weatherization contractors on a more frequent schedule.

5 Experimental Protocols and Workflows

CET partnered with our weatherization contractors and utility partners to test a variety of program elements aimed at expanding the uptake of weatherization projects among small businesses. Elements tested included utilizing a comprehensive modeling tool, on-site contracting, weatherization contractors performing assessments, weatherization contractor-generated leads, and offering incentives for roadblock remediation costs. Originally, CET anticipated financing to be a significant barrier to completing projects and proposed on-bill financing as part of the Pilot. The concept of combining gas savings projects with an electric project to enable the electric program's on-bill financing proved unattainable. It is still a valuable tool if gas companies decide to provide on-bill financing in the future. During the term of the Pilot, the combination of enhanced utility incentives in response to the pandemic and CET's use of our Community Climate Fund reduced financing barriers to a significant degree.

5.1 Energy Savings Modeling Tool

Prior to the Pilot, CET developed a successful Excel-based energy savings modeling tool for generating on-site contracts in the Mass Save Residential Program. The tool incorporates standardized pricing from weatherization partners and pre-determined incentive levels. The tool recognizes inputs on the building specifications and recommended measures, calculates the project cost, incentive level, and savings, and then generates a recommendations summary for the customer to sign on-site.

The ability to generate costs, savings, and a customer agreement on-site is an indispensable tool in the Mass Save Residential Program for maintaining momentum with customers, compressing timelines, and increasing the rate of conversions from home energy assessments to implemented weatherization projects. A key motivation for this Pilot was to adapt the modeling tool for the commercial small business sector to realize the same benefits it brings to the residential sector. While a more sophisticated software application is now more commonly used in residential, CET's Excel based tool served as the jumping off point for creating a similar tool for commercial.

CET adopted and modified the tool for commercial small businesses as part of the Pilot to initially test real-time data inputs with pre-set pricing, and in later stages also created on-site contracting. After identifying the initial measures and target building construction types, CET collaborated with weatherization partners to set standardized pricing for commercial materials and convened with utility partners to set pre-determined incentive levels. These prices and incentive levels, along with new customer agreements, were incorporated into the tool.

The tool was used to calculate energy savings and costs for the customer and to provide incentive agreements for customers to sign on-site. The tool also allowed CET auditors and partner weatherization contractors an opportunity to evaluate DI measures in conjunction with weatherization, which often helped support positive BCR calculations. In cases where multiple custom measures were identified, CET would run scenarios outside the tool to support a more comprehensive project. For example, CET frequently bundled pipe insulation and water saving direct install measures in with weatherization projects to lower the \$/therm and achieve greater savings.

CET developed several iterations of the modeling tool as the Pilot progressed.

- **On-Site BCR.** The initial walkthroughs provided important insight into the functionality of the tool within the new commercial workflows. CET enhanced the savings reporting within the tool to provide the energy auditor with the BCR immediately on-site and allow the auditor to configure additional utility-specific settings for each project.
- **Cost Savings Report.** Working towards scalability, CET incorporated functionality to generate a leave-behind sales report for customers, with descriptions and potential cost savings. As CET's goal with this Pilot was to serve customers as comprehensively as possible. Custom recommendations included windows, boiler replacements, kitchen appliances, and lighting.
- **Alignment with Statewide Screening Tool.** CET tested and shared feedback on the new Statewide Screening Tool in Q7 of the program. Through this effort, CET screened projects using both tools to compare savings estimates for different measures and building types. CET revised our modeling tool to align closer with the air sealing savings calculations in the statewide tool.
- **Alignment with Eversource Savings Tool.** CET engaged with the Eversource engineering department in Q6 of the program following an analysis of the weatherization savings tool. After several project submissions and conversations, it became evident that CET needed to revise savings calculations to adhere to the utility's standards and expectations for weatherization savings. CET partnered with a third-party contractor to revise the modeling tool to further qualify savings based on customer usage, to add additional capability for steel framed buildings, and to align the equations and assumptions more closely with Eversource's expectations. The savings adjustments condensed the approval process from weeks and even months to get through technical review, to a recent project that was reviewed and accepted in about one hour.
- **On-site Agreement.** As a precursor to an on-site contract, CET configured the tool to produce an informal agreement, designed to convey project parameters and secure commitment to move forward in the process. Understandably, the utility partners wanted a high degree of confidence in the efficacy of the tool and CET's

approach, so this interim step proved to be a very effective sales tool and helped prepare CET staff to eventually create on-site contracts.

Based on a survey conducted with seven weatherization contractors in March 2022 following the end of the Pilot, **100% of the contractors surveyed said that CET’s modeling tool created efficiencies and/or positively impacted their work.** At the top of the list, the three most positive impacts included:

- Increase in approved incentives (19%)
- Improved collaboration with utilities (19%)
- Increased number of projects (15%)

Followed closely by,

- More efficient workflow (11%)
- Faster incentive turnaround times (11%)
- Quicker contracting (7%)
- Improved customer acquisition (7%)
- Identification of incentive roadblocks (7%)
- Use of fixed pricing (4%)

The weatherization contractors surveyed also agreed that if adopted by utilities, a tool like this could be easily used and adopted by weatherization contractors. However, they cautioned that fixed pricing during time of inflation or increased energy prices may be problematic and commented that pricing needs to be flexible in response to current economic conditions (for example, monthly fluctuating prices for closed foam). The results of the weatherization contractor survey are presented in Appendix F.

LESSONS LEARNED: ENERGY SAVINGS MODELING TOOL

- Customers appreciated seeing a cost/savings breakdown by measure, allowing for a greater understanding of what was being proposed to them.
- Insight into the savings behind each measure made it easier to assess the building envelope comprehensively, which allowed all parties (CET, customer, and weatherization contractor) to run different scenarios to maximize energy savings.
- Qualifying projects could be vetted by CET, allowing high quality leads to be passed to weatherization contractors.
- Weatherization contractors observed that the tool created efficiencies and/or positively impacted their work, citing increase in approved incentives, improved collaboration with utilities, and increased number of projects.
- Pricing incorporated into the tool needs to remain flexible and updated in response to variable economic conditions.

5.2 On-Site Contracting

Reducing the elapsed time between lead generation and a signed contract is a key factor in improving uptake of weatherization measures by small businesses. In addition to other strategies employed as part of the Pilot, CET collaborated with our Berkshire Gas and Liberty utility partners in October 2021 to identify and accelerate opportunities for on-site contracting. Both partners expressed interest in Pilot testing on-site contracting on 3-5 projects and provided the following set of energy and cost-saving parameters to allow immediate, on-site approval.

- Liberty Gas
 - BCR above 1
 - Project cost threshold: ≤\$15/therm (BCR at or above 1)
 - Incentive: 70% or up to \$10.50/therm (equivalent to a 70% incentive for \$15/therm project)
- Berkshire Gas
 - BCR above 1.25
 - Incentive 70%
 - Incentive cap \$12,000

The CET Modeling Tool was updated to accommodate the approved parameters and the utility-specific contracts were included for on-site signature. Potential project sites were identified for testing during the Pilot, however no on-site contracts were administered due to challenging building conditions and complex weatherization specifications, resulting in lower than desired confidence in savings calculations.

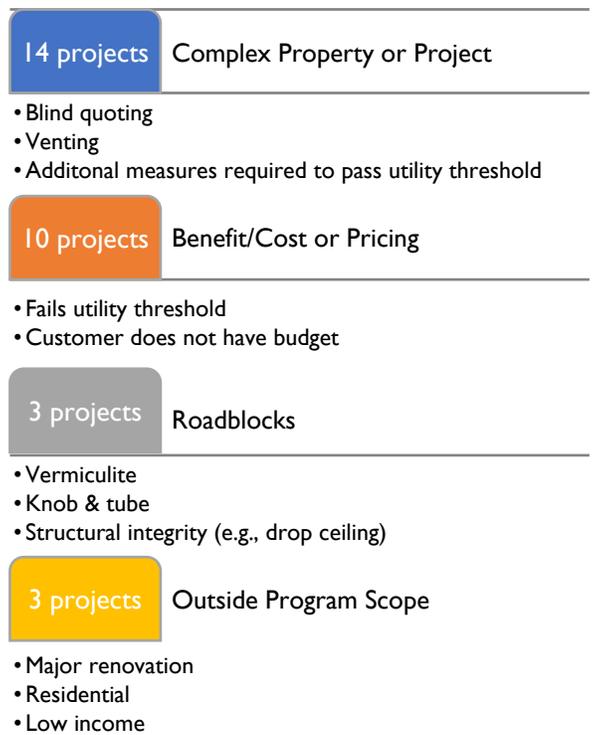
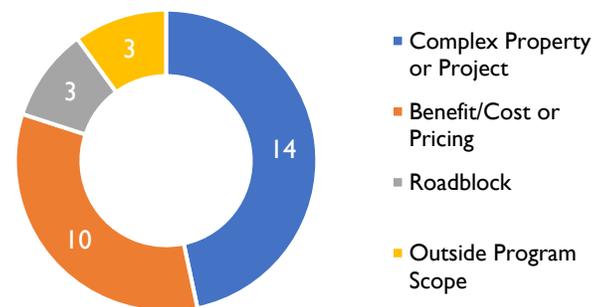
In many cases, CET specialists would seek consultation with a lead or senior building scientist in response to complex conditions. Unfortunately, this was completed in the office, resulting in no ability to issue the contract on-site immediately following the assessment. However, this resulted in a greater probability of projects ultimately moving forward.

