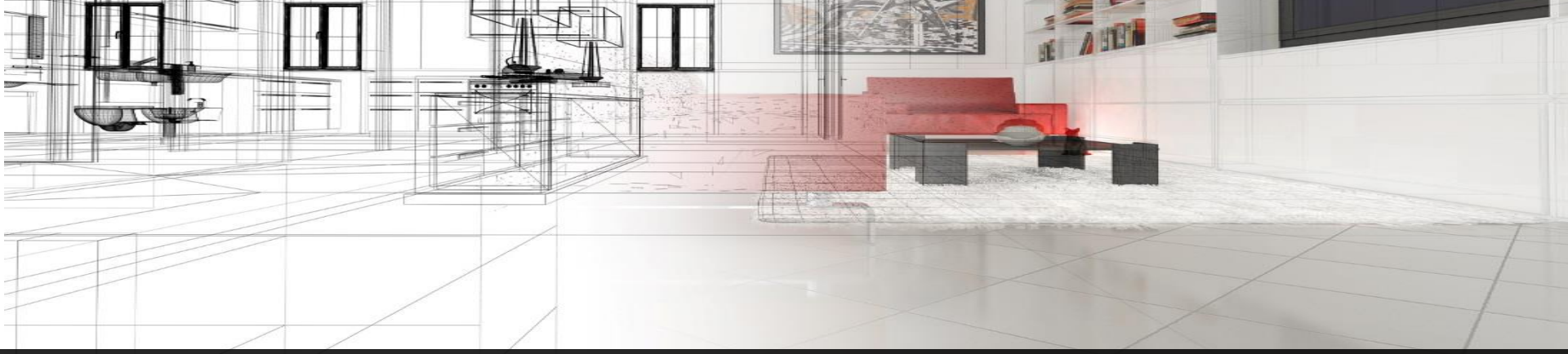

Residential Contractor Working Group:

Summary of Findings and Straw Proposal

Prepared for Massachusetts Department of Energy Resources by

Meister Consultants Group

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May 2017

MEISTER CONSULTANTS GROUP

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EXECUTIVE SUMMARY

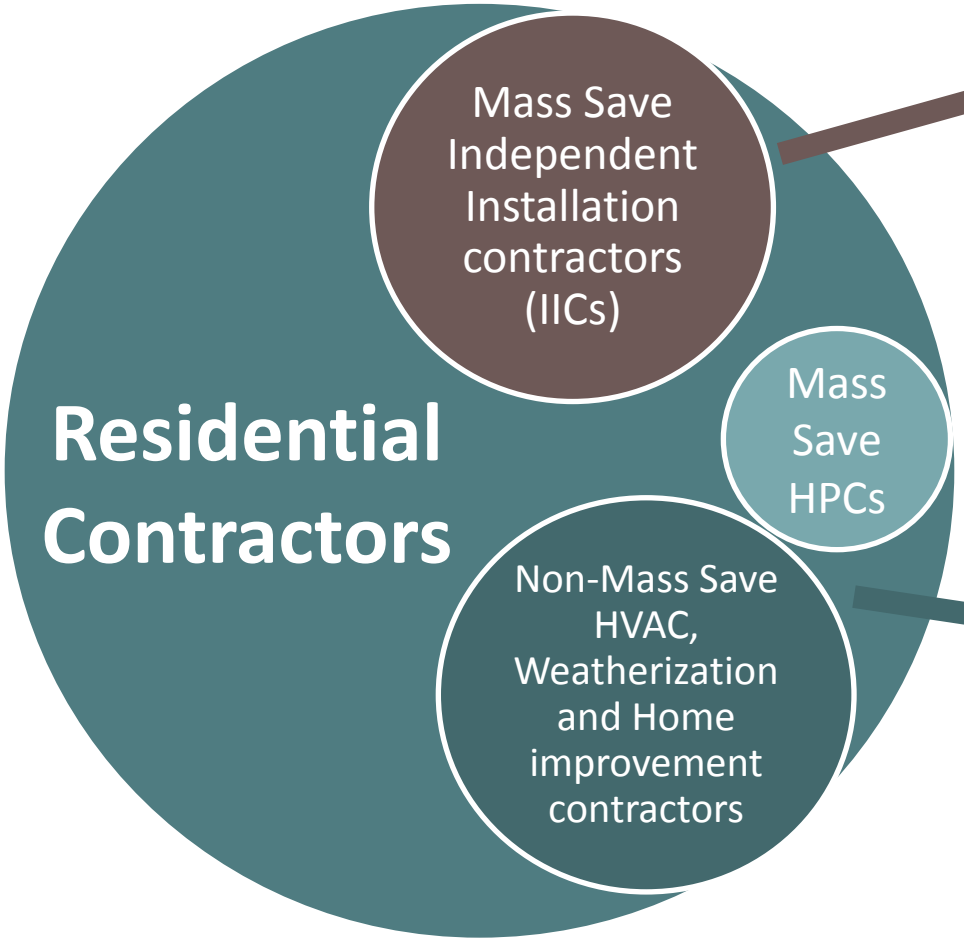
Provides a synopsis of the findings and results of the Residential Contractor Working Group (RCWG) process.

Residential Contractor Working Group: Background

- During the 2016-2018 Energy Efficiency Investment Plan (EEIP) development process, stakeholders discussed the need to improve the efficiency and effectiveness of the Mass Save® home audit program (Home Energy Services or HES) to:
  - Better serve varied customer needs;
  - Ensure that the HES program model accommodates various contractor business models.
  - Engage contractors currently working outside Mass Save to maximize the energy efficiency potential of residential contractors
- As a result, the Massachusetts Department of Energy Resources (DOER) committed to convene a new residential contractor engagement effort in 2016. The Mass Save® Program Administrators (PAs) pledged to participate in this effort.

Contractor Engagement findings:

Macro trends divided based on Mass Save Program Affiliation



- Participating IICs were generally **highly satisfied with the current Mass Save program** and perceived few barriers to implementing residential energy efficiency projects in Massachusetts.

- Participating and non-participating home performance contractors (HPCs), HVAC contractors, and other non-participating contractors **identified several challenges with Mass Save** and the overall energy efficiency market.

Residential Contractor Working Group: Mission

Identify innovative ways to improve efficiency and effectiveness of the home audit program:

- Provide flexibility to contractors and customers to develop & implement energy solutions that better respond to varied customer needs
- Include residential contractors from outside Mass Save® to identify approaches that support a variety of contractor business models
- Explore best practices from other states
- Inform the 2019-2021 Energy Efficiency Investment Plan

RESIDENTIAL CONTRACTOR ENGAGEMENT: TIMELINE

- Residential Contractor Working Group (RCWG): 5 meetings May through November 2016
  - Mass Save & non-Mass Save contractors, & PA representatives
  - Presentations from innovative California & Oregon pilot programs
- Public comment forum: June 2016
  - Over 50 attendees, primarily Mass Save contractors
- Contractor Survey: July-August 2016
  - Obtained additional feedback from outside the RCWG (>100 respondents)
- DOER additional engagement: October-November 2016
  - 1-1 discussions with each RCWG member
  - Interviews with Vermont & Maine statewide EE programs
- Report summarizing contractor engagement process, findings & recommendations: May 2017

Incremental Refinements:

- Recommendations to improve delivery of the Mass Save home audit program (HES) program that can be implemented in the short term, and

Comprehensive Alternative:

- A design proposal for a residential energy efficiency pilot to demonstrate and test a more 'contractor-centered' and 'performance-based' approach to home audit program delivery.

- **Increase uptake and facilitate deeper energy savings in projects** by:
  - Raising the $2K cap on incentives for insulation
  - Providing customers with comprehensive heating & cooling technology options, i.e., fuel neutral options, including renewable thermal technology

INCREMENTAL REFINEMENTS - RECOMMENDATIONS FOR IMMEDIATE IMPROVEMENTS TO MASS SAVE HES PROGRAM (CONTINUED)

- **Streamline EM&V** & facilitate real-time program feedback through:
  - Improved data-sharing (between utilities, customers, lead vendors, contractors)
  - Standardized software (HPxml) and data collection
- **Reduce barriers to contractor participation** in HES by:
  - Simplifying data collection requirements
  - Reducing uncertainty around local permitting requirements, including working with communities to streamline and verify issuance of permits

COMPREHENSIVE ALTERNATIVE - PILOT PROGRAM DESIGN

Goal: Test an innovative alternative to the HES program to better serve varied customer needs and contractor business models and inform the 2019-2021 Energy Efficiency Plan

- **"Open market" framework with increased contractor autonomy and flexibility to meet customer needs**
  - Contractor performs both audit and efficiency upgrade work
  - Pricing set by contractors rather than program (i.e., open market pricing)
  - Contractor has the customer relationship, and liability
  - Customized energy solutions: Contractor and customer determine best solution for the house based on customer needs
- **Reward real-world results**
  - Projected home energy savings calibrated with energy usage history (requires utility data access)
  - Additional incentive available based on actual (vs. projected) results

COMPREHENSIVE ALTERNATIVE- PILOT PROGRAM DESIGN (CONTINUED)

- **Simplify participation** for contractors and customers
- Provide **flexibility** to implement home energy solutions that better respond to specific customer needs and preferences
- Support **fuel switching** (e.g. renewable thermal technology) and **deeper energy savings per home**
- Use **real-time info and meter data** to **streamline program oversight and EM&V**, resulting in **faster program delivery improvements and reduced costs**

