

Stacked Efficiency and Electrification (SEEP)

Model Program Framework

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Acronyms and Abbreviations

ACCA	Air Conditioning Contractors of America
ACEEE	The American Council for an Energy-Efficient Economy
AGC	Association of General Contractors
AQI	Air Quality Index
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
BEM	Whole-Building Energy Modeling
BPA	Building Performance Association
BPI	Building Performance Institute
CBO	Community Based Organization
CDBG	Community Development Block Grant
CO ₂	Carbon Dioxide – a byproduct of fossil fuel combustion, a greenhouse gas contributing to global warming
CLCPA	Climate Leadership and Community Protection Act
CO _{2e}	Carbon Dioxide Equivalent
DOE	United States Department of Energy
EEaaS	Energy Efficiency as a Service
EPA	Environmental Protection Agency
ERI	Energy Rating Index
FHA	Federal Housing Authority
GC	General Contractor
GHG	Greenhouse Gasses
GJGNY	Green Jobs Green New York
HCR	Homes and Community Renewal
HEAP	Home Energy Assistance Program
HES	Home Energy Score
HERS	Home Energy Rating System
HOA	Homeowner’s Association
HUD	Housing and Urban Development
HVAC	Heating, Ventilation and Air Conditioning
IECC	International Energy Conservation Code
IRA	Inflation Reduction Act
IRS	Internal Revenue Service
LMI	Low and Moderate Income

MMBtu	Million British Thermal Units
NABCEP	North American Board of Certified Energy Practitioners
NEEP	Northeast Energy Efficiency Partnerships
NYC	New York City
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
OSHA	Occupational Safety and Health Administration
PACE	Property Assessed Clean Energy
PV	Photovoltaic
QA	Quality Assurance
RESP	Rural Energy Savings Program
RESNET	Residential Energy Services Network
RGGI	Regional Greenhouse Gas Initiative
SEEP	Stacked Efficiency and Electrification Program
SNAP	Supplemental Nutrition Assistance Program
SSI	Supplemental Security Income
TEP	Total Energy Pathways
USDA	United States Department of Agriculture
VBP	Value-Based Payment
WAP	Weatherization Assistance Program
ZEN	Zero Energy Now, a Vermont based program similar to the SEEP

Overview

A Stacked Efficiency and Electrification Program (SEEP) aims to achieve scalable solutions for whole-home energy efficiency upgrades and electrification. A “stacked” project (or a whole-home energy retrofit) can be defined as any retrofit project that incorporates a mix of weatherization, energy efficiency upgrades, clean heating and cooling implementation, and renewables; whether bundled in an all-in-one approach (e.g., [Total Energy Pathways](#)) or strategically planned to implement measures over a period of time.

This framework is intended to help potential implementers plan, design, and implement a program that combines all aspects of and incentives for a whole-home energy efficiency retrofit into a single, easy to use program for participating homeowners and contractors. For the purposes of the SEEP framework, the stacked approach has been broken down into three primary aspects: weatherization of the building envelope to improve energy efficiency, electrification of the home, including replacing fossil fuel heating with electric systems, and the installation of renewable energy sources in the home or community (via community solar).

This framework was developed using feedback and input from experts in the various industries and organizations involved in the retrofit process, including contractors, financial institutions, government programs, and Community-Based Organizations (CBOs). Common challenges, important considerations, and best practices from these experts have been consolidated into the framework and organized into navigable chapters with the intention of allowing users to easily find and address pertinent questions and topics. While the framework is intended to be as comprehensive as possible, the material is tailored specifically to the needs of single-family homes within New York State (NYS), and an emphasis has been placed on effective ways to scale retrofit projects up to meet consumer demand and meet any targeted environmental goals.

Table ES-1. SEEP Design Elements

Element	Description	Questions/Ideas to Consider
1) Building Evaluation	Evaluating the performance of the home is essential in determining next steps and recommended measures. This will help tailor plans to specific home typologies.	
2) Weatherize	Efficiency First: By helping reduce energy consumption through weatherization measures, it can help decrease the costs and size of heating/cooling systems and solar PV.	
3) Electrify	Electrify Everything: Make the switch from fossil fuel space and water heating equipment to energy efficient electric equipment.	
Space Heating		
Cooling		
Water Heating		
Cooking		
4) Renewables	Investing in local energy production such as residential PV or community solar further reduces energy costs, reduces carbon emissions, and adds less load to power distribution systems.	Resilience—backup power/storage
5) Financing		
6) Reporting/Feedback Loop	Built-in reporting standards to help track project efforts, collect data, and act as a reporting data source.	

How to Use This Framework

This framework is intended to inform the development of a locally sensitive plan to implement a Stacked Efficiency and Electrification Program. There are many options available, and the implementer should choose the options that best align with the goals and local conditions where the SEEP would be implemented. For additions use local and expert input where applicable.

Feedback about this framework can be sent to NYSERDA at ResMarket@nyscrda.ny.gov.

1 Potential Impacts of SEEP Project

1.1 Introduction

The SEEP is projected to have a number of positive impacts not just for homeowners undertaking the upgrades, but for the environment and community as well. Different benefits will appeal to different individuals, so it is important for the program implementer to understand and, whenever possible, quantify these benefits. Understanding and quantifying the projected benefits will play an important role in marketing the program to the public, measuring its success, securing financing, and overall success.

1.2 Design and Decisions

This section details benefits expected to be gained directly from the program implementation as well as indirect benefits resulting from the program. In addition, this section will address how the implementer can go about quantifying the benefits for their specific area.

Carefully documenting the expected benefits of a locally implemented SEEP will provide content for program design, marketing, evaluation, and reporting.

1.2.1 Direct Benefits

A SEEP is expected to provide benefits for homeowners, tenants, their local communities, and the wider community of State and regional residents. The program implementer should be aware of these benefits as they will help with both measuring the success of the program and marketing it to participants.

1.2.1.1 Homeowner and Tenant Benefits

Homeowners and tenants can derive a significant number of benefits from the successful implementation of a SEEP. There are a variety of different benefits for homeowners that range from financial to health to general quality of life. Common examples are listed below.

Energy Savings: Programs that incentivize whole-home retrofits (weatherization, electrification, and distributed renewable energy) can significantly reduce a home's energy demand along with expenses for energy.

An American Council for an Energy-Efficient Economy (ACEEE) study noted projected energy savings ranging from 2.5 million British thermal unit (MMBtu) to 51 MMBtu annually.¹ For reference, a single MMBtu is enough energy to run around 150 loads in a standard electric dishwasher or to run a 24-cubic foot refrigerator for roughly 6 months.

It is important to note that many of the programs studied by the ACEEE report were not as comprehensive as a SEEP report would be. These programs ranged in services offered from whole-home retrofits to single renovations, such as replacing a natural gas heating system with a heat pump. While exact savings will vary, if correctly implemented energy savings from the SEEP should fall on the higher side of the range listed above.

Caveat

When informing homeowners about program benefits be aware that simply electrifying a home by replacing the fossil fuel heating with an electric system can increase total energy used in a home. It is typically only through the weatherization improvements and the use of on-site renewables that homes can achieve a reduction in energy used from the grid. This is an important caveat to mention, particularly to any homeowners that choose to undergo electrification improvements prior to the other aspects of the whole-home retrofit.

Health Benefits: The SEEP upgrades can have significant health benefits for the homeowner(s). Switching homes from fossil fuel appliances and systems to electric alternatives, such as induction stoves and air source heat pumps, results in a significant reduction of indoor air pollutants. This in turn results in better respiratory health for homeowners. Additionally, while not directly part of the SEEP, addressing health hazards like asbestos, lead paint, mold from excessive indoor humidity, or lack of even heating are typically prerequisites before the weatherization stage can take place, providing additional health and safety benefits to occupants.²

Quality of Life Improvements: A successful home retrofit should result in improved comfort levels for the inhabitants. Examples include more consistent temperatures and humidity, as well as more control over temperatures and when appliances/heating systems are active. Improved insulation, more efficient appliances, and integrated building controls all contribute to these quality-of-life improvements.

Better Property Values: Modernizing homes through the SEEP can result in better property values for homeowners.³

Financial Savings: In addition to less energy used in homes, homeowners can expect to reduce their energy expenses through the retrofit process. Between the efficiency improvements from weatherization and the use of renewables on site, the retrofit could result in a lower monthly energy bill for homeowners even in situations where fossil fuels for heating are less expensive per unit of energy than electricity.

Vermont's Zero Energy Now (ZEN) conducted a review on 24 homes that underwent whole-home retrofits (weatherization, electrification, renewable installation) under their program and found that homeowners saved an average of \$1,861 annually on their energy bill, with the highest savings amounting to \$3,885 annually. This average represented an annual cost savings of 60% for households. The savings will be particularly impactful for low- to moderate-income individuals, as they usually face higher energy bills in proportion to their incomes.

Caveat

It should be noted that out of the 24 retrofitted homes analyzed in the study, only four were cash flow positive (i.e., the monthly energy savings were greater than the monthly payments for the loans) over the 20-year financing period at a 5.25% interest rate. While this ratio may seem low, the evaluation report notes that the savings for many of the homes could have been greater had users been more thoroughly educated on newly installed features such as heat pumps as well as had more follow-up sessions with contractors.⁴ Improving the retrofitting process through the feedback of programs like ZEN and securing loans with lower interest than the modeled 5.25% for prospective homeowners will help a great deal in increasing the ratio of retrofitted homes that are cash flow positive. It's also important to note that the cash flow is heavily influenced by the cost of upgrades, incentives available (local, utility, State, federal), tax credits available, solar Photovoltaic (PV) generation potential and financing terms.

In addition to money saved from reduced energy usage, homeowners also stand to benefit financially from the health benefits of the retrofits. A reduction in health-related issues from the retrofits can also reduce the amount a homeowner spends on healthcare annually.⁵

1.2.1.2 Community Benefits

In addition, the community in which the program is implemented should benefit along with homeowners. Some of these possible benefits are listed below.

Employment Opportunities: Keeping up with demand generated from the SEEP will likely require an increase in the number of contractors available and/or the number of staff employed by the existing contractor base. The program is also expected to increase demand for skill sets relevant to these energy efficiency improvements. These requirements will generate more employment opportunities for most communities.⁴

Better Grid Management: While the transition from fossil fuel heating to electric sources will increase overall electricity use, weatherization retrofits will significantly improve the energy efficiency of homes, decreasing the additional electrical load requirements. Implementing local rooftop solar PV or subscribing to local community solar brings the generation and consumption closer together, decreasing long-distance transmission requirements. Additionally, energy management technology such as smart thermostats should allow homes to divert energy consumption from times of peak demand, resulting in more consistent energy demands throughout the day for the grid.⁶

Energy Independence: On a community level, expanding the availability of renewable energy sources in homes means there will be less reliance both on fossil fuel sources and energy imports from neighboring states/communities. This increased energy independence should provide a financial advantage for individuals and communities involved in the SEEP.

1.2.2 Environmental Benefits

Aside from benefits to individual homeowners and the community where a SEEP is implemented, significant environmental benefits from the program are also expected. Some of these benefits are listed below.

Reduced Greenhouse Gas Emissions: Replacing fossil fuel heating with electric sources will result in a significant reduction in greenhouse gas emissions. This reduction will be most significant in states like New York where the amount of electricity generated from renewable sources is relatively high and on target to be 70% renewable by 2030.

The ACEEE study that measured the energy savings done from various electrification programs did a similar analysis of the reduction of Carbon Dioxide (CO₂) equivalent emissions. A reduction in greenhouse gas emissions from these programs was found, ranging from .13 tons of CO₂ equivalent (CO₂e) emissions to 3.33 tons annually.⁷ Given that the SEEP entails a whole-home retrofit unlike many of the programs analyzed in the ACEEE study, the program implementer can expect their emission reductions to fall on the higher side of the range listed. The exact reductions will vary, but with the average home generating about 7.5 tons of CO₂e emissions annually, there is real potential to significantly reduce emission levels through the program.

Improved Air Quality and Reduced Pollution: The expansion of renewable energy generation from the SEEP means that there will likely be less energy generation from fossil fuel sources. This will have positive impacts on air quality not just for the homeowner but also for the community.

1.2.3 Indirect Benefits

In addition to the direct benefits expected from a SEEP, there are also predicted to be several indirect benefits that could contribute toward other decarbonization efforts in the future. Some examples of indirect benefits and how they might occur are listed below.

Improved Consumer Awareness: The education of homeowners on the use of energy efficiency measures and their benefits is expected to play a significant role toward the overall success of a SEEP. An indirect benefit is that this improved awareness should extend to other energy efficiency and decarbonization efforts in the community.⁷ Homeowners that have positive experiences with their own retrofit are more likely to publicly support other decarbonization efforts and the further expansion of the SEEP itself.

Additionally, electrifying homes provides more opportunities for independent decarbonization efforts for homeowners. For example, a homeowner who has just undergone a retrofit and expands on the electricity infrastructure in their own home will be more likely to purchase electric appliances and vehicles than homeowners who lack this capacity.

Workforce Development and Specialization: A SEEP is likely to provide more employment opportunities for a community. As these energy efficiency retrofits tend to require specific training, it can also be expected that the local workforce in a community would gain these skills over the course of the program. This means that a post-program workforce will be better trained to handle energy efficiency improvements, which should in turn increase the accessibility of these improvements going forward.

Innovation for Future SEEPs or Similar Programs: Information gained through the execution of a SEEP can provide insight for future iterations or similar programs in other areas. An example of this would be the gathering of home characteristics from the program. Such information can then be shared with similar programs to collaboratively establish and improve best practices.

More Financing Opportunities: Successful implementation of a program can provide additional insights and evidence about its benefits. This data can potentially be leveraged to access funding from relevant sources in the future.

1.3 Calculating Benefits

SEEP programs should use building energy modeling to calculate average expected energy savings. A variety of modeling tools, both for the individual level and for levels at the municipality or greater, have been provided in chapter 2 on measuring success.

For other benefits aside from energy savings, it may be advisable that the program establish a baseline for each metric prior to the program starting and measure again at the end of the program. For example, before and after surveys could be used to measure benefits such as consumer awareness or quality of life improvements. For programs that are expected to have a longer duration, the program implementer may want to measure progress at various stages throughout the process in addition to doing so at program completion. Data for some of these metrics may already exist, so reaching out to organizations involved in local research may be able to provide this information without adding significant expense to the program implementer. It is recommended that SEEP program staff conduct a research review to add additional insights to the modeled versus actual calculations.

1.4 Partners and Support

The program implementer is encouraged to identify groups in their local area that can assist with forecasting and measuring potential benefits from the SEEP. This section lists some potential groups that might be able to assist the program implementer with this and how.

Research Organizations: Research organizations dedicated to the study of energy, health and safety, or construction will likely have insights on identifying and quantifying the potential benefits of a SEEP.

These organizations will potentially be interested in studying the results and implementation of the SEEP program as well. Collaboration with research organizations will assist in both accurately determining benefits as well as lending additional credibility to claims made by the program implementer regarding these benefits.

Homeowners or Community Groups like HOAs: Aside from needing general participation from them, homeowners, and homeowner organizations like Homeowners Associations (HOA), can provide important information to the program implementer regarding specific characteristics for the community as well as shared home traits.

Programs Similar to SEEP: Other programs that already have or currently are assisting with energy efficiency efforts in homes may be able to assist the program implementer in identifying what benefits are most appealing to homeowners. Collaboration with veteran programs will likely provide other helpful insights as well.

1.4.1 Additional Resources

Table 1. Potential Impacts of SEEP Additional Resources

Resource (Benefits)	Description	Link
An environmental justice analysis of distribution-level natural gas leaks in Massachusetts, USA	A study on Science Direct, discussing the presence of natural gas leaks in MA, the communities they affect, and equity issues related to these leaks.	https://www.sciencedirect.com/science/article/pii/S0301421522000039?via%3Dihub
Methane and Nitrogen Oxide emissions from natural gas stoves, cooktops, and ovens in residential homes	A study from Lawrence Berkeley National Labs discussing the emissions and health effects from indoor natural gas cooking equipment.	https://pubs.acs.org/doi/10.1021/acs.est.1c04707
Customer Outcomes in Pay-As-You-Save Programs	A Lawrence Berkeley National Labs study, discussing the outcomes of Pay-As-You-Save programs.	https://eta-publications.lbl.gov/sites/default/files/deason_aceee_2022_preprint.pdf
Utilities and Energy Efficiency as a Service: The potential for win-win partnerships	An ACEEE study demonstrating energy efficiency as a service (EEaaS) has proven value for businesses and energy efficiency service providers. Utilities can also benefit from involvement.	https://www.aceee.org/sites/default/files/pdfs/u2203.pdf
Analysis: Cutting the 'green crap' has added 2.5billion pounds to UK energy bills	A Carbon Brief article discussing the negative consequences of David Cameron's strategy of scrapping climate policies over the past decade, including energy-efficiency subsidies, effectively banning onshore wind in England, and eliminating the zero-carbon homes standard.	https://www.carbonbrief.org/analysis-cutting-the-green-crap-has-added-2-5bn-to-uk-energy-bills/#:~:text=Energy%20bills%20in%20the%20UK,the%20zero%2Dcarbon%20homes%20standard.
New NY Appliance Efficiency Bill will Save Consumers Money and Cut Climate Emissions	An ACEEE article discussing the expected benefits from the New NY Appliance Efficiency Bill.	https://www.aceee.org/blog-post/2022/06/new-ny-appliance-efficiency-bill-will-save-consumers-money-and-cut-climate

Table 1 continued

Resource (Benefits)	Description	Link
Energy Storage for Winter Grid Reliability: How Batteries Became the Low-Cost Solution for Power Assurance in Massachusetts	This Clean Energy States Alliance report finds that customer-sited battery storage is by far the lowest priced new winter peaking resource now available to Massachusetts utilities; that payments to customers enrolled in the Commonwealth's Connected Solutions battery program should be increased by at least 33 percent; and that program budgets should be expanded significantly.	https://www.cesa.org/resource-library/resource/energy-storage-for-winter-grid-reliability/
3H "Hybrid Heat Homes:" An Incentive Program to Electrify Space Heating and Reduce Energy Bills in American Homes	This 3H report discusses policies to encourage the use of heat pumps in homes. It includes a discussion of the benefits that can be gained from their use.	https://www.clasp.ngo/research/all/3h-hybrid-heat-homes-an-incentive-program-to-electrify-space-heating-and-reduce-energy-bills-in-american-homes/
Beneficial electrification: Lessons from leading utilities	This report discusses electrification of homes and how it can be done in a way that is beneficial.	https://www.icf.com/insights/energy/kev-drivers-beneficial-electrification-success
A Guide to Retrofitting Your Home	A report by Trustmark on what a whole-home energy retrofit is and how it can benefit homeowners.	https://www.trustmark.org.uk/docs/default-source/retrofit/trustmark's-guide-to-retrofitting-your-home.pdf
The Value of Urgent Action on Energy Efficiency	This International Energy Agency report underscores the vital role of energy efficiency and energy saving in meeting today's crises by immediately addressing the crippling impacts of the spike in energy prices, strengthening energy security, and tackling climate change.	https://www.iea.org/reports/the-value-of-urgent-action-on-energy-efficiency

2 Measuring Success

Table 2. Sample List of Program Measures of Success

Financial Measures	
Cash flow positive	
95% of loans are current within 60 days	
Program implementation budget not exceeded	
Admin / implement cost per project	<\$300 per project
Satisfaction Measures	
Customer	Survey 30 days, 6 months, 12 months
Contractor	
Homes with Air Conditioning added	
Quality	
Less than 5% of jobs fail inspection	
Environmental Benefits	
Tons of CO ₂ avoided	
Homes electrified	
Energy use per home reduced 20%	

2.1 Introduction

As the SEEP is intended to have robust benefits for participating individuals, the community, and the environment, measuring the success of the program requires the review of multiple metrics. This chapter aims to identify and discuss metrics that might be used to cumulatively represent the overall success of the program.

Measuring success can be a significant challenge, as there are both objective, quantifiable metrics (e.g., financial savings) and subjective ones (e.g., homeowner satisfaction). For quantifiable metrics, the program implementer should set a target goal whenever feasible and compare actual results with that target. For the more subjective metrics, collecting participant feedback is likely the best way to track results.

When metrics are discussed throughout this chapter, it is important for the program implementer to consider the following points for each of them.

- How accurate is the data?
- What resources are needed to obtain necessary data?
- How frequently should data be collected?
- Who will collect the data? How should the data be reported, and to whom?
- Who will analyze the data? What will they analyze for?
- Where will the data be stored?

2.2 Design and Decisions

2.2.1 General Metrics

This section details some of the metrics that can be potentially important to the success of a SEEP regardless of the nature of the program implementer. An explanation of the importance of the metric as well as suggestions on how to measure it are included.

Admin's Choice

Some metrics are unequivocally important to any SEEP iteration (e.g., CO₂e reduction). However, the program implementer may not need to track every metric listed below, nor are they limited to tracking the following items.

2.2.1.1 Environmental Benefits

With the time sensitive nature of climate change and the aggressive climate policies of some states such as New York, environmental benefits will be the most important measures of success in most cases.

CO₂e Reduction: The best way to measure the program's impact on climate change is to measure the total reduction in carbon dioxide equivalent emissions. For example, methane is measured to be 25 times more potent than CO₂ at trapping heat in the atmosphere.⁸ If the program were to reduce methane emissions by 1 ton annually, this would be 25 CO₂e tons (or 25 tons of CO₂).

CO₂e reduction can be measured by looking at the difference in energy use in a household before and after a retrofit as well as changes in the source of energy. For net change in energy use, many homeowners will be switching from fossil fuel heating sources to electric ones, so simply looking at the change in the electrical grid may not be sufficient to get an accurate measurement. It is important to consider both electricity use in the grid and the energy value of the fossil fuel heating sources that were used.

Displacing fossil fuels with electricity will no doubt have a reduction in CO₂e emissions, but it should not be forgotten that electricity from the grid utilizes some amount of fossil fuels for its generation. How much of a home's electricity comes from on-site renewable sources versus the grid (and how much that grid utilizes renewables) are important considerations for measuring CO₂e reduction.

Another factor to consider is the environmental impact of the retrofit itself. Commonly called “embodied carbon,” the manufacturing and transport of the appliances and materials needed for a retrofit has its own CO₂e footprint. One way to take this factor into consideration is to measure the total emissions impact of the retrofit and divide it over the total average expected lifetime of a retrofit (in years). This will provide an annual CO₂e output for the retrofit, which can be subtracted from the total expected reduction in CO₂e emissions.

As a quantitative measurement, the program implementer is advised to set a target goal for CO₂e reductions early in the program’s development. As the program progresses, real emission savings should be tracked and compared to the estimated goals. There are several tools available that can assist with tracking CO₂e emissions. Examples include, but are not limited to, resources such as [GridMarket](#) and [CityBES](#) which can help to model potential emission reductions from renovations. There are also life cycle assessment tools that can be utilized to calculate the carbon impacts of the construction, transportation, and installation of relevant materials. Resources for examples can be found at [NZero](#) and [One Click LCA](#).