CET, in partnership with Liberty and Berkshire, continued to evaluate potential projects for on-site contracting beyond the Pilot. In Q1 of 2022, CET tested a total of 30 project sites.

- 14 Liberty Gas customers
- 16 Berkshire Gas customers

Although several projects proceeded to signed recommendations, none of the 30 projects successfully advanced to signed contracts on-site. This was due to a variety of factors including complexity of the project or property, pricing, physical roadblocks, or misalignment with program scope. The breakdown of projects, by limiting factor, with examples is presented in Figure 3.

Figure 3 Breakdown of limiting factors to on-site contracting out of 30 test sites.



LESSONS LEARNED: ON-SITE CONTRACTING

- Factors limiting the ability to complete on-site contracting was primarily due to complexity of the project or property and pricing, followed by physical roadblocks and projects that were outside the program scope.
- In cases where on-site contracts could not be executed, customer engagement was enhanced by signing recommendation summaries.
- CET is now exploring a short-term follow up with customers where the contract would not be offered on-site but would be emailed within a few business days.

5.3 Contractor-Generated Leads and Weatherization Assessments

CET's partnership with weatherization contractors resulted in an increased number of leads, improved processes and pricing, opportunities for non-weatherization energy savings measures, and reduced time to serve. The partnership proved invaluable for both entities from a business and mission-driven aspect and offered customers a seamless customer service experience.

- **Increased Project Leads.** CET's weatherization partners generated leads that were converted to projects throughout the Pilot. CET shared Pilot customer acquisition materials with contractors to distribute and met monthly with partner contractors to review project pipelines and customer acquisition progress. **Out of 27 contractor-generated leads, 14 resulted in completed projects, which translates to an average capture rate of 50%.**
- **Improved Processes and Pricing.** CET viewed the weatherization contractor site visits as an essential component of the Pilot. CET collaborated closely with contractor partners, Energia and Rogers Insulation, to incorporate commercial measures and updated pricing into the modeling tool, and developed training materials with workflow documents, communication protocols, and technical specifications for using the tool in the field. Utilizing a standard process between contractors and CET also allowed a consistent, efficient approach to assessments and pre-set parameters resulted in higher confidence of project approval.

CET recruited additional weatherization partners in the program, especially new contractors in Liberty Gas territory. The additional of new contractors, Utility Energy and JM of New Bedford, provided CET more data on the success of important program elements such as standard pricing and process. The new partners also enhanced the referral feeds.

- **Removal of Small Business Contractor Barriers.** CET collaborated with weatherization contractors to address a common barrier for small businesses, which is the terms of payment. The longer the terms of payment for incentives, the more difficulty contractors have in securing capital for staffing and materials. CET worked with utilities and our internal team to issue payment to weatherization contractors on a more frequent schedule. The viability of commercial work for small business contractors is an important element for the success of a weatherization program.
- **Compressed Sales Time.** Weatherization contractors pre-trained on the modeling tool were able to conduct on-site weatherization assessments for customers as they were generating leads. This resulted in a quicker

conversion of leads to contracts by fast-tracking the initial step of the process. CET was then able to seamlessly execute the remainder of the process for the respective utility program (i.e., final modeling, incentive evaluation, paperwork, direct installs).

- **Opportunities for Additional Energy Savings Measures.** Customers who scheduled contractors directly for weatherization services were also shared with CET. This served as a mechanism for customers to access utility weatherization incentives and offered opportunities to engage the customer on other energy savings measures, such as DIs and other non-weatherization measures (e.g., heat pumps).
- **Streamlined Project Hand-Off to Contractors.** In instances where CET conducted the initial site visit and scoped project work, we developed processes for providing contractors with clear direction on next steps and ensuring a shared understanding of the project scope. CET began providing an enhanced plan view document to weatherization contractors with work orders; the document included drawings of the building with measurements and detailed where each measure was to be installed along with the quantity.

Out of the seven (7) partner contractors surveyed at the end of the Pilot, **85% noted that the small business weatherization Pilot positively impacted their business**, and that they worked with more small businesses during the Pilot than normal. This was primarily attributed to leads being provided by CET and in addition to sourcing their own leads. Positive impacts included,

- Being provided leads by CET (39%)
- Being able to source my own leads (22%)
- Having fixed, predictable pricing (17%)
- Reducing time on site (17%)

CONTRACTOR'S EXPERIENCE: IN THEIR OWN WORDS

"We were really impressed with how quickly [CET] turned leads into projects. We also thought the monthly pipeline status meetings helped all parties stay on point and move projects through to installation."

"Learning through CET how the utilities underwrite allows us to better tailor projects and measures and client conversations to result in greater conversion rates."

"I like the collaboration with CET. Good collective teamwork. If we can't bring all buildings to a higher performance ASAP then it's our loss."

LESSONS LEARNED: CONTRACTOR-GENERATED LEADS AND WEATHERIZATION ASSESSMENTS

- Contractor-led assessments allowed CET to incorporate commercial measures, update pricing into the modeling tool, and improve field assessment documentation and protocol.
- Utilizing a standard process between contractors and CET allowed a consistent, efficient approach to assessments and pre-set parameters resulted in a higher confidence of project approval.
- Shortening payment terms reduced the difficulty contractors have in securing capital for staffing and materials, improving the viability of commercial work for small installers.
- Contractors pre-trained on the weatherization modeling tool resulted in a quicker conversion of leads to contracts by fast-tracking the initial step of the process.
- Through mutual sharing of leads, CET was able to introduce other energy saving, non-weatherization measures to customers who scheduled with contractors directly.

5.4 Roadblock Remediation Incentives

Pre-weatherization barriers are a challenge in the small business and nonprofit sector, where building stock trends older, and maintenance tends to be deferred. CET and weatherization contractors frequently identify live knob and tube wiring, vermiculite, moisture, and mold, all of which threaten to halt or dramatically increase the costs of completing weatherization. To address this challenge, CET collaborated with utilities and contractors and developed a strategic approach for turning some roadblocks into mere project speedbumps.

CET realized that in cases of high BCR results for weatherization, there is room to add additional costs—i.e., remediation expenses—and still pass the BCR. CET convened with utility partners during the Pilot to evaluate data and determine which roadblocks they would consider for incentives. Across our partners, one or more utilities agreed to provide incentives for the following measures on the condition that the project still passed the BCR test:

- Intumescent paint for spray foam
- Venting
- Damming
- Knob and tube remediation

CET's novel approach to “getting to yes” entails using the state-wide screening tool to first conduct a baseline BCR test for just weatherization, then iteratively adding roadblocks and rescreening the project until it fails the BCR test. This approach allows us to maximize the portion of remediation costs that can be incentivized, thereby reducing the customer's co-payment, and increasing the likelihood of implementation. We also employ building science principles to parse out weatherization projects, if needed. We do not rely strictly on vendors to create weatherization packages (which are by design comprehensive), but rather make strategic choices about adding or subtracting weatherization elements to achieve the necessary BCR.

And it is not just weatherization that we consider. CET looks at the entire portfolio of energy conservation and electrification measures and builds the package of solutions that optimizes for energy and economic objectives. Where barriers were identified, CET documented the type, extent, and cost of remediation. For some projects, including a church in Springfield and a domestic violence shelter in Pittsfield, CET was able to include remediation with the project costs covered by utility incentives.