Next Steps and Acknowledgements

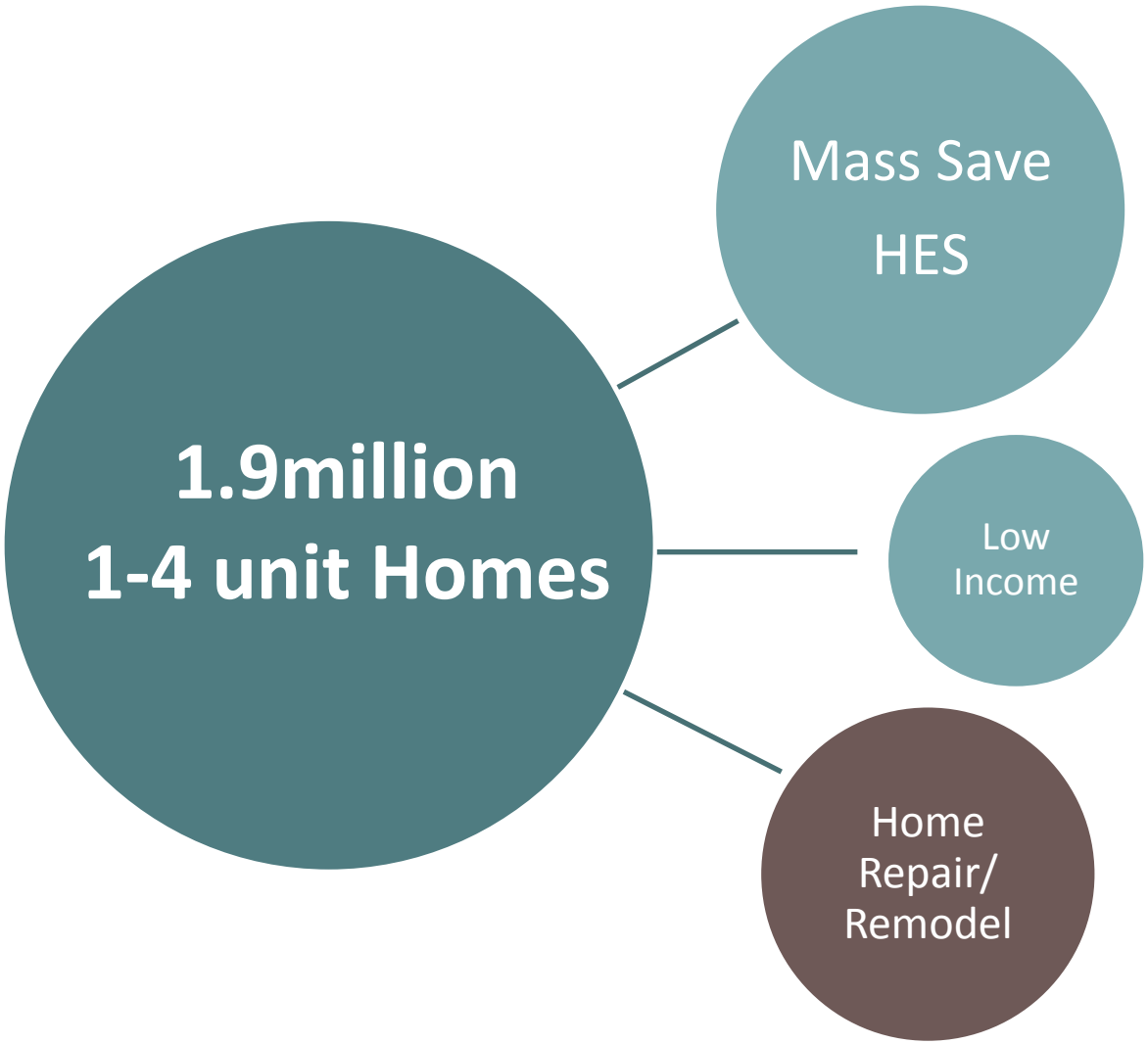
- The Residential Contractor Working Group and survey respondents provided thoughtful feedback into the development of the straw proposal from May-November 2016. **DOER integrated these recommendations and feedback into short-term recommendations for Mass Save HES, and the development of a design proposal for a comprehensive alternative energy efficiency pilot program** intended to inform future energy efficiency plans.

- The **development of these recommendations would not have been possible without the contributions of the contractors and program administrators within the Working Group and the wider responses received through the survey.** DOER will continue to refine and roll-out the pilot program in the coming months.

INTRODUCTION AND CONTEXT

This section provides context for the RCWG and outlines DOER's contractor engagement strategies, including the RCWG's purpose and process.

MA - Existing Residential Retrofit market



- 80,000-100,000 Audits/year
- 30,000 Weatherized/year
- 17,000 Insulated/year
- 10,000 Heating upgrades/year

- 4,000 Weatherized/year
- 2,400 Heating upgrades/year

- 80,000-100,000 Remodels/year
- 14,500 Heating replacements /year
- Unknown # of projects insulated/weatherized

Introduction and context

- During the 2016-2018 Energy Efficiency Investment Plan (EEIP) development process, stakeholders discussed the need to improve the efficiency and effectiveness of the Mass Save® home audit program (Home Energy Services or HES) to:
  - Better serve varied customer needs;
  - Ensure that the HES program model accommodates various contractor business models.
  - Engage contractors currently working outside Mass Save to maximize the energy efficiency potential of residential contractors
- As a result, the Massachusetts Dept. of Energy Resources (DOER) committed to convene a new residential contractor engagement effort in 2016. The Mass Save Program Administrators (PAs) pledged to participate in this effort.

DOER Contractor Engagement Effort

- The Residential Contractor Working Group (RCWG)
  - Included both Mass Save & non-Mass Save contractors, and PA representatives
  - Met 5 times from May through November 2016
  - Included a survey to obtain feedback from contractors outside the RCWG
- Public comment forum
  - Held June 2016
  - Over 50 attendees, primarily Mass Save contractors
- 1-1 discussions with each RCWG member—Oct/Nov 2016
- Discussions with state efficiency program implementers
  - California & Oregon—pilot programs; discussed at RCWG meetings 1&2
  - Vermont & Maine—statewide EE programs; DOER & program implementers

Residential Contractor Working Group: Mission

Identify innovative ways to improve efficiency and effectiveness of the home audit program:

- Provide flexibility to contractors and customers to develop & implement energy solutions that better respond to varied customer needs
- Include residential contractors from outside Mass Save to identify approaches that support a variety of contractor business models
- Explore best practices from other states

Incremental Refinements:

- Recommendations to improve delivery of the Mass Save home audit program (HES) program that can be implemented in the relatively short term, and

Comprehensive Alternative:

- A design proposal for a residential energy efficiency pilot to demonstrate and test a more 'contractor-centered' and 'performance-based' approach to home audit program delivery.

Reasons for a DOER-run residential pilot

- Demonstrate and test an alternative approach and innovations that respond to contractors concerns with the current Mass Save HES program framework
- Provide experience and data to inform development of the 2019-2021 Energy Efficiency Investment Plan
- Minimize disruption to current 2016-2018 plan implementation

METHODOLOGY: WORKING GROUP PROCESS

Leverage Contractor Experience

Contractors on the RCWG provided feedback on areas for innovation to increase savings from EE in Massachusetts

Consult Best Practices

Experts from California and Oregon spoke about their experience with creating innovative EE pilot programs

PAs shared lessons learned from Mass Save pilots (e.g., Deep Energy Retrofit) and provided insight on cost-effectiveness analysis

Collect Additional Input

The RCWG developed a survey distributed to contractors (both Mass Save and non-Mass Save) to better understand contractor needs/ market challenges and explore interests in different potential pilot program designs. DOER also held a public comment forum for contractors and had 1-1 discussions with RCWG members.

Develop Recommendations and Straw Proposal for 2017 DOER Pilot Program

Highlights of Market Challenges for Residential EE in MA

The Mass Save HES program works well for some contractors and not for others:

- Two modes of participation for contractors in HES:
  - Independent Installation Contractors (IICs): access leads generated by Mass Save; work on projects identified through HES audits.
  - Home Performance Contractors (HPCs): generate their own leads; can work with customers on home performance needs beyond HES measures.
- Based on contractor survey and public forum comments:
  - Many IICs (who benefit directly from Mass Save program leads) expressed high satisfaction with HES, despite concerns around market demand
  - Many HPCs found HES more challenging, in part due to more limited access to marketing support
- Other non-Mass Save contractors, e.g. renovation contractors, expressed that HES audit-related paperwork (e.g., to document light bulb installation) was too burdensome for their business.

Conclusion: Market Challenges for Residential EE in MA

- While Mass Save serves many contractors well (IICs), there are also **many contractors** (e.g., HPCs, renovation contractors) **interested in a comprehensive alternative** featuring **innovative program elements** (including a performance-based component) to allow testing of an **alternative delivery model** to the current Mass Save HES program framework.

- There are **opportunities for no and low cost innovations** to more immediately improve the efficiency & effectiveness of the Mass Save HES program**.**

Key Goals of the Proposed Pilot Program

Based on RCWG discussions around market challenges and opportunities for innovation and energy efficiency program growth, several **key goals for the pilot program emerged:**

- Support a variety of business models, resulting in more residential contractors delivering energy savings to customers
- Support projects that integrate energy efficiency (EE) and fuel switching to renewable energy (RE)
- Provide financing (similar to the Mass Save HEAT loan)
- Enable deeper and customized EE projects to better serve varied customer needs
- Reduce administrative burden & improve program efficiency through streamlined contractor paperwork

Inform development of the 2019-2021 Energy Efficiency Investment Plan (EEIP)

Parameters and Scope for the Pilot Program

DOER provided RCWG members with **guidance on the expected scope of the pilot**:

Size: Retrofit 400-600 homes

Timeline: Implement program over a 2 year timeframe

Participating Contractors: 6-10 contractors for pilot

Key outcome: Test and demonstrate viability of an open-market framework (contractor-centered delivery and open pricing) in MA. Provide information to inform development of the 2019-2021 Energy Efficiency Investment Plan.

The RCWG discussed six key elements, which served to frame discussions about best practices from other states (see next slide) and pilot program design.

Program Elements for Pilot Design

Project Scope: What types of energy projects will be incentivized or eligible for financing in the pilot?

Data Tracking and EM&V: What data tracking, evaluation and verification methods will be employed?

Incentive Structure: How are incentives determined in pilot program?

Financing: What are the financing mechanisms for EE measures under the pilot program?

Contractor Participation: Are all contractors eligible or is there a screening criteria?

Marketing and Outreach: Who is responsible for conducting marketing and outreach efforts for the pilot program?

Case Studies and Market Models: California, Oregon, Maine, and Vermont

This Section details key findings from a literature review and discussion with experts on energy efficiency pilots in California and Oregon, and with state energy efficiency program implementers in Maine and Vermont.