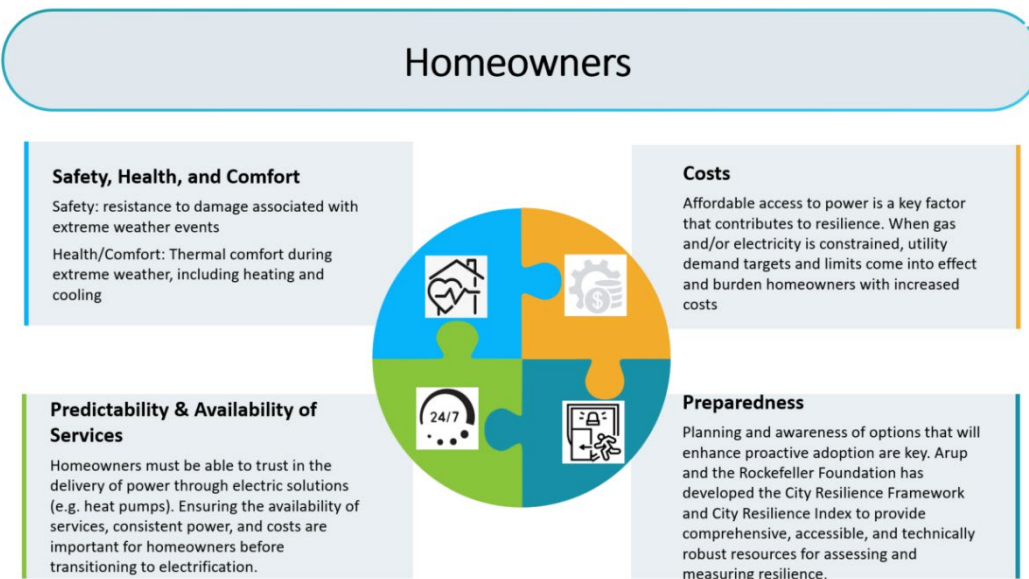
Air Quality Improvements: An increase in electric appliances and renewable energy sources means less fossil fuels burning both in households and powerplants. As a result, air quality improvements could potentially occur not only in participating homes, but also in the communities that were originally generating this power.

Air quality improvements can be best measured by utilizing the Air Quality Index (AQI). Given the nature of pollution emissions from energy generation, it will likely not be feasible to find a direct connection to overall AQI reduction and reduced fossil fuel use in a community. This metric can, however, be used to track changes in air quality in individual homes.

Homeowner Benefits

As discussed in the first chapter, homeowners stand to gain significant benefits from a SEEP. Some metrics for gauging program success in this regard, as well as suggestions on how to measure them, are listed below.

Figure 1. Homeowner Benefits



Energy Cost Savings: Program implementers can consider two aspects of energy cost savings. The first aspect is the total reduction in energy bills, which can be calculated by comparing the homeowner’s energy bills before and after the retrofit. The second is whether the project was cash flow positive or not, and to what degree. This can be measured by comparing the annual/monthly energy savings with the annual/monthly loan payments over the lifetime of the loan. If the energy cost savings are greater than the loan payments, then the project can be considered as cash flow positive.

Other Savings/Benefits: Reduced healthcare expenditures from reduced fossil fuel use or health and safety retrofits and increased property values are two examples of nonenergy related benefits. While there has been proven improvements in health from reducing fossil fuel usage in the home, it will likely be impractical to attempt to measure these benefits on an individual level, as doing so would be time intensive and potentially lack comprehensiveness due to privacy concerns. If the program implementer does wish to quantify these benefits, doing so on a community level would be more advisable.

Energy Use: Changes in energy use for a household is a metric that is closely tied to other metrics such as financial savings and CO₂e reduction. Energy use reduction can also indicate how effective weatherization services were for retrofits.

The program implementer can use the net change in units of energy before and after the renovations. It is important to consider the energy that was previously derived from fossil fuels in the equation, and not just the overall change in electricity use.

Energy Efficiency: There are a number of standards used to measure a home’s energy efficiency. Commonly used ones in the U.S. include the U.S. Home Energy Rating System (HERS) and the Home Energy Score (HES).

The HES was developed by the Department of Energy (DOE) and designed to measure the energy use and efficiency of a home. It has been described as a metric for homes equivalent to miles per gallon for vehicles. The HES consists of a 1–10 rating to indicate how efficient a home is, with 10 as the highest (i.e., a home with a score of 10 uses less energy than 90% of homes in the U.S.). In addition to the number rating, a HES also typically includes a list of recommendations for energy efficiency improvements, as well as an estimate of potential savings from these improvements.

Take Note

Because the HES bases the score on relative energy use, larger homes will often have a lower rating than smaller ones even if they are more energy efficient.

While the HES has detailed methodology for how it can be measured independently, many existing energy measurement and modeling tools are already designed to provide a HES, including the DOE Home Energy Scoring Tool.

Additional information on the HES can be found on the DOE website:

<https://betterbuildingsolutioncenter.energy.gov/home-energy-score>

The HERS was developed by the Residential Energy Services Network (RESNET) to measure the energy efficiency of a home. The metric is based on the International Energy Conservation Code (IECC) requirements but is specifically for residential buildings. The HERS provides a numerical value with each whole number increase representing a 1% decrease in energy efficiency. The score is based on the performance of a reference home (same type, size, and shape) that meets the 2006 IECC requirements. For example, a home with a score of 100 would be exactly as efficient as a reference home, and a score of 0 would indicate the home has net-zero energy use. The score can be outside of the 0–100 range as well, with a 100+ score indicating the home is less efficient than the 2006 reference home. A negative number indicates the home generates a surplus of energy (likely through the installation of renewables).

While a HERS score may be more difficult to obtain and slightly more complex than a HES, it can be considered a more accurate measurement of energy efficiency due to the independent nature of the score from the overall size of the home. Additional information on HERS scoring can be found on the RESNET website: <https://www.hersindex.com/hers-index/>

Home Comfort: Improved levels of comfort in the home is expected to be one of the most appealing benefits of the program to homeowners.⁹ While some assumptions can be made regarding home-comfort levels based on criteria such as temperature consistency in the building—overall, this metric should be considered subjective. The program implementer will need to rely on user feedback to determine whether there was success or not in this regard. Surveys that include questions on how the homeowner feels about home-comfort levels before and after the retrofit will likely be the best way to collect this feedback.

Homeowner Satisfaction: Maintaining homeowner satisfaction with the program is critical for keeping participation levels high. It can also be an indicator of how effectively the program is being administered. Like home-comfort levels, this is another subjective metric that would best be measured through surveys.

Home Resiliency: In addition to the significant impact natural disasters or other events can have on the electrical grid, these events can also have disastrous impacts on homes as well. Consider home resilience in addition to energy efficiency may be welcomed in the local implementation.

There are metrics that already exist for this purpose and can be utilized by the program implementer. The Natural Hazard Resilience Screening Index is an example of such a metric. The program implementer will want to set a standard that is proportional to community's risk of experiencing natural disasters.

Including resiliency into a SEEP could bring additional financial benefits including:

- Additional project funding sources.¹⁰
- Lower homeowner's insurance premiums charged for homes made more resilient or meeting the Fortified Home standard.¹¹

Health Benefits: The reduction in fossil fuel burning as well as health and safety improvements to homes that often accompany the retrofit process are expected to provide health benefits for participating homeowners and to a lesser extent, the community itself.¹² Tracking community health metrics such as number of annual hospitalizations/deaths from relevant health issues, such as respiratory illness, can help quantify the program's non-financial health benefits.

2.2.1.2 Community Benefits

In addition to measuring the benefits for participating homeowners, there are also benefits and metrics for the community that should be measured to gauge the overall success of the program. Some suggested metrics for this purpose are listed below.

Economic: While the total benefit to the local economy would be hard to measure, identifying and measuring specific metrics within the community is a good way to gauge success. A home retrofit program implemented in a community can open opportunities for further development of energy efficiency products and services, as well as create employment opportunities.¹³

Some metrics to consider include the number of contractor jobs before and after implementation, changes in the average energy expenses, and, if possible, changes in access/availability of goods and services related to the retrofitting process such as solar panels and insulation services.

Grid Resiliency: With climate change causing more extreme and erratic weather events, resilience of the communal electrical grid is more important than ever. Without resilience improvements, a natural disaster or other disruptive event could have significantly greater consequences for electricity access in a community.

The program implementer is advised to include this metric when trying to measure the success of the program, especially in areas that are vulnerable to natural disasters. There are several already established metrics that can be used to measure grid resilience. Some commonly used include the System Average Interruption Duration Index, System Average Interruption Frequency Index, Customer Average

Interruption Duration Index, and Customer Average Interruption Frequency Index.¹⁴ The program implementer is encouraged to select one of these metrics to determine the SEEP's effectiveness in improving grid resilience.

Energy Independence: Energy independence can be important for the economic health and stability of a community, although this can have varying degrees of importance depending on the specific characteristics of a community. Ideally, by expanding the use of renewable energy sources through the SEEP, a community will become less dependent on outside sources to provide energy. This can be measured by comparing the net level of imported energy with the total energy use of the community before and after the program's implementation.

2.2.1.3 Program Effectiveness

Aside from metrics to measure the benefits of the SEEP, there are others to consider relating to the quality, potential, and equity of the program.

Homeowner Participation: Homeowner participation is essential for a program like the SEEP to succeed. The program implementer can get a general idea of participation levels by comparing the number of homes eligible for retrofits under SEEP in the area with the total number of participants over the course of the program's lifetime. Looking at participation levels of similar programs such as Vermont's ZEN or reviewing expected timelines for state climate plans such as the New York State's Climate Leadership and Community Protection Act (CLCPA) are two ways in which to establish a baseline of expected participation that would reflect success for programs.

Contractor Participation: Contractor participation is needed to maintain a work rate that matches homeowner demand. A higher participation rate typically means better availability of all the skill sets needed to complete all aspects of a whole-home retrofit, as well as more competitive quotes for interested homeowners. The program implementer can measure participation rates by comparing the total number of potentially qualified contractor businesses in the area with the number participating in the program. While the exact workforce needs of each SEEP iteration will vary, a key goal for any program is that participation rates remain high enough to keep up with homeowner demand.

Contractor Work Quality: Ensuring that home evaluations as well as weatherization and electrification work are done according to industry best practices and standards is extremely important. Quality work will offer the best chances of achieving expected or modeled energy savings from the retrofits, but also for maintaining high-homeowner satisfaction levels. Chapter 3 has more details on standards and quality assurance. Consider using surveys to gain feedback from homeowners regarding the quality of their contractors as well.

Equity: With Low and Moderate Income (LMI) households typically facing a higher energy burden,¹⁵ offering an inclusive SEEP will ensure that some of the most vulnerable populations realize benefits provided by the SEEP. Appropriately prioritizing services to these areas can also be a step in addressing the historical neglect and injustices many of these communities have or still experience.

The program implementer is encouraged to set a personal target goal (e.g., x% of service resources to be dedicated toward LMI communities) based on the specific characteristics and needs of their community and any applicable legislation or regulation.

2.2.1.4 Implementer Specific Metrics

Some metrics may only be important for specific program implementers. Below are different types of potential program implementers with additional metrics to consider.

Municipality Specific Metrics

- Preparedness
- Delivery of services
- Tax base
- Maintain property values and housing stock
- Reducing response costs

Utility Specific Metrics (ex. Load-serving entities)

- Minimize costs for improvements
- Grid reliability
- Predictable income
- Locational marginal pricing
- Minimizing repair costs
- Peak shaving

Grid Operator Specific Metrics (ex. NYSO)

- Affordable, clean energy resources
- Load management
- Reliable access to dispatchable power to meet load demand
- Locational marginal pricing

Community Organization Specific Metrics (ex. CBOs, advocacy groups, etc.)

- Social/cultural cohesion
- Cost management
- Reliable delivery of services
- Preparedness
- Access to multiple energy resources

2.3 Partners and Support

The program implementer is encouraged to collaborate with partners for the purpose of measuring success. The assistance of different groups can provide various channels of support from data for

calculating metrics to assisting with measuring success. A list of potential partners and some specific ways they might help are detailed below.

Research Organizations: Research organizations dedicated toward any goal related to energy efficiency or building improvements may be interested in assisting in some capacity. These groups often have data available that can be used to set reasonable standards for target goals. Research organizations may also be interested in assisting with tracking the results of the program and quantifying relevant metrics.

Utilities: Utilities can be a valuable source of information for gathering any data related to the electrical grid and general energy use in a community. Coordination with utilities to measure success is encouraged throughout the lifetime of the program.

Homeowners and Contractors: Both homeowners and contractors can provide valuable information throughout the program's implementation. Metrics such as satisfaction levels, expenses, and home comfort all require communication with homeowners and/or contractors to ensure accuracy.

CBO's and Other Advocacy Groups: Community Based Organizations and other advocacy groups can also serve as an important partner. Many of these groups have special relationships with certain segments of the community that allow them to collect information more effectively than the program implementer or other groups.

2.4 Challenges and Solutions

This section details some of the expected challenges a program implementer might face when attempting to measure the success of the program as well as suggested solutions.

Quantifying benefits for more abstract metrics: Some metrics like home comfort or participant satisfaction do not have clear units of measurements to gauge success and rely instead on participant feedback. Because of the subjective nature of these metrics, participant responses are likely to be inconsistent even with similar levels of satisfaction (i.e., an 8/10 for one participant might imply a different level of satisfaction than the same grade from another participant). In the interest of making such subjective measurements as consistent as possible, the program implementer is encouraged to be as clear as possible about the actual value of each metric when collecting feedback. For example, if using a 1–10 scale, describe the expected level of satisfaction associated with each number value. Including specific considerations for different ratings (e.g., level of draftiness in the home, aesthetic appeal, etc) could also help bring greater consistency to responses.

Baseline data unavailable: The availability of data will likely vary by community. Some areas might be lacking important information needed to set up a baseline for a before-and-after target goal. If data deemed necessary to the program does not seem immediately available, reaching out to third-party partners or other groups that operate locally is recommended.

Admin's Choice

If no groups have the necessary data, then collecting it simultaneously with the program's launch will likely be the most cost-effective course of action. Lacking information at the beginning of implementation may affect initial success, so it's crucial to make adjustments based on newly gathered data if employing this strategy. Using a random sample to make inferences on community characteristics prior to program launch is another option. Collecting this information or employing a third-party to do so beforehand would ensure that the program launch is as well-guided as possible. However, as collecting this information will likely take time, it is important to consider the additional delays and costs when planning a timeline for implementation.

2.4.1 Additional Resources

Table 3. Measuring Success Additional Resources

Resource (Metrics of Success)	Description	Link
MyHeat	Visualize, rate, and compare residential building heat loss at the community and inter-community scale for Canadian cities.	https://heat.myheat.ca/
Local Clean Energy Self-Scoring Tool	Score your community's efforts to save energy and reduce greenhouse gas emissions using the metrics from ACEEE's 2021, City Clean Energy Scorecard.	https://www.aceee.org/toolkit/2022/06/local-clean-energy-self-scoring-tool-version-60
City Buildings, Energy, and Sustainability (CityBES)	A web-based data and computing platform, focusing on energy modeling and analysis of a city's building stock to support district or city-scale efficiency programs. CityBES uses an international open data standard, CityGML, to represent and exchange 3D city models.	https://citybes.lbl.gov/
WattHour	Provide hourly carbon emissions for any building in the United States, on-demand.	https://wattcarbon.substack.com/p/w-hat-weve-been-building?s=w
Optimiser	Energy Audit Software	https://optimiserenergy.com/
EDS Auditor	HVAC, IAQ, Home Performance and Home Services Energy Calculator	https://www.eds.tech/
Hayward Score IAQ	Indoor Air Quality score	https://www.haywardscore.com/
Sierra Club Energy Burden Calculator	Helps user estimate energy burden	https://www.sierraclub.org/energy-burden-calculator
Home Energy Yardstick	Benchmark your home	https://www.energystar.gov/index.cfm?fuseaction=home_energy_yardstick.howgetstarted
CAEN Energy	Energy savings calculator	https://caenergywise.com/calculators/electric-combination-ovens/#calc

Table 3 continued

Resource (Metrics of Success)	Description	Link
NYC Energy & Water Performance Map	Developed by New York University's Marron Institute of Urban Management and the NYU Urban Intelligence Lab in partnership with the Mayor's Office of Sustainability. Covering six years of data, the New York City (NYC) Energy & Water Performance Map provides an interactive data analysis and query platform to better understand the energy and water use of more than 20,000 of the largest buildings across New York's five boroughs.	https://energy.cusp.nyu.edu/#/
PVWatts Calculator	Calculator from the National Renewable Energy Laboratory for estimating the savings and costs of solar panels.	https://pvwatts.nrel.gov/
Solar-Estimate	Calculator from Solar Estimate for estimating the savings and costs of solar panels.	https://www.solar-estimate.org/
AVoided Emissions and geneRation Tool (AVERT)	This Environmental Protection Agency (EPA) tool lets non-experts evaluate county-level emissions displaced at electric power plants by energy efficiency and renewable energy policies and programs.	https://www.epa.gov/avert
NHEC Heat Pump Calculator	A calculator from the New Hampshire Electric Co-op that measures potential energy savings from switching to an electric heat pump.	https://www.nhec.com/new-heat-pump-calculator/
Efficiency Maine Heat Calculator	A calculator from Efficiency Maine that measures cost differences between different heating sources.	https://www.energymaine.com/at-home/heating-cost-comparison/
Enervee	Enervee provides scoring services for measuring the energy efficiency of consumer products.	https://www.enervee.com/score
California Energy Wise Calculator	A calculator that shows the energy efficiency and potential energy savings of various home appliances.	https://caenergywise.com/calculators/
Low-Income Energy Affordability Data (LEAD) Tool	The LEAD tool was created by the DOE to help stakeholders understand housing and energy characteristics for low- and moderate-income households. Using data, maps, and graphs from the LEAD Tool, stakeholders can make data-driven decisions when planning for their energy goals.	https://www.energy.gov/eere/slsc/low-income-energy-affordability-data-lead-tool#:~:text=The%20Low%2DIncome%20Energy%20Affordability,planning%20for%20their%20energy%20goals.

3 Assessments and Estimating Energy Savings

3.1 Introduction

Accurate assessments of homes to determine both the potential for energy savings prior to work being done and the actual post-renovation savings will be a key step for the program. An initial assessment is also needed to determine what specific work will be required for a home and how ready the homeowner is to begin the process.

This chapter will detail some suggested information, tools, and standards for the program implementer to consider when making these assessments. Additionally, recommendations for how the assessments themselves can be conducted are discussed.

Take Note

The resources listed in this chapter are limited and not necessarily the only source that could be utilized for assessments. The program implementer is encouraged to reach out to municipalities, utilities, and any other local entities that might have resources available.

3.2 Design and Decisions

3.2.1 House Typology

An important part of optimizing energy savings is identifying the specific characteristics of participant homes. A comprehensive analysis of each home and its characteristics can be a time-consuming process and costly, and so may not be feasible for every program at scale from a time or cost perspective. As the SEEP is intended to scale up, identifying common home traits and house typologies in the community can help standardize the process and save time when performing evaluations.

Admin's Choice

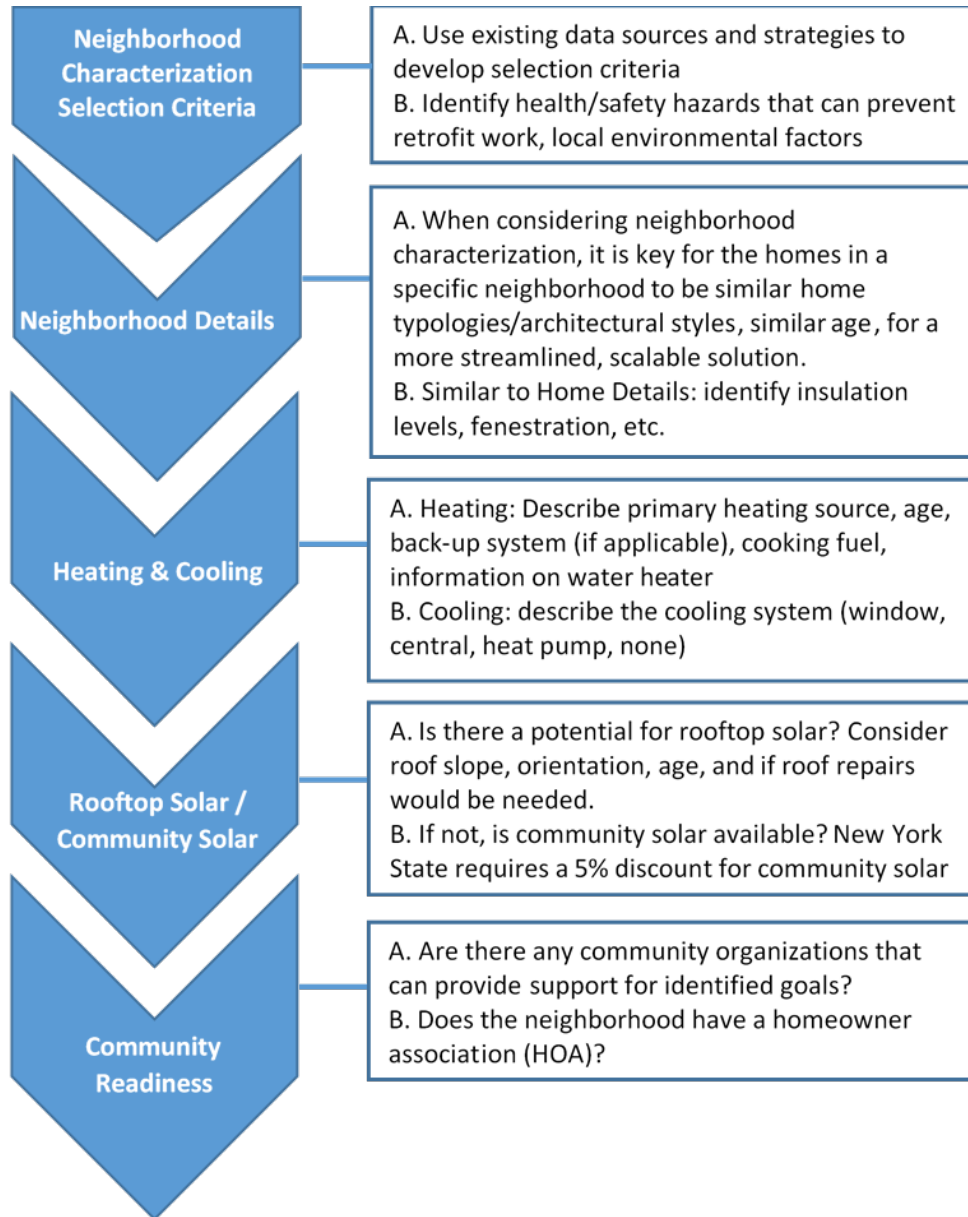
While gathering common traits for homes in an area can be a time saver, ensuring that evaluations are still relatively comprehensive is important for realizing the benefits expected from a stacked approach. Finding an appropriate balance between a neighborhood- and individual-level approach will be key.