While including pre-weatherization barriers in the BCR test can be an effective tool for increasing weatherization uptake, the prevailing conditions do not always make it possible, particularly with utilities' increased focus on lowering the \$/therm cost of projects. As such, the presence of costly roadblocks still prevented many projects from proceeding over the course of the Pilot. Permitting requirements for larger projects (e.g., construction affidavit required by an architect) are

Project Showcase: First Churches of Northampton

First Churches is a listed historic church built in 1878. In 2021, CET was able to secure a 100% incentive for energy efficiency upgrades with a local contractor who was able to complete more measures than originally proposed, resulting in **2,099 annual therm savings**. The project included an energy assessment of two non-standard, historical building types, with the added challenge of procuring materials and implementing construction practices consistent with historical requirements.

“I am writing with the highest compliments for the energy conservation work that the Center of EcoTechnology accomplished for First Churches last summer and fall... We couldn't be more pleased with the process of the work and the final product. It's early to tell what the savings will be. COVID makes for an unusual year! Our impression is that substantial savings are occurring. Thank you for an excellent job.”

-William Holloway, Chairperson, First Churches of Northampton

not covered by utilities and are another example of a cost barrier that can prevent projects from moving forward.

This issue continues to disproportionately affect buildings and organizations in greater need. In several cases, CET was able to identify alternative funding through our Community Climate Fund to remediate roadblocks (or provide co-pay support) to small business customers. A total of five (5) small businesses under the Pilot program were funded. Utility partners covered a portion of the weatherization costs through incentives and the fund contributed an additional \$25,287.45, resulting **in energy savings of 6,699 therms or 41 tons CO2 annually (820 tons across the measures' lifetime)**. These funds, however, are limited and thus not readily scalable to meet the need.

LESSONS LEARNED: ROADBLOCK REMEDIATION INCENTIVES

- In cases of high BCR results for weatherization, there is room to add additional costs (i.e., remediation expenses) and still pass the BCR.
- Successful strategies include:
 - Using the state-wide screening tool to first calculate a baseline BCR and then iteratively adding roadblocks and rescreening until the project fails the BCR.
 - Not strictly relying on vendors to create weatherization packages but rather making strategic choices about adding or subtracting weatherization elements using building science principles.
- Prevailing conditions do not always make it possible to include remediation of pre-weatherization barriers in the project cost (i.e., increased focus by utilities on lowering the \$/therm cost).
- Permitting requirements for larger projects (e.g., construction affidavit required by an architect) are not covered by utilities and are another example of a cost barrier that can prevent a project from moving forward.

6 Field Air Infiltration Measurements

CET pursued opportunities with weatherization contractors to perform specific testing and verification of the air leakage reduction effects of improving individual building envelope components (attic, basement, rim joists, etc.) during installation, using blower doors. To our knowledge, this information is not available for small business retrofit applications and was proposed to help develop savings projections or assumptions in future programs, and to inform additional innovations in program design.

Like the impact of the pandemic on in-person audits, the number of businesses open and/or able to move forward with recommended weatherization measures was also reduced with the onset of COVID restrictions in early 2020. At the beginning of the Pilot execution phase, CET developed field measurement protocols with partner contractors for implementation once field work resumed. Once in-person audits and fieldwork recommenced, CET pursued opportunities with weatherization contractors to perform blower door tests, developed a data collection form for distribution to the engaged contractors, and discussed strategic application of the blower door tests, including targeting buildings with more complex structures or with severe air leakiness.

6.1 Testing Constraints

Unfortunately, the number of completed air filtration tests conducted over the life of the Pilot were lower than anticipated due to COVID restrictions limiting the number of completed weatherization projects, and the nature of the older buildings small businesses tend to occupy. Although older buildings tend to have more air infiltration and blower door tests would help identify leakage to support weatherization strategies, older buildings also have a variety of complicating factors that prevented contractors from conducting infiltration tests during the Pilot:

- **Size of structure.** Larger buildings can be challenging, as they require multiple blower doors to achieve a result and larger spaces, especially more historic, are prone to be less airtight, have multiple leaks that cannot be located and/or corrected, resulting in low confidence results.
- **Size and/or configuration of the structure or weatherization spaces.** Certain structures, such as retail shopping centers, row houses or multifamily homes with adjacent attached units, would require doing either "guarded" testing for hallways and mechanical spaces or "pressure equalization" method testing for adjacent units or whole building testing. This is problematic for both pricing and for coordination with the tenants on either side of the target unit. Other structures, including motels, are treated as a whole building, yet the units are not connected by a common hallway with individual entrances and therefore cannot be tested as a whole building. Contractors are also further challenged with equalization issues when testing just a single motel room and the need for multiple blower door tests multiple times, which is a cost burden.
- **Environmental/Health Roadblocks.** Many small businesses are housed in older buildings, which introduce the added environmental health complications of possible ACM (asbestos containing material) either in place or historically (e.g., pipe insulation and vermiculite), active mold, and/or excessively chipping lead paint.

6.2 Test Results

The table below presents the results of the air infiltration tests collected during the Pilot. The initial intent was to conduct tests at each stage of the weatherization installation measures, however, due to the various constraints and complexities noted in the previous section only pre and post measurements were collected. However, based on the results, CET's original air sealing savings calculations were very close to the savings verified by the blower door testing.

Table 2 Air Infiltration Results

Project Site	Weatherization Measures	Test Results (cfm)		% Change
		Pre	Post	
Gemini Sign (Marlboro, MA)	Air sealing and insulation (attic, stairway)	8,910	7,884	12%
Living Hope Church (North Adams, MA)	Air sealing and insulation (attic)	6,248	4,677	25%
Ruggeri Real Estate (Greenfield, MA)	Insulation (attic, basement)	5,248	4,187	20%

LESSONS LEARNED: AIR INFILTRATION TESTING

- The nature of the older buildings small businesses tend to occupy limit the ability to conduct blower door tests due to a variety of complicating factors, including building size, configuration of the structure or weatherization spaces, and environmental or health and safety roadblocks.
- Although this is a small sample size and considering that little data exists on blower door testing in small business retrofits for weatherization, it is encouraging that the actual results closely mirrored calculated estimates, affirming the calculation tool's accuracy.

7 KPIs and Energy Savings Goals

CET defined tracking and measurement protocols for both quantitative and qualitative data, which were used to compare methods, determine program iterations, and develop conclusions. CET identified necessary data points, including key performance indicators (KPIs), as well as the collection protocols for capturing this data.

- Quantitative data collection occurred at multiple points during the Pilot, from the intake call to audit process, to post inspection and air infiltration tests.
- Qualitative data was collected with a customer survey and anecdotally through customer and weatherization contractor interactions.

Data was housed within and reported from CET's Salesforce platform. The KPI and Pipeline Report (Appendix H) were maintained throughout the Pilot and included with quarterly reports. Keeping non-test conditions separate, we used this data to draw conclusions about the correlation between KPIs and specific program elements or a combination thereof and make iterative decisions.

Our original program design included evaluating results against CET's historical data and where possible, data published on Mass Save Data, to draw conclusions about the relative impact of the new elements, and to develop recommendations for the Mass Save program. However, due to the onset of COVID restrictions CET is not able to draw like-for-like comparisons to historic data. The data would not be comparable given the abnormal conditions in 2020/2021. Similarly, the disruptions observed throughout the life of the Pilot, both to CET, weatherization contractors, and customers, impacted CET's ability to meaningfully track and report on the impact to elapsed time between lead generation and signed contract. Since the lifting of restrictions in late 2021/early 2022, CET has observed a more consistent and streamlined submission and approval response between the customer, the contractor, and the utility (i.e., "back to normal").

The KPIs presented in the table below were set at the beginning of the program and have been used to help inform our conclusions and our recommendations for the Mass Save program. The project demographic information, specifically building types, square footage, business types and equity metrics, were not part of the program design but are provided here to give context to the customers we served specific to completed projects.