Best-practice Case Studies: California and Oregon

- Over the first few meetings, the Working Group **explored best practices in residential energy efficiency to learn how other states approached pilot design and implementation.**
- The two pilots that were reviewed at the meetings were **the PG&E Pay for Performance Pilot (California) and the Clean Energy Works Oregon (CEWO) Pilot**.
- The Working Group **compared the two pilots and considered program elements that may be suitable for the Massachusetts efficiency market.**
- Details on elements of the California and Oregon models are presented in the next slides. Citations are available in the notes for further information.

Case Study- PG&E Pay for Performance Pilot (California)
Program parameters

Size (Proposed 2016-2020 Pilot):

- Number of homes served: Targeting 2100/year for 2016-2019
- Number of contractors participating: Participate through qualified aggregators; 3-5 aggregators and 50 active contractors targeted for the first two years

Timeline:

- Customer Enrollment Begins: September 2016
  - Two phase, four-year pilot program

Cost of implementation:

- Total EE incentive payout: $5 million paid upon performance
  - Fixed incentive rates per kwh or per therm saved
- Administration cost: $240,000

Case Study- Clean Energy Works Oregon (CEWO) Pilot Program parameters

Size (2010-2013)

- Number of homes served: Average 1,066/year
- Number of contractors participating: 40
  - Rebranded as Enhabit in September 2015

Timeline

- Clean Energy Works Oregon Expansion funded by DOE – 2010-2013
- Rebrand- Enhabit – 2015
- Home scorecard requirement -2017

Cost of implementation (2013)

- Total EE finance payout: $4.8 million
  - Loan loss reserve and revolving loan fund
- The program eliminated the loan loss reserve in December 2012

Program Element: Project Scope

California Model

Scope:
All home performance and behavioral measures that provide a clear reduction in energy usage and identified during a required, free energy assessment performed by an approved contractor.

Measured by:
Performance is measured by pre/post intervention analysis of weather adjusted metered consumption using CalTRACK. Aggregators are required to submit intervention measures and installation dates for the evaluation process.

Oregon Model

Scope:
All home performance measures such as duct sealing, heat pumps and air sealing, identified during a required, free energy assessment. After the energy assessment, CEWO advisors meet with homeowners to identify and select a financing package.

Measured by:
Performance is measured by the deemed savings of the proposed home performance package on that home. Based on the deemed savings, the project receives a tiered incentive and access to low-interest financing.

Program Element: Data Tracking and EM&V

California Model

Data Tracking:
PG&E and aggregators use CalTRACK to track customers' usage data and quantify weather adjusted savings from installed EE measures.

EM&V:
PG&E uses quasi-experimental design to compare energy consumption pre- and post-intervention of participant households to reference households outside of the program.

Oregon Model

Data Tracking:
CEWO provided a shared software platform for all contractors, which managed the process flow from application to installation to track projects. A web portal called My Project provided project status reports to contractors, customers, administrators and lenders. The software leveraged Home Performance XML and after Q1 2013 also generated an energy score for all homes entering the program.

EM&V:
CEWO has a customer quality assurance program to verify contractor work, which also determines the contractors level of participation in the program. CEWO also negotiated access to customer energy usage data as part of the energy assessment process. It hopes to directly access usage data in future years.

California Model

Pay-for-performance (measured):
PG&E pays incentives to project aggregators based on measured/actual gross portfolio energy savings. Aggregators are paid annually, once after the first year of the program and again after the second year.

Oregon Model

Pay-for-performance (modeled):
The Clean Energy Works Oregon program offered a tiered performance-based incentive based on modeled energy savings per project. A portion of the incentive was delivered after the completion of a successful energy assessment with the bulk of incentive delivered upon project completion. The average savings for CEWO were above 20% annual savings per home. The tiers were:

- 15-20% - $500,
- 20-30% - $1000
- 30%+ - $1250

California Model

Consumer Finance and Capital Markets:
Consumers will have access to existing consumer finance products such as PACE, on-bill utility financing and unsecured loans.
The program will enable access to capital market finance through project aggregation. It aligns incentives with energy savings and as a result, Property Assessed Clean Energy (PACE) loan providers, as aggregators, can offer financial assistance to more households and be able to generate profit under a new business model.

Oregon Model

Loans and warehousing:
CEWO worked with Craft3, a community bank, to develop a long-term, low interest loan product. The loan term was 10-15 years, and could be provided based on utility bill repayment history as opposed to a credit check. Homes with expected savings over 15% after the energy assessment could qualify for a no-money down option and a 5.5% interest rate. The loan funding could cover a host of energy efficiency measures and up to 25% could be used for non-energy measures such as moisture, seismic protections and solar. The maximum loan amount was $30,000. In December 2013, Craft3 successfully warehoused and resold a tranche of the loan portfolio.

Program Element: Eligibility for Contractor Participation

California Model

All projects through aggregator:

All contractors are eligible to participate, but must be affiliated with an aggregator. Aggregators will develop their own selection criteria.

Aggregators are administrative entities that can yield high project volume. In California, the PACE programs and PACE administrators have seen high success in the residential and commercial markets, and thus are a natural fit to serve as an aggregator, however the initial selection process for project aggregators is not yet closed.

Oregon Model

Tiered system:

At the beginning of the CEWO program, the home performance industry was relatively nascent. The CEWO limited contractor participation based on quality assurance and fair/living labor and wage practices. Until contractors had six satisfactory assessments they were considered “basic” contractors and could not access CEWO-generated leads. “Full” contractors were organizations which met this program requirement and could access CEWO-generated leads. Both groups could generate their own leads – contractor leads accounted for approximately 35% of project volume.

California Model

Aggregator-led:
Aggregators are anticipated to conduct marketing and outreach. The existing PACE providers already conduct extensive marketing within California. They will work closely with contractors to determine the advertising and customer incentives to recruit participants.

Oregon Model

Administrator-led:
Clean Energy Works, an independent non-profit provides marketing for installers and information to customers about Oregon's EE programs and incentives. During the CEWO pilot, Clean Energy Works shared and allocated leads with full contractors in its programs, provided shared software platforms and financing. In 2015, contractors began to pay CEWO (now Enhabit) for leads. Contractors can also bring their own leads into the program.

RCWG Discussion Takeaways

Highlights of the discussion within the RCWG following presentations on the **California and Oregon models and their applicability to a Massachusetts pilot program** are presented below.

- **The pilot should be contractor-led and support contractor autonomy.** The RCWG emphasized that contractors are experts in their industry, and consequently should have the autonomy and flexibility to design customized solutions using a range of technologies, including weatherization, renewables and fuel-switching. This approach supports comprehensive, whole house projects with the potential to achieve deep energy savings per home. Both CA and OR are piloting contractor-led models.
- **The pilot should reduce administrative burden and simplify participation for contractors and customers.** The pilot should include both contractors that participate in Mass Save's HES program and those that don't, with a view to demonstrating a more open market model.
- **Financing is essential.** Pilot program incentives should be complemented by financing for pilot program customers. Contractors were satisfied with the Mass Save HEAT Loan, and thought that it or a similar financing product would be a significant enabler of projects. In both the Oregon and California pilots, contactors were able or will be able to access financing (as well as marketing provided by the pilot program).

RCWG Discussion Takeaways (continued)

Highlights of the discussion within the RCWG following presentations on the **California and Oregon models and their applicability to a Massachusetts pilot program** are presented below.

- **The pilot program should reward performance based on energy savings.** The RCWG emphasized that incentives should be provided based on home-specific energy savings. CA uses a pay-for-performance model based on metered savings at the home. The Oregon approach based incentives on home-specific modeled energy savings. Both approaches contrast with the Mass Save approach to incentives, which are based on deemed energy savings (i.e., average energy savings per measure across a portfolio of homes).
- **The RCWG expressed concern with fully implementing California's pay for performance approach in Massachusetts.** The RCWG agreed that the California approach would be difficult because of Massachusetts' limited use of smart meters, contractor concern around the role of a financial aggregator, and more limited access to customer usage data. The RCWG agreed that the Massachusetts home energy infrastructure was more similar to that in Oregon.

Additional DOER Discussion with State Efficiency Programs

- Based on key takeaways from RCWG discussions regarding California and Oregon, as well as the contractor survey, DOER subsequently met with state efficiency program implementers in **Maine and Vermont**.

- Both Maine and Vermont operate contractor-led programs that support **contractor autonomy to design customized energy solutions** and feature **streamlined data collection procedures**.

Review of Best Practices: Efficiency Maine Home Energy Savings Program

Program Overview

- Efficiency Maine's Home Energy Savings Program is a market-based residential energy efficiency program targeting existing single- and multi-family homes and delivered through program-approved contactors.

Incentive Structure

- The program doesn't require contractors to model savings. Instead, the program has a schedule of fixed incentives for air sealing, insulation and heating equipment.
- Contractors who do model savings and can show that the model savings exceed 20% of the buildings energy use can earn additional incentives:
  - Tier 1: Minimum of 20% modeled whole home energy savings - $1,000
  - Tier 2: Minimum of 40% modeled whole home energy savings - $1,500

Data Tracking

- For projects with non-modeled savings, the program uses deemed savings' calculations from its technical reference manual. Contractors who take the custom path provide savings calculated with a program-accepted software.

Review of Best Practices: Home Performance with ENERGY STAR Vermont

Program Overview

- Efficiency Vermont Home Performance with ENERGY STAR (HPwES) is a market-based residential energy efficiency program for single-family homes delivered through certified Home Performance ENERGY STAR contractors.
- Incentives for fuel switching to renewable thermal and foam insulation

Incentive Structure

- The program provides prescriptive incentives to customers, capped at $2,000 for air sealing and insulation, based on a list of eligible measures. Incentives for insulation measures are price per square foot.

Data Tracking and EM&V

- HPwES contractors use Efficiency Vermont's Home Energy Reporting Online (HERO) tool to report thermal energy savings.
- The HPwES program requires all contractors to conduct energy audits prior to beginning work and has an additional inspection once projects are completed for final estimation of energy savings.