3.2.1.1 Neighborhood-Level Typology

A neighborhood-level typology focus, identifying house typologies, will likely be the preferred strategy for communities where homes are more homogenous. Areas with three or fewer house types mean that time and money spent on creating in-depth analyses of these types is likely to be a worthwhile investment. Community groups like HOAs may also be interested in helping with assessments done on a neighborhood level.

In addition, a neighborhood-level focus can be preferable in communities where the capacity to install solar or other renewables on the individual home level is limited. Community-level-renewable installation will benefit from taking a larger neighborhood-level perspective. A neighborhood approach can also potentially improve pricing for homeowners if a group financing plan can be developed for contractors to develop a set of similar homes in a community.

Figure 2. A Neighborhood Approach

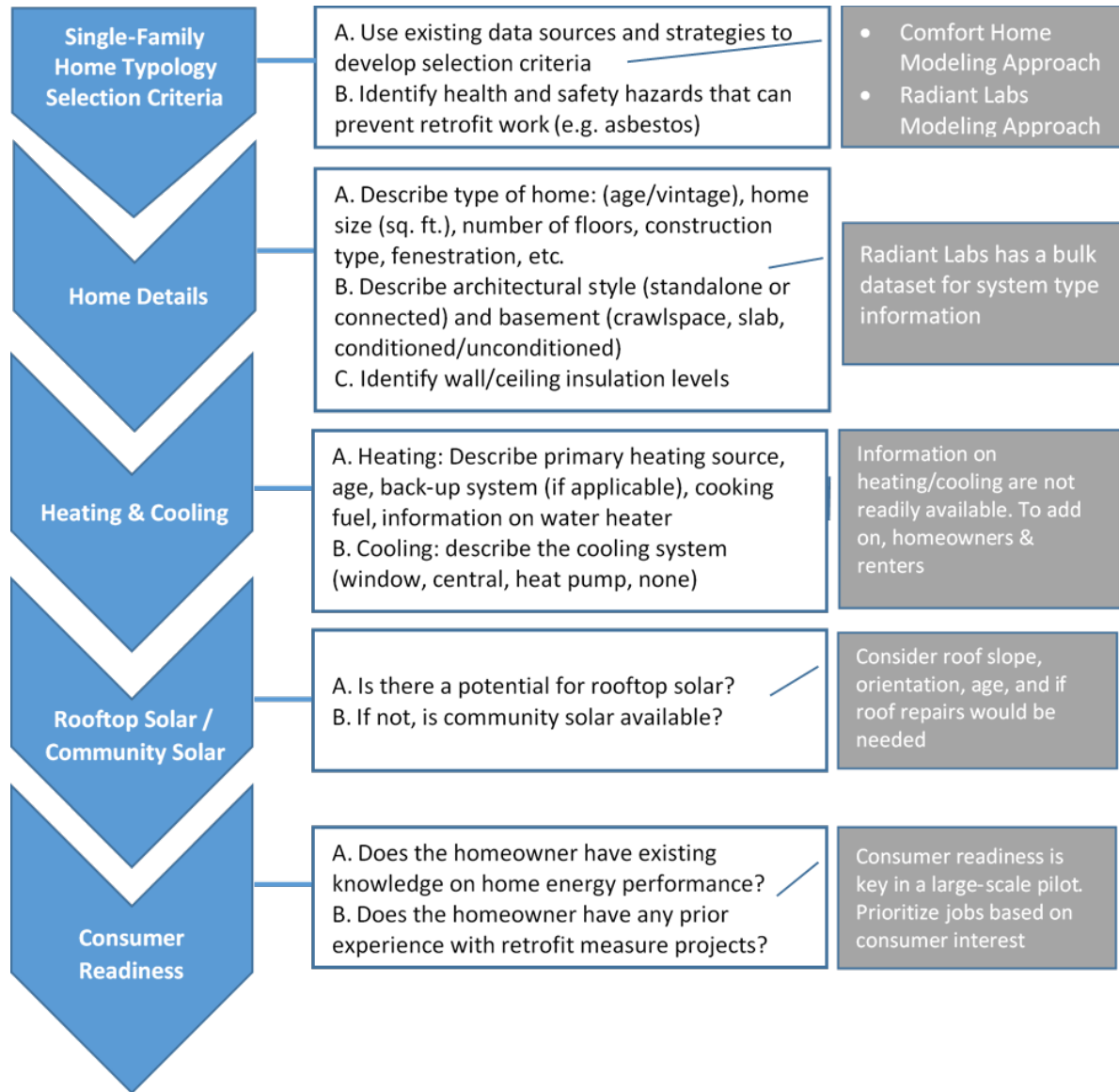


3.2.1.2 Individual House Level Typology

An individual home-level approach will typically be preferable in communities with more varied house typologies and characteristics. For the purpose of maximizing energy savings for participants, it is recommended that some attention be given to an individual home-level approach, even when neighborhood level is the main focus.

The below graphic details important considerations to make when following an individual home-level approach, as well as some resources that can assist with the process.

Figure 3. An Individual Home Approach



3.2.2 Initial Assessment

An initial assessment is needed to gauge the savings potential of homes and the homeowner's participation readiness. It should be expected that a significant ratio of homeowners receiving an initial assessment will choose not to proceed with the program, and typically an estimated range of potential savings and costs is sufficient for most homeowners to make this determination. To be efficient, initial assessments should be quick, convenient, and cost-effective.

Similar programs have had success conducting initial assessments remotely.¹⁶ Information about the house is gathered and placed into modeling software to determine recommended improvements, potential for energy savings, and renovation costs. Once a homeowner has confirmed their interest, a more in-depth on-site assessment can be done. This initial assessment also serves as an opportunity to inform homeowners of the various incentives and benefits available through the program.

Caveat

There has been mixed feedback from contractors regarding whether the program implementer should include price ranges for services and how specific they should be. Some contractors have expressed a preference for having a program implementer provide an initial quote or price range, as they believe customers holding a contact with them are more likely to make a purchase. However, other contractors have expressed concerns about providing an initial quote, as they feel inaccuracies from an implementer-created quote could potentially make customers feel misled and upset.

It is recommended that the program implementer collects feedback from their own participating contractors to build a consensus on whether an initial quote or price range should be provided, as well as on the level of detail provided in the quote.

3.2.3 Follow-Up Assessments

Pre-Renovation Assessments: If a homeowner continues to express interest after receiving information from the initial assessment, follow-up assessments can be conducted for a more accurate look at the exact retrofit measures needed and their costs. Stakeholder feedback has suggested that homeowners requesting follow-up evaluations after an initial assessment are a good indicator of program buy-in and continued participation. For these reasons, it is recommended that follow-up assessments be in person, more resource intensive, and more detailed than initial assessments.

Take Note

Regardless of how many assessments the program implementer conducts for a specific SEEP, it is recommended the final pre-renovation assessment be conducted by the contractor(s) performing the work. This ensures the suggested renovations and pricing are consistent with the services to be rendered.

Feedback indicates a common challenge for many contractors is managing the costs of conducting these assessments, particularly when homeowners choose not to participate in the program afterwards. Considering this, the program implementer may want to conduct an on-site follow-up using a third-party energy concierge or, if available, a qualified professional in the SEEP staff. This optional on-site follow-

up allows for a greater level of detail on recommended renovations and costs than from a remote assessment, while also increasing the likelihood that homeowners moving on to the contractor level assessment(s) will participate in the program. In cases where evaluation costs for homeowners that end up not participating in the program is a significant concern for contractors, this step can be an important buffer to support them.

If resources are available, the program implementer may also want to consider subsidizing the costs of assessments for contractors. This strategy can help address contractors' concerns and improve participation levels, particularly if the program implementer chooses not to employ an energy concierge.

Post-Renovation Assessments: In addition to evaluations done prior to work starting in a home, the program implementer will need to conduct an assessment after the work is completed to measure the effectiveness of improvements. For consistency and accuracy, the post-renovation evaluation should be in person and use the same standards and metrics that the pre-renovation evaluations utilized.

3.3 Process Evaluation

It is recommended that the program implementer collect feedback and information on energy

assessments performed, especially for early participants. Evaluation of the process and feedback could reveal shared-home traits that weren't initially apparent as well as discrepancies between evaluation estimates and real results. Such discoveries can be used to improve future evaluations.

3.3.1 Assessment Aspects

This section details important considerations for the whole-home retrofit assessment process. Some resources that can be used both remotely and in person are also listed below.

Weatherization: For cold, mixed humid, and marine climates such as those in New York State, weatherization has the greatest potential out of the three major renovation aspects to provide energy and financial savings.¹⁷ It is also the recommended first step of a whole-home retrofit since it will affect future heating and cooling loads. Given its significance, extra consideration should be given to weatherization potential during the initial assessments.

Electrification: There are numerous considerations when planning the electrification of a home. Some major considerations include the overall potential energy savings that can be achieved, and determining the size of the heat pump that should be installed, as doing so is critical for optimizing savings and efficiency. It should be noted that the heat pump size needs of a post-weatherized home will be less than what was needed pre-renovation. This is a major reason for why weatherization work should typically be conducted prior to installing a heat pump. Evaluators estimating heat pump needs for a home should make the determination based on the expected efficiency of the home after weatherization rather than the current conditions.

Another significant consideration is the cost of improvements. Some homes may need significant equipment improvements, rewiring work, and other modifications before the home is fully electric ready. These costs must be balanced with both the potential for energy savings and any quality-of-life benefits to determine what will be a worthwhile investment.

Renewables Installation: Installation of renewables, such as solar panels on a home, helps both with reducing energy costs to homeowners and ensuring a greater proportion the home’s power use is coming from renewable sources. Some communities may lack the capacity to have sufficient renewables installed on an individual home level (e.g., limited roof space or lack of access to direct sunlight to install solar for many homes in the area). In such cases, the program implementer should attempt to offer renewables at the community level to supplement participants’ energy demands.

Acknowledgement of Past Work: Some homeowners may have completed past projects, which might make certain work typically standard for a whole-home retrofit unnecessary. For example, a homeowner may have already weatherized their home recently.

For such situations, the assessor should acknowledge the previous work done. Stakeholder feedback suggests that ignoring or underplaying previous work may hurt the credibility of the program. In addition, if the program implementer is offering specific incentives for the completion of all stages of a whole-home retrofit, homeowners with previous work done should not be excluded from them. Even if resources are scarce, such an incentive structure can be perceived as punishing proactive behavior among homeowners and so can work counter to the long-term goals of growing the energy efficiency industry.

Standards, Tools, and Other Resources: There is a wealth of resources that can be used for a whole-home energy retrofit. This section lists some of the most commonly used standards, tools, and other relevant resources.

Admin’s Choice

In addition to or in lieu of these options, the program implementer is encouraged to consult with local utilities, municipalities, and contractors in their area to see what is commonly used. If certain tools or standards are more prevalent, it may be more practical to utilize methods participants and partners are already familiar with rather than re-training personnel.

- **Snugg Pro:** Snugg Pro is an online auditing tool that can be used for comprehensive modeling as well as can provide financial tools and services for contractors. The program is relatively easy to use while still being comprehensive. Snugg Pro is best utilized for on-site evaluations as a tool for contractors or third-party assessors when conducting follow-up assessments.

Additional Information on Snugg Pro can be located on their website: <https://snuggpro.com/>

- **Radiant Labs:** Radiant Labs offers an interactive modeling tool that can remotely estimate a home's energy use. In addition to being a useful initial assessment tool, Radiant Labs also offers other features. For example, the software can help predict which residents in an area are likely to want or need building upgrades, which can help identify areas of focus for the program.

Additional information about Radiant Labs: <https://radiantlabs.co/>

- **Northeast Energy Efficiency Partnerships (NEEP) Heat Pump Sizing Tool:** Northeast Energy Efficiency Partnerships hosts a sizing tool that makes recommendations about what kind of heat pump should be installed. This can be used in initial evaluations to remotely assess a home's heating needs. In addition to this assessment, NEEP also offers a comprehensive list of heat pump brands and models that can be used to match the correct heat pump with a home's specific needs.

NEEP's heat pump sizing tool: <https://ashp.neep.org/#/>

- **NEEP's Remotely Tool:** Remotely from NEEP is an online evaluation tool that can be used to remotely assess the energy efficiency of a home and make upgrade recommendations. Remotely has several comprehensive features that can be utilized by both evaluators and homeowners.

Remotely is accessible here: <https://neep.org/residential-energy-labeling-and-retrofit-programs/remotely>

- **Manual J, D, and S Assessments:** Manual J, D, and S assessments were developed by the Air Conditioning Contractors of America (ACCA) to identify properties of residential Heating, Ventilation, and Air Conditioning (HVAC) systems. Manual J assessments determine the heating and cooling loads and required system capacity, D identifies the duct design, and S determines the appropriate equipment to be installed for a home. Contractors involved with HVAC work should be familiar with these assessments already, but online resources and calculators also exist to help with conducting assessments. While some of these calculators have been simplified enough that they could be used remotely during an initial assessment, an on-site evaluation would typically be required to get the most comprehensive measurements.
- The program implementer is encouraged to explore online for resources such as Manual J, D, and S calculators.

An example of a Manual J calculator has also been provided here: <https://www.loadcalc.net/>
Additional Information on these assessments: <https://www.acca.org/standards/technical-manuals>

Green Jobs Green New York (GJGNY) Proforma: The GJGNY initiative offers a proforma tool for contractors and evaluators that can be used to determine if selected measures meet the program's loan cost-effectiveness requirements. This tool is especially important if the program implementer intends to utilize GJGNY loans as a source of financing for participating homeowners.

Additional information on the GJGNY proforma and a link to the tool is on the NYSERDA website in the contractor resources section under Project Application Guidance:

<https://www.nyserdera.ny.gov/solar-contractor-resources>

- **Building Performance Institute (BPI):** The Building Performance Institute offers sets of standards to evaluate residential building performance. They also offer the Home Energy Professional Energy Auditor certification. This certification trains and examines certifiers on their ability to evaluate the energy efficiency, health, and safety of homes.

Additional information on the Home Energy Professional certification and the exam process can be found on the BPI website: <http://www.bpi.org/certified-professionals/energy-auditor>

- **Project Sunroof:** Project Sunroof is a tool that utilizes data from Google Earth to determine the solar potential of homes in the U.S. and Puerto Rico. Using an address and some basic information on the home's energy expenses, the program can provide an estimate for the potential capacity of solar installed on the home as well as the expected savings. While not every address in the country has been added to the database, it can still be a useful tool for remote evaluations when available.

For more on Project Sunroof go to: <https://sunroof.withgoogle.com/>

- **DOE Whole-Building Energy Modeling (BEM):** The Building Technologies Office, under the supervision of the DOE, developed the Whole-Building Energy Modeling (BEM) tool to model the hour-to-hour energy use of buildings. While there are several iterations of this software, the most common version is the open source EnergyPlus. EnergyPlus and the other iterations of BEM software are comprehensive, but typically require considerably training for their use. If the expertise needed to utilize this software is available to the program implementer it can be a considerable asset when assessing the savings potential of retrofits.

Additional information on BEM and downloads for the software itself can be found on the DOE website: <https://www.energy.gov/eere/buildings/about-building-energy-modeling>

- **NYSERDA Energy Audit Programs:** For a SEEP operating within New York State, NYSERDA offers a number of energy related programs designed to reduce energy costs through retrofits or other forms of assistance. NYSERDA also offers homeowners a no cost audit performed by contractors participating in one or more of these programs.

Additional information on NYSERDA's energy programs and their no-cost audit can be found on at: <https://www.nyserdera.ny.gov/All-Programs/Energy-Audit-Programs>

- **DOE Solar Resource Repository:** The DOE actively maintains a list of resources and tools that can be used for the purpose of measuring solar potential. The program implementer can explore and determine resources listed on their webpage that might best help them.

Website link: <https://www.energy.gov/eere/solar/solar-rooftop-potential>

3.3.2 Home Eligibility Threshold

While initial assessments are important for helping homeowners determine eligibility and interest in the program, they can also help the program implementer determine how to best allocate resources. In addition to other potential eligibility requirements, establishing a minimum amount of potential savings to be gained as a prerequisite for participation can help ensure that available resources are used in a cost-effective manner.

Vermont's ZEN program saw success by creating eligibility requirements called the 10/50/50 Modeled Approach. This requirement dictated that homes eligible for the program would need to achieve at least a 10% reduction in heat loss from weatherization improvements, a 50% reduction in combined fossil fuel and grid electricity use, and for 50% of the post-project energy load to come from renewable sources. This threshold was determined through modeling done in the initial assessments.

ZEN also created a simpler approach for determining eligibility in situations where initial modeling of a home was not feasible. This consisted of a checklist of criteria used to determine if the potential savings for a home would be sufficient. These approaches allowed ZEN to maximize the environmental benefits of the program using limited resources.¹⁸

While the ZEN approaches can certainly be copied, this exact eligibility threshold may not necessarily yield the best results for the community the SEEP that is being implemented. It is recommended to instead try and establish unique thresholds based on selected target goals, common characteristics of homes in a community, participation levels, and the availability of funding.

3.3.3 Additional Considerations

Assessment Standardization: Regardless of which specific tools and standards are chosen for the assessment process, the program implementers should be consistent in their choice and when providing training to personnel for the chosen methods. Ensuring that assessments are standardized will help to streamline the process and increase the efficiency of evaluations. It is also typically worthwhile to commit resources toward evaluating the accuracy and effectiveness of assessments done, especially early in the program's lifetime. Insights gained from this evaluation can help to improve the accuracy and costs of this process down the line.

Savings Timeline: In addition to providing estimated energy and financial savings to homeowners, the program implementer should also try to provide a timeline of when these savings and benefits are expected to be gained by the homeowner. Providing a timeline for benefits to homeowners will reduce misunderstandings about the program process and help homeowners plan out their own finances and schedule.

Guarantees: Providing guarantees to homeowners during the evaluation process can help bolster participant confidence in the program. An example of this practice is from Vermont’s ZEN program, which offered savings guarantees to homeowners. ZEN support staff stated the guarantee received a positive response from participants. In addition, ZEN was able to meet all the guarantees made with only one exception, which led to a small payout. While guarantees can be a strong incentive, it is important to ensure any made can be reliably achieved or else the SEEP risks losing credibility.

3.4 Partners and Support

There are numerous different entities that may be willing to assist with one or more aspects of the evaluation process. Below is a list of some potential partners and how they might be able to assist.

HOAs and Other Local Organizations: Neighborhood organizations such as HOAs sometimes have information on homes that can provide insights for specific renovations in terms of what might be most beneficial in a community. Since these communities stand to benefit from the program, such organizations may also be willing to directly assist with designing an effective assessment process.

Local Architects/Contractors: Architects and contractors local to the area have likely done previous work on homes there. Such individuals may have unique insights that could save time on assessments and maximize potential savings. Contractors participating in the program can also provide information on homes they are currently working on, which would help identify additional considerations for assessments going forward.

Local and State Government: Local governments sometimes carry archives containing records about homes in the community. Such archives are a useful source of information when conducting initial analyses of home typologies in the area. Local or State level governments may also offer programs that provide energy audits at low or no cost to the homeowner like the ones offered in New York State.

Homeowners: Homeowners may have plans or past records for their own homes that potentially save time in the evaluation process. In addition, feedback from homeowners regarding complaints about their homes in pre-renovation may reveal key areas of focus for future assessments.

Research Organizations: Local research organizations dedicated to studying homes or energy efficiency may have relevant data that they would be willing to share. Gathering such information from these groups can help the program implementer save resources on their own analyses.

Modeling Software Developers: Developers of modeling software may be willing to provide training and other forms of technical expertise to the program implementer or participating contractors. If the program implementer chooses to utilize some form of modeling software for their assessments, they should consider reaching out to the developers for advice and assistance.

3.5 Challenges and Solutions

The below section details some potential challenges the implementer may face during the assessment process as well as suggestions on how to address them.

Community highly diverse in terms of house typology: Some neighborhoods and communities might have a diverse set of house types, rendering a neighborhood-level approach less practical. This can result in the program implementer needing to rely entirely on a more resource intensive individual home approach. However, there may still be some universally shared traits for homes that the program implementer can utilize to standardize the home assessment process. Factors such as weather, the local availability of building materials, and common homeowner complaints can be used to infer common themes for homes in the absence of an in-depth analysis of specific house typologies. For example, if homes are built in a cold weather community, and temperature regulation problems are a common complaint, then inadequate insulation may be a widespread issue for homes in the area.

No historical data for homes in area: Some neighborhoods will be largely homogenous, encouraging a neighborhood-level approach, but have no historical data readily available on the home types in the area. In such situations it is recommended that the program implementer, either with partners or independently, conduct an in-depth analysis of the common home types. While this approach can have higher up-front costs, gaining a strong understanding of the house typologies early on will be the more cost-effective and efficient option in the long term.

Modeling done provides inaccurate results: There are many reasons as to why modeled estimates might not match the real results. Common causes include discrepancies between the modeled home/materials and the real counterpart, user input error, and not accounting for unexpected behaviors from the inhabitants. While there will always be some degree of inaccuracy with modeling, if it is reaching a level where modeling is becoming unreliable, the program implementer should try to identify the exact reason or reasons as to why. Steps to address the most common potential causes for modeling discrepancies include identifying user behavior either during assessments or with surveys, reviewing modeling methods used by staff or contractors performing evaluations, and reviewing modeling software options that may work better for the needs of the program.

3.5.1 Additional Resources

Table 4. Assessments and Estimating Energy Savings Additional Resources

Resource (Assessments)	Description	Link
U.S. Building Stock Characterization Study	Description of building types in the U.S. from the National Renewable Energy Research Laboratory.	https://www.nrel.gov/docs/fy22osti/81186.pdf
Build With Rise	Sustainable home renovations.	https://www.buildwithrise.com/products
Compare Home Heating Costs	Estimate your annual heating costs using different heating systems.	https://www.energymaine.com/at-home/home-energy-savings-program/heating-cost-comparison/
Home Ventilating Institute Certified Products Directory	Searchable database for HVAC equipment.	https://www.hvi.org/proddirectory/index.cfm
NHEC	Calculate cost savings with a heat pump.	https://www.nhec.com/new-heat-pump-calculator/
EPA Watersense	Estimate water savings.	https://www.epa.gov/watersense/watersense-calculator

Table 4 continued

Resource (Assessments)	Description	Link
Just Transition Working Group 2021 Jobs Study	A New York State study documenting the results of the green jobs energy transition.	https://www.bwresearch.com/docs/BWR_NY-JTWG-JobsStudy2021.pdf
Mass Save Home Energy Assessment	Online assessment of energy use in home.	https://www.masssave.com/en/saving/energy-assessments/online-home-energy-assessment
National Grid Upstate New York Energy Assessment	Online assessment of energy use in home.	https://energyassessment.nationalgridus.com/residential/start/
LBL Home Energy Saver	Online assessment of energy use in home.	http://www.hes.lbl.gov/consumer/
Energy- and Cost-Savings Calculators for Energy-Efficient Products	Screening tool that estimates a product's lifetime energy cost savings at various efficiency levels.	https://www.energy.gov/eere/femp/energy-and-cost-savings-calculators-energy-efficient-products
ReStock Analysis Tool	The ResStock analysis tool is designed to help states, municipalities, utilities, and manufacturers identify which home improvements save the most energy and money.	https://resstock.nrel.gov/
Building Energy Data Exchange Specification (BEDES)	The Building Energy Data Exchange Specification (BEDES) is designed to support analysis of the measured energy performance of commercial, multifamily, and residential buildings, by providing a common data format, definitions, and an exchange protocol for building characteristics, efficiency measures, and energy use.	https://www.energy.gov/eere/buildings/building-energy-data-exchange-specification-bedes
The Building Performance Database (BPD)	This DOE database exists to publicize energy related characteristics of commercial and residential buildings in the U.S.	https://www.energy.gov/eere/buildings/building-performance-database-bpd
NEEA/BetterBuiltNW HVAC Sizing Tool	A free to use online tool for calculating room-to-room HVAC load requirements (requires an account).	https://hvac.betterbuiltinw.com/Account/Login.aspx?ReturnUrl=%2fCommon%2fSites.aspx

4 Financing the Program

4.1 Introduction

This chapter will discuss the financial resources available for implementing the SEEP. These resources include various programs and other opportunities that provide financial assistance to the program implementer, homeowners, or other involved parties. In addition, this section will discuss allocation of resources, possible incentives to offer, and anticipated expenses.