Table 3 Key Performance Indicators

Metric	Results	Observations
Businesses Visited	242	Businesses were initially engaged and screened through a series of avenues, and most successful was direct outreach.
Weatherization Projects Completed	59	As of 12/31/21, 36 projects were still in progress and on track for completion in 2022. To date, 24% of visited businesses have been weatherized; 39% will ultimately be weatherized.
Businesses Served with DI Measures	120	50% of businesses visited received one or more DI measures.
Total Unique Businesses Served	166	Among all businesses visited, 69% have already completed a weatherization project or received DI measures. Including those weatherization projects in the pipeline, 83% of businesses visited will complete an energy efficiency measure.
Building Size (sf)	200-64,500	The average square footage of businesses served was 11,634 sf.
Types of Structures	4	Completed projects included the following building types: Stick Built (51%); Brick Frame (40%); Concrete Block (6%); Metal Frame (4%)
Types of Business Served (completed projects)	15	Completed projects included the following business types: <ul style="list-style-type: none"> • Church 19% • Real Estate 15% • Retail 15% • Hotel 8% • Restaurant 6% • Manufacturing 6% • Community Service 8% • Recreational 6% • Law 4% • Apartments 6% • School 2% • Military 2% • Marketing Agency 2% • Landscaping 2% • Childcare 2%
Designated Environmental Justice (EJ) Communities ²	62%	Of the completed projects, 62% of the businesses are located within an EJ Community and fell within the following Block Groups: Income (45%): <ul style="list-style-type: none"> • Minority and Income (27%) • Minority (15%) • Minority and English Isolation (6%) • Minority, Income and English Isolation (6%)
Total Cost of Installed Measures	\$813,596	
Utility Incentive Contributions	\$731,279	Utility contributions included incentives from Columbia Gas (63%), Berkshire Gas (25%), and Eversource (12%). These contributions amounted to 90% of total installed measure costs.
Customer Contributions	\$82,317	Approximately 14% of customer co-pays were partially funded by CET's Community Climate Fund.
Annual Customer Cost Savings	\$116,764	
Lifetime Customer Cost Savings	\$1,591,938	

¹ Percent of contracts offered to contracts signed

² Data were obtained from <https://www.mass.gov/info-details/massgis-data-2020-us-census-environmental-justice-populations>.

The table below presents the energy savings recognized from the Pilot against the goals set at the beginning of the program. Proposed energy savings were not achieved due to depressed project activity and opportunities to complete audits and weatherization measures due to the onset of COVID restrictions.

Table 4 Energy Savings

Energy Savings ¹	Pilot Goals ²	Pilot Results ³
Natural Gas (Therms)		
Lifetime	3,575,000	971,112
Annual	143,000	68,119
Electric (kWh)		
Lifetime	7,700,000	396,021
Annual	1,100,000	55,832
GHG Emissions (lbs CO₂e)		
Lifetime	--	13,459,388
Annual	--	964,317

¹ TRM was utilized to attribute a lifetime and demand offset by a completed project annual gas and electric savings to each installed measure to calculate expected lifetime MMBTU or kWh savings.

² Defined goals assumed that the majority of savings would be recognized through lighting, however electric savings from the Pilot were primarily from measures related to heating or cooling resulting in lower-than-expected results.

³ As of 12/31/21

8 Recommendations

The goal of the Pilot was to test and refine program design and delivery models that when brought to scale will greatly increase, and make more comprehensive, cost-effective annual and lifetime energy savings in the small business sector. This section summarizes feedback CET received from weatherization contractors, which was used in combination with Pilot outcomes, to develop recommendations.

8.1 Weatherization Contractor's Feedback

As part of a survey conducted at the end of the Pilot (Appendix F), weatherization contractors were asked what elements of the Pilot they recommend be adopted moving forward:

- More flexibility for measures that do not fit neatly into modeling tool categories.
- A customer relationship tool or customer communication management and tracking system to allow for more seamless movement in the overall process.
- Fixed pricing worked well in many instances, however there were occasions when projects were especially complicated that made fixed prices difficult.
- An audit tool that contractors can use and implement, allowing contractors to calculate incentives.
- CET, or similar organization, conducting more outreach and building enthusiasm and commitment for commercial owners so they realize the value.

The weatherization contractors were also asked about challenges to small business weatherization that were not adequately considered during the Pilot:

- The Pilot did try to be adaptable and help to find solutions for roadblocks but was not always successful in removing all roadblocks of significance.
- Like all small business weatherization projects, it is critical to identify the correct building type that allow weatherization to be possible. I think CET and contractors are aware of the most favorable building types. Identifying them upfront would be great.
- Permitting costs can vary with businesses depending on size and use of buildings.
- Environmental roadblocks and owner vs. tenant liaisons for access to perform the work.
- Duration between initial estimating to installation can be months and lot can change on the contractor's level within that timeframe. Make the process open and fluid with room for evolving. If too stringent the more difficult to bring to life.

8.2 Recommendations

The recommendations for program design innovations to increase weatherization in small businesses are listed below and based on the outcomes of the Pilot and the above feedback received from weatherization contractors. The proposed actions may be new, additive, or simple enhancements to existing utility programs, but all serve the goal of streamlining and strengthening program design to effectively engage small business customers and help utilities scale to meet aggressive energy savings and equity goals.

1. **Modeling Tool with Embedded Pricing.** *Adopt a modeling tool that includes pricing to provide customer transparency, streamline decision making, and shorten the contracting timeline.* Customers appreciated seeing a cost/savings breakdown by measure, allowing for a greater understanding of what was being proposed to them, and weatherization contractors observed efficiencies with increased project approvals leading to an increased number of completed projects.
2. **Project Delivery Services.** *Leverage the project delivery services of the Small B vendor as a facilitator (e.g., CET) between the utility, customer, and weatherization contractor to translate technical requirements, demystify incentives, streamline execution, and verify project completion.* This role was critical in 1) providing the customer with one point of contact and providing full-service, turnkey support to reach weatherization goals; 2) helping the small business installation contractor complete projects successfully in a timely manner; 3) helping utilities meet energy savings goals; and 4) introducing other energy saving, non-weatherization measures to customers who scheduled with weatherization contractors directly.
3. **Customer Outreach Collaboration.** *Partner with weatherization contractors to collaborate on marketing, outreach, and acquisition efforts.* This strategy would “level up” existing PA marketing efforts by partnering with “boots on the ground” contractors who have direct engagement with small business customers. The contracting community is an untapped resource that can help utilities bring their program to scale to meet aggressive energy savings goals. Involving contractors at the beginning of customer outreach, including leveraging them during early on-site assessments, has proven to be a successful strategy for increasing referrals, customer leads, and contracted projects.
4. **Contractor Training.** *Train weatherization contractors on using assessment or modeling tool(s) and conducting weatherization assessments, including how to use building science to make strategic choices about adding or subtracting weatherization elements and potential remediation strategies to successfully meet BCR thresholds (vs. standard weatherization packages).* This strategy resulted in a quicker conversion of leads to contracts by fast-tracking the

initial step of the process. By leveraging the weatherization contractor community, utilities may also be able to bring their incentive programs to scale more quickly to meet energy savings goals.

5. **Auditor Skills.** *Teams who have both residential experience (Building Performance Institute [BPI]) and Certified Energy Manager (CEM) certifications can navigate both weatherization and the complex mix of other commercial energy efficiency measures to achieve comprehensiveness.* To maximize weatherization of commercial buildings, especially small businesses, CET recommends audit teams with this combination of skills and experience. CET has CEMs and engineers with decades of combined experience in the C&I space, but do not have BPI certification. We also have auditors that have moved up from the Mass Save residential programs who have extensive weatherization experience and BPI certifications. While CEM training touches on weatherization, it is a relatively minor aspect of the certification and the skills of our auditors that have come out of the residential program have proven most valuable, especially in the project component scenario building to tweak scopes so they pass, or to incorporate roadblock remediation costs. Our staff are collaborative in nature and leverage our whole team to the benefit of the customer and our utility partners.
6. **Decoupled Cost Model.** *Separate the cost of small business vendor services from actual project costs, especially for “micro” businesses.* The annual savings from a customer who only uses a few thousand therms per year is so modest that the traditional model of an all-in-one cost for these projects presented to the utilities is prohibitive to projects passing BCR or for them to be financially compelling for these smaller business customers. The long-term benefits are clear, and this adjustment to program design would increase access to this critical measure, and in the building types that are also most likely to be easily electrified among commercial rate payers.

Appendix A: Physical Rack Card



ENERGY EFFICIENCY PROGRAMS FOR SMALL BUSINESS



centerforecotechnology.org • ee@cetonline.org

- Control energy spending
- Keep your customers and employees comfortable
- Receive utility incentives up to 70% of project cost
- Local contractors
- Financing options may be available
- CET guides you through each step

Berkshire Gas: 800.944.3212 ext. 3
Columbia Gas: 413.727.3142



FOUR SIMPLE STEPS

1

Schedule your no-cost facility assessment by phone or email.