Cost Effectiveness and Efficiency Programs

The design of residential efficiency programs in each state, as well as Mass Save's HES program, is governed by cost effectiveness criteria. A program is cost-effective when **the ratio of benefits to costs is greater than 1.** In MA, the Department of Public Utilities (DPU) rules on whether Mass Save programs are cost-effective.

The type of **benefits and costs considered in the cost effectiveness tests have implications on program design and can affect the way financing and incentives are presented to customers.** An example is that high participant costs for installed measures under the Total Resource Cost (TRC) test may result in a benefit-cost ratio of less than 1. A Utility Cost Test (UCT) approach that does not include participant costs would not penalize the customer selection of the same energy efficiency measures, but would not include all the same benefits. A Societal Cost Test (SCT) would include the same costs as the TRC but may include more societal benefits such as improvements to public health and reduced environmental externalities.

Cost Effectiveness and Efficiency Programs

The type and detailed approach of cost effectiveness tests vary across states. Among New England states, **Massachusetts, Rhode Island, New Hampshire and Maine use variations of the Total Resource Cost Test** while **Vermont uses the Societal Cost Test** and **Connecticut uses the Utility Cost Test**. The main differences between these tests are:

Total Resource Cost Test (TRC) *Compares utility and customer (program participants and non-participants) costs to utility resources savings and customer benefits*	**Societal Cost Test (SCT)** *Compares society's cost of energy efficiency to resource savings and non-cash costs and benefits*	**Utility Cost Test (UCT)** *Compares only the Utility's cost to deliver energy efficiency to utility resource savings and ratepayer benefits*
Benefits: avoided energy- and capacity-related cost, resource savings, and monetized non-energy benefits that accrue to the participant. **Cost**: program overhead cost and installed measure cost paid by the program and the participant.	**Benefits:** Includes the benefits from the Total Resource Cost test, *and adds societal benefits such as a $/kWh value for reduced environmental impacts from the burning of fossil fuel.* **Cost:** program overhead cost and installed measure cost paid by the program and the participant.	**Benefits**: avoided energy- and capacity-related cost, resource savings, and monetized non-energy benefits that accrue to utility ratepayers. **Cost**: program overhead cost and installed measure cost paid by the program only.

State of the Energy Efficiency Market in Massachusetts – An Analysis of Contractor Perspectives

This section provides the results and key findings from the survey developed for Massachusetts contractors. The results were used in Working Group Discussions and to develop a proposal for the pilot.

Overview of Survey

Objective

- The purpose of the Residential Contractor Working Group survey was to **collect information regarding interaction of Massachusetts-based residential contractors with the Mass Save** program and **solicit feedback in order to help DOER develop a pilot** program.

Timeline and Outreach Methods

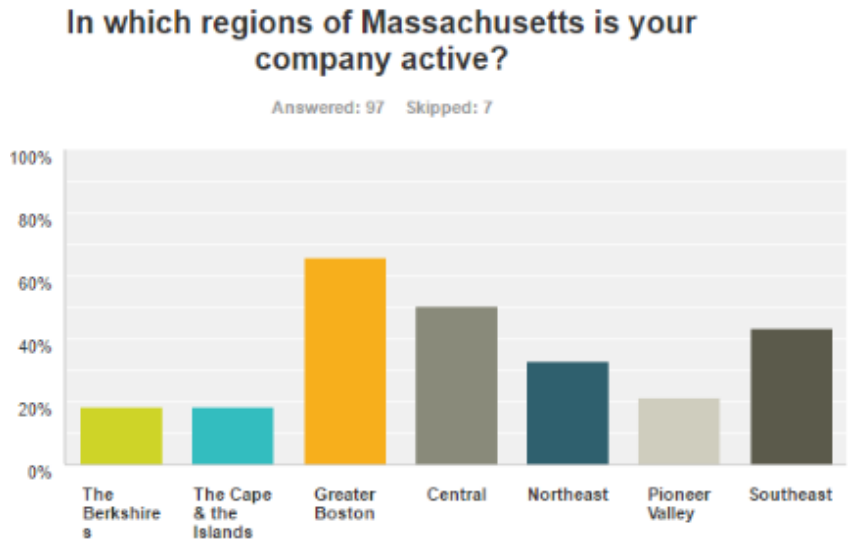
- MCG distributed the survey to Best practices Working Group, Home Energy Services contractors, the Northeast Sustainable Energy Association , and ACA New England. The survey remained **open for approximately one month**.

Sample Size

- **104 Massachusetts-based residential contractors** completed the survey; 70% of respondents completed the full survey.

Summary of Respondents

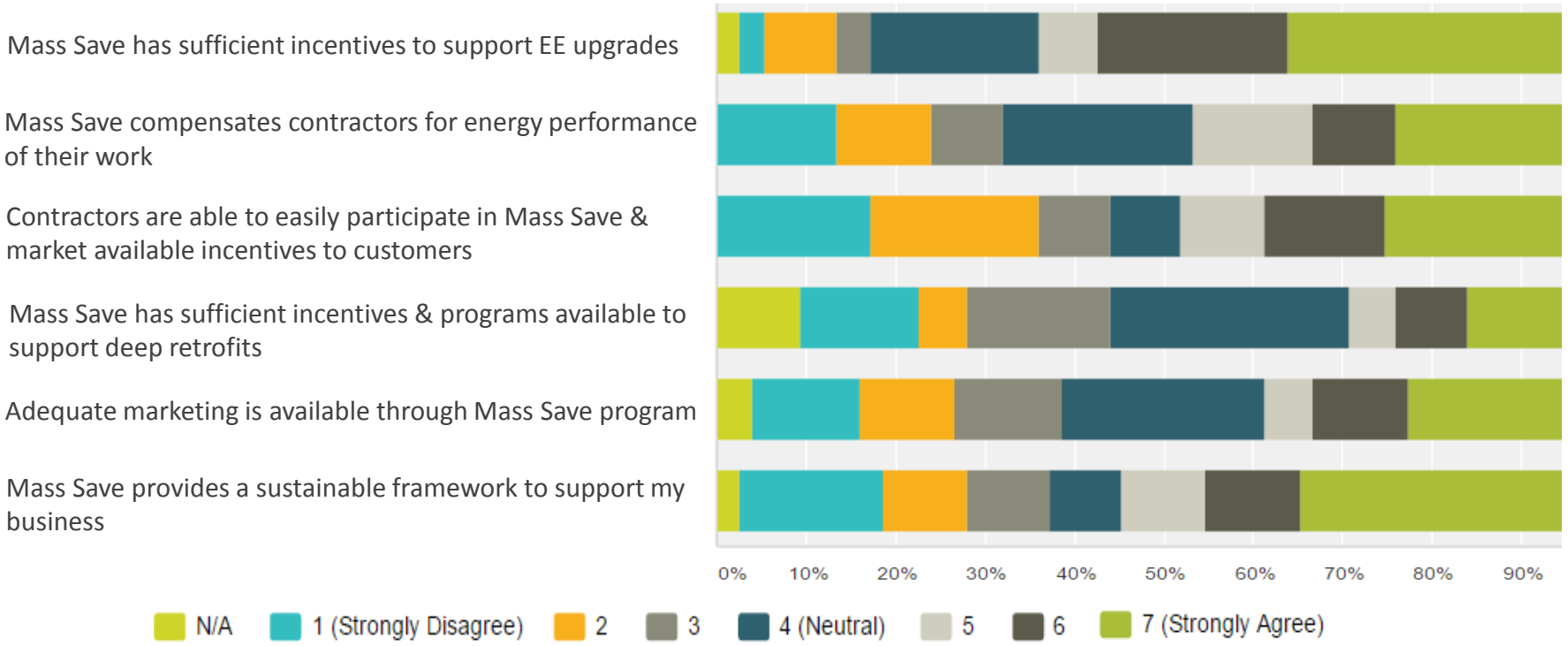
- Survey respondents were distributed across the regions of Massachusetts, with the **majority (66%) active in the Greater Boston area**.
- Respondents were also diverse in regards to the size of their organization, ranging from businesses with 0-5 employees to 300+ employees. **34% of respondents indicated that there are 11-25 employees in their organization**.
- Respondents were distributed across a range of business areas and residential property types they serve, **with 63% identifying insulation and weatherization as a primary business area and 98% serving single family homes**.
- **15 respondents were Home Performance Contactors** (HPC) while **57 were Independent Installation Contractors** (IIC); 25 noted they were neither (this included HVAC contractors who are still within Mass Save or non-Mass Save contractors).
- **11 respondents were outside of Mass Save** program.



Perceptions of the Mass Save Program

Respondents were generally **satisfied with Mass Save's current incentives** for residential efficiency projects but **indicated that the incentives are not sufficient to support deep retrofits**.

"Please respond to the following statements regarding the Mass Save Program"

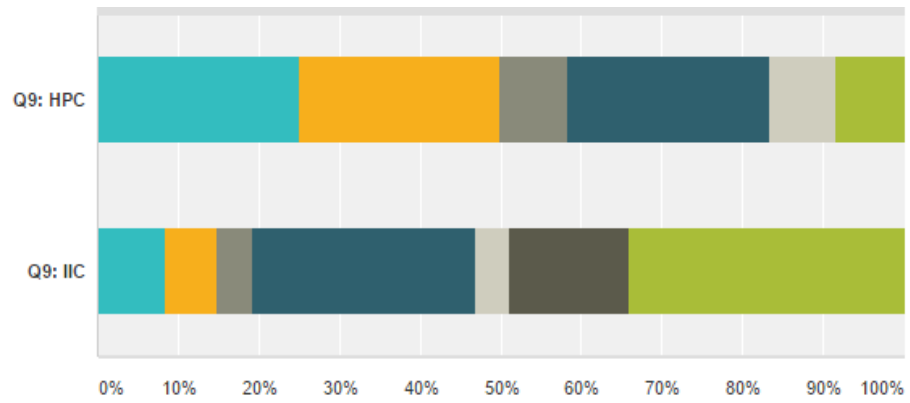


n = 75

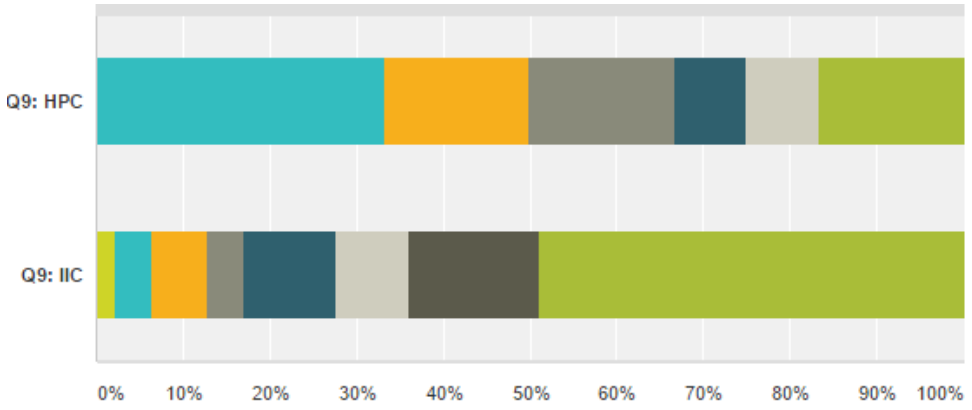
Perception of the Mass Save Program – HPC vs. IIC