4.2 Design and Decisions

4.2.1 Funding and Finance Options

Below are some strategies and programs commonly used to fund similar programs. Financial programs and other opportunities to assist homeowners are also listed.

4.2.1.1 *Service Benefits Charge*

The most common funding method utilized by similar programs has been the addition or re-allocation of fees on ratepayers' utility bills.¹⁹ In addition to being the most used method, it typically provided the largest source of revenue for programs using multiple funding methods.

Caveat

If the program implementer is not a utility or a municipality that owns and administers its own energy infrastructure, then adding fees to or reallocating funds from utility bills requires the approval of the New York State Department of Public Service. Program implementers seeking to utilize utility bill surcharges are encouraged to reach out to the Department of Public Service or NYSEERDA to see if their plan would be eligible. Program implementers in other states are encouraged to reach out to their respective Department of Public Service or DOE to check for eligibility.

4.2.1.2 *Taxes*

Program implementers that are public entities or working closely with one may be able to acquire funding through tax revenue. While tax revenue could theoretically come from any level, local-level taxes are typically the most accessible.

One potential tax revenue source would be from the local property tax. Revenue from local property taxes would allow a program to begin at a small level if needed, but the funding can still scale with the program as it expands. This tax source would likely be the most palatable to the public as well since residents paying local property taxes would also be some of the primary beneficiaries. The expenses can also be justified as they increase the quality and value of homes in the area.

Take Note

While there are other taxes from which to generate revenue like the sales tax, these can often present equity issues. For example, increasing the sales tax would put a disproportionate burden on poorer families. In addition, since poorer families are more likely to be renters, many will not be able to directly benefit from the program. If tax revenue is being selected as a source of funding, that revenue should come primarily from groups that can directly benefit from the program.

4.2.1.3 Carbon Mitigation Fees

Another possible funding method is the collection of revenue from carbon mitigation practices. This includes practices such as Cap and Invest for carbon emissions and compliance fees collected from industrial activities. Carbon fees serve the dual purpose of both providing funding and discouraging carbon emitting practices.

New York State's largest carbon mitigation program is the Regional Greenhouse Gas Initiative (RGGI). This program collects fees from power plants and then uses the proceeds for climate initiatives. The program implementer is also encouraged to explore carbon mitigation programs independently to identify other opportunities.

More information on the RGGI can be found on the program's website: <https://www.rggi.org/>

4.2.1.4 Grants

Some similar programs have managed to acquire much of their funding through the acquisition of grants. Several grants that are available for use as of the release of this framework are listed below. The program implementer is also encouraged to explore grant options independently to stay up to date on new opportunities.

Caveat

Acquiring funding primarily through grants is most likely to occur for smaller scale implementations of a SEEP, with the feasibility of doing so decreasing as program scale increases. In addition, the grants available will vary based on the type of organization running the SEEP.

Community Development Block Grant Program (CDBG): The U.S. Department of Housing and Urban Development (HUD) offers CDBGs to cities, counties, and states with urban environments. The primary purpose behind CDBGs is to promote the viability of urban communities, particularly for LMI individuals. CDBGs can be used toward any goal that would serve that purpose. This includes all stages of the energy efficiency retrofits, health related retrofits needed as prerequisites, and subsidizing contractor training for local workforce development.

Recipients of CDBGs are also eligible for the Section 108 Loan Guarantee Program. This program allows CDBG recipients to leverage their annual grant money to receive a low-interest loan for projects. The intention behind this additional federally guaranteed loan is to help address up-front costs for a community in situations where the money from the CDBG alone would be insufficient.

While CDBGs do offer discretion on how benefits can be provided, there are still requirements that must be met to be eligible. At least 70% of funds from the grant must be spent on LMI individuals, and at least 51% of the beneficiaries of the program must be LMI individuals. In addition, the program requires significant community engagement and planning from the grantee prior to being eligible. The grantee must offer meeting opportunities and provide information to the public. They must also create a community development plan detailing both how the grantee intends to use the funds and their expected results.

While CDBGs will not be a viable option for many areas, lower income communities in urban environments—particularly ones with health and safety prerequisites or other issues impeding program progress—will be an ideal candidate.

Additional details and information regarding CDBGs can be found on the HUD’s website:

https://www.hud.gov/program_offices/comm_planning/cdbg

United States Department of Agriculture (USDA) High-Energy Cost Grant: The USDA offers a grant to energy providers in areas where energy expenses are at 275% of the national average or higher. In 2022 there were no areas in NYS that would qualify for this program, but the program implementer should be aware of its existence should there ever be a significant increase of energy rates in the state. Program implementers outside of NYS are encouraged to investigate whether their area of operation might be eligible.

Additional information regarding the USDA High-Energy Cost Grant can be found on the USDA website linked here: <https://www.rd.usda.gov/programs-services/electric-programs/high-energy-cost-grants>

4.2.1.5 Existing Federal Programs

There are several federally run programs that could provide financial assistance, technical assistance, or both. While examples of federal programs that might help are listed below, it is advisable to independently research programs as well.

Medicaid: A relatively recent reform for Medicaid in some states is the switch to a Value-Based Payment (VBP) system. Historically, Medicaid has paid healthcare providers based on services rendered. The VBP reforms in states like New York; however, now have compensation provided based on health issues prevented directly or from addressing social determinants of health, substandard housing being one of them. Such a change opens the door for Medicaid reimbursement to a recognized VBP participating entity, such as a managed care organization or a healthcare services provider, that can demonstrate their actions will prevent health issues for Medicaid recipients. This in turn provides cost savings to the State related to avoidable health expenses such as hospitalizations and emergency department visits.²⁰

As improved health is an expected outcome from the SEEP, this change creates potential for the program implementer to access Medicaid funding through a Medicaid managed care organization or a VBP healthcare service when assisting Medicaid recipients participating in the program. This opportunity could be particularly useful for homes that have significant health and safety issues needed as pre-requisite before the actual retrofit work can begin (e.g., lead abatement, asbestos removal, moisture control), as many other resources mentioned in this framework are only available for the energy and efficiency elements of the retrofit process.

While the Medicaid VBP system has potential, the concept of using Medicaid funds to reimburse non-healthcare providers is relatively new. There are some significant hurdles that must be addressed before it can be reliably utilized.

The first barrier is the fact that the current VBP system only allows for a CBO to access these funds through contracted agreements with a Medicaid Managed Care Organization (MCO) or VBP healthcare service provider. Program implementers that are utilities would need to contract a CBO to serve as the implementer on their behalf if they wanted to participate in a Medicaid VBP arrangement. Local municipalities and governments would also be unable to utilize this opportunity unless they created a nonprofit body within their organization to serve as the program implementer.

Another significant barrier is that the process requires significant legal expertise. The current VBP system is complex and requires contracts between the program implementer and a MCO or subcontracts with healthcare providers. In addition, there are healthcare regulations that limit what information the program implementer can access regarding Medicaid members and how they can be referred to the program. Without the necessary legal expertise needed to navigate these contracts, negotiate with MCOs/healthcare providers, and design a legally compliant referral method for Medicare members, it is unlikely a program implementer could fully utilize this opportunity.

The last and perhaps most significant hurdle is the current lack of usable data demonstrating and quantifying the health benefits associated with residential building retrofits. While studies exist that confirm health benefits do exist from the reduction of fossil fuels and other health and safety improvements in homes, most are not rigorous or specific enough to build an evidence-based business case for including dwelling-based services in VBP arrangements addressing social determinants of health.

Efforts are being made to build a case for this, however. One such pilot program addressing this need is the NYS Healthy Homes Value-Based Payment Pilot, a partnership between NYSERDA and the New York State Department of Health. The pilot was initiated to develop a framework that allows New York State's MCOs to fund residential healthy homes interventions as part of their VBP arrangements with healthcare providers. Once the NYS Healthy Homes Value-Based Payment Pilot is completed and evaluated, the resultant data could justify the use of Medicaid funds for health-related retrofits.

Additional information on the VBP system, its reforms, and the current state of progress toward its use for various purposes within the State of New York can be found on the NYS Department of Health website: https://www.health.ny.gov/health_care/medicaid/redesign/dsrip/vbp_reform.htm

Weatherization Assistance Program (WAP): The Weatherization Assistance Program is a national program funded by the United States DOE with additional funding from the New York State Homes and Community Renewal Agency. WAP provides energy efficiency improvements to privately owned residences at or below 60% of the State median income. These improvements primarily focus on weatherization efforts but do include assistance for heat system repairs/replacements as well as replacements for select appliances like refrigerators.

Priority consideration for WAP funding is given to senior citizens, families with children, and persons with disabilities. However, households that currently have a member receiving assistance from the Supplemental Security Income (SSI), public assistance, Supplemental Nutritional Assistance Program (SNAP), or the Home Energy Assistance Program (HEAP) are considered automatically eligible for WAP.

The program implementer is encouraged to reach out to the specific subgrantee for their region to understand the specific resources available locally and the requirements to access them.

Additional information on the WAP can be found on the DOE website:

<https://www.energy.gov/eere/wap/weatherization-assistance-program>

NY specific information for the WAP can be found on the Homes and Community Renewal (HCR) website: <https://hcr.ny.gov/weatherization>

Federal Housing Authority (FHA) Energy Efficient Mortgage Program: The Federal Housing Authority under the federal HUD offers mortgages to homeowners seeking lower utility bills through energy efficiency improvements. This program allows homeowners to leverage their FHA insured mortgage to secure a loan for said improvements. These energy efficiency measures include but are not limited to weatherization and renewables installation.

The idea behind the Energy Efficient Mortgage program is that the homeowner will save money on their utility bill through the efficiency measures and those savings can then be used toward paying off the addition to the mortgage. This assumption means that work proposed under this program must be projected to be cash flow positive. The borrower must be able to qualify for the loan amount needed to refinance the home and there are limits to how much money can be borrowed (A calculator showing the predicted amount a homeowner can borrow is accessible on the FHA's website).

The Energy Efficient Mortgage program can be paired with another program offered by the FHA, the 203(K) Rehabilitation Mortgage program. This associated program allows homeowners to finance up to \$35,000 on the mortgage for the purposes of repairing, rehabilitating, or improving their home. This allows homeowners to finance additional retrofit requirements that might be needed but would otherwise prevent the project from being overall cash flow positive.

Additional information regarding the FHA's Energy Efficient Mortgage and the 203(K) Rehabilitation Mortgage programs can be found on the HUD website:

https://www.hud.gov/program_offices/housing/sfh/eem/energy-r

Take Note

While the 203(K) Rehabilitation Mortgage works well with the FHA’s Energy Efficient Mortgage program, it is important that the program implementer only advocate for such resources if they are confident homeowners will be able to repay these expenses. Instances of homeowners losing their homes due to inability to make mortgage payments would not only have disastrous consequences for them, but also negatively affect the public perception and long-term viability of the SEEP.

Property Assessed Clean Energy (PACE): Property Assessed Clean Energy is a program offered by the DOE that allows homeowners to finance the up-front cost for energy efficiency improvements through a loan tied to the homeowner’s property. Payments to the debt are made through the homeowner’s property tax and remain with the home when a change of ownership occurs.

The program is not currently offered in New York State for residential opportunities, but program implementers outside of the State should be aware of the option.

Additional information about PACE can be found on the DOE website linked here:

<https://www.energy.gov/eere/slsc/property-assessed-clean-energy-programs>

Take Note

Similar to the FHA Mortgage, PACE runs the risk of homeowners losing their property if they default on their debt. If utilizing such a method, the program implementer must be especially vigilant when taking precautions to prevent overselling to homeowners.

4.2.1.6 *State and Utility Programs*

There are also many State-level programs that can be a resource. Below is a list of some relevant NYS programs. Program implementers in other states are encouraged to investigate what resources are available to them.

NYS Clean Heat: NYS Clean Heat is a utility-based incentives program for heat pumps. The program offers rebates for installations of heat pumps done by participating contractors. Depending on the model purchased, rebates can go up to several thousand dollars, and serve as an effective incentive to reduce up-front costs for homeowners. The levels and availability of incentives under this program vary by region and utility. Implementers are strongly encouraged to contact their local utility about what incentives are currently available.

Additional information on the NY Clean Heat program can be found on their website:

<https://cleanheat.ny.gov/>

EmPower: NYSERDA operates the EmPower program to provide weatherization and certain electrification upgrades to income-eligible residents. Households at or under 60% of the State median income receive full coverage for energy related retrofitting expenses up to \$10,000 in value. Households between 60% and 80% of area median income are eligible for a 50% cost share up to a NYSERDA investment of \$5000.

Additional Information on the EmPower program can be found on the NYSERDA website:
<https://www.nyserdera.ny.gov/All-Programs/empower-new-york>

NY-Sun: The NY-Sun program offers incentives to homeowners and businesses for the installation of solar panels. In addition to incentives to lower the price of installation, the program also offers technical expertise and a variety of finance options to help with out-of-pocket expenses.

Additional information on the NY-Sun program can be found on NYSERDA's website:
<https://www.nyserdera.ny.gov/All-Programs/ny-sun>

Comfort Home: The Comfort Home Program provides incentives for packages of weatherization improvements for market-rate homeowners to prepare their homes for electrification.

Additional information about Comfort Home can be found on the NYSERDA website:
<https://www.nyserdera.ny.gov/All-Programs/Comfort-Home-Program>

4.2.1.7 Lending Programs

The federal government and many states support lending programs relevant to the SEEP. These programs can be critical to addressing initial cost issues with both homeowners and the program itself, particularly if there are challenges with securing agreeable terms from private lenders. Some lending programs that can be used in New York State are listed below.

Rural Energy Savings Program (RESP): The Rural Energy Savings Program is funded by the USDA for the purpose of offering loans to entities that provide energy efficiency services in rural areas. The loans offered by the USDA are 0 interest with terms for up to 20 years. The borrower is authorized to charge up to 5% interest if they choose to offer the funding as a loan to end users.

Given the energy efficiency focus of the SEEP's retrofits, funding from the RESP can be used for most every aspect of the program. There are also no real requirements on who the program implementer can be. Utilities, municipalities, nonprofits, and nearly any other organization that might potentially serve as the program implementer would be eligible to apply. The primary limitation to using the RESP is that communities benefiting from it must be in rural areas.

Additional Information regarding the RESP can be found on the USDA's website:
<https://www.rd.usda.gov/programs-services/electric-programs/rural-energy-savings-program>

Green Jobs Green New York (GJGNY): The Green Jobs Green New York program run by NYSERDA offers low-interest financing options to homeowners for energy efficiency renovations. GJGNY also offers several other services through the program such as energy assessments.

Additional information on the GJGNY program can be found on the NYSERDA website linked here: <https://www.nyserda.ny.gov/researchers-and-policymakers/green-jobs-green-new-york>

4.2.1.8 Tax Incentives

Tax incentives can significantly reduce long-term cost burdens for homeowners. Tax incentives often come and go quickly, so it is particularly important for the program implementer to stay up to date on any incentives that might be offered on the federal, State, and even local level.

Currently, the only major tax incentive available is the Internal Revenue Service (IRS) Residential Energy Tax Credit. Details of that program are below.

IRS Residential Energy Tax Credits: The current federal tax code includes a tax credit for a percentage of the costs associated with the installation of renewable energy technology such as solar, wind, and geothermal. These credits can be applied to any renewables installed in residents' primary or secondary homes.

For solar, wind, and geothermal technology installation, the tax credit can be worth up to 30% of the value of the installation, with the exact percentage reimbursed decreasing over time. There is no upper limit to this credit, and the recent passing of the Inflation Reduction Act (IRA) has extended it until December 31, 2032.

Additional information on the IRS Residential Energy Tax Credits can be found on the IRS website: <https://www.irs.gov/instructions/i5695><https://www.irs.gov/newsroom/energy-incentives-for-individuals-residential-property-updated-questions-and-answers>

The necessary form for the tax credits, form 5695 can also be found on the IRS website: <https://www.irs.gov/instructions/i5695>

Take Note

The Residential Energy Tax Credit is nonrefundable. As the credit only offsets existing tax liability, it would be unlikely to be substantive for low-income households with little to no federal income tax liability.

4.2.1.9 Expected Expenses

In addition to identifying potential sources of funding for the program, the program implementer must consider the various expenses they will have. This section will discuss some of these predicted expenses.

Staff Expenses: To effectively manage the SEEP, dedicated staff time toward recruiting contractors, marketing the program, managing the program and staff, and monitoring the program will be needed. The number of staff and their compensation will vary based on the specific needs and strategies of each SEEP iteration.

While budgets may be tight, it is advised that priority be given toward staff expenses. Ensuring that staff are highly motivated and competent is essential for promoting homeowner buy-in. Studies of similar programs have shown that there is a strong relationship between homeowner participation and monetary investment into program administration.²¹

Marketplace expenses: The program implementer is likely going to want a medium that homeowners can use to interface with the Program Implementer, contractors, and other relevant parties. Perhaps the most obvious example of such a medium would be a website. While the medium could also be a physical location such as a storefront, it is important to consider ease of access for participants when choosing.

Creation of a website or other medium will likely cost money to develop, maintain, and upgrade as needed, and so should be given significant consideration in the program implementer's budget. With so many different programs and factors involved in the SEEP, presenting this information in an unorganized manner could quickly become overwhelming for many participants. As a result, expenses dedicated to developing this marketplace is another area of the budget that will be of critical importance to the success of the program.

Marketing: Marketing of the SEEP is another expense that must be considered. Public knowledge about the program and its benefits will likely be limited when the program is first implemented. Ensuring that knowledge is spread about the benefits of SEEP will be essential to promote continued participation. Additional details on marketing the program can be found in chapter 7 on marketing and communications.

Additional Incentives: While there are many incentives offered via third-party entities, these may not be enough to ensure buy-in from some participants. If budget allows, the program implementer should consider using program funds to include their own incentives.

Admin's Choice

There are many ways in which incentives could be offered, but each incentive is typically set up to address a specific challenge that prevents participation. Since there may not be enough funding available to provide every incentive mentioned, the program implementer should consider the specific challenges that seem the most prevalent for them and prioritize accordingly. For example, if low participation from homeowners is a prominent issue, focusing incentives on reducing the up-front or overall costs homeowners face with methods such as buying down the interest of loans or providing an initial bonus to reduce the amount a homeowner would need to borrow would likely see the greatest impact. As another example, a program implementer struggling with low-contractor availability in their area may want to offer an additional bonus for the completion of work for contractors, or to subsidize training expenses for new contractors.

QA/ Evaluations: Another expense to consider is hiring evaluators to monitor the performance of participating contractors, other relevant partners, and of the organization itself. Evaluating contractors and the program is critical for ensuring homeowners receive quality service. Maintaining high satisfaction for homeowners is also important to the long-term viability of the SEEP.

In addition to ensuring quality, previous studies of similar programs have shown that many homeowners end up not saving as much on energy bills as they potentially could have.²² This discrepancy is largely due to homeowners not being familiar with their new heating systems and so not using them to their full potential. Ensuring follow ups with customers also provides an opportunity to educate homeowners on how to use their new appliances more efficiently. Additional savings made after a no cost evaluation are likely to boost customer satisfaction even more.

The program implementer may want to consider a third-party organization with experience in Quality Assurance (QA) and evaluations if qualified local personnel are not immediately available. Contractors could also be paid to perform follow-up visits to help homeowners familiarize themselves with their heating equipment. Other forms of collecting feedback such as surveys can also be considered to supplement more expensive in-person evaluations.

4.3 Partners and Support

There are expected to be several organizations that could provide some form of financial assistance. This section will discuss some of these groups and how they might assist.

Lenders: The SEEP will very likely need to rely, at least partially, on the financing capabilities of private lenders to help participants address their up-front costs. There are a significant number of private lenders available within the State of New York, and many of them offer their own unique finance plans for energy efficiency renovations. Some examples of private lenders with unique energy finance programs are Blocpower and Sealed's HomeAdvance.

It is important to coordinate with private lenders to ensure that terms offered for loans are acceptable for all parties. Given the low rate of default for home energy efficiency loans, these should generally be considered safe investments by lenders.²³

State and Federal Programs: Some State and federal programs have delegated responsibilities to smaller local organizations or groups such as the WAP and NYS Clean Heat programs, while others are directly managed by the organization or government such as the New York Green Bank.

Participation and coordination with these entities is important for ensuring that funding opportunities for homeowners and the program itself can be properly accessed when needed. The program implementer is encouraged to identify what groups or individuals administer relevant programs for their area to facilitate future collaboration.

Local Organizations and Governments: In addition to administering various State and federal programs, local organizations can assist the SEEP in a variety of different ways. Examples include helping with community outreach and advocacy, collecting homeowner feedback, or providing technical assistance. As some individuals and communities may be hesitant to participate in programs like SEEP for trust-related reasons rather than financial ones, cooperation with local CBOs can be an important step in building trust.

Other local groups such as HOAs and the municipal government are entities the program implementer is also encouraged to coordinate with. These groups can provide important technical assistance like providing housing plans for neighborhoods.

4.4 Challenges and Solutions

A program with as many moving parts as the SEEP can be expected to encounter some challenges related to finance in its implementation. This section will detail some of the possible difficulties the program implementer might encounter, as well as suggested methods to address them.

Initial up-front costs and long-term debt for homeowners: Two of the most significant barriers preventing homeowner participation are the prospects of up-front costs and taking on unaffordable debts. Many households in the U.S. simply do not have the necessary funds on hand to pay for these renovations and paying interest on a long-term loan they are unsure they can afford is not an appealing alternative.

The most straightforward way to address these financial concerns are through incentives, paid for either by funds from other programs or the SEEP itself. Programs like NYS Clean Heat can provide rebates to drive down up-front costs. In addition, securing low or even 0% interest loans, if possible, from lenders on behalf of homeowners is an effective way to assuage concerns regarding long term debt. If renovations are done efficiently, it is entirely possible for energy savings to cover all debt incurred from a low-interest loan.

Up-front costs for contractors: For most projects contractors typically need to acquire and pay for tools, labor, and materials long before they can collect payment from the client. These up-front costs can be a significant barrier to contractors, who often must take out short-term bridge loans to ensure they are able to cover costs until payment is due. Such short-term loans can easily cut into contractors' overall profit.