2

A trusted, local contractor will complete the work

3

Receive applicable incentives from your utility

4

Enjoy the savings!

Cut your energy costs

Save money on overhead costs

Improve the ambiance of your business

"CET helped Super Brush navigate the MassSave energy incentive program resulting in a \$45,000 rebate for the project. The project is good for the company, their employees, and the economic health of Massachusetts."

- Phil Barlow, Sales & Engineering
McCormick Allum Co. Inc.,

Appendix B: Virtual Rack Card

SMALL BUSINESS WEATHERIZATION & ENERGY EFFICIENCY

FOUR SIMPLE STEPS:

- 1 Schedule your no-cost facility assessment:**
 - email ee@cetonline.org
 - Columbia Gas customers call 413.586.7350
 - Berkshire Gas customers call 800.944.3212
- 2 A trusted, local contractor will complete the work**
- 3 Receive applicable incentives from your utility**
- 4 Enjoy the savings!**



Cut your energy costs | Improve the comfort of your business | Save money on overhead costs



Appendix C: Commercial Weatherization Program Webinar



**Welcome to our
webinar! We'll get
started shortly**



**Commercial
Weatherization
and it's
Benefits**



We help people and businesses
save energy and reduce waste.

We make green make sense.



Center for EcoTechnology Partners





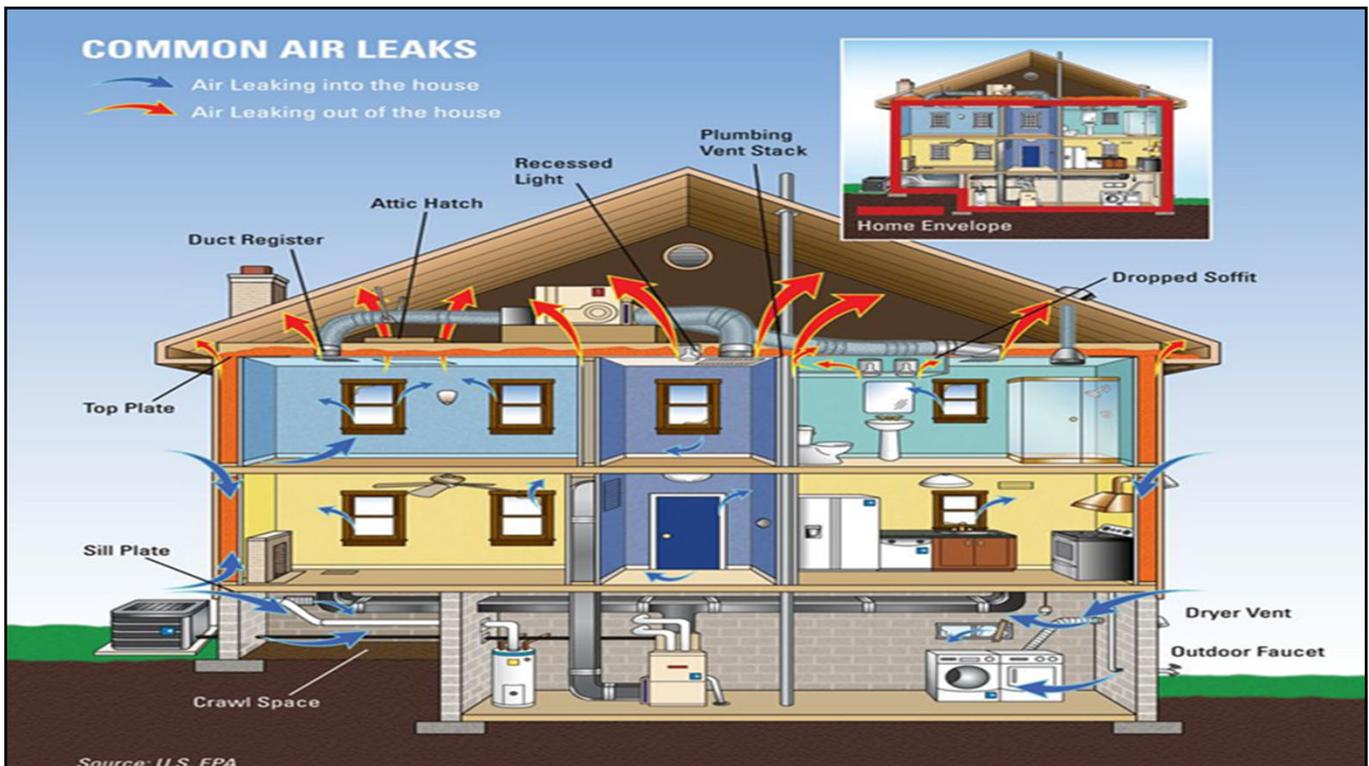
PROGRAM DETAILS



Commercial Weatherization Program



EVERSOURCE





WHAT CAN I GET WITH THIS PROGRAM?



Direct Installs Offered

- Faucet Aerators
- Spray Valves
- Showerheads
- Pipe Insulation
- Wi-Fi and Programmable Thermostats



Program Incentives and Benefits



Commercial Weatherization Program

Description	Qty	Estimated Cost (\$)	Estimated Incentive (\$)	Estimated Cost to Customer (\$)	Estimated Annual Savings (\$)	Estimated Payback Years
Weatherization						
Install 2" Thermal Barrier Polyiso on Kneewall	300	\$1,527.00	\$1,068.90	\$458.10	\$193.97	2.4
Attic Floor Enclosed Cellulose Dense Pack 12"	2700	\$7,776.00	\$5,443.20	\$2,332.80	\$1,439.84	1.6
Door: Thermal Barrier Polyiso 2" (Attic)	1	\$101.15	\$70.81	\$30.35	\$35.17	0.9
Install 2" Closed Cell Spray Foam on Rim Joist	564	\$2,256.00	\$1,579.20	\$676.80	\$195.76	3.5
Perform Air Sealing at Estimated 62.5 CFM50 Per Hour	4	\$410.00	\$287.00	\$123.00	\$46.42	2.6
Subtotal		\$12,070.15	\$8,449.11	\$3,621.05	\$1,911.16	1.9
Totals		\$12,070.15	\$8,449.11	\$3,621.05	\$1,911.16	1.9