There was a **significant difference in opinion between HPCs and IIC** on whether Mass Save provides sustainable framework for their business and whether there was adequate marketing available through the program. **These sentiments were also expressed during the June 2016 listening session for contractors hosted by DOER.**

"Please respond to the following statements regarding the Mass Save Program"
(Responses: 12 HPCs and 47 IICs)



Adequate marketing is available through Mass Save program

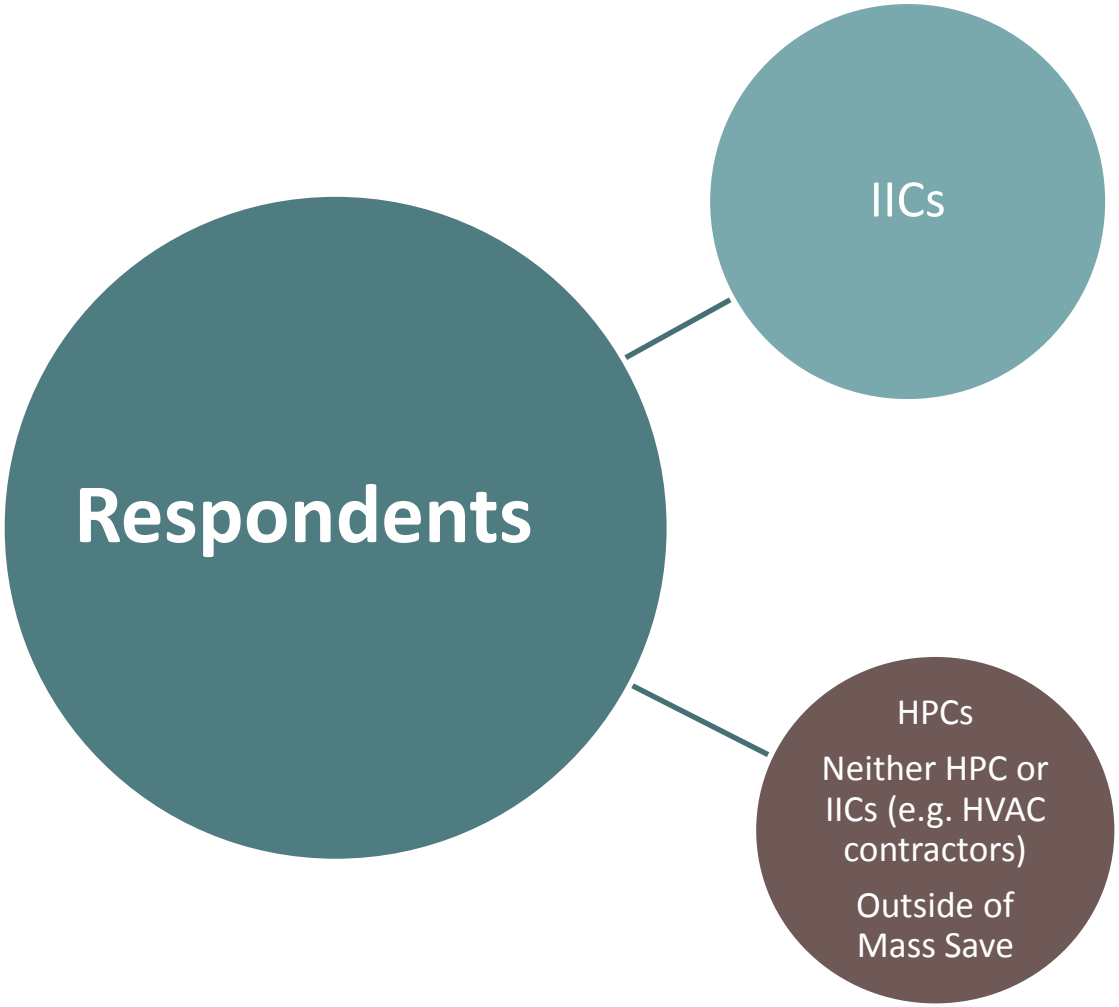


Mass Save provides a sustainable framework to support my business

N/A | 1 (Strongly Disagree) | 2 | 3 | 4 (Neutral) | 5 | 6 | 7 (Strongly Agree)

n = 75

Macrotrends based on Mass Save Program Affiliation



- **IICs were generally highly satisfied with the current Mass Save program** and perceived few barriers to the residential energy efficiency projects in Massachusetts.

- **Other participants (e.g. HPCs) indicated higher interest in the future pilot program and also identified several challenges with Mass Save** and the overall energy efficiency market.

Barriers to Residential Energy Efficiency Projects – Open-ended Responses

In an open-ended question, respondents cited the following as the largest barriers to residential energy efficiency projects in Massachusetts.

1. Lack of customer awareness of available programs and incentives
2. Poor marketing and outreach to promote available programs to customers
3. Lengthy permitting process and inconsistencies across local building departments
4. Bureaucratic processes for contractors, including those related to financing
5. Complex incentive delivery for customers
6. Lack of access to leads generated through Mass Save marketing

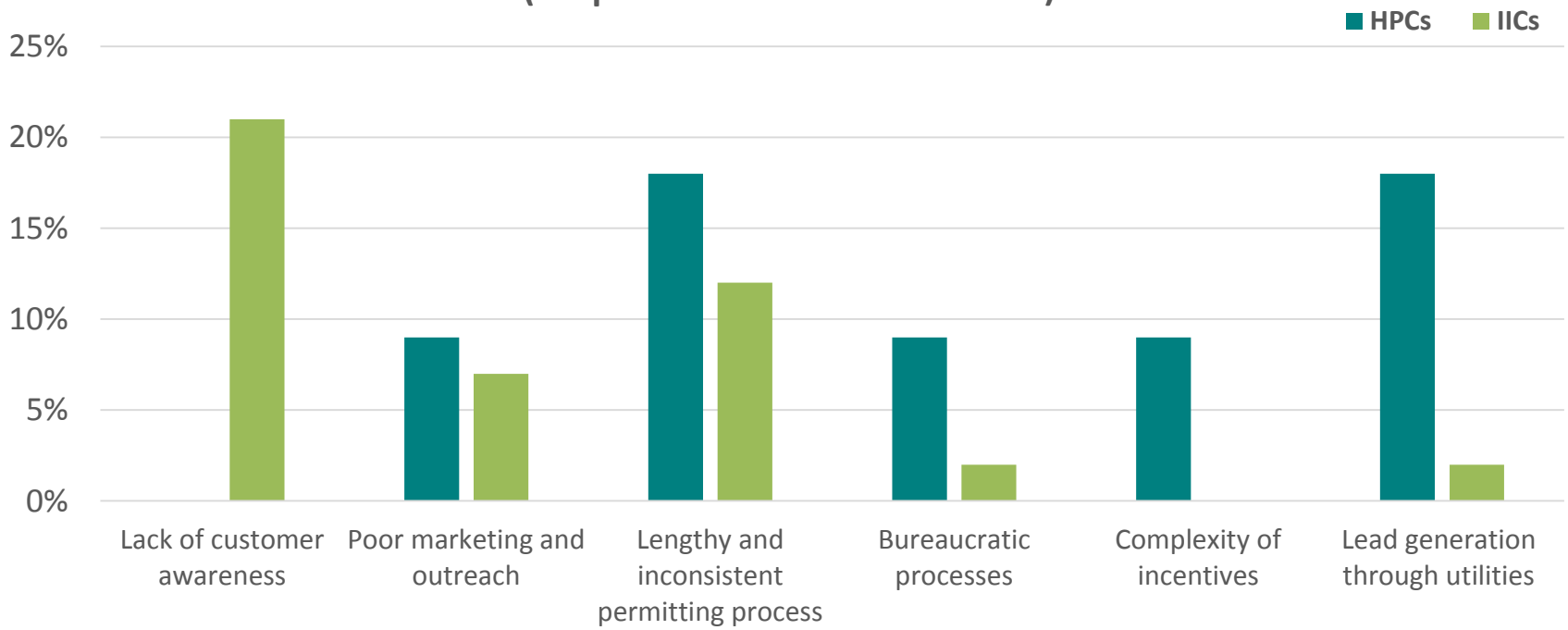
"I want to focus on what the customer needs, not what measures the program offers…The program needs to be simpler; a lot of staff time is taken up with data entry."