There are several methods that a program implementer might utilize to address this challenge. As a SEEP will typically involve partnering with lenders, one of them could potentially offer contractors short-term loans with more favorable terms than they would typically get outside of the program. Another approach would be to assist with the costs as much as possible through program benefits and incentives. Methods such as requiring repayment for equipment purchases after contractors are paid (if the program implementer is utilizing a supply management system) or incentives that provide initial capital to contractors are effective ways at addressing up-front cost concerns. It is also advisable to consult with participating contractors to see which solutions would be the most appealing to them.

Soft and transaction costs for contractors: Contractors have also expressed concerns about dealing with costs for services that don't generate revenue such as building assessments and initial consultations. Additionally, there are concerns over transaction costs such as time spent looking for new jobs and adjusting schedules for customer cancelations. An initial evaluation and consultation performed by SEEP staff in addition to the recommended strategy of subsidizing contractor evaluations and follow-ups are quite advantageous for contractors seeking to reduce these soft costs.

Having homeowners use program staff for initial steps also has advantages for contractors with regards to transaction costs. Homeowners that make it to the point in the program where they are working with a contractor have already gone through several steps of the program, and so are less likely to cancel services at that point. The engagement teams and the General Contractor (GC), if that model is being used, also fulfill the important role of organizing work for homeowners. This service, in addition to the comprehensive listings of participating contractors that are to be made available to customers, should go a long way in reducing time contractors spend looking for work between jobs.

Residents may be renters: For some communities, many of the homes in the area are rented out to residents. This poses a challenge for the program, as the individuals who own the home do not live there. The traditional incentives to retrofit a home (energy savings, better health, better comfort) typically won't apply to them.

It is unlikely the program implementer will have enough funding to provide incentives strong enough to offset the lack of other benefits for rental situations, but other indirect benefits to the homeowners can be an option as well. For example, if the program implementer is the local government, offering a reduction in local property taxes could be an option. Encouraging participation in the SEEP program among homeowners that rent out their properties is a significant challenge. The National Renewables Energy Laboratory has recently conducted studies on the financing of whole-home energy retrofits and some of the recommendations show promise in altering finance options to be more favorable to building owners. These recommendations include providing homeowners with more credit and better lending terms for retrofits.²⁴ While the program implementer is encouraged to explore options to address this challenge, it may simply be more cost-effective to instead focus resources on non-renting households.

4.4.1 Additional Resources

Table 5. Financing the Program Additional Resources

Resource (Assessments)	Description	Link
The DSIRE Database	This database provides comprehensive information on State, federal, local, and utility incentives and policies that are in place to support renewable energy and energy efficiency.	https://www.dsireusa.org/
Spotlight on Maine: Transition to a Sustainable Level of Incentives	This DOE case study describes Efficiency Maine's Home Energy Savings Program (HESP), one of the few large residential energy efficiency programs that has attempted to navigate the transition from rebate-focused offerings to financing focused offerings that better align with its limited budget.	http://energy.gov/sites/prod/files/2014/01/f6/maine_incentives_case_study.pdf
Low-Interest Rates Entice Philadelphians to Reach for the Stars	Outlines Philadelphia's EnergyWorks program's use of low-interest loans to incentivize homeowners by tying the interest rate to the number of energy efficiency measures incorporated into the home.	http://energy.gov/eere/better-buildings-neighborhood-program/low-interest-rates-entice-philadelphians-reach-stars
Sustainable Debt Finance: Trends and Opportunities in an Area of Accelerated Growth	A report from Vinson and Elkins on the growth of Environmental, Social, and Corporate Governance funds as well as green loans and bonds.	https://www.velaw.com/insights/sustainable-debt-finance-trends-and-opportunities-in-an-area-of-accelerated-growth/
Energy Future's Group EnergyFirst Mortgage	The pilot program in Vermont funds energy improvements through refinancing the mortgage in a home. Can be used as a template for similar financing methods for a SEEP.	https://energyfuturesgroup.com/mortgage/

5 Workforce Development

5.1 Introduction

The lack of contractor availability is a significant barrier to completing residential work projects here in the U.S. As a result, building and maintaining a qualified workforce will be critical to program success. Stakeholder feedback also indicates that there are some common reservations from contactors about participating in programs like SEEP that should be addressed.

This chapter will discuss strategies for developing a network of qualified contractors, organizing contractor work for the program, and making the program more appealing to contractors to increase participation. For resources on how to build and maintain an effective program administration workforce, see chapter 6 on program design.

5.2 Design and Decisions

5.2.1 Training

5.2.1.1 General Strategy

One of the intentions of the SEEP is to ensure a workforce capable, not only meeting the demands of the program, but also future demands for renovations and electrification services from the community after program completion. Much of the current contractor workforce is older and approaching retirement, and there are relatively few new contractors entering the workforce to replace them. Because of these factors, a SEEP would likely benefit most by focusing on building a new workforce in the area rather than relocating an existing one.²⁵

A major component of building this workforce is ensuring relevant training is available to contractors, both current and aspiring. How exactly the training will be organized and conducted is ultimately up to the program implementer. If the necessary local expertise is already available, the program implementer could try utilizing this expertise to create a training plan for the local community. There are also numerous organizations and entities that have already developed comprehensive training programs for specializations relevant to whole-home energy retrofits. Taking advantage of these existing programs will likely be more cost-effective and practical than trying to build the necessary training curriculum from scratch. This strategy will also ensure new contractors are familiar with widely recognized standards and practices. Similar programs have seen relative success by utilizing these existing training programs and subsidizing the cost of enrollment for interested participants.²⁶

When formulating a training plan, the program implementer is encouraged to collect feedback from established contractors in the area to understand what training and certifications they already have as well as which ones they feel will be most relevant for the program. Doing this will help determine what specializations are currently most needed to meet program demands and what courses might be most useful to promote standardized workforce skills. Ensuring the training provided is relevant to the skillsets needed is of critical importance, as spending resources to train contractors for skills that aren't needed or are overrepresented is likely to negatively affect participation and satisfaction with the program.

Stakeholder feedback has indicated that, between the costs of retraining and re-organizing labor, expanding workforce capability can be a significant challenge for new and existing contractors. In addition to training for the relevant building specializations, a curriculum should be developed to ensure that contractors have the necessary management skills to oversee the growth of their businesses. This training can be provided solely by the contractor engagement group and the SEEP financial expert if the program has the necessary expertise. However, if that expertise is not available or lacks the capacity to cover contractors' needs, the program implementer may want to consider including third-party training programs on business management skills in their course offerings.

Take Note

Regardless of which specific programs or strategies the program implementer employs, the time and locations at which these training courses are offered need to be as flexible as possible. New contractors can be expected to come from many different groups with a diverse range of schedules. Ensuring that these training programs are as accessible as possible will be an important factor for developing a new workforce in a timely manner.

5.2.1.2 Certification Options

This section lists some relevant certifications and training programs that are commonly used in the U.S. In addition to the list provided, the program implementer is encouraged to explore additional programs that are offered in their area.

Air Conditioning Contractors of America Accreditation (ACCA): The ACCA is a nonprofit association of HVAC professionals. In addition to the networking and teaching opportunities, the ACCA also offers certifications through their contractor accreditation program. There are two separate accreditation tracks offered, one of which specializes in retrofitting residential homes.

Additional information on the ACCA and the opportunities they offer can be found on the following website: <https://www.acca.org/home>

North American Board of Certified Energy Practitioners (NABCEP): NABCEP is a professional certification and accreditation organization that offers training and certifications for renewable energy professionals. NABCEP is a nationally recognized organization and will be a valuable resource for developing a workforce for the installation of renewable energy sources.

Additional information about NABCEP and their course offerings can be found on the following website:
<https://www.nabcep.org/>

Building Performance Institute Certifications (BPI): In addition to creating standards for the buildings themselves, BPI also offers training and certifications for contractors seeking to develop building skills. Courses offered by BPI can be utilized to develop the skills needed to complete many of the steps for weatherization and electrification.

Additional information on BPI and the courses they offer can be found on the following website:
<http://www.bpi.org/>

Building Performance Association Training (BPA): The Building Performance Association is a separate organization from BPI, but also offers training and other resources to contractors. In addition to BPA specific resources, the association lists courses and opportunities offered by third-party organizations.

Additional information on the BPA and their course offerings can be found on the following website:
<https://www.building-performance.org/>

Total Energy Pathways Certifications (TEP): The Total Energy Pathways program under the management of NEEP assists with developing a contractor workforce capable of performing all aspects of a whole-home retrofit. Initially only available in Vermont, TEP's early successes led to plans to expand the program to states throughout the northeast and mid-Atlantic regions of the country. In addition to training and workshops offered by TEP, they maintain a list of third-party organizations that offer training opportunities and resources.

Additional information on TEP and their course offerings can be found on the NEEP website:
<https://neep.org/tep/total-energy-pathways-workforce-development>

Occupational Safety and Health Administration Training (OSHA): The Occupational Safety and Health Administration is a U.S. government organization dedicated to ensuring the safety of the American workforce. While OSHA does not offer direct training for the building skills needed, the organization does offer courses on how to safely conduct such work. Given the potentially dangerous nature of some roles in the construction industry, it is strongly recommended that the program implementer include OSHA training as a general requirement for participating contractors regardless of which specific skills they are training for or have already acquired.

Additional information on OSHA and its course offerings can be found on the following website:
<https://www.osha.gov/training>

Association of General Contractors (AGC): The AGC is a trade association set up to represent contractors and other roles in the construction industry. One of the resources offered by the AGC are listings of training programs and courses offered both by the association and third-party organizations. The AGC has a separate chapter with its own website for each state in the U.S. The program implementer is encouraged to identify the specific AGC chapter for the state it is operating in to determine what resources are available.

Additional Information on the AGC can be found on the website: <https://www.agc.org/>

A link to the New York AGC chapter can be found here: <https://www.agcnys.org/>

Local Universities and Trade School Programs: There are countless trade schools, colleges, and universities throughout the country that offer courses on building, business management, and other relevant skills. The program implementer is encouraged to identify local educational institutions that might provide such courses.

5.2.2 Workforce Equity

In addition to helping meet labor demands generated from the program, local workforce development should provide employment opportunities and other benefits to the public. With limited resources available for subsidizing training and building a workforce, it is recommended that the program implementer identify which populations and areas in the community might be most in need of the economic opportunities expected from the program. To maximize benefits, resources for marketing the workforce development may be best directed toward disadvantaged communities.

Take Note

Ideally, a new workforce will be inclusive and mostly local to where the program is operating. If a workforce is not representative of the community, the program implementer may want to investigate why this discrepancy exists. While it is possible such a discrepancy is entirely coincidental, it can also indicate an equity issue related to resource allocation or general strategy. A change in marketing, incentives offered, or even the accessibility of training and employment opportunities may be needed to ensure that program workforce benefits are appropriately distributed.

5.2.3 Program Certifications

To make the process of organizing all the subcontractor specializations needed for a retrofit as straightforward as possible, the program implementer may want to categorize third-party certifications into specific tasks according to the qualification they provide. This would help to clearly convey the actual skills acquired for each certification as well as clarify any training differences from similar courses offered by different program providers. It is also necessary to verify that contractors with new certifications can meet program standards. Contractors interested in expanding the range of services they offer in the program would likely need an evaluation from QA staff prior to offering additional services through program channels.

An ideal feature of a one-stop-shop approach is a workforce where each contractor is certified for the entire whole-home retrofit process. While this adds significant convenience to a stacked approach, stakeholder feedback indicates the current contractor workforce in the U.S. is highly fragmented in terms of specializations. Many contractors only focus on a single aspect of the process or sometimes even a single task (e.g., window installation only for house weatherization). It is important to consider the actual capabilities of current contractors and what plan might best facilitate progress toward this goal.

A suggested strategy is to provide clearly defined pathways for participating contractors to gain additional certifications. The pathway could include a list that is accessible to the contractor (ideally on the website if one is being utilized), stating relevant training programs and the skills and qualifications provided. Additional recognition from the program noting a contractor as “whole-home” certified should also be provided, preferably in a manner highly visible to participating homeowners. Providing opportunities for the contractor to practice the skills they are trying to get certified for, either by having them assist an already certified contractor or through some other method, has been successful in helping to prepare contractors. This pathways strategy was successfully utilized by the Sustainable Energy Authority of Ireland to build a workforce of contractors certified for every aspect of a whole-home energy retrofit.

Contractors should be continuously encouraged to seek additional certifications. The program implementer may want to consider offering incentives for acquiring additional certifications as well as ensuring the program evaluation process for new skills is done in a timely manner and with consideration toward the contractor’s schedule. Incentives such as monetary bonuses for completing certifications or prioritized listing and referencing of contractors based on relevant certifications can encourage contractors to expand beyond their current skillsets. Subsidizing training and coordinating job shadowing opportunities between participating contractors for relevant skills are also suggested ways to make the certification process more accessible.

5.2.4 Work Model

In the interest of maintaining a single point of contact for homeowners, the program implementer will need to determine a method for reaching out to and coordinating subcontractors to complete retrofits.

Admin’s Choice

While several models are listed below, the program implementer is not necessarily limited to these suggestions. Engaging with stakeholders in the community to determine what might be most suitable for specific circumstances is encouraged.

General Contractor Model: With the fragmented nature of the contractor workforce in the U.S., other whole-home energy retrofit programs such as Vermont’s ZEN have seen success utilizing a GC model to organize work. This model consists of providing a list of GCs for homeowners to choose from early in the sign-up process. The selected GC would become the homeowner’s primary point of contact which would involve scheduling work, accessing program resources, and assisting with any other inquiries or issues that might arise for the homeowner. Any assistance needed from SEEP staff would be provided indirectly through supporting the GC (unless SEEP staff are specifically sought out by the homeowner).

The GC would be able to access the list of qualified subcontractors as well as schedule work with these individuals through the program. With this model, things such as subcontractor billing, equipment costs, and any other additional expenses would be handled through the GC with support provided by SEEP staff as needed.

Given the importance of the GC role with this model, it is critical that the program implementer perform the necessary due diligence to confirm that GCs are not only competent but have the necessary customer service skills to serve as a primary point of contact and representative of the program. While this model has been successful elsewhere, it requires that there are already sufficiently qualified contractors available to assume this role.

Engagement Group Model: An alternative approach to the GC model is to rely on the program's community engagement group to coordinate work for homeowners. With this model, the community engagement group would serve as the primary point of contact. In the interest of building a rapport between the homeowner and their point of contact, the program implementer should consider assigning a specific member of the engagement group to each homeowner, with a backup available in the event the primary contact takes a leave of absence for vacation or other reasons.

This approach would have the engagement group reaching out to subcontractors directly to coordinate work. Any issues or inquiries the homeowner might have would be handled by an assigned engagement representative. While this approach has the advantage of not needing to rely on third-party personnel to coordinate work and serve as a program representative, engagement personnel assigned to this role would need comprehensive training or existing experience with coordinating subcontractors and managing renovation projects. It would also mean that the engagement teams would have a higher overall workload and would need to perform significantly more fieldwork to meet with participants and monitor progress.

One-Stop-Shop Model: The one-stop-shop approach is very similar to the GC model, except that for this approach the contractor who is the primary point of contact would also be certified for every required aspect of a whole-home energy retrofit. As a result, the contract would typically not need to subcontract through the program at all. This should make the process more convenient for both the contractor and homeowner as well as reduce the administrative burden of the program implementer.

While this approach would be more convenient and straightforward than either the GC or engagement group approaches, it also has the significant barrier of requiring sufficient contractors existing in the network that are certified for every aspect of the whole-home retrofit process. Such contractors are exceedingly rare in the current U.S. workforce, so this approach would likely require significant time and investment in the contractor training and certification process before being viable.

Until there are enough fully certified contractors to meet demand, the program implementer should continue to utilize another model to ensure that contractors that are not certified for every aspect are still able to find work within the program. It is recommended that the program implementer start the program utilizing one of the other approaches and slowly transition to the one-stop-shop model as the necessary skills are cultivated within the workforce.

Homeowner Driven Model: While it is strongly recommended that one of the previously mentioned models or a model developed through stakeholder engagement be used, the program implementer should allow for an approach in which the homeowner essentially functions as a GC. This would entail the homeowner coordinating directly with subcontractors and performing other relevant responsibilities normally completed by the GC. The homeowner performing this role themselves will likely be challenging for them and require past project management or building experience. The option should, therefore, only be available by request for individuals that desire a higher level of control over the renovations and clearly understand the challenges and responsibilities associated with the task.

If utilizing a website, it is recommended to include features that would make the process of planning one's own renovation as accessible as possible for interested parties. Additionally, the engagement groups should be made accessible to these individuals to assist with any questions or issues they might encounter.

5.2.5 Contractor Marketing

Participating contractors can be a very cost-effective way to expand on the program's marketing outreach efforts to customers. Ensuring that contractors are well informed about the program and have support when needed will be a key element of contractor marketing. Chapter 7 of this framework contains additional details and suggestions on this aspect of the program.

5.3 Partners and Support

Developing a workforce that is capable of meeting demand during the program and after will likely require assistance from partners within the community. This section details some groups that could assist in developing a workforce as well as how a workforce can be created.

Lenders: Partnered lenders providing financial assistance to homeowners may also be interested in offering services to participating contractors. Lending services can help contractors fund up-front costs or support growth. Some lenders may also be able to provide consultations or other forms of financial assistance.

Third-Party Certifications and Training Programs: There are many groups and organizations related to the home energy retrofit industry with existing certifications and training programs that can be utilized to build a workforce. Identifying the most relevant local programs when planning a training strategy is recommended.

Equipment Distributors and Manufacturers are essential for acquiring the appliances and materials needed for the retrofit process. As these groups are interested in selling their products, and a well-developed SEEP is expected to significantly increase demand, distributors and manufacturers may be willing to extend special offers that could be mutually beneficial. In addition, they may be willing offer training programs for the proper installation and use of their equipment.

Contractors: As potential participants themselves, experienced contractors can have a wealth of knowledge of workforce development and contractor management. The program implementer should identify already established contractors that might be able to provide training and general advice to new contractors entering the workforce.

Local Schools, Educational Organizations, and Relevant Interest Groups: The program implementer should identify local organizations which might help with expanding the outreach and capacity of recruitment efforts. Schools and educational organizations are an excellent potential partner for this as students graduating will be looking for new opportunities. Organizations with related interests and goals are another potential pipeline to build the workforce. Clubs and groups related to environmental advocacy, community improvement, and construction may have members that are looking for relevant opportunities.

5.4 Challenges and Solutions

Given the general shortage of contractors and the fragmented nature of specializations within the U.S. market, it is expected that developing a workforce will be one of the more challenging aspects of the SEEP. This section details some of the expected challenges when developing a workforce and suggestions on how to address those encounters.

Not enough contractors: Most communities simply won't have a large enough workforce to meet program demands. While the overall goal of the SEEP's workforce development effort is to address this issue, in some cases the shortage may be so severe that the program is unable to operate. There are two suggested strategies for such a situation. If contractors are available in nearby regions, one option is to attempt to bring them in temporarily. Non-local contractors would focus on training efforts and keeping the program running until a local workforce is able to meet these requirements. This approach would require that there be an available workforce within a reasonable distance of where the program is operating, and that the nonlocal workforce understands and agrees to the temporary nature of the work.

An alternative option that would require some advance planning would be to deploy the SEEP in phases. With this phased approach, the program implementer would first focus on planning and workforce development without enrolling homeowners yet or only doing so in a limited capacity. This approach would allow development of a local workforce prior to needing them and would help avoid potential issues with homeowners not receiving services in a timely manner. In addition to requiring advanced planning, efforts would need to be made to ensure there are opportunities for newly trained workers prior to the homeowner enrollment phase.

Both strategies can also be utilized if there are enough contractors in the area. In the event of there being availability issues with specific specializations, training or recruitment efforts can focus on those specializations.

Fragmented training and certification credentials: The training background of an existing workforce may be fragmented enough that it becomes unclear exactly which programs and certifications should be used as the standard. For such situations, the program implementer should identify their options and determine which programs would suit their specific needs most closely. Offering free or subsidized re-training for a particularly fragmented workforce will likely be necessary. While this will have additional training costs, doing so will help standardize the workforce, improve program satisfaction, and demonstrate to contractors that the program exists to benefit them as well as homeowners.

Limited resources for contractors to expand: Some contractors may be interested in acquiring training to expand their range of services or hiring additional personnel, but lack the initial capital needed to facilitate this growth. One possible solution to this challenge would be for the program implementer to work with their partnered lenders to develop a loan program for interested contractors. By working with already partnered lenders on the collective behalf of participating contractors, the program implementer may be able to achieve loan terms that are more favorable than what many contractors could obtain independently.

An additional solution for training expenses unique to New York State is NYSEERDA’s Cooperative Advertising and Training Program. The co-op program offers a 50% cost share for any training or marketing expenses related to clean energy or energy efficiency infrastructure up to a cap of \$100,000. While currently the program is only offered until 2024 or until available funding runs out, it is an excellent opportunity for smaller contractors in need of capital to grow their business.

Additional details on the co-op program and the program manual can be found on NYSEERDA’s website: https://portal.nyserda.ny.gov/CORE_Solicitation_Detail_Page?SolicitationId=a0rt0000011YFNMAA4&gl=1*9n1r93*_ga*MjAyMjE4MDk1NC4xNTAyNDY0MTY5*_ga_DRYJB34TXH*MTY2MDEzNzMyOC4xNTguMC4xNjYwMTM3MzI4LjA

5.4.1 Additional Resources

Table 6. Workforce Development Additional Resources

Resource (Workforce)	Description	Link
The Better Buildings Residential Network Training Toolkit	This DOE toolkit was designed to help residential energy efficiency program managers identify resources and opportunities to help contractors, staff, and volunteers enhance their understanding of building science.	https://www.energy.gov/eere/better-buildings-residential-network/downloads/better-buildings-training-toolkit
Efficiency Maine’s Find a Residential Registered Vendor Locator	This feature from Efficiency Maine can be used to find contractors participating in the program. Used as a template, it can model SEEP workforce features.	https://www.efficiencymaine.com/at-home/vendor-locator/

Table 6 continued

<p>Build It Green: Bringing Energy Efficiency Knowledge to the Real Estate Market in a BIG Way</p>	<p>Build It Green is a DOE initiative to provide training on sustainability issues to real estate professionals for the purpose of encouraging these practices among the public.</p>	<p>https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/Build%20It%20Green%20Bringing%20Energy%20Efficiency%20Knowledge%20to%20the%20Real%20Estate%20in%20a%20BIG%20Way%20%282%29.pdf</p>
<p>Construction Instruction</p>	<p>A phone app designed for building professionals that provides instructional videos and resources about the construction industry.</p>	<p>https://constructioninstruction.com/app/</p>
<p>Building America Building Science Advisor</p>	<p>Building America Building Science Advisor (BSA) is a DOE sponsored website that provides expert advice on building envelope system performance from the industry's best researchers and building scientists.</p>	<p>https://bsa.ornl.gov/#/</p>
<p>Internal Quality Management</p>	<p>This paper from Home Performance with Energy Star discusses how contractors can manage their work quality. It could also be used by a program implementer to monitor contractor work quality.</p>	<p>https://hpwescontractorsupport.com/internal_quality_management_october_2017/</p>

6 Program Design

6.1 Introduction

A well-designed SEEP should be comprehensive as well as easy to access and navigate for homeowners and contractors. The program implementer will also want to ensure that there is enough expertise to administer the program. This chapter will go over strategies for the operation of the program, staffing suggestions, and other general considerations.