Custom Energy Efficiency Measures



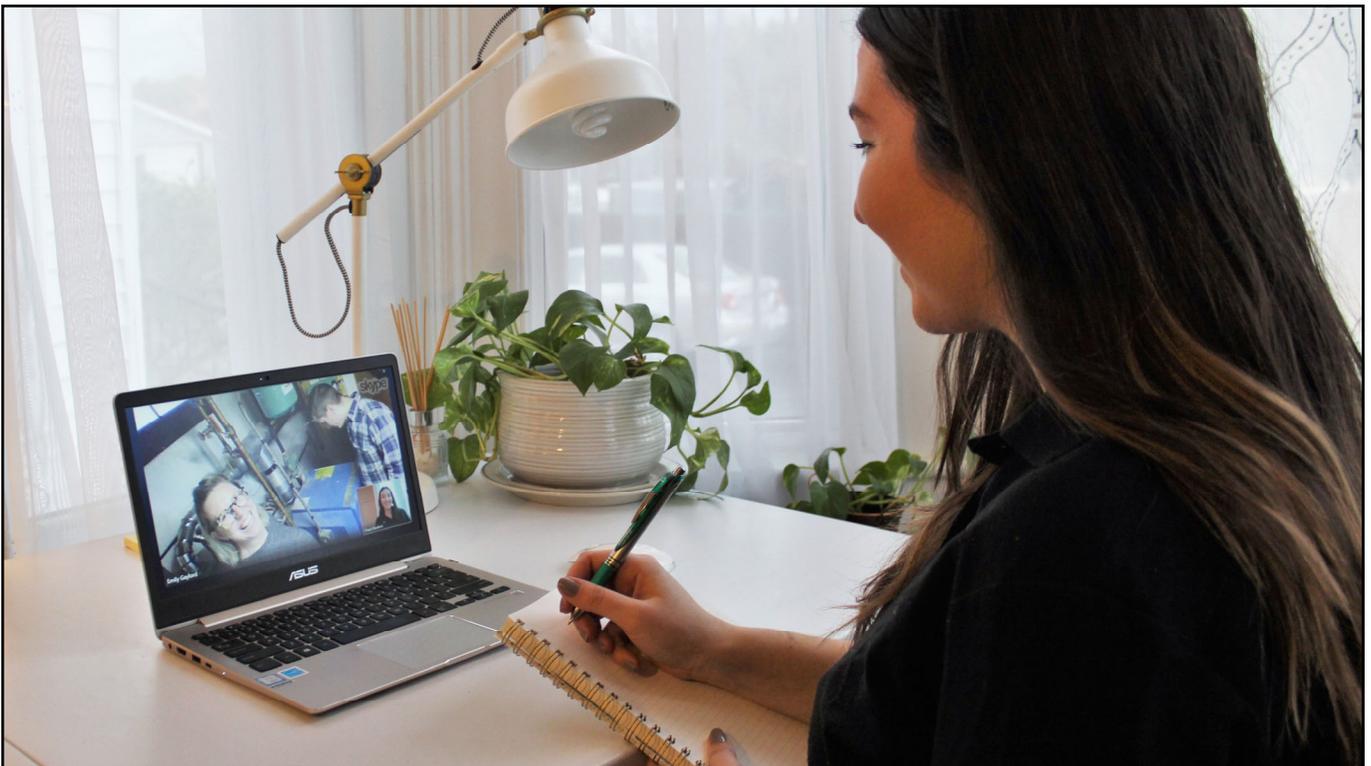
Heating System Controls



Steam Trap Maintenance



VIRTUAL ENERGY ASSESSMENTS



1. OUTSIDE PHOTOS

An image of each side of your business.



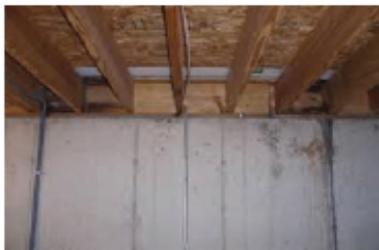
2. THERMOSTATS

Photos of each type of thermostat in your business.



3. BASEMENT & RIM JOIST

A photo of your basement and/or crawlspaces and a photo of the rim joist that sits at the top of your foundation wall (if exposed).



4. HEATING & DOMESTIC HOT WATER SYSTEM

A photo from the front with the exhaust pipe and/or hot water pipes in view and one of the name plate with the model number.

(2 photos per system.)



5. ATTIC & KNEE WALL

A photo from inside any accessible attic spaces or knee walls.

A knee wall is a short wall, typically under three feet in height, used to support the rafters in timber roof construction.



ENERGY AND COST SAVINGS



First Church of Christ

- Vendor: Energia
- Measures: Air sealing and insulation
- Annual Savings:
 - 4,716 therms natural gas
 - Cost savings: \$5,423
- Lifetime Savings:
 - 70,740 therms natural gas
 - Cost savings: \$81,351



Gray House

- Vendor: Energia
- Measures: Attic insulation and air sealing
- Annual Savings:
 - 699 therms natural gas
 - 176 MMBtu oil
 - \$803 cost savings
- Lifetime savings
 - 10,485 therms natural gas
 - 2,640 MMBtu oil
 - \$12,045 cost savings



WRAP-UP



Recap: What are the Benefits?

- Control energy spending
- Keep your customers and employees comfortable
- Receive utility incentives from 50-100% of project cost
- Receive recommendations with pricing during visit
- Support local contractors
- Financing options may be available

You will be guided every
step of the way!

Commercial Weatherization Program

For more information, call:

Columbia Gas customers: (413)-727-3142

Berkshire Gas customers: (800)-944-3212 (Press #3 for Commercial)

Or email:

All utilities: ee@cetonline.org

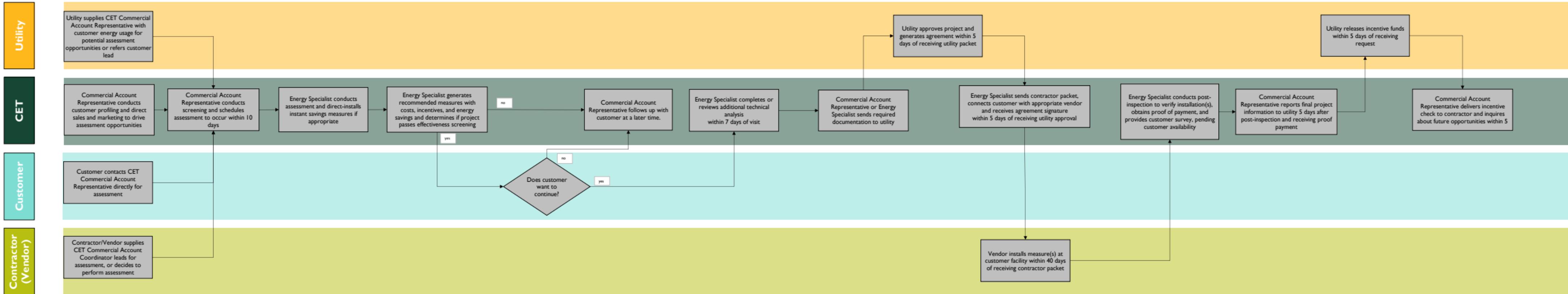
Satisfied Customers

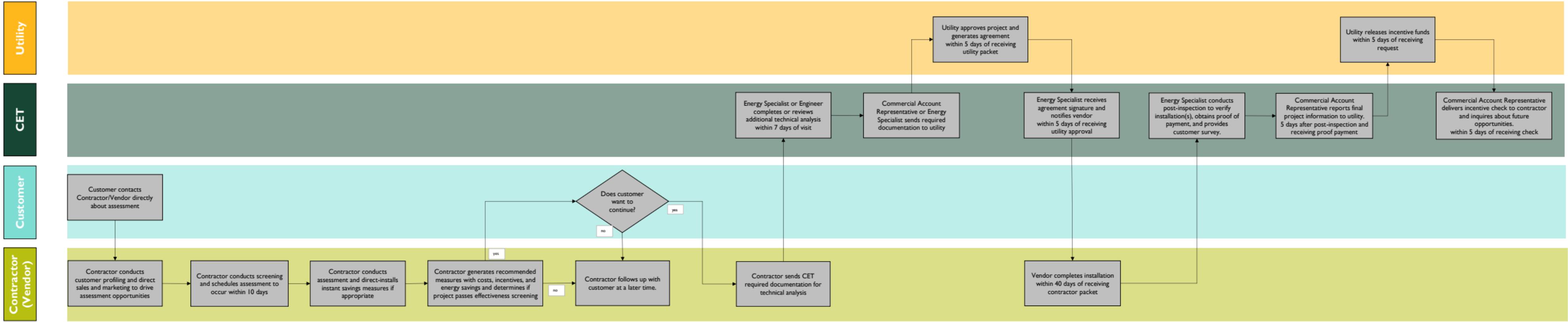
"CET helped Super Brush navigate the MassSave energy incentive program resulting in a \$45,000 rebate for the project. The project is good for the company, their employees, and the economic health of Massachusetts."

- Phil Barlow, Sales & Engineering
McCormick Allum Co. Inc.,

Appendix D: Project Workflow

DOER Small Business Program Delivery Tasks - Customer Acquisition Pathway Through CET

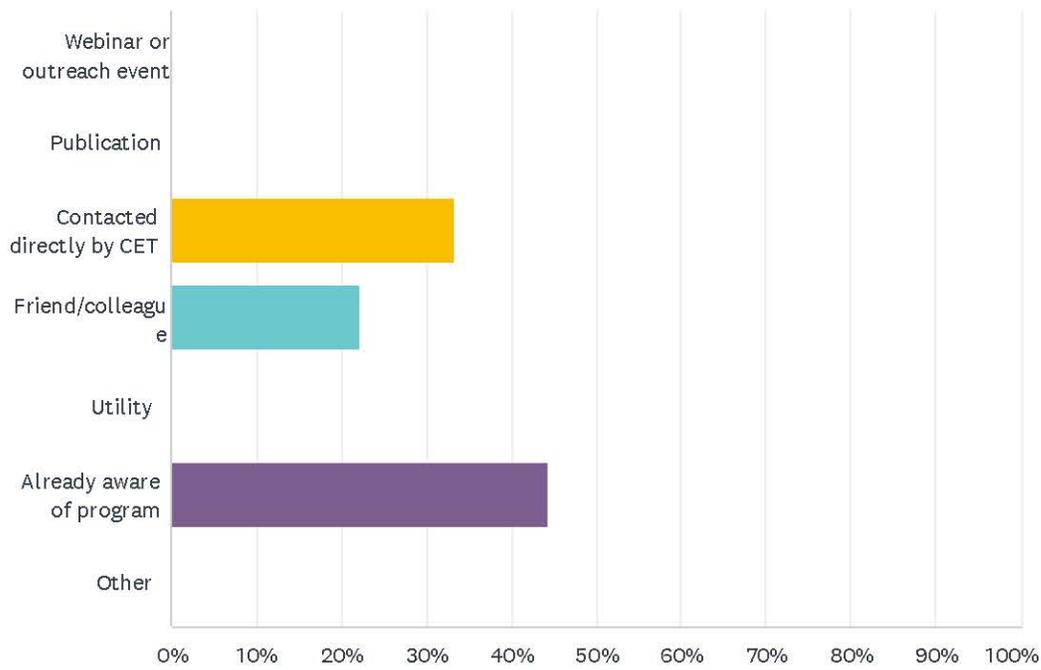




Appendix E: Customer Survey

Q1 How did you learn about the weatherization program?