n = 70

Barriers to Residential Energy Efficiency Projects – Open-Ended Responses

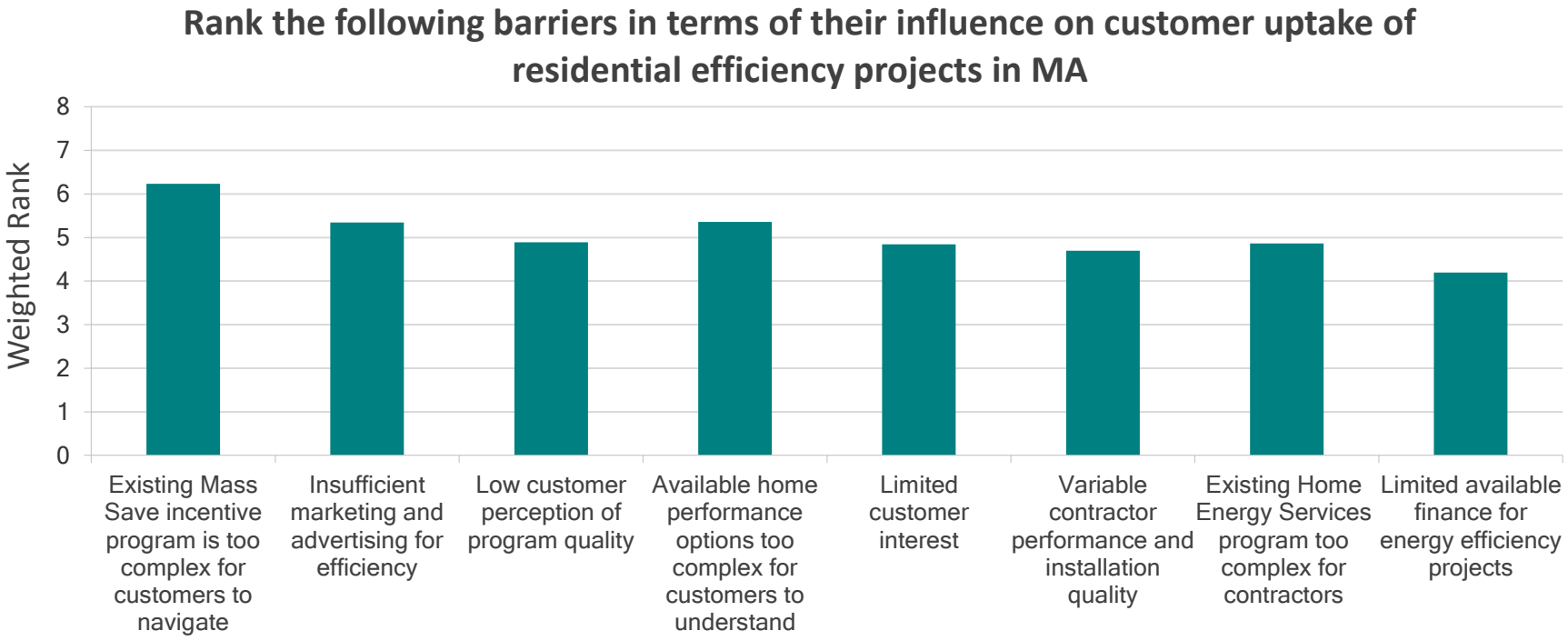
Lack of customer awareness was the most commonly cited barrier by IICs (21%) while **lead generation** was indicated as the largest barrier by 18% of HPCs.

From the contractor perspective, what do you consider to be the largest barriers to residential energy efficiency projects in Massachusetts? (Responses: 11 HPCs and 43 IICs)



Barriers to Customer Uptake of Efficiency Projects

Respondents were asked to rank barriers to uptake of residential efficiency projects. Many of the IICs (44%) and a few other respondents (10%) indicated that these barriers were not problematic. The remainder ranked **complexity of the current Mass Save incentives as the highest barrier to customer uptake** of residential efficiency projects.

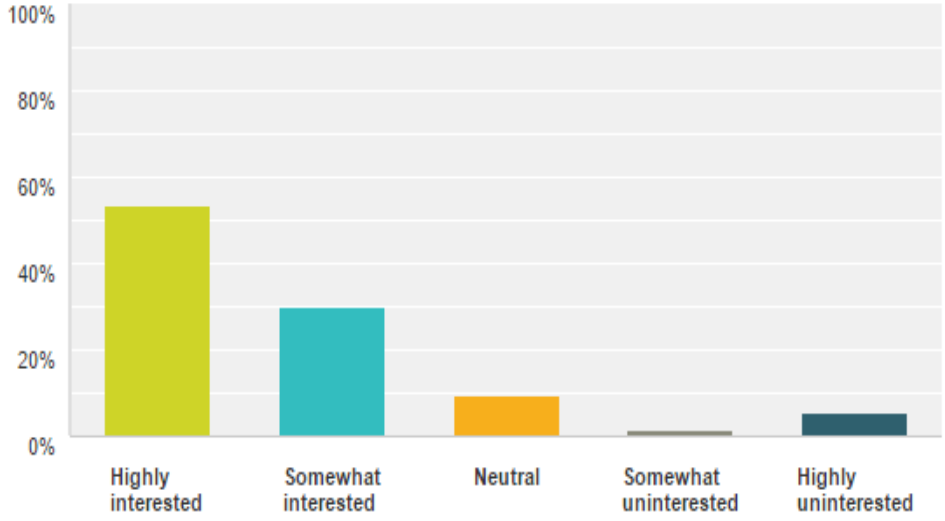


n = 43

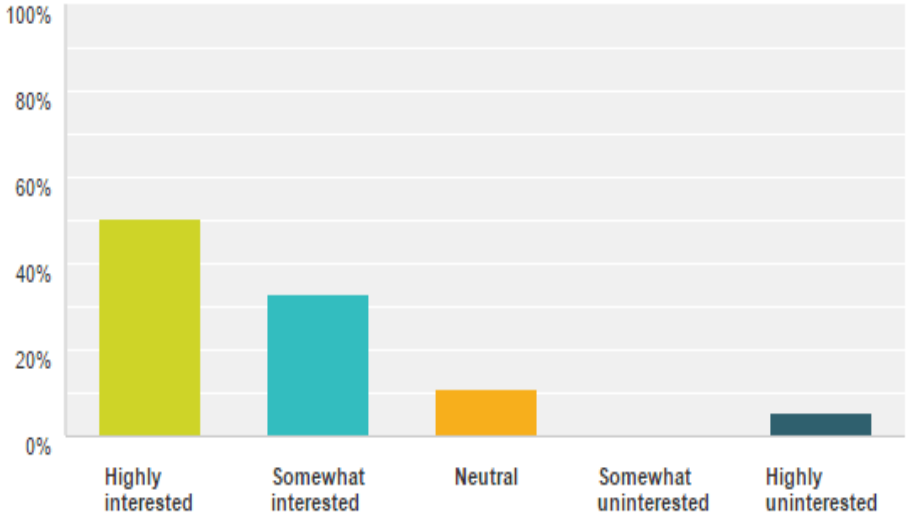
Pilot Program Strategies Strong Contractor Support

Respondents were **interested in pilot program that has additional finance products** (83%) and establishes incentives for **deeper energy efficiency retrofits** (84%).

Potential Pilot Strategies



A pilot program that has available **additional finance products** (such as loans or credit enhancements) **for energy efficiency projects, renewables and pre-weatherization barriers** (e.g. asbestos removal and knob and tube wiring)



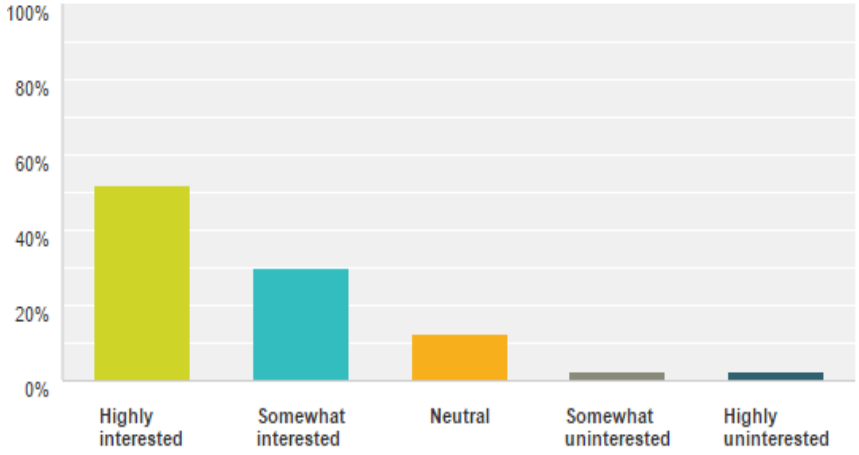
Establishing incentives for **deeper energy efficiency retrofits** (Defined as annual savings exceeding 25%)

n = 73

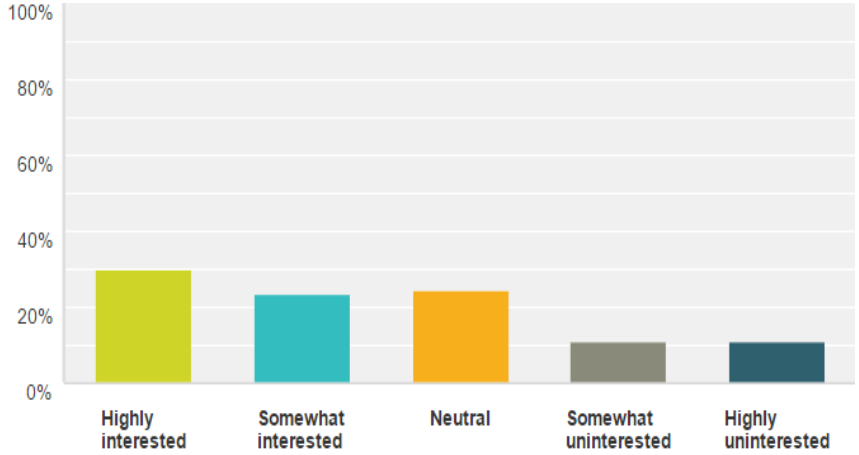
Perceptions of Additional Pilot Program Strategies

Respondents were also **interested in pilot program that provides incentives regardless of overall project cost** (82%) but were more **neutral towards a program that has performance-based incentives**.