6.2 Design and Decisions

6.2.1 Implementer Roles and Services

A SEEP will need to perform many roles on behalf of its participants. This section will outline the responsibilities that are to be expected.

Admin's Choice

The program implementer is by no means limited to performing only the roles listed below, nor do they necessarily need to handle these responsibilities directly. Outsourcing of the listed responsibilities or the adoption of new ones can be beneficial depending on the circumstances.

6.2.1.1 Outreach and Marketing

Marketing the program and building positive relations with the community will be an important part of any SEEP, especially early in the program's life. Program awareness is needed to build a participant base of both homeowners and contractors. Additionally, without building and maintaining a positive relationship with the community, the program will be less likely to maintain necessary participation rates and scale up to the level needed to adequately address today's climate needs. More details and suggestions on the outreach and marketing process can be found in chapter 7 on marketing and communications.

6.2.1.2 Administrative Support

It is critical that the program implementer can reliably provide administrative support to participants. Stakeholder feedback indicates a major impediment that has negatively affected participation rates for similar programs has been the administrative burden placed on homeowners and contractors when coordinating all the different elements required for a retrofit. This burden is especially significant for contractors and one of the most cited reasons for contractors declining to participate in similar programs is a concern that navigating the complexities in such a program would distract personnel from paid work.

To address this barrier, program staff should work to complete paperwork, coordinate services, and perform other tasks as needed on behalf of participants whenever possible. If it is not practical or feasible to do certain tasks on behalf of the participant, guidance should be readily available for them to complete the tasks independently.

While providing such comprehensive assistance will create additional administrative burden for the program implementer, convenience is a significant selling point of the one-stop-shop stacked approach. The program implementer must ensure they have appropriate staffing and training to address these needs.

6.2.1.3 *Coordination of Services*

Another important responsibility is scheduling work on behalf of homeowners. In addition to working with the homeowner, facilitating coordination between contractors may also be necessary, especially if a general contractor (GC) is not utilized.

Both homeowner and contractor feedback indicate that participants tend to prefer a single point of contact for coordinating services. Program staff should ideally maintain some level of familiarity with homeowners and their homes to ensure consistency of service.

Admin's Choice

If utilizing a GC for coordinating work, the program implementer will have the option of relying on the GC to be the primary contact for homeowner. It is up to the discretion of the program implementer to determine whether they want to handle the coordination of services in-house or through their established contractors. More details on this can be found in chapter 5 on workforce development.

Take Note

While most homeowners will prefer having program staff or contractors work with them to create an accommodating work schedule on their behalf, others may prefer the autonomy of being able to schedule independently. The option for homeowners to independently schedule work should be available for individuals inclined to do so. Program staff should also be available to advise individuals on any challenges encountered during this process.

6.2.1.4 *Financing Support*

Given the extensive number of grants, incentives, and other financial elements that can be involved in a SEEP, most participants will need extensive assistance from the program staff. The exact assistance provided is ultimately up to the program implementer but should include support for accessing associated extra-programmatic funding sources (e.g., equipment rebates or energy specific loans offered through other programs) and help developing a financing plan for participants.

These services should be offered to both homeowners and contractors. In the event the program implementer does not have the expertise readily available to appropriately advise on one or more aspects of financing to participants, a third-party resource should be identified for that purpose.

6.2.1.5 Technical Support

Questions regarding program details, other resources available, or even how to properly utilize installed equipment can arise during participation. To provide comprehensive support it is recommended at least one staff member be on call to assist with inquiries at reasonable hours throughout the day. The mode of contact and the timeframe chosen for this assistance should be as easily accessible and accommodating as possible. For example, having someone available by e-mail and phone from 8 a.m. to 8 p.m. every day would ensure that there is a reasonable timeframe throughout the week for participants with more restrictive schedules.

Responding staff should either have the expertise on hand to advise on these questions or be able to promptly reach the appropriate contact that can. Ensuring these inquiries are addressed in a timely and comprehensive manner is essential. The one-stop-shop experience emphasizes that participants shouldn't feel the need to seek help outside of program channels to address issues.

6.2.1.6 Contractor-Homeowner Conflict Resolution

There is a definite possibility of conflict arising between participating homeowners and contractors, which can potentially escalate to the point where work progress becomes impeded and expensive legal involvement becomes necessary. The program implementer is in a good position to serve as a nonbiased third-party, should such conflicts arise during the SEEP, and would ideally resolve these conflicts in a timely and mutually agreeable manner without relying on extensive legal involvement. Program staff that interact with homeowners, such as the energy concierge or engagement representatives, should be made available to the participants to resolve any conflicts. In the interest of fairness to both homeowners and contractors, it is important that the program implementer remain as objective as possible when mediating.

6.2.1.7 Quality Assurance

To ensure that contractors' work meets the expectations of homeowners and the standards set by program, conducting assessments on work done throughout the process will likely be necessary. As acquiring in-house expertise needed to consistently conduct these evaluations can be a significant challenge, contracting this role out to a third-party specialist may yield the best results.

Best practices in the industry include:

- Quality inspections, using a checklist informed by BPI/ACCA/ The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and other industry standard and training organizations.
- The inspections should be frequent and early in a contractor's tenure with the program (require three passing inspections initially), then 10% of jobs for each contractor are inspected after the 3 passing scores.

6.2.1.8 Measuring Success

Aside from monitoring contractor quality, the program implementer will also need to evaluate homes for improvements in the target metrics identified at the beginning of the SEEP. For example, if energy savings was an important metric set forth in the SEEP, the program implementer would likely want to collect information on the before and after energy expenses of participants. If personnel utilized to evaluate contractor quality have the necessary expertise, they could also evaluate how well work achieved these metrics at the same time.

6.2.1.9 Supply Management (Optional)

Stakeholder feedback and results from similar programs indicated that when contractors are unable to access the relevant equipment needed for retrofits in a timely manner it can be a significant barrier to homeowner participation. This issue is particularly relevant for homeowners scheduling work on an emergency basis. Often, individuals experiencing a heating failure in their home are unable to wait the necessary days or even weeks before the right size and type of heat pump can be brought and installed. While there are multiple ways to address this issue, one suggested avenue which provides a great deal of control for the program implementer is to independently stock the appropriate equipment.

The program implementer would maintain an inventory of the relevant appliances and pieces of equipment from manufacturers based on projected demand (or past demand if the program has been operating for some time). This equipment would be locally stored and would serve as a stockpile from which participating contractors would be able to quickly acquire the necessary equipment. The program implementer should design this supply system so that it is a preferable alternative to acquiring the equipment independently for contractors. Given the challenge that up-front costs for materials and equipment can pose for contractors, delaying repayment until the contractor is reimbursed for their labor may be a significant draw for such a strategy.

The storage space utilized for holding this equipment could potentially be used for other purposes as well. For example, old fossil fuel heating systems could be stored and used for discounted or free emergency replacements when the appropriate heat pump isn't available. This would ensure that homes undergoing a like-for-like replacement (i.e., a fossil fuel boiler is replaced with another fossil fuel boiler) on an emergency basis are not locked in to use fossil fuels for as long as if a new heating system were used.

Even if the program implementer decides not to actively manage supplies and materials on behalf of participating contractors, there are other, less resource intensive methods that can assist contractors with supply management. Looking at past demand for various appliances and materials related to retrofits, using that data to predict future demands, and sharing this information with contractors is one way in which to help reduce uncertainty about what equipment contractors should buy and in what quantities. Alternatively, if analyses for the common house typologies in the community have been done, this information could be shared with contractors to help narrow down the types of appliances that would need to be kept on hand.

6.2.2 Staffing

Contractors, homeowners, and program partners will all rely on program staff to navigate the program as well as other third-party resources and opportunities. This section will detail some of the suggested positions the program implementer should create to handle the previously mentioned responsibilities, as well as recommendations for the desired skills and characteristics for staff fulfilling their duties.

Admin's Choice

Since the size and needs of any SEEP will vary, staffing may need to be adjusted accordingly. The program implementer might need to employ more than one individual to fulfill a single role or have a single individual complete multiple roles depending on circumstances. Additionally, the program implementer should not feel restricted to only the roles listed below nor feel that every role needs to necessarily be handled in-house.

- **Program Manager:** The program manager would oversee all functions of the SEEP. Responsibilities such as developing an implementation plan from this framework, hiring new staff, and directing existing staff would typically be under the direct control of the program manager.
 - An effective program manager should have experience with project and/or program management and possess good communication skills. Ideally, the program manager would also have experience with residential energy efficiency programs, or at least demonstrated interest in such programs and possess the ability to readily apply their management skills to new topics or fields.

- **Community Engagement Manager/Representative:** The community engagement manager and representatives would be responsible for interacting with participating homeowners, community organizations and leaders, financial institutions, partnered programs, and the public. Responsibilities such as helping homeowners sign up for the program, scheduling renovations, meeting stakeholders to collect feedback, and helping homeowners apply to extra-programmatic resources would all typically fall onto the community engagement group. The community engagement group would also likely be the group responsible for handling inquiries from the public.
 - One of the intended responsibilities of the community engagement group was to reduce or even eliminate the administrative burden of homeowners. Therefore, staff should be customer oriented and highly competent. It would also be expected that community engagement representatives be able to quickly learn the nuances of other programs that provide relevant benefits, so they can efficiently connect homeowners with those resources.

- Given the time it can take to build the necessary knowledge about the industry to perform this role effectively, the program implementer should hire with the anticipation of a long-term and specialized customer service role. Pay should reflect this expectation and be competitive with other highly specialized and skilled customer service positions. This competitive salary may add significantly to costs, particularly for larger programs that require a significant number of community engagement staff. However, this set up will help to maintain the retention rates necessary to build the required expertise for the role. If the program implementer only predicts the SEEP will exist for a short enough duration that in-house hires will not have the time to develop these skills, or the local personnel needed simply aren't available, it may be practical to contract out these services to a group already experienced with similar customer service efforts.
- **Contractor Engagement Manager/Representative:** The contractor engagement manager and representatives serve a similar function as that of the community engagement group except their efforts are focused on assisting contractors. The contractor engagement group will need to assist with helping contractors sign up for the program, scheduling work with homeowners, answering inquiries, and any other tasks that contractors may need help with.
 - The primary goal of this group is to reduce or eliminate the administrative burden of contractors for the purpose of making program participation more appealing. Like the community engagement group, individuals with a customer service-oriented background would be ideal candidates for contractor engagement hires.
- **Quality Assurance:** Personnel will be needed to provide quality assurance services for the SEEP. This includes responsibilities such as field evaluations of contractors, homeowner feedback collection, coaching contractors, and creating reports.
 - Ideal QA personnel will have extensive experience and knowledge of building sciences and energy efficiency measures, preferably with past evaluation experience. Given the initial experience needed for this role, the program implementer may find it most practical to contract it to a third-party with the relevant experience.
- **Retrofit Energy Modeling Specialist:** With the critical step of evaluations in determining a home's potential for savings, it will be essential to have personnel on call that can effectively utilize the modeling software or methods. Depending on the complexity of the modeling methods chosen, the Retrofit Energy Modeling Specialist could either conduct assessments themselves or train community engagement representatives on how to do so.
 - Ideal candidates for this role would have extensive knowledge of building sciences, energy efficiency, and the use of the modeling software or methods chosen.
- **Financial Expert:** Contractors, homeowners, and even the program itself will need to navigate the various financing options and sources of funding for these retrofits, and a financial expert will likely be needed. Responsibilities for this role would include helping to develop a stacked financing package for homeowners from the various incentives available, assisting contractors with financial planning for their projects, and advising the community and contractor engagement groups on how to apply for financial programs and resources on behalf of program participants.

- In addition to assisting participants, financial expertise will likely be needed to assist the program with efficiently managing the budget, accessing external resources, and coordinating with partnered financial services. If partnered lenders are planning on packaging loans for the purpose of selling on a secondary market, then knowledge of the loan reselling process and the details of the lender’s plan will be needed to ensure homeowners are appropriately protected.
 - An ideal candidate for this role will have extensive experience in residential and energy financing. A background in business and general financing may also be useful for advising contractors and the SEEP.
- **Regulatory and Legal Expert:** There are many resources and programs the SEEP will need to engage with to fully realize the potential of a stacked approach. To ensure the program and its participants can access these resources, someone with both the expertise on these processes and ability to teach them to the program engagement groups will be needed. As local regulations and resources available will vary, the SEEP will need staff familiar with these local laws and resources in addition to the broader resource network discussed in this framework. If the SEEP is choosing to utilize in-house staff for most roles, the program will need staff familiar with contract management and HR requirements. Lastly, a legal expert will need to advise on liability management and allocation for when the SEEP is organizing contractors for project work.
- An ideal candidate for this role would be a local legal expert familiar with residential housing regulations, energy efficiency programs, and employment/contract management law. Given the wide range of legal topics involved, it is unlikely that the program implementer will find all the necessary expertise needed for this role in a single individual. For many of these skillsets, it may be more practical to bring in outside parties to assist in their relevant area of expertise.
- **(Optional) Supply Chain Manager:** If the program implementer chooses to keep a stock of relevant equipment and materials on hand for participating contractors, personnel to manage this aspect of the program will be needed. Supply chain managers will need to research available materials, current prices, and local demand. They will also need to manage the ordering and distribution of materials to participating contractors. Lastly, the supply chain managers will need to set up and manage a pay structure between the program and participating contractors.
- An ideal candidate for this role would have experience with supply chain management and already have some knowledge of the home energy retrofit industry with regards to materials and equipment commonly used.
- **(Optional) Energy Concierge:** If the program implementer chooses to utilize an in-person assessment between the initial remote one and the contractor assessments, it will be necessary to ensure staff are available and trained in performing these more in-depth assessments. The energy concierge would visit homes to evaluate savings potential as well as address any questions or concerns the homeowner might have.

- Ideal candidates for this role would have experience with home energy evaluations and the assessment tools used by the program. They would also need excellent communication skills to assist customers with questions and concerns. A recommended strategy is to contract out this work to one or more local professionals experienced with home energy assessments.

6.2.3 Program Interface with Public

It is recommended the program implementer utilize a medium to allow participants to easily interface with the program. This medium could be as simple as making the office space in which staff work open to the public to visit and address issues. However, if resources are available the most effective and recommended form is a website.

A website that allows contractors and homeowners to sign up for the program, stay informed, apply for benefits, make payments, and coordinate work would help make the program more accessible. Storing uploaded information on homes, improvements, and participant information would also make it easier for engagement representatives to quickly look up specific participants and help different contractors working on the same project to coordinate their work. This medium would also make the program more accessible for homeowners that wish to handle their retrofit independently whenever possible.

There are some features that should be included when utilizing a program website. A scheduling tool and calendar to help homeowners track their work and the milestones they've reached is recommended, as is a financial tool to help homeowners identify financing sources and track their own expenses. These tools should also be adapted to help contractors with tracking scheduled work and finances.

It is essential that the website be set up so that homeowners, contractors, the program implementer, and partnered organizations such as lenders can all easily interface with each other through the website to coordinate services. Ensuring that participants can access their customers/service providers, financing resources, and program administration all on one site will make participation significantly more convenient and further solidify the one-stop-shop selling point for the program.

Take Note

It is very likely the technology, resources, and practices of the home renovation industry will change throughout the lifetime of the program. The program implementer should ensure that the website is maintained and updated as new resources and information become available. In the interest of accessibility, it should also be designed to be compatible with multiple platforms including cell phones, computers, and tablets.

6.2.4 Program Process

6.2.4.1 Initial Sign Up

The process would begin with identifying interested participants and enrolling them into the program. Engagement representatives would conduct an initial interview to gauge eligibility (e.g., address, confirming homeowner status, etc.) and interest as well as relay the details of the program. Staff would then take information and sign the interested party up as a participant. If the program implementer chooses to utilize a medium such as a website, the site should be set up so that participants can independently enter their information to sign up. Regardless of whether a website is used, a representative assisted sign-up process should always be offered for individuals who prefer not to sign up independently or need help with the procedure.

6.2.4.2 Energy Assessment

After a homeowner has been enrolled, their home will need to be assessed to determine potential savings and an improvement plan. This will typically start with a remote assessment and can later be followed up with a more detailed on-site assessment from a trained professional. Homes should be assessed for their improvement potential in weatherization, electrification, and renewable installation, and a cost estimate for the recommended improvements should be made. This early assessment stage also serves as an opportunity to assist the homeowner with collecting information that will be needed to apply for financing, contractor work, and extra-programmatic resources.

6.2.4.3 Financing Assistance

With the scope of work needed and a price range determined, the financial expert, along with the help of the engagement representatives, will work with homeowners to ensure they have a financing plan set up that will be able to cover the cost requirements of the projected work. This would include assisting homeowners with signing up for extra-programmatic financial resources and helping them work with lenders and other partnered organizations.

As much of the finance planning for homeowners as possible should be done prior to scheduling work with contractors. This is to minimize the chances of homeowners having to cancel already scheduled work for financial reasons, thus reducing risk for participating contractors. However, not all financial planning can necessarily be completed prior to this step, so the program implementer should ensure staff are available to assist throughout the process.

6.2.4.4 Contractor Coordination and Services Sign Up

Once the homeowner is ready to begin work on the home, they can be put in contact with contractors who can conduct their own assessments (if needed) and schedule work. A list of participating contractors and their certified specializations by program should be made readily accessible to minimize the research burden for homeowners. If the program implementer is utilizing a website, it is suggested this list be included along with the suggestion to communicate with listed contractors directly through the website.

If the program implementer is utilizing a GC model to organize labor, then it is at this stage of the process that the homeowner would select a GC to become their primary point of contact. The GC would assist the homeowner with scheduling and could reach out to SEEP staff for any support they might need. If not utilizing a GC model, then the community engagement group would continue to work with the homeowner and coordinate contractor work on their behalf.

Take Note

In order to maximize the benefits of a stacked approach, the community engagement group will need more knowledge on energy efficiency measures and the home renovation industry than would be required if using the GC model. If choosing this approach, the program implementer must ensure that their community engagement group has the necessary training and resources to competently complete this task. Pay should be increased accordingly to attract and retain qualified staff.

Regardless of which model is used, the community engagement group should be accessible to the homeowner throughout the process to assist with any issues that arise. In addition to assistance from staff, a checklist of the necessary steps and milestones should be provided for homeowners that want to handle the process more independently or simply track their progress. If utilizing a website, the checklist should be included in the scheduling feature.

For programs similar to the SEEP such as Vermont's ZEN, a factor that negatively affected participation rates were narrow timelines in which to complete work.²⁷ Feedback regarding ZEN's 8-month timeframe in which homeowners must sign up, schedule, and complete the work indicated that many individuals were simply too busy to complete every aspect of a process in the amount of time given. While this time constraint was an issue, if different stages are planned over too long a period it may be more difficult for different contractors to effectively coordinate their efforts and maximize the benefits expected from a stacked approach. Scheduling over too long a period can also create uncertainty and may cause some homeowners to never complete all aspects of the program.

With these factors in mind, it is recommended the program implementer allow for a flexible schedule for homeowner convenience, but also offer incentives for reaching specific milestones in the retrofit process. An additional incentive for completing all stages within a specific timeframe could also be offered.

Admin's Choice

The exact timeframe and incentives offered will ultimately be up to the program implementer, but should consider factors such as contractor availability, material availability, and seasonal conditions. Monitoring the progress of early SEEP participants or inquiring with participating contractors about the speed of similar past projects can also be good ways to establish a reasonable timeframe.

6.2.4.5 Weatherization

When scheduling work, it is recommended that weatherization be prioritized. This is primarily due to the significant impact it will have on energy demands in the home, which in turn impacts other factors such as heat pump size and renewable energy needs. While not necessarily required for every home, weatherization work typically involves air sealing, extreme weather resiliency development, as well as insulating the building shell (walls, attic, basement).

6.2.4.6 Electrification

Making the home fully electric ready and installing electric heating systems and appliances is typically the second stage of the retrofit process as the benefits from renewables installation may not be fully realized until the step is completed. The process typically includes rewiring work, panel upgrades, and ensuring the appropriate outlets are available for electric appliances. Once the home is electric ready, an electric heat pump system can be installed.

Caveat

While new cold air heat pumps have a much larger effective range in which they can operate, in extremely cold conditions their heating capacity does become limited. A backup heating system may be required in especially cold climates or where the home's heating load is high and exceeds the installed system capacity. Leaving the existing heating system in place is an option; but if this isn't feasible, it is important ensure there is some sort of backup in place for extreme weather. To maximize energy savings for homeowners, they should also be made aware the backup systems are only intended for extreme weather situations.

Admin's Choice

In addition to the heating system, the program implementer will likely want to include the replacement of fossil-fueled appliances with their electric counterparts as a requirement for meeting the electrification milestones. The extent of these requirements is ultimately up to the program implementer, but they should consider at least targeting major appliances such as ovens, stoves, and clothes dryers. Depending on local priorities, legislative mandates, and public opinion, electrification can also extend to outdoor equipment including lawn mowers, mall tractors, weed trimmers, and outdoor grilling (to replace propane). Program implementers should consider adding these measures to their program if these are deemed a priority and feasible.

6.2.4.7 Renewables Installation

The last stage in the retrofit process is typically the installation of renewables. Given the amount of extra-programmatic incentives available and its practical application in residential areas, solar will likely be the most used renewable energy source. The program implementer will need to decide whether to focus on an individual renewable approach, a community renewable approach, or a mixture of both. It is strongly recommended that the program implementer try to focus on an individual renewable approach whenever possible. While having solar or other renewables installed on each home can add to project costs, past programs have shown that on-site energy generation was a significant contributor in allowing homeowners to pay off project costs through their energy savings.²⁸ While community solar still does help to reduce the amount of CO₂e emissions in the community, homeowners do not gain the same financial benefits they would otherwise.

Not every home will be well suited to have renewables installed on site, so community solar may be the only option in some cases. Such cases should not be discounted from the program if homes still have the potential for significant savings in other aspects. Participating homeowners not benefiting from on-site renewables may need additional financial assistance from the program.

6.2.4.8 Services Completion Follow Up

A noted weakness of previous programs, particularly those using the GC model, was a lack of follow-up assistance after work was completed.²⁹ In addition to quality assurance evaluations done throughout the program process, each home should receive a final follow-up once work is finished.