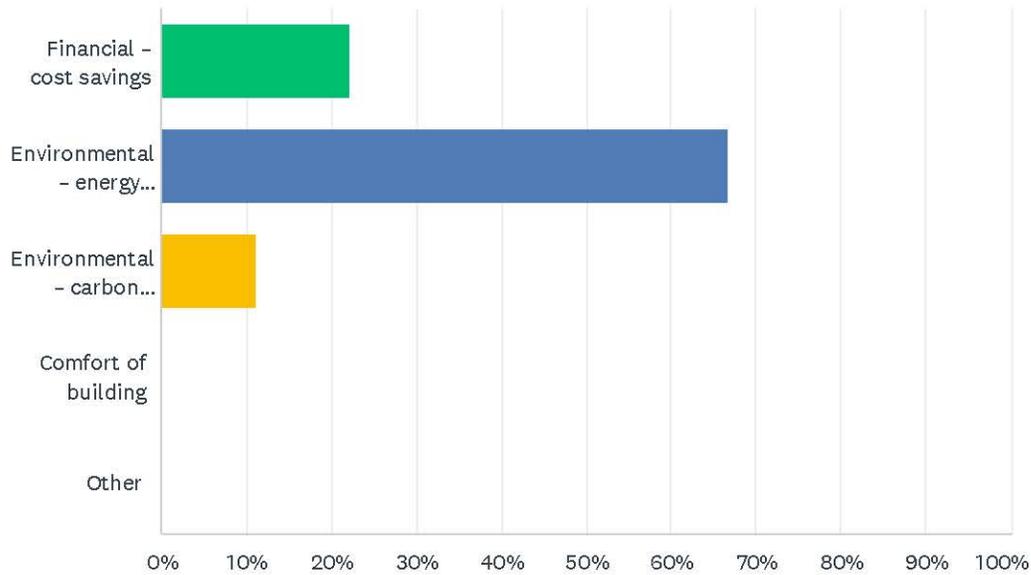
Answered: 9 Skipped: 0



ANSWER CHOICES	RESPONSES	
Webinar or outreach event	0.00%	0
Publication	0.00%	0
Contacted directly by CET	33.33%	3
Friend/colleague	22.22%	2
Utility	0.00%	0
Already aware of program	44.44%	4
Other	0.00%	0
TOTAL		9

Q2 Which factors influenced your decision to schedule the energy audit? Check all that apply.

Answered: 9 Skipped: 0



ANSWER CHOICES	RESPONSES	
Financial – cost savings	22.22%	2
Environmental – energy savings	66.67%	6
Environmental – carbon emission reduction	11.11%	1
Comfort of building	0.00%	0
Other	0.00%	0
TOTAL		9

Q3 Did the auditor present you with a summary of recommendations with costs and savings?

Answered: 9 Skipped: 0

#	RESPONSES	DATE
1	Yes	7/19/2021 9:39 AM
2	Yes	7/16/2021 1:07 PM
3	yes	7/1/2021 8:10 PM
4	Yes	5/25/2021 9:29 PM
5	somewhat	5/24/2021 8:09 PM
6	yes - had a virtual assessment. Auditor was great!	1/5/2021 5:27 AM
7	yes	12/17/2020 4:37 PM
8	YES	12/15/2020 5:44 PM
9	Yes	12/15/2020 11:44 AM

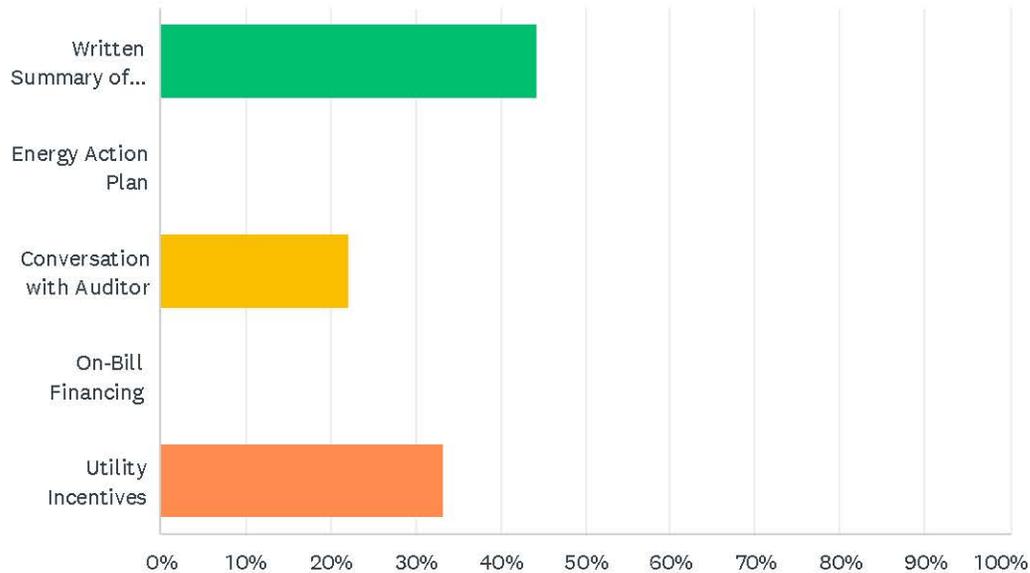
Q4 How satisfied were you with the audit process?

Answered: 9 Skipped: 0

#	RESPONSES	DATE
1	Satisfied	7/19/2021 9:39 AM
2	10/10	7/16/2021 1:07 PM
3	the best	7/1/2021 8:10 PM
4	Very helpful. Gave us new ideas and helped us refine what was most important	5/25/2021 9:29 PM
5	very good	5/24/2021 8:09 PM
6	Very! Laura made it really easy and explained evrything!	1/5/2021 5:27 AM
7	very	12/17/2020 4:37 PM
8	100% satisfied	12/15/2020 5:44 PM
9	Extremely satisfied	12/15/2020 11:44 AM

Q5 Did any of the following program elements influence your decision to proceed with installation? Check all that apply:

Answered: 9 Skipped: 0



ANSWER CHOICES	RESPONSES	
Written Summary of Recommendations, Costs, and Savings	44.44%	4
Energy Action Plan	0.00%	0
Conversation with Auditor	22.22%	2
On-Bill Financing	0.00%	0
Utility Incentives	33.33%	3
TOTAL		9

Q6 How satisfied were you with the installations and installation process?

Answered: 9 Skipped: 0

#	RESPONSES	DATE
1	Satisfied	7/19/2021 9:39 AM
2	10/10	7/16/2021 1:07 PM
3	exlant	7/1/2021 8:10 PM
4	very	5/25/2021 9:29 PM
5	good	5/24/2021 8:09 PM
6	Very! Ours was a difficult building. Very old. Nothing straight.	1/5/2021 5:27 AM
7	very	12/17/2020 4:37 PM
8	It was FANTASTIC	12/15/2020 5:44 PM
9	100%	12/15/2020 11:44 AM

Q7 Do you plan to implement additional measures from your Energy Action Plan?