Potential Pilot Strategies



Providing incentives regardless of the overall project cost, **removing incentive caps**



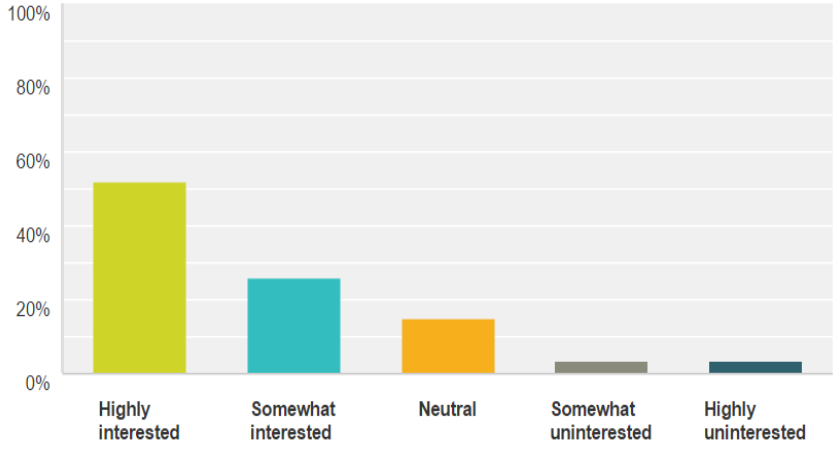
Establishing a pilot program where whole building incentives are awarded based on **measured energy usage reductions on customer bills**

n = 73

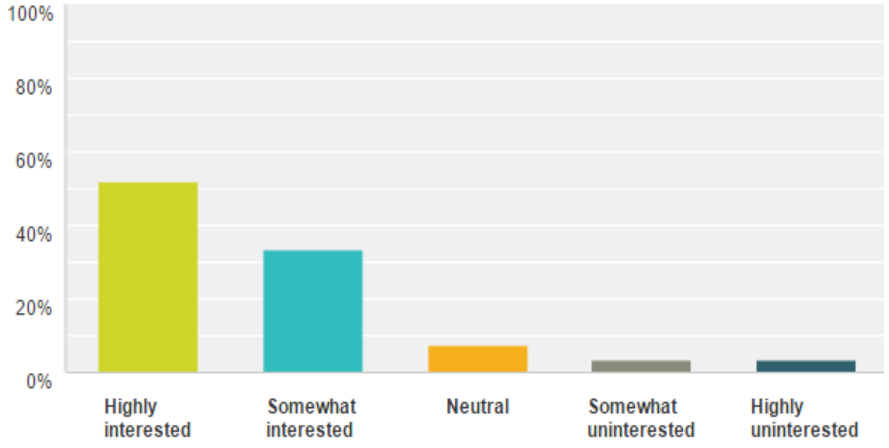
Pilot Program Strategies with Support from Non-HPCs

Contrary to results from the full dataset, **when responses from IICs are removed, there was more interest in performance-based pilots**, with 78% and 85% indicating interest in either a modeled or meter-based model, respectively.

Potential Pilot Strategies



Establishing a pilot program where whole building incentives are awarded based on **expected or modeled savings** for projects rather than for specific efficiency measures



Establishing a pilot program where whole building incentives are awarded based on **measured energy usage reductions on customer bills**

n = 27

KEY TAKEAWAYS FROM CONTRACTOR SURVEY

- IICs were generally satisfied with the Mass Save program, and overall **perceptions of the current incentives provided by Mass Save were very positive**.

- **There is significant bifurcation in contractor perceptions of the Mass Save program and interest in a future pilot**. Non-IICs were generally more interested in a pilot program, and had much more positive interest in a performance-based pilot.

- **There is significant interest in encouraging deeper retrofits** – based on the responses.

- Contractors also expressed in open-ended and structured responses that **customer awareness of specific incentives and program complexity were challenges**.

Recommendations and Straw Proposal for DOER Pilot Program

This section outlines the proposal for the DOER energy efficiency pilot, and includes additional recommendations for near-term improvements to the HES program based on findings from the Working Group. Pilot details are being further developed by DOER; a preliminary timeline for the pilot launch is provided.

Recommendations for Mass Save Home Energy Services (HES) Program

The Residential Contractor Working Group process collected important feedback regarding the state of the residential efficiency market in Massachusetts. **While many of the findings will be tested within the pilot, some findings had near-term relevance for Mass Save**.

Improved data sharing between utilities, customers and lead vendors contractors could enable EM&V processes, which are closer to real-time based on billing and performance data. In the near-term, data standardization across program administrators could allow for streamlined EM&V studies.

Integration of streamlined data collection options, could decrease data collection burdens for contractors. Contractors expressed concerns that data entry was a significant burden to working with the Mass Save program, and any improvements via the pilot or within the existing programs would be welcomed.

Contractors have expressed concerns that **the $2,000 insulation incentive cap prevents more comprehensive projects from proceeding**. In future iterations of Mass Save, this cap could be raised to encourage deeper, whole-house projects. In Maine, if energy efficiency improvements are anticipated to yield more than 40% annual savings, projects are able to access a higher-incentive amount. In Massachusetts the Cape Light Compact, the Home MPG pilot, and the statewide moderate income initiative have higher caps of $4,000, $3,500 and $3,000 respectively.

Contractors expressed concern **that incentives were being provided to contractors to complete efficiency work prior to contractors receiving local permits.** Utilities could work with local jurisdictions to streamline permitting processes for common efficiency upgrades or request verification for permits prior to delivering incentives.

The Mass Save program can increase the number of measures installed per visit by discussing additional technologies and programs with residential customers, including the Expanded HEAT Loan program and renewable heating and cooling technologies. To encourage more comprehensive projects, as opposed to repeated annual audits, the timeframe for implementing energy recommendations could be increased.

Pilot Program Design: Findings and Recommendations

FINDING	RECOMMENDATION
Current HES program works for many contractors (Mass Save Insulation Installers (IICs)), but other contractors (HPCs in Mass Save & Home Remodelers outside Mass Save) showed strong interest in trying a performance based model with more contractor autonomy and flexibility to serve customer needs.	Focus both on improvements to mass market HES *and also* develop and pilot a parallel path for HPCs and Remodelers that gives contractors more design and price control.
HES "Lead Vendor model" and fixed price menu of measures does not fit many contractor business models.	Pilot an open market framework that allows contractors to set pricing, own the customer relationship, and liability.
75% of non-IICs support a performance-based pilot with the incentive tied to metered savings but expressed concerns about delayed incentive payments or the California model of a financial aggregator.	Pilot should have incentive primarily up-front, with a modest performance-based true-up and performance rating tied to actual meter savings after 6-12 months.
Lead vendor major role and cumbersome reporting leads to contractor delays and significant overhead cost; EM&V and program feedback is too expensive and takes too long (2+ years backward-looking.)	Pilot should use modern data tools to simplify and streamline data collection and use analytics to reduce cost, time and complexity of EM&V and QAQC.
Financing is critical to promoting bigger jobs /deeper savings. Current low-cost financing is only available through HES.	Incorporate expanded HEAT Loan and make available in pilot.
Current Cost Test used to screen EE programs may not allow proposed pilot model and disincentives leveraging funds.	Review pilot results under a variety of cost test models, review cost test inputs.

Pilot Proposal Framework

- Based on the survey results, conversations with other state programs and the working group, DOER focused the pilot around three core elements:

Contractor-focused Delivery Model

Contractors would be the customer's primary point of contact during the pilot and would complete program audits and associated work. The model would also have open marketing pricing and performance bonuses for contractors whose projects save more than projected. Contractors will also receive an public recognition which can be used for marketing.

Home-specific, Performance-Based Incentives

Building off successful demonstrations in Oregon and the "custom path" in Efficiency Maine, contractors and homeowners would decide on energy investments for the home. **Contractors would have a choice of a simple audit path with fixed incentives for a list of measures or an energy audit path which includes a home-specific model energy model and more customization.** Customer billing data would be used to verify results, and create a true-up based on performance. Contractors using the model will receive a higher proportion of incentive payments upfront.

Leverage Mass Save Incentives

Given that the survey feedback indicated the importance of financing options and that contractors had positive perceptions of Mass Save's existing incentives**, existing finance such as the Expanded HEAT Loan and HVAC and appliance incentives could be leveraged by the pilot.**

Proposed Pilot Program Process

1 - Contractor generates lead and meets with customer during one of two types of home energy audits

2a – Simple Audit

The simplified audit pathway provides prescriptive incentives for air sealing and insulation. The customer will be asked to disclose their utility data, and thus streamline data collection. Measured savings from customer billing data will provide contractors with a performance-based bonus payment based on the annual performance of a contractor's project portfolio. The size of the bonus payment will be tiered based on the achieved percentage of annual metered savings, with a higher $/MMBTU value as savings increase. As the savings will not be modeled prior to the measures being installed, less of the incentive will be paid up-front.

2b – Energy Model Audit

The energy model audit includes the completion of a home-specific energy model prior to the installation of planned measures. Data collection will remain streamlined and a customer release of energy data is still required. Tiered incentives based on modeled savings will be distributed with a higher $/MMBTU value for projects with higher projected savings. The contractor will also have a performance-based, true-up of their annual project portfolio as in the simple audit. Additional payments will be disbursed if necessary. As the modeling is done prior to the true-up, contractors under this path will likely receive the majority of the incentive upfront.

4

Top performing contractors based on measured savings will be recognized formally through program marketing.