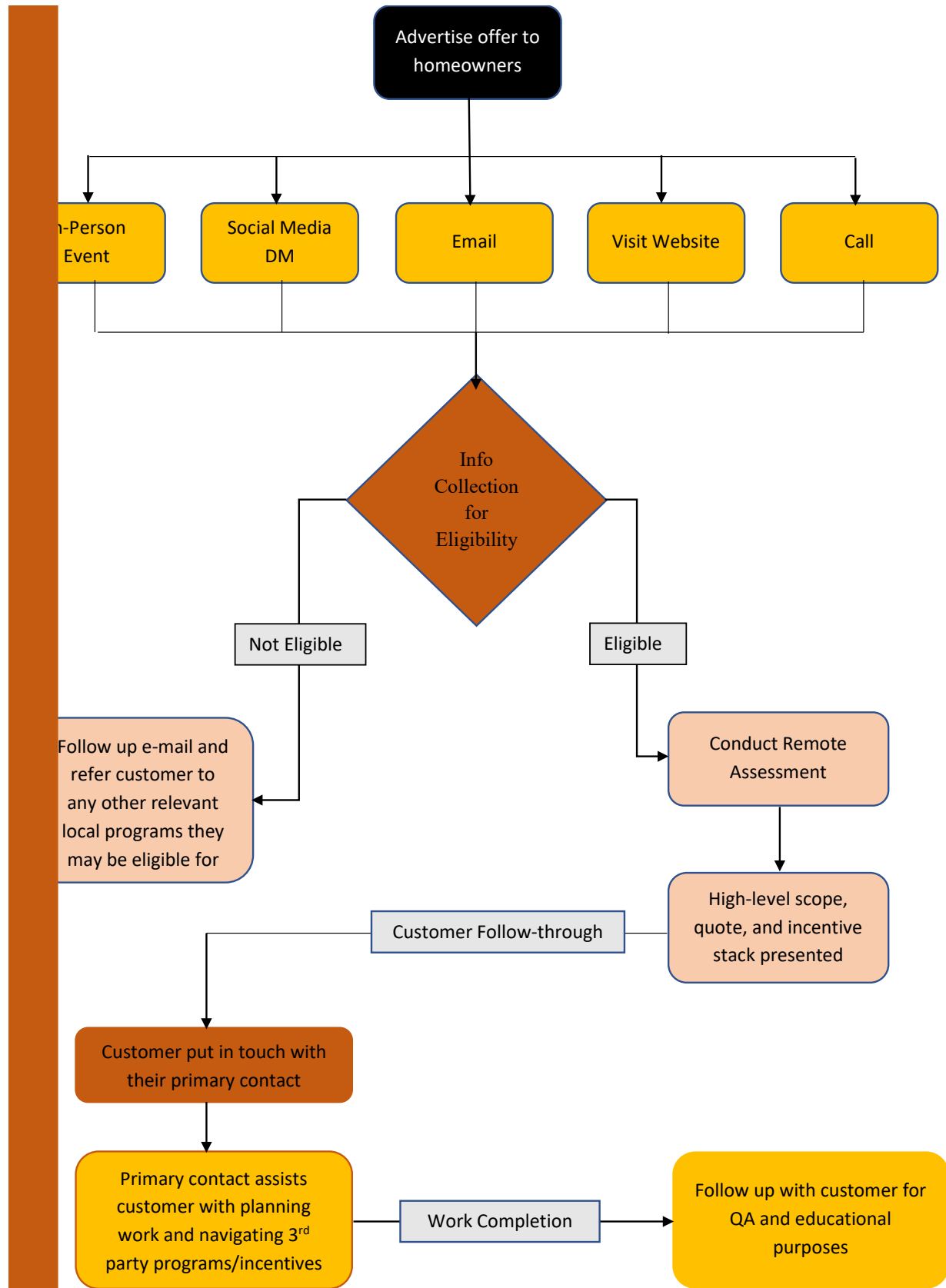
This final assessment serves several purposes. It is a good method of determining the actual savings of a home and an opportunity to collect participant feedback. Its most important function, however, is to ensure that homeowners have been educated on utilizing their new electric systems appropriately to maximize benefits. Failure to inform homeowners about the proper use of new features in their homes resulted in a significant reduction in the actual savings relative to their projected potential in other programs.²⁹ To streamline this process, the program implementer may want to consider creating educational materials on the proper management of these systems.

The assessments can either be conducted by SEEP staff or by the GC, with the information to be relayed to SEEP afterwards. If utilizing a GC for this role, incentives may need to be provided to address any cost concerns contractors have with the follow-up review.

6.2.5 Customer Experience

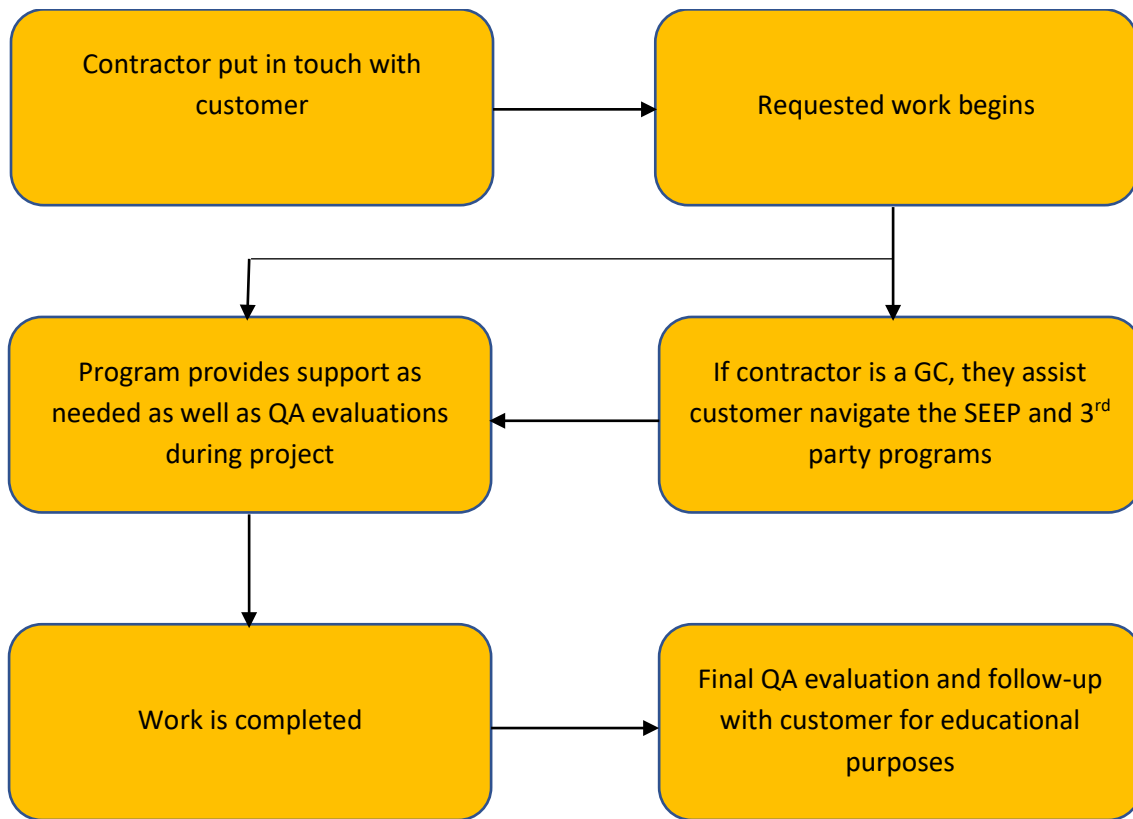
The below graphic is intended to serve as a distributable resource to homeowners to help clarify the SEEP process. Adaptations may need to be made to the flowchart depending on the specifics of the SEEP. Program implementers should brand the flowchart and make it relevant to the local market.

Figure 4. Customer Experience Flow Diagram



The below graphic is intended to serve as a distributable resource to help clarify the SEEP process to contractors. Adaptations may need to be made to the flowchart depending on the specifics of the SEEP.

Figure 5. Contractor Experience Flow Diagram



6.2.6 Program Specific Incentives

In addition to incentives available to participants from third parties, the program implementer will likely want to offer additional incentives of their own to help address whatever specific challenges are most significant to their program. Examples include using funding to secure lower interest rates on homeowner loans to address cost concerns, offering referral bonuses to homeowners to address low-participation rates, or subsidizing a specific aspect of the retrofit process that might be acting as a bottleneck for progress.

Given the finite resources available for these incentives, the program implementer may want to consider adding eligibility requirements. While every homeowner will likely be interested in having a low-interest loan or other monetary incentives, funding availability might mean that such things can only be offered to income-eligible individuals. The program implementer should try to allocate these incentives so that they have the most impact relative to the money spent. Interviewing members of the community to identify which barriers are most significant to them may be the best approach in determining which incentives to offer and eligibility thresholds.

6.2.7 Program Sustainability

For there to be sufficient buy-in for the SEEP, confidence in the program's viability from contractors and homeowners is critical. Unexpected funding failures or other planning-related issues can have disastrous consequences for participation rates. It is important that whatever finance plan the program implementer sets forth is one that can be sustained for the sake of consistency.

Stakeholder feedback has suggested that planning out current finances for the program to maintain operations as is for a five-year period is typically sufficient for promoting public confidence in the program. When planning out finances, it is also important to consider how incentives and expenses might scale as the program expands in size. One way to address this growth challenge is to ensure the use of funding sources that can scale along with expenses whenever possible.

6.2.8 Common Homeowner Scenarios

There are likely to be special cases of homeowners that would still benefit from the program, but additional factors impede participation. This section details some common scenarios that can be expected, as well as suggestions on how to address them.

6.2.8.1 Emergency Replacements

A significant number of service requests for homeowners are made on an emergency basis. In such cases, significant work might be needed beforehand to prepare a home that previously used fossil fuel equipment for electric replacements. Without functional heating or cooling, homeowners may not want to wait for this work to be done or for the appropriate equipment to arrive.

One possible way to address this problem is for the program implementer to proactively recruit homeowners to engage in preparatory steps for a replacement. Offering an improvement path that ensures the homeowner has the necessary prerequisites in advance will allow for quick and easy heating replacements when a failure does occur.

Offering a temporary replacement to homeowners experiencing a system failure is another option. If the SEEP is keeping a stock of used heating systems on hand from past replacements, an offer for replacement could be made at low or no cost to homeowners in exchange for agreeing to participate in all or part of the SEEP. This temporary solution would ensure that homeowners can remain comfortable while waiting for program related improvements.

Lastly, since for some climates a backup heating system is needed to cover extreme temperatures outside of most heat pumps' operational range, the program implementer could take this chance to install the back-up heating system first. Whichever method or methods are chosen, the program implementer should consider offering incentives to increase the appeal of program participation as an alternative to a like-for-like replacement.

6.2.8.2 Partial Work Completion

In some cases, a homeowner may only be interested in participating in one or two aspects of a whole-home retrofit either because they aren't interested in the other improvements, or their home is already up to standards in those areas. Assuming there are still significant savings to be earned in the other aspects and there is not another local program that fits better with the homeowner's needs, the program implementer will likely want to proceed with these requests.

Homeowners that would significantly benefit from other aspects of the SEEP but choose to only participate in select parts anyways should be informed that they may not receive all the benefits advertised. Benefits relevant to the improvements done through the program should still be provided, and a plan should be offered to the homeowner that allows them to complete all aspects of the retrofit if they so choose.

6.2.8.3 Multi-Homeowners

In many areas, a significant number of homes are rented out by the owners. Some of these building owners may own multiple properties in the area. Identifying ways to motivate a building owner to retrofit their properties when they are not responsible for energy expenses has been a significant challenge for similar programs.³⁰

Incentives targeted at building owners has been one strategy employed to address this challenge. To increase building owner participation and address LMI challenges, Vermont's ZEN program offered loans to building owners that were forgivable so long as these owners kept rent prices at a low enough level to be considered affordable housing. This strategy saw some success.

For building owners with multiple properties, the stacked approach may be particularly beneficial to them. As the purpose of a stacked approach to retrofits is to reduce overall costs by packaging the retrofit as a single deal, these savings should also scale for renovating multiple properties under the same deal as opposed to just one. By forming a packaged deal for all a building owner's properties, the resulting net discount may interest these individuals in participating.

6.2.8.4 Planned Moves

Given the long timeline for the expected payoff of loans, many participants may be interested in the program but hold off due to uncertainty about how long they intend to stay in their current home. There are several lending services that have payment models that account for the possibility of moving early. For example, Blocpower's equipment leasing system allows homeowners to move out of a home without the cost of improvements following them. The program implementer is encouraged to partner with at least one lender that offers a payment structure allowing homeowners who plan to move to not be left with debt for a home in which they no longer live. While this shouldn't necessarily be the only partnered lender, having this option available will improve the overall accessibility of the program.

6.3 Partners and Support

There are multiple entities that can assist with running the program. The below section lists some potential partners to consider working with as well as suggestions on how they might help.

Other Local Programs: Local programs such food banks or ones that offer only part of a whole-home retrofit will likely have experience working with the community. These entities may be able to provide advice on proper administration and nuances relevant to the area. Such organizations may even be able to utilize their own expertise to perform specific roles needed for the SEEP.

Private Lenders: Partnering with lenders is necessary to ensure there are appropriate financing options for interested participants. Lenders can provide other forms of assistance to the program as well, as they may have already developed financing tools that can be shared with homeowners. Lenders may also have the expertise on hand to serve in a financial advisor role for the both the program and its participants. While lenders can be an invaluable source of information, the program implementer should avoid becoming solely reliant on any one lender for advice or services to minimize the possibility of homeowners being taken advantage of by predatory practices.

Contractors: In addition to the importance of contractors as participants, they are also a key demographic from which to recruit staff for the SEEP. Skilled contractors are excellent candidates for roles in the SEEP requiring experience in the building industry, such as the energy concierge, supply chain manager, and engagement managers.

Third-Party Administrators and Experts: Third-party administrators and experts operating in the area can often be relied on to perform various roles in the program. These third-party party groups can be particularly critical when the program implementer lacks the in-house expertise to effectively run the program. The program implementer is encouraged to identify individuals and entities operating in their area that have skills relevant to the SEEP.

6.4 Challenges and Solutions

The program implementer will almost certainly meet multiple challenges when setting up and running the SEEP, particularly early on when the exact needs of the program may not be fully realized yet. This section lists some common challenges the program implementer can expect to encounter as well as suggestions on how to address them.

Lack of personnel expertise available: Some regions will simply lack the existing local expertise needed to run the SEEP. For such situations, relying on third-party expertise outside of the immediate area is likely the best option. If distance, cost, or specific program circumstances make permanently contracting out these responsibilities impractical, the program implementer may instead want to consider using these experts to train an in-house workforce rather than, or in addition to, performing duties directly.

Budget constraints limit staffing: Given the extensive staffing needs for a SEEP, there may be budgeting challenges when hiring. While there is no one-size-fits-all solution for such challenges, there are several recommendations that may help to address them. One option is to identify services offered by other local programs that could potentially be shared with the SEEP. For example, a municipality partnered with the SEEP may already have legal expertise on retainer that could provide legal advice. Utilizing the expertise of partnered organizations can be an effective way to reduce staffing costs.

Another factor to consider is how active roles will be at the various stages of a program. For example, a financial expert may be heavily involved with the program when designing the initial recommended strategies for participants and the program administrator but could be less involved when the engagement groups are sufficiently trained to advise participants themselves. The program implementer should consider what degree of involvement is needed for each role at each stage of the program and plan employment duration accordingly. If choosing to have set timelines for certain roles, such circumstances should be made transparent to potential hires to avoid any misunderstandings or disputes.

Retrofitting is time intensive, and homeowners may only be interested in one aspect of the program: An issue similar programs have faced is homeowners lacking the time to coordinate all steps of a whole-home retrofit. Programs that offered less than a year for all the renovations to be made saw that homeowner participation rates were reduced, or homeowners only engaged in one aspect of the process.

A proposed solution to these time constraints is to expand the amount of time that homeowners have to complete the program. Allowing a longer timespan for the process to take place may add some difficulties for the program implementer, but it is likely to improve participation among homeowners that are concerned they might be too busy to complete the process on a more aggressive schedule. Regarding homeowners that may only be interested in one aspect of the retrofit, a possible solution is to offer an incentive for the completion of all three aspects of the renovation. Offering a bonus for the work completed within a reasonably set timeframe encourages homeowners to participate in the entire retrofit process, but at a comfortable. While flexibility is important, the program implementer should still encourage homeowners to get the work done in as timely a manner as possible.

6.4.1 Additional Resources

Table 7. Program Design Additional Resources

Resource (Program Design)	Description	Link
New Tools and Tech to Prep your Electrical Panel for an All-Electric Home	This Canary Media article Identifies new technologies from startups and major electric equipment manufacturers that can help solve electrical panel bottlenecks.	https://www.canarymedia.com/articles/electrification/new-tools-and-tech-to-prepare-your-electric-panel-for-an-all-electric-home
What are the hurdles to electrifying a home? Contractors and experts weigh in.	A Canary Media article that discusses some of the barriers to electrifying homes.	https://www.canarymedia.com/articles/electrification/what-are-the-hurdles-to-electrifying-a-home-contractors-and-experts-weigh-in

Table 7 Continued

Resource (Program Design)	Description	Link
Better Buildings Residential Network Designing Incentives Toolkit	This DOE toolkit provides easy access to various case studies, presentations, and tips related to incentive design.	https://www.energy.gov/eere/better-buildings-residential-network/downloads/voluntary-initiative-designing-incentives
Clean Energy for Low Income Communities Accelerator (CELICA)	The CELICA toolkit was designed by the DOE to increase the usage of energy efficiency and renewable energy technologies among low- and moderate-income communities.	https://betterbuildingssolutioncenter.energy.gov/accelerators/clean-energy-low-income-communities
DOE Building America Solution Center	An interactive DOE website that provides residential building professionals with access to expert information on hundreds of high-performance design and construction topics, including air sealing and insulation, HVAC components, windows, indoor air quality, and much more.	https://basc.pnnl.gov/
State and Local Energy Efficiency Action Network (SEE Action)	This DOE plan offers resources and publications to entities trying to improve energy accessibility to communities through energy efficiency efforts.	https://www.energy.gov/eere/state-and-local-energy-efficiency-action-network-see-action
Better Buildings Residential Network Case Study: Partnerships	This DOE case study shares how GTECH (Growth Through Energy and Community Health) Strategies, a Better Buildings Residential Network member, developed and maintains strong strategic partnerships with trusted local companies and organizations to meet a shared goal of completing 100 home energy upgrade projects.	https://www.energy.gov/eere/better-buildings-residential-network/downloads/better-buildings-residential-network-case-study
Focus Series: Energy Advisor Program Helps Homeowners Go the Extra Mile in Mile-High City	This DOE case study discusses Denver Energy Challenge's adjustment from focusing on door-to-door outreach to an energy advisor model that allowed customers to receive one on one support throughout the home energy upgrade process.	http://energy.gov/sites/prod/files/2014/03/f10/focus_series_denver_energy_advisors.pdf
NYSERDA Home Performance Case Studies	This link contains case studies of residential projects and contractors under the New York State Energy Research and Development Authority (NYSERDA)'s Home Performance with ENERGY STAR program.	https://www.nyserda.ny.gov/About/Publications/Case-Studies-and-Features

Table 7 Continued

Resource (Program Design)	Description	Link
Spotlight on Portland, Oregon: Use Incentives to Get Attention and Encourage Deep Savings	This DOE case study discusses how Clean Energy Works Oregon (now Enhabit) used performance-based incentives, limited-time bonus rebates, early financing approvals, and seasonal advantages to broaden its program reach and increase home upgrade completions.	http://energy.gov/sites/prod/files/2013/12/f6/cewo_incentives_case_study.pdf
Spotlight on Michigan: Experiment to Find the Right Mix of Incentives	This DOE case study discusses BetterBuildings for Michigan's targeted outreach campaigns, which applied varying incentives and outreach strategies to neighborhoods with a goal to understand which rebates and strategies work best in the target communities.	http://energy.gov/sites/prod/files/2014/01/f6/michigan_incentives_case_study.pdf
The City Resilience Framework	This framework by ARUP and the Rockefeller Foundation discusses characteristics of cities that improve their overall resilience.	https://www.rockefellerfoundation.org/report/city-resilience-framework/
Flipping the Switch: How the Transition to Efficient All-Electric Buildings Will Help the United States to Meet its Climate Goals	This National Resource Defense Council article discusses the benefits of home electrification and the role it will play in meeting US climate goals.	https://www.nrdc.org/sites/default/files/flipping-the-switch-building-decarbonization-fs.pdf
EnergyFit NYC: Final Report	This report from the Pratt Center discusses and recommends features for energy retrofit programs in an urban environment like NYC.	https://prattcenter.net/our_work/energy_fit_final_report
Energy Master Planning toward Net Zero Energy Resilient Public Communities Guide	Purchasable reading material discussing planning net zero energy resilient communities (this is not a free resource).	https://link.springer.com/book/10.1007/978-3-030-95833-6
Guide for Resilient Thermal Energy Systems Design in Cold and Arctic Climates	A U.S. Army Corps of Engineers manual on planning energy systems in cold weather climates.	https://www.wbdg.org/ffc/army-coe/design-guides/guide-for-resilient-thermal-energy-systems-design-in-cold-and-arctic-climates
Energy Star Directory	A list and description of Energy Star certified products.	https://www.energystar.gov/products
Home Ventilating Institute Product Directory	A directory of HVI certified products.	https://www.hvi.org/hvi-certified-products-directory/

Table 7 continued

Resource (Program Design)	Description	Link
Iowa HVAC Systems Adjustment and Verified Efficiency (HVAC SAVE) Program Case Study	This DOE case study describes how the Midwest Energy Efficiency Alliance (MEEA) partnered with gas and electric utilities in Iowa to establish the Iowa residential heating, ventilation, and air conditioning System Adjustment and Verified Efficiency (HVAC SAVE) program, taking it to scale improving the performance and energy efficiency of HVAC systems, growing businesses, and gaining consumer trust.	https://rpsec.energy.gov/sites/default/files/case-study/C-1588_HVAC_SAVE_Case_Study.pdf
Open Energy Data Initiative (OEDI)	OEDI is a centralized repository of high-value energy research datasets aggregated from the U.S. Department of Energy's Programs, Offices, and National Laboratories. Built to enable data discoverability, OEDI facilitates access to a broad network of findings, including data relevant to energy efficiency retrofits.	https://openei.org/wiki/Main_Page
Better Buildings Residential Program Energy Efficiency Cost-Effectiveness Tool	This DOE Excel tool is used for estimating the cost-effectiveness of a residential energy efficiency program based on a program administrator's inputs.	https://www.energy.gov/eere/better-buildings-residential-network/articles/better-buildings-residential-program-energy

7 Marketing and Communications

7.1 Introduction

Ensuring there is adequate public awareness of the program and that positive relations with participants and the community are maintained is critical success. This chapter will discuss some suggested strategies that can be utilized to these ends.

7.2 Design and Decisions

7.2.1 Program Branding

Most successful marketing campaigns will stress the importance of brand and name recognition. The program implementer should think of a memorable name for their program to help improve public recognition.

Admin's Choice

When determining a name, the program implementer may want to select one that speaks to the specific needs of their community. For example, if feedback indicates home-comfort improvements are a major selling point in their community, a name underlining that aspect of the program might be best.

7.2.2 Homeowner Engagement

Marketing to and maintaining good relations with homeowners is necessary, not just to improve participation rates, but also to establish a positive public image for the program. This section details some important considerations when planning a homeowner engagement strategy.