Answered: 9 Skipped: 0

#	RESPONSES	DATE
1	Possibly	7/19/2021 9:39 AM
2	We have everything we need.	7/16/2021 1:07 PM
3	no	7/1/2021 8:10 PM
4	yes	5/25/2021 9:29 PM
5	none needed	5/24/2021 8:09 PM
6	We have all new energy efficient lighting and will be looking into a deeper energy retrofit.	1/5/2021 5:27 AM
7	yes	12/17/2020 4:37 PM
8	Yes	12/15/2020 5:44 PM
9	yes	12/15/2020 11:44 AM

Q8 Do you have any additional comments or suggestions?

Answered: 9 Skipped: 0

#	RESPONSES	DATE
1	No	7/19/2021 9:39 AM
2	THANK YOU!	7/16/2021 1:07 PM
3	i hope all company like your company " Mark O'Hearne"	7/1/2021 8:10 PM
4	Thanks for helping to facilitate connections with so many good people and programs. We're already saving money and energy. Laura Drake was fabulous and really tried hard to help us out.	5/25/2021 9:29 PM
5	thank you for making this program happen	5/24/2021 8:09 PM
6	Laura Drake is awesome, helpful, goes above and beyond!	1/5/2021 5:27 AM
7	no	12/17/2020 4:37 PM
8	Everything was so professional and helpful. I am so thankful for this program!!	12/15/2020 5:44 PM
9	No	12/15/2020 11:44 AM

Appendix F: Contractor Survey

DOER Small Business Weatherization Pilot: Contractor Survey

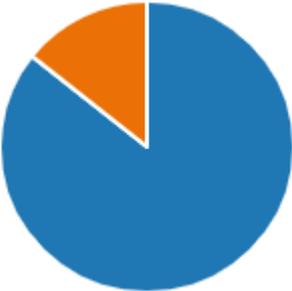
7
Responses

09:39
Average time to complete

Active
Status

1. Did the small business weatherization pilot positively impact your business?

- Yes 6
- Neutral 1
- No (negatively impacted) 0



2. If yes, how was your business positively impacted? (select all that apply)

- Being provided leads by CET 7
- Being able to source my own I... 4
- Having fixed, predictable prici... 3
- Reducing time on site (pre-sc... 3
- Other 1



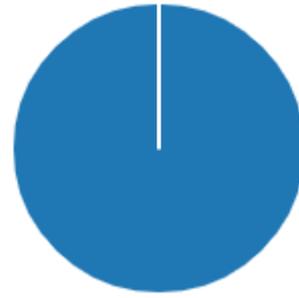
3. Did you work with more small businesses during the pilot than you otherwise would have?

- Yes, small businesses represen... 6
- Small businesses represented ... 1
- Small businesses represented ... 0



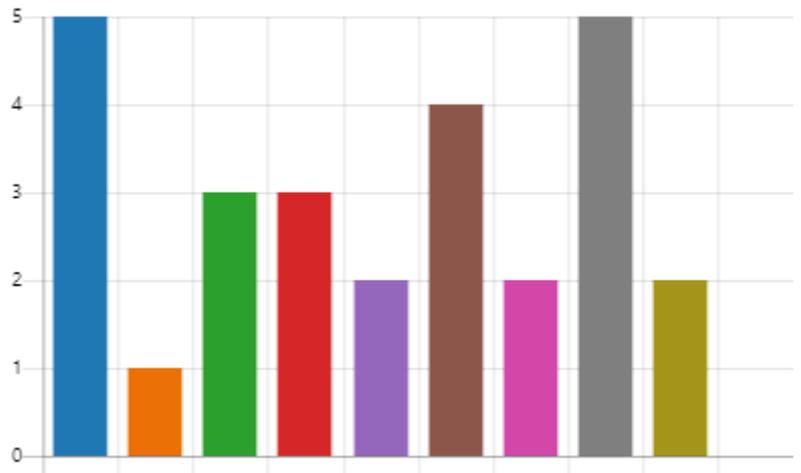
4. Has CET's modeling tool created any efficiencies or positively impacted your work?

- Yes 7
- No 0



5. If yes, how? (select all that apply)

- Increase in approved incentives 5
- Use of fixed pricing 1
- More efficient work flow 3
- Faster incentive turnaround ti... 3
- Quicker contracting 2
- Increased number of projects 4
- Improved customer acquisition 2
- Improved collaboration with u... 5
- Identification of incentive roa... 2
- Other 0



6. Have any other aspects of working with CET positively impacted your work?

5
Responses

Latest Responses

"I like the collaboration with CET. Good collective team work. If we can'...

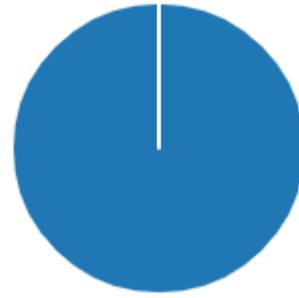
7. Have you had a chance to use CET's on-site modeling tool?

- Yes 3
- No 4



8. If adopted by utilities, do you think a tool like this could be easily used/adopted by contractors?

● Yes	6
● No	0



9. If no, what are the major areas of concern or limitations to use?

2
Responses

Latest Responses

"only concern is fixed pricing during time of inflation, gas hikes. how c...

10. What elements of the pilot would you recommend be adopted moving forward?

3
Responses

Latest Responses

"Most. the more CET can outreach and build enthusiasm and commit...

11. Are there challenges to small business weatherization that weren't adequately considered or addressed during the pilot?

5
Responses

Latest Responses

"Its been awhile but, can't think of specifics. Turn around times can be ...

Appendix G: KPI and Pipeline Report

DOER Small Business Weatherization Pilot Quarterly KPI Report

Metric	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Total
Program Delivery								
Program Administration	\$ 71,701.25	\$ 51,032.50	\$ 51,362.50	\$ 56,098.75	\$ 82,066.25	\$ 105,932.50	\$ 54,108.75	\$ 472,302.50
Utility Incentive Contributions	\$ 170.00	\$ 454.00	\$ 68,535.00	\$ 70,667	\$ 180,689	\$ 196,815.33	\$ 213,948.30	\$ 731,278.87
Customer Contributions	NA	NA	\$ 4,407.00	\$ 3,501.07	\$ 11,673.50	\$ 11,360.31	\$ 51,374.80	\$ 82,316.68
Weatherization Projects Completed	NA	NA	5	7	16	9	22	59
Other Energy Efficiency Projects Completed	1	7	8	5	43	46	23	133
Businesses Engaged	29	34	28	36	54	68	42	291
Annual Impact								
Annual Therm Savings	132.5	398.5	7,239	3,162.5	18,103.50	19,592	19,490	68,119
Annual kWh Savings				348	9,215	1,890	44,378	55,832
Annual MMBtu Savings				29.1	97	6.6	66	199
Annual Customer Cost Savings	\$ 192.13	\$ 577.83	\$ 10,496.55	\$ 5,372.04	\$ 30,641.26	\$ 29,042.85	\$ 40,441	\$ 116,764.07
Annual GHG Emissions Reductions (lbs. CO2e)	1,708	5,137	93,311	46,267	258,408	255,340	304,147	964,317
Lifetime Impact								
Lifetime Therm Savings	927	3,045	117,635	59,416	249,213	148,110	392,766	971,112
Lifetime kWh Savings				3,486	64,506	13,231	314,798	396,021
Lifetime MMBtu Savings				582	1,940	46.2	1320	3,888
Lifetime Customer Cost Savings	\$ 1,344.15	\$ 4,415.25	\$ 170,570.75	\$ 100,328.44	\$ 420,431.37	\$ 219,197.14	\$ 675,651.14	\$ 1,591,938
Lifetime GHG Emissions Reductions (lbs. CO2e)	11,949.03	39,250.05	1,516,315.15	774,159.61	3,601,783.71	1,928,699.89	5,587,231	13,459,388

GHG Emissions Based on the following values:

Electric	0.932	lb/kWh CO2E
Oil	24.250	lb/gal CO2E
LP	12.780	lb/gal CO2E
Nat Gas	12.890	lb/therm CO2E

Energy density

Oil (MMBtu/gal)	0.1385
Propane (MMBtu/gal)	0.0914

The \$/unit should come from the following list**:

Electricity (\$/kWh)	\$0.24
Oil (\$/gal)	\$3.21
Propane (\$/gal)	\$2.83
Natural gas (\$/therm)	\$1.45

*Values sourced from

<http://www.epa.gov/cleanenergy/energy-resources/refs.html>,

<https://www.eia.gov/electricity/state/massachusetts/>

<https://www.mass.gov/info-details/household-heating-costs>