PROPOSED PILOT PROGRAM DESIGN

Goal: Test an innovative alternative to the Mass Save HES program delivery to better serve varied customer needs and contractor business models

- **"Open market" framework with increased contractor autonomy and flexibility to meet customer needs**
  - Contractor performs both audit and efficiency upgrade work
  - Pricing set by contractors rather than program (i.e., open market pricing)
  - Contractor has the customer relationship, and liability
  - Customized energy solutions: Contractor and customer determine best solution for the house based on customer needs
- **Reward real-world results**
  - Projected home energy savings calibrated with energy usage history (requires utility data access)
  - Additional incentive available based on actual (vs. projected) results

PROPOSED PILOT PROGRAM DESIGN (CONTINUED)

- **Streamline the process using innovative software/solutions**
  - Option for simplified audit
  - Incentives reward building shell improvements (rather than lighting), resulting in less paperwork for contractors
  - Real-time program oversight – requires utility data access
- **Facilitate comprehensive projects**
  - home energy scorecard illustrates how efficiency investments improve home energy performance
  - Tiered incentive based on overall project savings
  - Fuel switching and renewable energy options
  - Access to Mass Save rebates for HVAC equipment, appliances, etc.
  - Access to financing via DOER Expanded HEAT loan

PROPOSED PILOT PROGRAM DESIGN (CONTINUED)

- **Simplify participation** for contractors and customers
- Provide **flexibility** to implement home energy solutions that better respond to specific customer needs
- Support **fuel switching** (e.g. renewable thermal technology) and **deeper energy savings per home**
- Use **real-time info and meter data** to **streamline program oversight and EM&V**, resulting in **faster program delivery improvements and reduced costs**
- Provide data to **analyze cost-effectiveness**

Summary of Comparisons Between the Pilot and HES

Pilot	HES
- Open-market pricing (contractors set price for work performed)	-Fixed pricing (program sets prices for work performed)
- Contractor conducts audits; contractor and homeowner develop customized energy solution; contractor performs work	- Lead vendor conducts audits; a separate IIC performs weatherization work according to scope developed by auditor
- Incentives tied to performance based on home-specific energy model and true-up using customer metered usage data	- Incentives based average savings per measure, not home-specific savings
-Use of customer meter data as well as contractor household data for swifter EM&V and contractor feedback	- Assessors/Contractors submit household data to EM&V team which uses a variety of survey and data analysis tools to calculate average savings

KEY CONSIDERATIONS FOR PILOT IMPLEMENTATION

Evaluation Timeframe and Meter Data Collection

- The pilot is anticipated to operate for 2 years. **A goal of the working group is to inform the 2019-2021 Three-Year Plans.** Discussions for these plans will begin in 2018. As such, **pilot data collection will need to occur in near real-time.** New software technologies and access to customer billing data through platforms such as Green Button could enable near-real time EM&V for the pilot. However, appropriate vendors and work-arounds for unmetered usage, such as oil and propane will need to be explored by DOER.

Quality Control

- **There are several options for inspections and quality control within the pilot, which are still being explored. Any implemented system would need to be mindful of pilot cost constraints.** DOER will offer trainings to qualified contractors, which will be selected via RFQ and at a minimum meet the standards set in place by Mass Save. Contractors could then be subject to random inspections, or a tiered-system could be explored where contractors receive inspections for each project, until they reach a certain threshold of customer satisfaction and performance.

Incremental Efficiency Costs and Cost Effectiveness

- The Working Group wanted to ensure the pilot could demonstrate cost-effectiveness or be able to analyzed in a framework familiar to utilities to provide statistically significant data for the three-year plans. An anticipated target of the pilot are remodeling projects. **Questions remain about an appropriate methodology for accounting for incremental efficiency savings within these projects, which are a result of the pilot.**

Delivered Fuel Customers

- The performance-based true-up will rely on customer billing data for delivery of final incentives. **Data collection will be more difficult for unmetered customers, such as residences with oil or propane providers.** Other states such as Maine and Vermont have developed release forms for customers to collect data from oil dealers. A number of start-ups are also working to develop metering technology. As the pilot develops, DOER will investigate additional data collection methods.

Cost Effectiveness Considerations

A stated goal of the pilot is to inform the next set of utility three-year plans and future iterations of Massachusetts efficiency programs. As mentioned before, Massachusetts utility programs are expected to comply with the Total Resource Cost Test, and the pilot intends to use the test as an evaluation framework to be able to provide meaningful results to the DPU and utilities. **The pilot hopes to incent homeowners to invest where there are opportunities to address many measures at once. While these projects will deliver more energy efficiency savings, it is possible that the customer contribution would be higher, which would impact the cost-benefit ratio. Given these dynamics, the pilot will also examine and consider the modification of current cost-effectiveness testing.** Other cost effectiveness considerations for program design include:

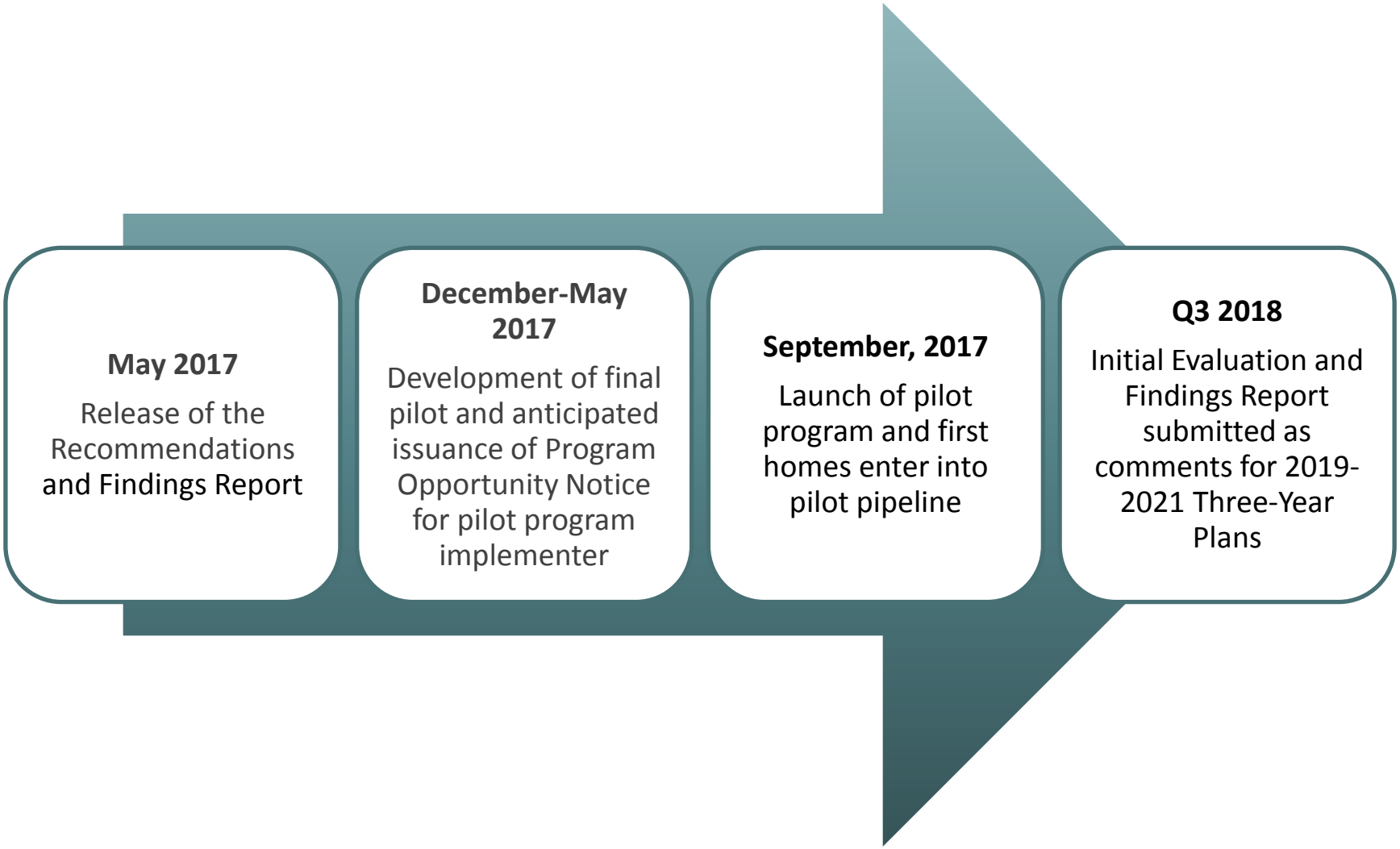
What cost evaluation framework will be used for measures in the program? Will the program consider total project costs or incremental costs for the purchase of efficient products in its calculations?

What types of projects are expected through the program and how will project costs and savings be defined? Will the program primarily have retrofits or major renovations?

How will the pilot differentiate between impacts delivered by the pilot and spillover from other programs in the market and free ridership?

What types of other cost-effectiveness tests or calculation methodologies will be explored through the pilot program?

Proposed Timeline for Pilot Program



Next Steps and Acknowledgements

- The Residential Contractor Working Group and survey respondents provided thoughtful feedback into the development of the straw proposal from May-November 2016. **DOER integrated these recommendations and feedback into short-term recommendations for Mass Save HES, and the development of a design proposal for a comprehensive alternative energy efficiency pilot program** intended to inform future energy efficiency plans.

- The **development of these recommendations would not have been possible without the contributions of the contractors and program administrators within the Working Group and the wider responses received through the survey.** DOER will continue to refine and roll-out the pilot program in the coming months.

APPENDIX

List of Working Group Members and Meeting Materials

Alissa Whiteman	Massachusetts DOER
Amy Vavak	National Grid
Courtney Moriarta	EEAC Consultant
Ellen Pfeiffer	National Grid
Ian Finlayson	Massachusetts DOER
Jonathan Goldberg	Rich May
Lawrence Masland	Massachusetts DOER
Manny Chaves	Chaves Heating and Air Conditioning, Inc.
Max Veggeberg	Home Works Energy
Mike Browne	Advanced Building Analysis
Paul Eldrenkamp	Byggmeister
Robert Calnan	Calnan Energy Systems
Tom Regh	Progressive Energy Services
Sean Jeffords	Beyond Green
William Stack	Eversource
David Heslam	Earth Advantage, Guest Speaker
Matt Golden	OpenEE Meter, Guest Speaker
Kimberly Crossman	National Grid, Guest Speaker

Glossary of Terms

- AMI meter: Advanced Metering Infrastructure (AMI) are systems of digital hardware and software that measure and collect time-based energy usage and enable two way communication between a consumer and utility, including information on time-of-use pricing and demand-response actions.
- CalTRACK EE Meter: A software that collects energy usage data using HP-XML and analyzes weather adjusted energy savings from home performance EE measures. CalTRACK was jointly developed by California Energy Commission, California Public Utilities Commission, and investor-owned utilities in an effort to enable pay-for-performance.
- HP- XML: Home Performance extensible mark-up language (XML) is a standard data transfer protocol used to communicate home performance related data between parties involved in the program, such as contractors, program administrators and utilities. It enables data sharing between these parties and allows energy savings to be tracked and verified.
- OpenEE Meter: Open Energy Efficiency Meter is an open source version of the CalTRACK software, which collects data using HP-XML to track actual energy usage and analyze weather adjusted energy savings and realization rates.