7.2.2.1 Identifying Target Demographics and Ideal Benefits

Different communities are going to have different needs. Prior to beginning a marketing campaign for the program, information on the specific characteristics and needs of the community should be collected.

Identifying who in a community might be most interested in the program can also provide insight on which benefits might generate the most interest when marketing the program. This information can also help determine what advertising medium(s) might be the most effective. For example, if homeowners in a community tend to be younger and less financially secure, then a social media campaign focused on the financial benefits of the program might yield the best results. Alternatively, if much of a community currently utilizes natural gas rather than oil or other fossil fuel sources, the financial benefits are likely to be less significant than they would be otherwise. In such a case, the program implementer may find better results by advertising a different benefit of the program such as home comfort.

While in some cases the program implementer may need to collect information on the community themselves, it's possible other groups or organizations have already collected some or all of what is needed to design the marketing campaign. Reaching out to local community groups, advertising firms, or any other organization that might be willing to share this information can help save money and time.

7.2.2.2 Common Community Considerations

Certain homeowner characteristics can be relatively universal. Below are some demographics and scenarios that are common in any given community, as well as some considerations for marketing to and engaging with individuals in these groups or situations.

Marketing to LMI Households: There are some notable distinctions the program implementer should be aware of when a significant proportion of expected participants are LMI households. Analyses done of similar LMI-focused programs have shown that, while LMI individuals tend to be less aware of these beneficial programs than their counterparts, minimal marketing efforts are typically needed to reach participation capacity for the program. For LMI focused programs, the program management budget is typically the limiting factor for participation rates rather than the marketing budget.³¹

Another important note, particularly for programs that intend to work with both LMI and market rate individuals, is how to brand LMI specific features of the program. There can sometimes be a negative association with terms sometimes used to describe LMI programs such as “assistance.” Past programs running both market rate and LMI versions saw success by classifying the LMI program as an “income qualified track” within the greater program, rather than differentiating it as its own program.³²

Working with LMI communities, partnering with local groups and programs such as food banks, health organizations, and other nonprofits like Habitat for Humanity can be an effective way to improve outreach for both the SEEP and the partnered program.

Emergency Replacements: Without a program or outside incentive, a significant proportion of heating equipment replacements are done on an emergency basis.³² During emergency replacements homeowners are typically concerned with getting a replacement as quickly and affordably as possible. Because of this, these replacements often result in like-for-like replacements. This is because fossil fuel equipment is typically readily available and requires less set up than electric equipment when replacing other fossil fuel systems.

By the time an emergency replacement is required, it can often be too late to have the homeowner agree to a more time intensive heat pump installation. The program implementer may want to consider pre-emptive marketing for such occurrences. Advertising some incentive for pursuing a heat pump replacement after a system failure while guaranteeing some form of temporary heating in the interim can help to persuade homeowners to hold out for a heat pump. Additional details on potential strategies to offer can be found in chapter 6 on program design.

Since contractors are typically the first point of contact for emergency replacements, advertising this incentive through contractors will allow for the incentive to receive the most exposure to potential candidates. Incentives can also be offered to the contractor to encourage them to offer a heat pump system replacement over the typically faster fossil fuel system replacement.

Other Considerations: There are many other marketing considerations relevant to most communities. Some additional considerations are listed below.

- **Language Barriers:** English may not be the primary language for every individual in a community, marketing materials should be also translated into the most spoken non-English languages in a community.
- **Participant Distrust or Hostility:** Some homeowners may have a history with contractors, partnering organizations, or the program implementer that might dissuade them from participating in the program. Partnering with trusted institutions or members of the community can help garner trust and legitimacy.
- **Renters:** For many communities, a significant portion of residents are renters. An important factor to consider when designing a marketing strategy for rented homes is that the building owner might not be responsible for the utilities bill. The program implementer should consider a strategy that markets relevant benefits to building owners. Marketing to renters as well should not be discounted though. Informing renters about the program can motivate building owners interested in maintaining tenant satisfaction or attracting new tenants to participate.

7.2.2.3 *Post-Sale Communications*

In addition to marketing the program to new potential participants, the program implementer should consider a strategy for engaging homeowners who are currently or have already participated in the program. Below are some suggested strategies.

Take Note

Past participants can be an important source of feedback, and follow ups are an effective way to ensure homeowners are properly informed about their new heating systems and utilizing them efficiently.

Follow-up evaluations: Providing follow ups for homeowners serves multiple purposes. These follow ups can be an important source of feedback from homeowners who have experienced any potential issues with the program first-hand.

Homeowner Education: As a key part of realizing the full benefits of a whole-home energy retrofit is the appropriate use of the new household features, the program must ensure that homeowners receive a sufficient education on their use. This is especially true for heat pumps, which differ in many ways from traditional fossil fuel heating systems. Providing educational materials or lessons from contractors during evaluations regarding what to expect from heat pumps as well as common maintenance practices can go a long way in both improving the efficiency of the home and reducing the instances of contractor callbacks. Some important heat pump features that customers should be informed about are listed below.

- Checking the heat pump lines for refrigerant leaks to ensure efficient operation.
- Proper set-up of heat pumps to prevent condensate leaks.
- Understanding temperature gradients due to warm air rising and how they might create differences between the temperature homeowners feel and what the thermometer is detecting.
- The defrost cycle for cold weather heat pumps and why it is necessary.
- How to check and change dirty filters.
- Providing sufficient electrical protection to prevent system damage during power surges.

Homeowner Referrals: Homeowners that are satisfied with the program are more likely to refer it to their peers. If the program implementer is having difficulty with maintaining participation rates, offering incentives for referrals can help increase the impact of peer-to-peer marketing.

Partial Sale Follow-ups: Some homeowners may have only been interested in part of the retrofits offered through the program at the time of their initial participation. Depending on the frequency of partial sales, the program implementer will want to consider a marketing strategy for such cases to encourage full participation.

7.2.3 Contractor Engagement

Marketing to Contractors: Building and maintaining a network of participating contractors is critical for keeping up with homeowner demand. In the U.S. there is currently high demand and relatively low availability for contractors. Additionally, stakeholder feedback has expressed mixed experiences related to contractor willingness to participate in whole-home retrofit incentive programs. Relevant factors that affected participation rates include, but are not limited to, administrative complexity, retraining requirements, and alternative work availability.³³ When engaging with contractors to promote program participation, these major concerns should be addressed.

For example, since the SEEP is intended to transfer as much of the administrative burden as possible from homeowners and contractors to the program implementer, participation will ideally require minimal effort to enroll in and navigate through the program. Another common challenge contractors have with many projects is handling the up-front costs. Bridge loans and other financing methods utilized by contractors to handle costs prior to completion of services can impact overall profits. If program financing is available to address up-front cost concerns for contractors, then this can be advertised as a selling point for the program. Ensuring contractors understand the advantages of the program will have a positive impact on participation rates.

Contractor-Based Homeowner Marketing: In addition to marketing to contractors, they can also serve as a critical marketing platform to promote the program to homeowners. Contractors are often the first point of contact for homeowners interested in renovations. Similar programs have seen success through utilizing contractors to advertise.³⁴

Since contractors can be so critical to marketing efforts, it is important to make sure they have the resources and information to effectively advertise the program. The program implementer should provide outreach to contractors to ensure they are well equipped for this purpose. Some things to consider when providing outreach to contractors are listed below.

- Up-to-date information about the projected or already achieved benefits of the program.
- Specifics about the incentives and eligibility-based assistance offered by the program.
- Common selling points that make the program appealing to homeowners.
- Additional resources and/or readings on the program that can be provided to homeowners.
- A clear line of communication to the program implementer that the contractor can use to answer inquiries and refer customers.
- An understanding of the program sign-up process from the perspective of the homeowner to help contractors guide them through the process when necessary.

Admin's Choice

A contractor convincing a homeowner to participate in the program will likely mean an increase in sales for that contractor. As a result, contractors may market the program sufficiently on their own. However, if the program implementer is struggling with participation rates, or contractors in the area do not stand to make significant personal gains from marketing the program (due to them being highly specialized in the services they offer or for some other reason), the program implementer can consider offering additional incentives to contractors for referring new customers to the program.

7.2.4 Third-Party Engagement

Homeowners and contractors are not the only groups a program implementer may want to use to promote their program. Some potential program partners may need convincing prior to agreeing to cooperate. Below are some common potential program partners, as well as suggestions on how a program implementer might demonstrate that cooperating with a SEEP can benefit them as well.

Lenders: Lenders can be critical with addressing up-front costs for program participants. These groups are typically concerned about receiving an adequate return on their investment. It has been shown that home improvement related loans, particularly ones with potential savings benefits such as energy efficiency retrofits, have much lower delinquency rates than similar loan types like car loans.³⁵ When promoting the program to potential lenders, the program implementer should emphasize the relative safety of an energy efficiency loan compared to the many other options.

CBOs/Advocacy Groups: Local community-based organizations and other advocacy groups can be important for a number of reasons including providing community outreach, identifying key concerns among specific populations in a community, and providing data that may benefit the program's design.

These organizations are typically concerned with specific issues within a community. When promoting partnership with such organizations, the program implementer should focus on what the goals are for each specific organization they aim to work with, as well as how the SEEP may help with achieving them.

Utilities: Utilities can be an important source of technical assistance and information. The specific goals and interests of a utility provider vary depending on their exact nature, but stakeholder feedback indicates these organizations are all typically concerned with grid maintenance costs and demand levels for energy.

The SEEP will improve the overall resiliency of the grid, which in turn will significantly reduce maintenance and repair costs in the event of a natural disaster or some other form of grid disruption. In addition, while the program may reduce electricity costs from the increased availability of renewables, the replacement of fossil fuels as an energy source will increase the overall demand for electric energy. These retrofits will also create opportunities for future purchases of electricity-based appliances and equipment, such as electric vehicles. The overall increase in electricity demand along with the improved grid resiliency should be appealing program features to utility providers, particularly ones not involved in providing natural gas or fossil fuels.

Municipalities: Municipalities can be an important source of funding, data, and technical assistance. As public entities, municipalities are typically concerned with resident welfare metrics and tax revenue. Some municipalities might also have their own Greenhouse Gas (GHG) or energy reduction goals. A SEEP will have positive benefits on resident's welfare with regards to both finances and health. Additionally, improvements of homes should yield better property values, and subsequently, a potential growth in property tax revenue. Demonstrating that the program is a cost-effective way to improve resident welfare will be critical in securing municipal cooperation.

Other Program Administrators: Programs with similar goals but with participation requirements would also be another group worth engaging. Such organizations will likely have a record of individuals that applied but were found ineligible. While eligibility requirements might preclude them from certain benefits, such individuals could likely still benefit from participating in the SEEP.

7.2.5 Marketing Mediums

The messaging of a marketing campaign is critical to its success, but the medium(s) that the marketing utilizes is also important in making sure the message reaches its target audience. Below are some common marketing tactics utilized by similar programs, as well as some of the trade-offs.

Word of Mouth: Stakeholder feedback has indicated the most successful mode of advertising based on results from similar programs was peer-to-peer word of mouth. Potential participants tend to trust the feedback of their friends and fellow community members and this medium has the added benefit of being effectively free.

While word of mouth will likely be the most effective form of marketing for the program, it is not without its challenges. The most apparent issue is that word of mouth cannot be relied on during the initial stages of the program before community members have had a chance to participate. This medium is also highly dependent on how satisfied participants were with the program. A program with a difficult start that negatively affected participant satisfaction can result in lower participation rates because of word of mouth.

If achieving acceptable participation rates early in the program is a challenge for the program, they should consider supplementing this form of advertising with other methods to help build an initial following.

Social Media: Social media is another advertising medium that has seen success in similar programs. This method has the advantage of being cost-effective, while still being able to reach a large audience.

If possible, the program implementer should see if community data is available that can determine the overlap of eligible homeowners and social media users (and the platform(s) they use) prior to investing significant resources into a social media campaign. Such information might be attainable from marketing firms or similar agencies that operate in the area.

Educational Campaign: Educational campaigns within the context of a SEEP would be events and efforts designed to raise awareness about climate or other community issues the program would help address (as opposed to directly advertising the SEEP). Since the scope of these campaigns is broader, they can be more costly than more direct efforts. However, the broader scope has the added benefit of promoting behavior to combat climate change or community issues outside of program participation. Additionally, such efforts can positively affect the disposition and behavior of individuals in the community who cannot or do not wish to participate in the program.

Traditional Marketing: Traditional marketing methods such as billboards, TV commercials, and radio ads are another way in which to raise awareness. These advertising methods can be costly depending on the medium used. Like social media campaigns, the program implementer should try to take advantage of data on the overlap between homeowners and users of the chosen medium if such information is available.

Community Events/Locational Advertising: Location and event focused advertising can be a very cost-effective way to target specific groups within a community that are likely to participate. For example, if a high percentage of homeowners in an area are religiously active, then holding a promotion or event coordinating with a local place of worship could yield greater results than other marketing methods. Common community recreational locations such as movie theatres are another location where advertisements will likely be impactful. While such methods can be cost-effective, the focused nature of these efforts means that the program implementer will need access to information that helps determine where and what these local hotspots are in a community. While this kind of information may be gathered from marketing data, consulting with prominent members and leaders of the community can be a more economical way to gain such insights.

Take Note

Targeted advertising strategies like these are unlikely to be noticed by other potential participants not active in that part of the community.

Program Merchandise: Some program implementers may benefit from creating and distributing SEEP specific merchandise. Individuals enthusiastic about the program or involved in the industry may be interested in items such as shirts, travel mugs, and stickers that have SEEP branding. Gifting such merchandise to interested parties or even establishing a store on the program website (if one is being used) can be a way raise public awareness, and sales can potentially generate revenue for the program.

Testimonials: A suggested strategy for program implementers experiencing high-participant satisfaction is to collect testimonials from participants. Testimonials should include positive feedback from homeowners to draw in potential customers, but also feedback from contractors to promote increased participation from the workforce. Including positive testimonials if using a website is an excellent way to advertise the benefits of the program.

7.2.6 Transparency

Program Transparency: When planning engagement strategies, the program implementer needs to be transparent about any issues or potential pitfalls of the program to participants. Creating participation by providing misleading information can have disastrous consequences on participant satisfaction levels and the long-term viability of the program.

While the program implementer should not be dishonest about potential program issues, neither should they present these challenges in a way that might discourage users from participating in the program. This can be a delicate balancing act. A suggested strategy for this would be whenever program issues are discussed, also include whatever measures are being taken to address the issue in the discussion. This can help assure participants that the program implementer is aware of and actively working on any problems they may have experienced.

Financial Transparency: In addition to transparency about the program itself, the program implementer should also be straightforward about financing. As of 2014, only 57% of American adults are considered financially literate.³⁶ Stakeholders have noted that private lenders or other profit-driven entities that could provide financing services sometimes intentionally obfuscate their terms to mislead homeowners into entering unfavorable or even predatory agreements.

The program implementer should utilize their own financing knowledge to ensure homeowners clearly understand not only the financing terms offered by the SEEP, but the terms of local private alternatives that offer financing outside of the program. Helping homeowners understand financing offered outside of the program can help build trust with the community and convey to homeowners the advantage of pursuing improvements through the program rather than independently. One solution suggested by stakeholder feedback is to develop a clear and standardized disclosure form that would help homeowners understand the exact details of any financing offered.

7.3 Partners and Support

There are many different groups that can assist with formulating a marketing campaign and maintaining relations with participants. Below are some notable groups that could assist and how.

Advertising/Marketing Firms: Having the assistance of a professional firm dedicated to advertising can be a major asset for a SEEP. In addition to the firms' ability to assist with designing effective promotions, they might also have marketing data on the community readily available, which can reduce the research burden on the program implementer. While potentially helpful, a marketing firm would expect to be paid for its services. Unless the specific SEEP is struggling with raising awareness and maintaining participation targets, resources spent on a marketing firm may be better spent elsewhere.

Contractors: Contractors can be both a source of as well as a target for program marketing. Contractors are often the first point of contact for homeowners interested in renovations. Working with contractors to promote the program to homeowners has shown to be an effective way to raise awareness.³⁷ Contractors may also be willing to share past work history in the area that could provide important insights when forming a marketing strategy.

CBOs and Other Local Organizations: Local organizations can help in a variety of ways with regards to marketing and communication. These groups often have unique insights on the specific needs and challenges of a community that could help determine a focus for a marketing campaign. Additionally, CBOs and advocacy groups are often deeply connected with members of a community, particularly under-represented or historically neglected groups. This connection means that these organizations can be an irreplaceable source of community outreach and can even serve as a mediator for new or pre-existing issues between members of the community and other program partners (or the program implementer themselves).

Relevant Appliance and Materials Manufacturers: Manufacturers and distributors of goods relevant to home retrofits are another potential marketing partner. Such manufacturers are likely to benefit financially from the increased demand for their products created by the program. Given the potential for both parties to mutually benefit, manufacturers are likely to be willing to promote the program to their own customer base. They might also be willing to offer promotions for their products, which could help to reduce costs to participating homeowners and contractors.

In addition to appliances and materials directly related to the retrofit program, other manufacturers that might indirectly benefit may also be interested in promoting the program. For example, the expansion of electrification in homes improves the viability of owning an electric vehicle for many homeowners. While EVs are not required to be part of a SEEP, manufacturers might still be interested in assisting with the promotion of the program due to the potential to expand their own customer base.

Other Local Programs and Services: Local programs and services that have some functional overlap with the SEEP are another potential partner for marketing and communications. For example, the NYS Clean Heat program offers incentives for the purchasing of heat pumps. Users purchasing a heat pump through the Clean Heat program may be interested in pursuing further improvements through the SEEP. Additionally, similar programs that have income or other eligibility requirements can refer ineligible individuals to the SEEP.

Programs that perform different services but have target demographics that overlap with that of the SEEP can also be potential partners. An example of this would be local food banks, which are likely to already have an established network with LMI individuals in a community. Such connections could be utilized to promote the program to LMI individuals.

Utilities: As most homeowners already have a relationship with their utility provider, partnering with utilities can be an excellent way to raise awareness. Utilities may also be able to provide data on energy expense and use rates for a community, which can provide important insights when forming a marketing strategy.

7.4 Challenges and Solutions

The program implementer will likely encounter challenges when trying to promote the benefits of a SEEP to the public. The following section details some potential challenges as well as provides suggestions on how to address them.

Projected benefits match poorly with the specific needs of community: One potential issue that a program implementer may encounter is that the projected benefits of a SEEP may not translate well to the specific needs of the community. For example, a neighborhood might already have a high level of fully electrified homes, meaning many of the benefits and incentives for this step of the retrofit are largely irrelevant to them.

A suggested solution to this issue is trying to tailor the focus of the program to address and advertise solutions for the most relevant needs of the community. For example, in a situation mentioned previously in which a community already has a high level of electrification, focusing marketing efforts on energy efficiency or comfort benefits instead could yield greater results. The program implementer is strongly encouraged to do an in-depth analysis of the needs of the community prior to determining what specific benefits to focus on when marketing the program.

Public doubts regarding program's ability to deliver on projected benefits: Communities may exhibit a degree of distrust on whether a SEEP will deliver on the benefits advertised. This trust issue may be particularly prevalent among communities and demographics that have been historically underserved or even mismanaged by the public sector. This distrust may in turn negatively affect homeowner participation.

Prior to the implementation of the SEEP, the program implementer is encouraged to verify that predictions of the benefits are as accurate as possible. Looking at previous energy efficiency projects from contractors in their area or case studies of similar neighborhoods/communities is a good way to avoid overpromising on results.

However, the best way for the program implementer to dispel any doubts about the benefits of the program is to carefully monitor and measure results during implementation. Doing so can provide a track record of the program to give credibility to claims regarding benefits.

Poor response to marketing efforts: One potential issue that might arise is a poor response to a marketing strategy from the public. This can be a significant impediment to reaching acceptable participation rates, particularly early on when overall program awareness is still low.

If a marketing strategy is not getting the expected response, the program implementer is encouraged to investigate why. The best way to do this will likely be by reaching out to members of the community for feedback on recent marketing efforts. Collecting response data from a sample of the community can help infer why the greater population did not have the expected response and can also provide insights on how to adjust the strategy accordingly.

7.4.1 Additional Resources

Table 8. Marketing and Communications Additional Resources

Resources (Marketing)	Description	Link
Behavior Insights and Tools How Social Science Has Been—and Could Be—Applied to Connected Programs	This is a document from the Conservatory of Energy Efficiency on human behavior and how this knowledge can be applied to programs.	https://library.cee1.org/content/2017-cee-behavior-insights-and-tools-public/
Utilities and Energy Efficiency as a Service: The Potential For Win-Win Partnerships	This is an ACEEE study showing that energy efficiency as a service (EEaaS) has proven value for businesses, energy efficiency service providers, and utilities.	https://www.aceee.org/sites/default/files/pdfs/u2203.pdf
Community Based Social Marketing Toolkit	This DOE toolkit describes how to strengthen residential energy efficiency program outreach and marketing efforts through data-driven, tailored efforts to change behaviors.	https://www.energy.gov/sites/prod/files/2017/08/f35/bbrn-community_based_social_marketing_toolkit_072617v2.pdf
Better Buildings Residential Network Social Media Toolkit	The DOE Better Buildings Residential Network Social Media toolkit can be used to help residential energy efficiency programs learn to engage potential customers through social media.	http://energy.gov/sites/prod/files/2015/07/f24/Social%20Media%20Toolkit_7-21-15.pdf

Table 8 continued

Resources (Marketing)	Description	Link
Energy Efficiency for Real Estate Professionals	This presentation is a customizable tool for energy efficiency programs to convey the value of energy information to real estate professionals.	https://betterbuildingssolutioncenter.energy.gov/resources/energy-efficiency-real-estate-professionals-0
Apogee Envoy	This is an outbound communications platform from Apogee for utilities to interface with energy customers proactively.	https://www.apogee.net/solutions/residential-energy-solutions/
New York City will prohibit natural gas hookups in new buildings	This is a news article discussing NYC's planned ban of new natural gas hookups for buildings.	https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/new-york-city-will-prohibit-natural-gas-hookups-in-new-buildings-68092539
How heat pump sales are starting to take off around the world	This is an article from Carbon Brief discussing the growth of the heat pump industry and policy changes that could supplement it.	https://www.carbonbrief.org/guest-post-how-heat-pump-sales-are-starting-to-take-off-around-the-world/#:~:text=Expanding%20market%20for%20heat%20pumps,year%20on%20year%20to%202030.
Case Study: Community Engagement	This DOE case study focuses on how the Community Home Energy Retrofit Project engaged the community in home energy upgrades.	http://energy.gov/sites/prod/files/2015/12/f27/bbrn_cherp_casestudy_12-17-15.pdf
Focus Series: Energy Impact Illinois Learns That Parties Sell Upgrades	This DOE case study discusses Energy Impact Illinois' marketing evolution from a broad outreach campaign to a house party approach that brought Chicago homeowners, neighbors, and friends together to learn about energy efficiency opportunities, while increasing demand for home energy assessments and upgrades.	http://energy.gov/sites/prod/files/2014/01/f6/focus_series_chicago_house_parties_12-18-13.pdf

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